MASON TRANSIT AUTHORITY

Shelton, Washington

PROJECT MANUAL FOR:

MTA – Belfair Park and Ride Project

Prepared by:

SCJ ALLIANCE

CONSULTING SERVICES

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OWNER: Mason Transit Authority
790 East Johns Prairie Road
Shelton, WA 98584
Contact: Danette Brannin, General Manager
Phone: (360) 426-9434
Email: dbrannin@masontransit.org

CIVIL ENGINEER: SCJ Alliance
8730 Tallon Lane NE, Suite 200
Lacey, WA 98516
Contact: Patrick Holm, PE
Phone: (360) 352-1465
Email: patrick.holm@scjalliance.com

ARCHITECT: Architects Rasmussen Triebelhorn
909 S. 336th Street, Suite 107
Federal Way, WA 98003
Contact: Rhonda Gillogly, AIA
Phone: (253) 572-5511
Email: rgillogly@a-rt.org

LANDSCAPE ARCHITECT: SCJ Alliance
8730 Tallon Lane NE, Suite 200
Lacey, WA 98516
Contact: Mark Garff, PLA, ASLA
Phone: (360) 352-1465
Email: mark.garff@scjstudiola.com

MASON TRANSIT AUTHORITY
MTA – BELFAIR PARK AND RIDE PROJECT

DIVISION 00
PROCUREMENT AND CONTRACTING DOCUMENTS

INSTRUCTIONS **TO BIDDERS**

PART 0 — GENERAL CONDITIONS

0.01 EXPLANATION TO PROSPECTIVE BIDDERS

A. Any prospective bidder desiring an explanation or interpretation of the solicitation, drawings, specifications, etc., must submit a request to the Architect/Engineer (A/E) seven (7) calendar days before the bid due date. Oral explanations or instructions given before the award of a contract will not be binding. Any information given a prospective bidder concerning a solicitation will be furnished promptly to all other prospective bidders by addendum to the solicitation, if that information is necessary in submitting bids or if the lack of it would be prejudicial to other prospective bidders.

0.02 PREPARATION OF BIDS — CONSTRUCTION

A. Bids must be: (1) submitted on the bid proposal forms, or copies of forms, furnished by the Owner or the Owner's agent, and (2) signed in ink. The person signing a bid must initial each change appearing on any bid form. If the bid is made by a corporation, it shall be signed by the corporation's authorized designee. The address of the bidder shall be typed or printed on the bid form in the space provided.

B. The bid form may require bidders to submit bid prices for one or more items on various bases, including: (1) lump sum base bid; (2) lump sum bid alternate prices; (3) unit prices; or (4) any combination of items 1 through 3 above.

C. If the solicitation includes alternate bid items, failure to bid on the alternates may disqualify the bid. If bidding on all items is not required, bidders should insert the words "no bid" in the space provided for any item on which no price is submitted.

D. Substitute bid proposals will not be considered unless this solicitation authorizes their submission.

0.03 BID GUARANTEE

A. When the sum of the base bid plus all additive bid alternates is $35,000.00 or less, bid security is not required.

When the sum of the base bid plus all additive alternates is greater than $35,000.00, a bid guarantee in the amount of 5% of the base bid amount is required. Failure of the bidder to provide bid guarantee when required shall render the bid non-responsive.

B. Acceptable forms of bid guarantee are: A bid bond or postal money order, or certified check or cashier's check made payable to the Washington State Treasurer.

The Owner will return bid guarantees (other than bid bond) to unsuccessful bidders as soon as practicable, but not sooner than the execution of a contract with the successful bidder. The successful bidder's bid guarantee will be returned to the successful bidder with its official notice to proceed with the work of the contract.

C. The bidder will allow 60 days from bid opening date for acceptance of its bid by the Owner.

The bidder will return to the Owner a signed contract, insurance certificate and bond or bond waiver within 15 days after receipt of the contract. If the apparent successful bidder fails to sign all contractual documents or provide the bond and insurance as required or return the documents within 15 days after receipt of the contract, the Owner may terminate the award of the contract.

D. In the event a bidder discovers an error in its bid following the bid opening, the bidder may request to withdraw its bid under the following conditions:

1. Written notification is received by the Owner within 24 hours following bid opening.
2. The bidder provides written documentation of the claimed error to the satisfaction of the Owner within 72 hours following the bid opening.

The Owner will approve or disapprove the request for withdrawal of the bid in writing. If the bidder's request for withdrawal of its bid is approved, the bidder will be released from further obligation to the Owner without penalty. If it is disapproved, the Owner may retain the bidder's bid guarantee.

0.04 ADDITIVE OR DEDUCTIVE BID ITEMS

The low bidder, for purposes of award, shall be the responsive bidder offering the low aggregate amount for the base bid item, plus additive or deductive bid alternates selected by the Owner, and within funds available for the project where requested.

The bidder agrees to hold all bid alternate prices for sixty (60) days from date of bid opening.

0.05 ACKNOWLEDGEMENT OF ADDENDA

Bidders shall acknowledge receipt of all addenda to this solicitation by identifying the addenda numbers in the space provided for this purpose on the bid proposal form. Failure to do so may result in the bid being declared non-responsive.

0.06 SITE INVESTIGATION AND CONDITIONS AFFECTING THE WORK

The bidder acknowledges that it has taken steps necessary to ascertain the nature and location of the work, and that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including but not limited to (1) conditions bearing upon transportation, disposal, handling, and storage of materials; (2) the availability of labor, water, electric power, and road; (3) uncertainties of weather, river stages, tides, or similar physical conditions at the site; (4) the conformation and conditions of the ground; and (5) the character of equipment and facilities needed preliminary to and during the work. The bidder also acknowledges that it has satisfied itself as to character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including exploratory work done by the Owner, as well as from the drawings and specifications made a part of this contract. Any failure of the bidder to take the actions described and acknowledged in this paragraph will not relieve the bidder from responsibility for estimating properly the difficulty and cost of successfully performing the work.

0.07 BID AMOUNTS

A. The bid prices shown for each item on the bid proposal shall include all labor, material, equipment, overhead and compensation to complete all of the work for that item.

B. The actual cost of building permit (only) and the public utility hookup fees will be a direct reimbursement to the Contractor or paid directly to the permitting agency by the Owner. Fees for these permits should not be included by the Bidder in the bid amount.

C. The Bidder agrees to hold the base bid prices for sixty (60) days from date of bid opening.

0.08 TAXES

The bid amounts shall include Washington State Sales Tax (WSST) in each Schedule lump sum. All other taxes imposed by law shall be included in the bid amount. The Contractor shall pay the WSST to the Department of Revenue and shall furnish proof of payment to the Owner if requested.

0.09 SUBMISSION OF BIDS

A. Bid Proposals must be submitted on or before the time specified in the Advertisement for Bids.

B. If the base bid and the sum of the additive alternates is one million dollars or more, the Bid Proposal shall comply with the following requirements:

1. Pursuant to RCW 39.30.060, if the base bid and the sum of the additive alternates is one million dollars or more, the Bidder shall provide names of the Subcontractors with whom the Bidder will subcontract for performance of heating, ventilation and air conditioning (HVAC), plumbing, and electrical.
2. The Bidder can name itself for the performance of the work.
3. The Bidder shall not list more than one Subcontractor for each category of work identified UNLESS Subcontractors vary with bid alternates, in which case the Bidder must indicate which Subcontractor will be used for which alternate.
4. Failure of the Bidder to submit as part of the bid the NAMES of such Subcontractors or to name itself to perform such work shall render the Bidder's bid nonresponsive and, therefore, void.

C. The Bid Proposal shall be submitted in a sealed envelope addressed to the office specified in the Advertisement for Bids. The envelope shall have printed on the outside:

1. The project number and description.
2. The name and address of the bidder.
3. Identification as Bid Proposal.

D. Prior to the bid opening, the Owner's representative will designate the official bid clock. Any part of the bid proposal or bid modification not received prior to the times specified, per the designated bid clock, will not be considered and the bid will be returned to the bidder unopened.

E. A bid may be withdrawn in person by a bidder's authorized representative before the opening of the bids. Bidder(s) representative will be required to show ID and sign on bid summary sheet before it will be released.

F. People with disabilities who wish to request special accommodation, (e.g., sign language interpreters, Braille, etc.) need to contact the Owner ten (10) working days prior to the scheduled bid opening.

0.10 BID RESULTS

After the Bid Opening, Bidders may obtain bid results by calling (360) 426-9434.

0.11 LOW RESPONSIBLE BIDDER

A. **Mandatory Responsibility Criteria:** Before award of a public works contract, a bidder must meet the following mandatory responsibility criteria under RCW 39.04.350 (1) to be

considered a responsible bidder and qualified to be awarded a public works project. The bidder must:

1. At the time of bid submittal, have a certificate of registration in compliance with chapter 18.27 RCW;
2. Have a current state unified business identifier number;
3. If applicable, have industrial insurance coverage for the bidder's employees working in Washington as required in Title 51 RCW; an employment security department number as required in Title 50 RCW; and a state excise tax registration number as required in Title 82 RCW;
4. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3); and
5. Until December 31, 2013, not have violated the "Off-site Prefabrication" reporting requirement more than one time as determined by the Department of Labor and Industries.
6. Have received training on the requirements related to public works and prevailing wage under this chapter and chapter 39.12 RCW.

0.12 CONTRACT AWARD

A. The Owner will evaluate bids responsiveness and responsibility.

1. A bid will be considered responsive if it meets the following requirements:
   a) It is received at the proper time and place.
   b) It meets the stated requirements of the bid proposal.
   c) It is submitted by a licensed/registered contractor within the state of Washington at the time of bid opening and is not banned from bidding by the Department of Labor and Industries.
   d) It is accompanied by a bid guarantee, if required.
2. A bid will be considered responsible if it meets the following requirements:
   a) It meets the mandatory responsibility criteria established in RCW 39.04.350 and an overall accounting of the supplemental responsibility criteria established for the project.

B. The Owner reserves the right to accept or reject any or all bid proposals and to waive informalities.

C. The Owner may negotiate bid price adjustments with the low responsive bidder, including changes in the contract documents, to bring the bid within the available funding per RCW 39.04.015.

D. The apparent low bidder, for purpose of award, shall be the responsive and responsible bidder offering the low aggregate amount for the base bid plus selected additive or deductive bid alternates and meeting all other bid submittal requirements.

E. The Contract will only become effective when signed by the Owner. Prior to the Owner's signature, any and all costs incurred shall be the sole responsibility of the bidder.

0.13 DOCUMENTS (ATTACHED)

A. Advertisement for Bids
B. Bid Form/Schedule of Values
C. Debarment, Suspension, Ineligibility or Voluntary Exclusion Certification Form
D. Performance Bond
E. Washington State Prevailing Wage Rates Link
F. Bid Checklist

Note: A Bid Bond is required. This form will not be provided by the Owner.

Mason Transit Authority
Advertisement to Bid
MTA – Belfair Park and Ride Project

Mason Transit Authority (MTA), located in Shelton, Washington, requests Project Proposal SEALED BIDS for construction of the:

MASON TRANSIT AUTHORITY
MTA – Belfair Park and Ride Project

The improvement(s) for which Project Proposals will be received is described below:

Construction of a Park and Ride near the intersection of Log Yard Road and State Route 3 in Belfair which will include pavement, transit building, bus canopy, sidewalk, ADA facilities, stormwater facilities, septic system, illumination, signing, striping, and other work, all in accordance with the attached Contract Plans, these Contract Provisions, and the Standard Specifications.

The transit building will include a new 3,000 square foot single story wood framed structure constructed on concrete slab, with new single slope single ply roofing construction. Exterior walls are a combination of wood siding and metal siding with anodized aluminum windows and doors. Interior are wood framed walls with gypsum and some ceramic tile with minimal interior finishes. Additional work includes hollow metal doors, frames and wood doors. Work includes full fire suppression system, mechanical, electrical, and plumbing systems.

The bus canopy will include a single story steel framed canopy with metal roofing. The canopy is open below the roof for the pass through of buses. Steel shall be painted. Work includes sheet metal gutters, downspouts and trim, electrical, and fire suppression system.

Bid Documents, including Plans and Special Provisions, may be obtained through Builders Exchange of Washington (http://www.bxwa.com) or MTA's Website (http://www.masontransit.org). Inquiries regarding the Project may be directed by contacting Patrick Holm at SCJ Alliance (360-352-1465 or patrick.holm@scjalliance.com).

Project Proposal SEALED BIDS must be received at the Mason Transit Authority Business Office reception desk located at 790 East Johns Prairie Road, Shelton, WA 98584 by 11:00a.m. on March 13, 2020 and MTA then and there will open and publicly read the bids. Bids may be submitted by mail or hand delivery only.

A pre-bid walkthrough is planned for March 3rd at 11:00a.m. at the future park and ride site near the intersection of Log Yard Road and SR-3 north of Belfair, WA. The site is an active construction site and hard hats and vests are required.

Mason Transit Authority reserves the right to reject any and all bids without cause and to waive any informalities or irregularities. MTA reserves the right to award this Contract to the lowest responsive, responsible bidder based on the Bid Proposal.

ADVERTISED IN: Mason Transit Authority Website www.masontransit.org
Builders Exchange of Washington
Seattle Daily Journal of Commerce
Shelton Journal

BID FORM/SCHEDULE OF VALUES

As part of the overall Base Bid the Bidder shall assign lump costs (including all taxes) to the line items listed in the following Schedule of Values. At the end of each month of construction the Contractor will submit an estimated percentage complete for the budget of each line item shown in the Schedule of Values. The Contracting Agency will then review and confirm if the Contractor percentage complete listed on the schedule corresponds to the actual work performed, including materials on hand.

The Owner reserves the right to accept or reject any or all bid prices within sixty (60) days of the bid date.

1. Mobilization (includes any incidentals/bond/etc.) _____
2. Erosion Control _____
3. Clearing & Grubbing _____
4. Grading _____
5. Stormwater Management Systems _____
6. Surfacing _____
7. Paving _____
8. Transit Building _____
9. Bus Canopy _____
10. Illumination System _____
11. Water system _____
12. Septic System _____
13. Pavement Markings _____
14. Permanent Signing _____
15. Traffic Control _____
16. Surveying _____
17. Clean-Up _____

Total Base Bid _____

Trench Excavation Safety Provisions _____
(Included also in Base Bid)

If the bid amount contains any work which requires trenching exceeding a depth of four feet, all costs for trench safety shall be included in the Base Bid and indicated above for adequate trench safety systems in compliance with Chapter 39.04 RCW. 49.17 RCW and WAC 296-155-650. Bidder must include a lump sum dollar amount in blank above (even if the value is $0.00) to be responsive.

The Owner reserves the right to accept or reject any or all bid prices within sixty (60) days of the bid date.

Time for Completion:

The undersigned hereby agrees to complete all the work under the Base Bid (and accepted alternates) within 260 working days after the date of Notice to Proceed.

Liquidated Damages:

The undersigned agrees to pay the Owner as liquidated damages the sum of $350 for each consecutive calendar day that is in default after the Contract Time. Liquidated damages shall be deducted from the contract by change order.

Receipt of Addenda

Receipt of the following addenda is acknowledged:

Addendum No._____	Addendum No. _____
Addendum No._____	Addendum No. _____
Addendum No._____	Addendum No. _____

Name of Firm _____

NOTE: *If bidder is a corporation, write State of Incorporation; if a partnership, give full names and addresses of all parties below.*

Signed by_____, Official Capacity _____

Print Name _____

Address_____

City_____State_____Zip Code _____

Date_____Telephone_____FAX_____

State of Washington Contractor's License No. _____

Federal Tax ID #_____e-mail address: _____

Employment Security Department No. _____

Debarment, Suspension, Ineligibility or Voluntary Exclusion Certification Form

NAME	Doing business as (DBA)	
ADDRESS	WA Uniform Business Identifier (UBI)	Federal Employer Tax Identification #:
This certification is submitted as part of a request to contract.		

This certification is required by regulations implementing Executive Order 12549, Debarment and Suspension. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.

BEFORE COMPLETING CERTIFICATION, READ INSTRUCTIONS ON REVERSE

(1) The prospective lower tier participant certifies, by submission of this proposal or contract, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this form.

Organization Name | Project Name

Name(s) and Title(s) of Authorized Representative(s)

Signature(s) | Date

Instructions For Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion Lower Tier Covered Transactions

READ CAREFULLY BEFORE SIGNING THE CERTIFICATION. Federal regulations require contractors and bidders to sign and abide by the terms of this certification, without modification, in order to participate in certain transactions directly or indirectly involving federal funds.

1. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.
2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.
3. The prospective lower tier participant shall provide immediate written notice to the department, institution or office to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or had become erroneous by reason of changed circumstances.
4. The terms covered transaction, debarred, suspended, ineligible, lower tier covered transaction, participant, person, primary covered transaction, principal, proposal, and voluntarily excluded, as used in this clause, have the meaning set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.
5. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is proposed for debarment under the applicable CFR, debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.
6. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled ``Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction,'' without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not proposed for debarment under applicable CFR, debarred, suspended, ineligible, or voluntarily excluded from covered transactions, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the List of Parties Excluded from Federal Procurement and Non-procurement Programs.
8. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business activity.
9. Except for transactions authorized under paragraph 5 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is proposed for debarment under applicable CFR, suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

Contract Bond –
Site Construction

KNOW ALL MEN BY THESE PRESENTS, That

of _____, as Principal, and _____ as Surety, are jointly and severally held and bound unto Mason Transit Authority, in the penal sum of _____ Dollars ($_____), the payment of which we jointly and severally bind ourselves, our heirs, executors, administrators, and assigns, and successors and assigns, firmly by these presents.

The CONDITION of this bond is such that WHEREAS on the _____ day of _____ A.D., _____, the said _____, Principal, herein, executed a certain contract with Mason Transit Authority, by the terms, conditions and provisions of which contract the said _____, Principal, herein, agree to furnish all material and do certain work, to wit: That will undertake and complete the construction of:

Construction of a Park and Ride near the intersection of Log Yard Road and State Route 3 in Belfair which will include pavement, transit building, bus canopy, sidewalk, ADA facilities, stormwater facilities, septic system, illumination, signing, striping, and other work, all in accordance with the attached Contract Plans, these Contract Provisions, and the Standard Specifications.

The transit building will include a new 3,000 square foot single story wood framed structure constructed on concrete slab, with new single slope single ply roofing construction. Exterior walls are a combination of wood siding and metal siding with anodized aluminum windows and doors. Interior are wood framed walls with gypsum and some ceramic tile with minimal interior finishes. Additional work includes hollow metal doors, frames and wood doors. Work includes full fire suppression system, mechanical, electrical, and plumbing systems.

The bus canopy will include a single story steel framed canopy with metal roofing. The canopy is open below the roof for the pass through of buses. Steel shall be painted. Work includes sheet metal gutters, downspouts and trim, electrical, and fire suppression system.

according to the maps, plans and specifications made a part of said contract, which contract as to executed, is hereunto attached, is now referred to and by reference is incorporated herein and made a part hereof as fully for all purposes as if here set forth at length. This bond shall cover all approved change orders as if they were in the original contract.

NOW THEREFORE, if the Principal herein shall faithfully and truly observe and comply with the terms, conditions, and provisions of said contract in all respects and shall well and truly and fully do and perform all matters and things by them undertaken to be performed under said contract, upon the terms proposed therein, and within the time prescribed therein, and until the same is accepted, and shall pay all laborers, mechanics, subcontractors, and material men, and all persons who shall supply such contractor or subcontractor with provisions and supplies for the carrying on of such work, and shall in all respects, faithfully perform said contract according to law, then this obligation to be void, otherwise to remain in full force and effect.

WITNESS our hands this _____ day of _____, _____

_____

_____

_____

(Principal)

_____

_____

_____

(Attorney-in-fact, Surety)

_____

Name and Address Local Office of Agent

APPROVED:

Mason Transit Authority

General Manager

By: _____

Date: _____

Surety Bond No.

Project

State of Washington Department of Labor & Industries

Washington State Prevailing Wage

Contractor to pay Prevailing Wages: Contractor shall pay the prevailing rate of wages to all workers, laborers, or mechanics employed in the performance of any part of the Work in accordance with RCW 39.12 and the rules and regulations of the Department of Labor and Industries. The schedule of prevailing wage rates for the locality or localities of the Work, is determined by the Industrial Statistician of the Department of Labor and Industries. It is the Contractor's responsibility to verify the applicable prevailing wage rate.

Phone Number:	Prevailing Wage Section - Telephone 360-902-5226, 1-800-647-0982
Mailing Address:	Department of Labor and Industries PO Box 44000, Olympia, WA 98504-4000
Web Site:	https://fortress.wa.gov/lni/wagelookup/prvWagelookup.aspx

AGREEMENT BETWEEN
OWNER AND CONTRACTOR

The Effective Date of this Contract is:	
The Parties to this Contract are:	
The "Owner"	Mason Transit Authority
The "Contractor"	
Project Name:	
The "Architect" or "Engineer:"	
The "Work:"	See "Scope of Work," Exhibit ___
Alternates included in the Contract Sum:	
Contract Sum for the Work: *(not including sales tax)*	$ _____
Payments: *(check one)*	□ The Owner will make a single payment to the Contractor within thirty (30) days of Final Acceptance. □ See Supplemental Conditions
Date of Substantial Completion of the Work:	
Date of Final Completion of the Work:	_____ days after Substantial Completion
Liquidated Damages:	$___ per day for each calendar day beyond the Contract Time that Substantial Completion is not achieved.
Owner's Permit Responsibilities:	
Unit Prices:	
Minimum Required Insurance:	
Commercial General Liability:	At least $1 million per occurrence and general aggregate.
Automobile Liability:	At least $1 million
Workers' Compensation (industrial insurance):	At least the State statutory amount
Employer's Liability:	At least $1 million
Aircraft Liability:	At least $5 million
Watercraft Liability:	At least $1 million
Property Insurance:	Full insurable value
Boiler and Machinery Insurance:	
Additional Insureds:	Mason Transit Authority

The Owner and Contractor agree as set forth below.

ARTICLE 1: THE WORK. The Contractor shall fully execute and complete the entire Work described in the Contract Documents, including the Alternates listed above.

ARTICLE 2: COMMENCEMENT AND SUBSTANTIAL AND FINAL COMPLETION.

2.1 The date of commencement of the Work is the date of this Agreement. The Contract Time is measured from the date of commencement to the date of Substantial Completion specified above, as it may be adjusted under the Contract Documents.

2.2 The Contractor shall achieve Substantial Completion and Final Completion of the entire Work within the dates specified above, subject to adjustments of the Contract Time as provided in the Contract Documents.

ARTICLE 3: THE CONTRACT SUM. The Owner shall pay the Contractor the Contract Sum for the Contractor's performance of this Contract, subject to additions and deductions as provided in the Contract Documents. Sales tax is not included in the Contract Sum.

ARTICLE 4: PAYMENT. The Owner will pay the Contractor within *thirty (30) days* of receipt of an approved Application for Payment in accordance with this Contract. Retainage will be released in accordance with statutory requirements.

ARTICLE 5: PERMITS AND FEES.

5.1 The Owner will secure and pay for only those governmental permits, approvals, fees, licenses, inspections, governmental charges and inspection fees listed on the cover page.

5.2 The Contractor shall secure and pay for all other governmental permits, approvals, fees, licenses, inspections, governmental charges and inspection fees required for the prosecution of the Work.

ARTICLE 6: ENUMERATION OF CONTRACT DOCUMENTS.

6.1 The Contract Documents form this Contract. This Contract represents the entire and integrated agreement between the parties and supersedes prior negotiations, representations or agreements, either written or oral. The Contract Documents shall not be construed to create a contractual relationship of any kind between the Owner and a Subcontractor of any tier, between any Architect and the Contractor, or between any persons or entities other than the Owner and the Contractor.

6.2 The Contract Documents are enumerated as follows and, in the event of a conflict or discrepancy among or in the Contract Documents, interpretation shall be governed in the following order of priority:

1. Agreement
2. Supplemental Conditions
3. Prevailing wage rates set by L&I as of the bid date for Mason County (available at http://www.lni.wa.gov/TradesLicensing/PrevWage/WageRates/default.asp)
4. General Conditions
5. Scope of Work (See Exhibit __)
6. Drawings and Specifications (See Exhibit __)
7. Site Conditions and Coordination
8. Requirements of Grant Funding

OWNER

By _____
(Signature)

_____
(Printed name and title)

CONTRACTOR

By _____
(Signature)

_____
(Printed name and title)

GENERAL CONDITIONS

ARTICLE 7
THE CONTRACT DOCUMENTS

7.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contractor's performance shall be consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended results.

7.2 "Work" means the construction and services required by the Contract Documents and includes all labor, materials, equipment and services to be provided by the Contractor to fulfill its obligations.

7.3 If the Contractor finds a conflict, error or discrepancy in the Contract Documents, the Contractor shall report it to the Owner in writing at once. The Contractor shall not proceed with the affected Work until it receives a written interpretation or clarification from the Owner.

ARTICLE 8
ADMINISTRATION OF THE CONTRACT

8.1 The Owner will provide administration of the Contract. If an Architect or Engineer is also involved, its duties beyond those addressed in these General Conditions will be described in an attachment to this Contract.

8.2 **Authority.** The Owner must approve in writing all changes in the Contract Sum or Contract Time as well as all Change Orders, Construction Change Directives, and payments to the Contractor. The Owner will make any modification or release of any requirement of the Contract Documents, or any approval or acceptance of any portion of the Work, whether or not executed in accordance with the Contract Documents, exclusively in writing.

8.3 **Rejection of Work.** The Owner may reject Work that, in its opinion, does not conform to the Contract Documents. If the Contractor fails to correct Work that is not in accordance with the Contract Documents or fails to carry out the Work in accordance with the Contract Documents, the Owner may order the Contractor in writing to stop the Work, or any portion thereof, until the cause for that order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right.

8.4 **Site Access.** The Owner shall have access to and may visit the Work site at intervals it considers appropriate to the stage of the Work to become generally familiar with the progress and quality of the completed Work, but the Owner will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work.

8.5 **Submittals.** The Contractor shall review, approve and submit to the Owner with reasonable promptness shop drawings, product data, samples and similar submittals required by the Contract Documents. The Owner will review and approve or take other appropriate action upon the Contractor's submittals for the limited purpose of checking for conformance with information given and the design concept expressed by the Contract Documents. The Work shall be in accordance with approved submittals. The Owner's review and approval does not relieve the Contractor of responsibility for compliance with the Contract Documents. The Contractor shall submit to the Owner any proposed change to or deviation from previously approved documents or submittals.

ARTICLE 9
THE CONTRACTOR

9.1 Using its best skill and attention, the Contractor shall perform, supervise and direct the Work. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, procedures and personnel, for safety, and for coordinating all portions of the Work under this Contract. The Contractor shall provide and pay for all labor, materials, equipment, tools and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

9.2 **Subcontractors.** A "Subcontractor" is a person or entity that has a direct contract with the Contractor to perform a portion of the Work at the site or to supply materials or equipment. A "Subcontractor of any tier" includes Subcontractors and lower-level subcontractors and suppliers.

9.2.1 Identification. As soon as practicable and no later than *fourteen (14) days* after award of this Contract, the Contractor shall confirm to the Owner in writing the names of the Subcontractors for each portion of the Work.

9.2.2 Subcontracts. Contracts between the Contractor and Subcontractors shall require each Subcontractor to be bound to the Contractor by the terms of the Contract Documents for the Work to be performed by the Subcontractor and to assume toward the Contractor all the obligations and responsibilities that the Contractor, by the Contract Documents, assumes toward the Owner.

9.2.3 Payment. The Contractor shall promptly pay (and secure the discharge of any liens asserted by) all persons properly furnishing labor, equipment, materials or other items in connection with the performance of the Work for which the Owner has paid (including, but not limited to, workers and Subcontractors). The Contractor shall furnish to the Owner releases of liens and claims and other documents that the Owner requests from time to time to evidence such payment (and discharge). Nothing in the Contract Documents shall obligate the Owner to pay or to cause the payment of any moneys due to any Subcontractor of any tier or other person or entity, except as may otherwise be required by law or regulation.

9.3 Workers. The Contractor shall enforce strict discipline and good order among persons carrying out the Work and shall not permit employment of unfit persons or persons not skilled in tasks assigned to them. At no change to the Contract Sum or Contract Time, the Owner may provide written notice requiring the Contractor to remove from the Work any employee or other person carrying out the Work that the Owner considers objectionable.

9.4 Warranty. The Contractor warrants that materials and equipment furnished under this Contract will be of good quality and new, that the Work will be performed in a workmanlike manner, free from defects not inherent in the quality required, and that the Work will conform with the requirements of the Contract Documents.

9.5 Progress Schedule. Within *fourteen (14) days* of execution of this Contract, the Contractor shall submit a schedule of the Work to the Owner ("Progress Schedule"). The Contractor will be responsible for planning, scheduling, managing, and reporting the progress of the Work in accordance with all of the specific methods and submittals described in the Contract Documents. The Contractor shall use the Progress Schedule (as updated) to plan, coordinate, and prosecute the Work in an orderly and expeditious manner.

9.6 Clean-Up. The Contractor shall keep the site and surrounding area free from accumulation of waste materials caused by operations under the Contract.

9.7 Indemnification.

9.7.1 Subject to the following conditions and to the fullest extent permitted by law, the Contractor shall defend, indemnify and hold harmless the Owner and its agents, employees, consultants, successors and assigns (together, the "Indemnified Parties") from and against all claims, damages, losses and expenses, direct and indirect, or consequential, including but not limited to costs, attorneys' fees, and other litigation expenses incurred on such claims and in proving the right to indemnification, arising out of or resulting from the performance of the Work by or any act or omission of the Contractor, its agents, any Subcontractor of any tier, and anyone directly or indirectly employed by them (together, the "Indemnitor").

.1 The Contractor will fully indemnify and defend the Indemnified Parties for the sole negligence of the Indemnitor.

.2 The Contractor will indemnify and defend the Indemnified Parties for the concurrent negligence of the Indemnitor only to the extent of the Indemnitor's negligence. The Contractor agrees to being added by the Owner as a party to any mediation, arbitration or litigation with third parties in which the Owner alleges indemnification or contribution from the Indemnitor. The Contractor agrees that all of its Subcontractors of any tier will similarly stipulate in their subcontracts. To the extent a court or arbitrator strikes any portion of this indemnification provision for any reason, all remaining provisions shall retain their vitality and effect.

9.7.2 After mutual negotiation of the parties, the indemnification obligation shall not be limited by the amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts in claims by an employee of the Contractor or a Subcontractor of any tier against any person or entity indemnified under this Paragraph 9.7. For the sole purpose of effecting the indemnification obligations under this Contract and not for the benefit of any third parties unrelated to the Owner, the Contractor specifically and expressly waives any immunity that may be granted it under Title 51 RCW, "Industrial Insurance." IF THE CONTRACTOR DOES NOT AGREE WITH THIS WAIVER, IT MUST PROVIDE A WRITTEN NOTICE TO THE OWNER PRIOR TO THE DATE FOR THE RECEIPT OF BIDS, OR THE CONTRACTOR WILL BE DEEMED TO HAVE NEGOTIATED AND WAIVED THIS IMMUNITY.

9.8 Records. The Contractor shall maintain and preserve books, ledgers, records, estimates, correspondence, logs, schedules, electronic data and other documents relating or pertaining to the costs and/or performance of the Contract ("records"). Within *seven (7) days* of the Owner's request, the Contractor shall make available at the Contractor's office all records for inspection, audit and reproduction (including electronic reproduction) by the Owner's representatives. These requirements apply to each Subcontractor of any tier. The Contractor agrees, on behalf of itself and Subcontractors of any tier, that the invocation of any rights under RCW 42.56 shall initiate an equivalent right to disclosures from the Contractor and Subcontractors of any tier for the benefit of the Owner.

9.9 Compliance with Law. The Contractor, its employees, Subcontractors of any tier and representatives, shall comply with all applicable laws, ordinances, statutes, rules and regulations, federal and state, county and municipal.

9.9.1 Prevailing Wages. The Contractor shall comply with all applicable provisions of RCW 39.12, including but not limited to submission of approved "Statements of Intent to Pay Prevailing Wage," payment of all Labor & Industries' fees, submission and posting of approved "Statements of Intent to Pay Prevailing Wages" and payment of prevailing wages. The State of Washington prevailing wage rates applicable for this public works project, which is located in Mason County, may be found at the following website

address of the L&I: http://www.lni.wa.gov/TradesLicensing/PrevWage/WageRates/default.asp. The Contractor shall keep a paper copy at the Project site.

9.9.2 Hours of Labor. The Contractor shall comply with all applicable provisions of RCW 49.28.

9.9.3 Worker's Right to Know. The Contractor shall comply with RCW 49.70 and WAC 296-62-054 regarding workplace surveys and material safety data sheets for "hazardous" chemicals at the Project site.

ARTICLE 10
CONSTRUCTION BY THE OWNER OR BY SEPARATE CONTRACTORS

10.1 The Owner may perform construction or operations related to the Project with its own forces and may award separate contracts in connection with other portions of the Project or other construction or operations on the site under contractual conditions consistent with those of the Contract Documents.

10.2 The Contractor shall afford the Owner and separate contractors reasonable opportunity for the introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations.

ARTICLE 11
CHANGES IN THE WORK

11.1 The Owner, without invalidating this Contract, may order changes in the Work consisting of additions, deletions or modifications ("Changes"), and the Contract Sum and Contract Time will be adjusted accordingly. Changes in the Work, in the Contract Sum and/or in the Contract Time shall be authorized only by written Change Order signed by the Owner and the Contractor or by written Construction Change Directive signed by the Owner.

11.1.1 Change Orders. A Change Order is a written instrument signed by the Owner and the Contractor stating their agreement upon a change in the Work, the amount of any adjustment in the Contract Sum, and the extent of any adjustment in the Contract Time.

11.1.2 Construction Change Directives. A Construction Change Directive is a written order prepared and signed by the Owner that directs a change in the Work and states a proposed basis for any adjustment in the Contract Sum and/or Contract Time. It is used in the absence of total agreement on the terms of a Change Order. The Contractor shall promptly proceed with the change in the Work described in the Construction Change Directive. As soon as possible, and within *seven (7) days* of receipt, the Contractor shall advise the Owner in writing of the Contractor's agreement or disagreement with the cost or the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

11.2 Costs of Changes and Claims. If the parties cannot agree on the cost or credit to the Owner from a Construction Change Directive or other Change in the Work, the Contractor and all affected Subcontractors of any tier shall keep and present an itemized accounting with supporting data. The total cost of any Change or Claim shall be limited to the reasonable value of the direct labor costs, material costs, construction equipment usage costs for the actual time equipment appropriate for the Work is used solely on the Change in the Work, the cost of any change in insurance, Subcontractor costs, and a fee for all combined overhead and profit, including impact costs of any kind, limited to twelve percent (12%) of the cost for any materials or work performed by the forces of the Contractor or a Subcontractor and eight percent (8%) of amounts due to Subcontractors.

11.3 Claims for Concealed or Unknown Conditions. If conditions are encountered at the site that are (1) concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found and generally recognized as inherent in activities of the character provided for in the Contract Documents, then the Contractor shall give written notice to the Owner promptly before conditions are disturbed and in no event later than *seven (7) days* after the first observance of the conditions. The Contractor shall make any Claim arising from such condition in accordance with the dispute resolution procedures of Article 19.

ARTICLE 12
TIME

12.1 Delay.

12.1.1 Time. If the Work is delayed by changes ordered in the Work, unanticipated general labor disputes, fire, unusual delay in deliveries, abnormal adverse weather conditions not reasonably anticipatable, unavoidable casualties or any other causes beyond the Contractor's control, then the Contract Time shall be extended by Change Order to the extent the critical path is affected.

12.1.2 Damages. The Contractor and Sub-contractors shall be entitled to damages for delay only where the Owner's actions or inactions were the actual, substantial cause of the delay and where the Contractor could not have reasonably avoided the delay by the exercise of due diligence.

12.1.3 Contractor Delay. If a delay was caused by the Contractor, a Subcontractor of any tier, or anyone acting on behalf of any of them, the Contractor is not entitled to an increase in the Contract Time or in the Contract Sum.

12.2 Completion and Liquidated Damages. The timely completion of the Project is essential to the Owner. The Owner will incur serious and substantial damages if Substantial Completion of the Work does not occur within the Contract Time. The Contractor is responsible for actual damages for delay unless an amount is inserted on the cover page for liquidated damages, in which case the liquidated damage amount shall apply. Liquidated damages shall not be affected by partial completion, occupancy, or beneficial occupancy.

ARTICLE 13
PAYMENTS AND COMPLETION

13.1 Payments. Payment shall be made as provided in this Contract, including any Supplemental Conditions.

13.2 Withheld Payment. The Owner may withhold payment in whole or in part, or it may nullify the whole or part of a payment previously issued, on account of (1) defective Work not remedied, (2) claims or liens filed by third parties, (3) failure of the Contractor to make payments due to Subcontractors or for labor, materials or equipment, (4) damage to the Owner or another contractor, (5) reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum, (6) reasonable evidence that the unpaid balance would not be adequate to cover actual or liquidated damages for delay for which the Contractor is responsible, (7) failure to carry out the Work in accordance with the Contract Documents, or (8) liquidated damages. The Owner will provide the Contractor with written notice of its intent to implement this provision and provide details supporting the Owner's intention. The Contractor will be afforded reasonable time following receipt of such notice to respond to or correct the circumstances provoking this action by the Owner.

13.3 Substantial Completion.

13.3.1 Substantial Completion is the stage in the progress of the Work when the construction is sufficiently complete, in accordance with the Contract Documents, so the Owner can fully utilize the Work (or a designated portion) for its intended use. All Work other than incidental corrective or punchlist work and final cleaning shall have been completed. The Work is not Substantially Complete if all systems and parts affected by the Work are not usable, any required occupancy or use permit has not been issued, or if utilities affected by the Work are not connected and operating normally. The fact that the Owner may use or occupy some or all of the Work does not indicate that the Work is Substantially Complete, nor does it toll or change any liquidated damages due the Owner.

13.3.2 When the Contractor believes that the Work has achieved Substantial Completion, it shall notify the Owner in writing. When the Owner agrees, it will issue a Certificate of Substantial Completion.

13.3.3 Immediately before any occupancy, the Owner will schedule an inspection tour of the area to be occupied. Representatives of the Owner and the Contractor will jointly tour the area and record items still remaining to be finished and/or corrected. The Contractor shall promptly supply and install any such items as well as items missed by the inspection but required or necessary for Final Completion as a part of the Contract Sum.

13.4 Final Completion. After the Contractor has notified the Owner that the Work has been concluded, and the Contractor has submitted the items listed below as may be required at the discretion of the Owner, the Owner will determine in writing that Final Completion has occurred.

.1 A final Application for Payment.

.2 An affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or its property might in any way be responsible or encumbered, have been paid or otherwise satisfied.

.3 Consent of surety to final payment.

.4 A certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be cancelled or allowed to expire until at least thirty (30) days' prior written notice has been given to the Owner.

.5 A written statement that the Contractor knows of no substantial reason why the insurance will not be renewable to cover the period required by the Contract Documents.

.6 Other data establishing payment or satisfaction of or protection (satisfactory to the Owner) against all obligations, such as receipts, releases and waivers of liens and claims.

.7 Pursuant to RCW 39.12.040, an "Affidavit of Wages Paid" from the Contractor and from each Subcontractor certified by the Industrial Statistician of the Department of Labor and Industries, with the fees paid by the Contractor or Subcontractor.

.8 A certified statement that the Contractor has closed all necessary permits or otherwise met the requirements of all governing jurisdictions related to this Project.

.9 Pursuant to RCW 60.28.020, certificates from the Department of Revenue and the Department of Labor and Industries.

.10 Pursuant to RCW 50.24, a certificate from the Department of Employment Security.

.11 All deliverables required by the Contract Documents.

.12 A certification that the materials in the Work are "lead-free" and "asbestos free."

.13 A legible hard copy of the as-built drawings.

13.5 Final Acceptance and Final Payment.

13.5.1 Pursuant to RCW 60.28, completion of the contract Work shall occur after Final Completion has been achieved and the Owner has formally accepted the Project ("Final Acceptance"). Final Payment shall not become due until after Final Acceptance.

13.5.2 If any Subcontractor of any tier refuses to furnish a release or waiver required by the Owner, the Owner may retain an amount to defray the cost of foreclosing the liens of such claims and to pay attorneys' fees, the total of which shall be no less than one hundred fifty percent (150%) of the claimed amount. If any such lien remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all moneys that the latter may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

13.6 Waivers.

13.6.1 Final Payment by the Owner. The making of final payment constitutes a waiver of claims by the Owner except those arising from (1) liens, claims, security interests, or encumbrances arising out of the Contract and unsettled; (2) failure of the Work to comply with the requirements of the Contract Documents; (3) Work subsequently found to be substandard and/or deficient; or (4) terms of warranties required by the Contract Documents or law.

13.6.2 Final Payment to the Contractor. Acceptance of final payment by the Contractor constitutes a waiver of Claims except those previously made in writing and specifically identified as unsettled on the final Application for Payment.

13.6.3 Change Orders. The execution of a Change Order constitutes a waiver of Claims by the Contractor arising out of the Work to be performed or deleted pursuant to the Change Order, except as specifically described in the Change Order.

13.6.4 Reservation of Rights. If the Contractor adds to a Change Order, a Construction Change Directive, or any other document a reservation of rights that has not been initialed by the Owner, any amounts previously agreed shall be considered disputed and not yet payable unless the costs are re-negotiated or the reservation is withdrawn or changed in a manner satisfactory to and initialed by the Owner.

13.6.5 Failure to Exercise. The Owner's failure to exercise any of its rights under this Contract shall not constitute a waiver of any past, present or future right or remedy. Any waiver by the Owner of any right or remedy under this Contract must be in writing and shall apply only to the right or remedy specified.

13.7 Warranty of Title. The Contractor warrants and guarantees that title to the Work, materials and equipment covered by an Application for Payment, whether or not incorporated in the Project, will pass to the Owner no later than the time of payment, free and clear of liens.

ARTICLE 14
PROTECTION OF PERSONS AND PROPERTY

14.1 The Contractor shall be solely responsible, and the Owner shall not have responsibility, for all aspects of safety related to this Contract or the Work, including initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall take reasonable precautions for the safety of, and shall provide reasonable protection to prevent damage, injury or loss to, persons or property.

14.2 The Contractor shall promptly remedy to the Owner's satisfaction damage or loss to property at the site caused in whole or in part by the Contractor, a Subcontractor of any tier, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable, except for damage or loss attributable to acts or omissions of the Owner or by anyone for whose acts the Owner may be liable that are not attributable to the fault or negligence of the Contractor or a Subcontractor of any tier.

14.3 The Contractor shall not be required to perform without consent any Work relating to asbestos or polychlorinated biphenyl, unless identified as such in the Contract Documents.

ARTICLE 15
INSURANCE AND BONDS

15.1 The Contractor shall, at its own cost, purchase from a company or companies authorized to do business in the State of Washington possessing a Best's policyholder's rating of A- or better and a financial rating of no less than VII, and reasonably acceptable to the Owner, and maintain during the life of this Contract, at least the following insurance. The Contractor shall also cause its Subcontractors of any tier to secure and maintain at least the following insurance. The insurance shall be in force at the time the Work is commenced and shall remain in force until Substantial Completion, unless a later date is specified below.

15.1.1 Contractor's Liability Insurance. The Contractor shall purchase and maintain an occurrence-based Commercial General Liability Insurance Policy and such other insurance as will provide protection from claims set forth below which may arise out of or result from Contractor's operations under the Contract Documents, whether to be performed or furnished by Contractor, by any Subcontractor, by anyone directly or indirectly employed by any of them to perform or furnish any of the Work, or by anyone for whose acts any of them may be liable:

.1 Claims under workers' compensation, disability benefits and other similar employee benefit acts, as required by the laws of the state of Washington, including Contingent Employers Liability (Stop Gap) for all employees of the Contractor and Subcontractors;

.2 If there is an exposure for injury to Contractor's or subcontractors' employees under the United States Longshoremen's and Harbor Workers' Compensation Act, the Jones Act or under laws, regulations or statutes applicable to maritime employees, or any similar laws, regulations or statutes, coverage shall be included for such injuries or claims.

.3 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees and of any person other than the Contractor's employees;

.4 Claims for damages insured by personal injury liability coverage that are sustained (a) by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or (b) by any other person for any other reason.

.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom;

.6 Claims arising out of operation of laws or regulations for damages because of bodily injury or death of any person or for damage to property;

.7 Claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle, including coverage for Owned Motor Vehicles, Non Owned Motor Vehicles and Hired or Borrowed Motor Vehicles; and

.8 The comprehensive general liability insurance required by this paragraph must include contractual liability insurance applicable to Contractor's obligations under Paragraph 9.7.

15.1.2 Property Insurance. Unless otherwise provided in the Contract Documents, the Contractor shall purchase and maintain property insurance upon the Work at the site to the full insurable value thereof (subject to any deductible amounts that may be provided in the Contract Documents). This insurance shall include the interest in the Work of the Owner, Contractor, Subcontractors of any tier, any Architect and consultants, all of whom shall be listed as insureds or primary, non-contributing additional insured parties. Additional insured status shall be evidenced by internal policy provision or by separate external endorsement. This insurance shall insure against the perils of fire and extended coverage and shall include "all risk" insurance for physical loss and damage including, without duplication of coverage, theft, vandalism and malicious mischief, collapse, false work and water damage, temporary buildings and debris removal (including demolition occasioned by enforcement of any applicable legal requirements), and such other perils as may be provided in the Contract Documents, and shall include damages, losses and expenses arising out of or resulting from any insured loss or incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers, architects, attorneys and other professionals). If not covered under the "all risk" insurance or otherwise provided in the Contract Documents, the Contractor shall purchase and maintain similar property insurance on portions of the Work stored on and off the site or in transit when such portions of the Work are to be included in an Application for Payment. The Owner shall bear no responsibility for such portions of the Work or the consequences of their damage or loss.

15.1.3 Boiler and Machinery Insurance. The Contractor shall purchase and maintain such boiler and machinery insurance for applicable equipment utilized or contained in the Work, which will include the interests in the Work of the Owner, Contractor, Subcontractors, any Architect, and consultants, all of whom shall be listed as insured or additional insured parties.

15.1.4 Aircraft/Watercraft Insurance. If the performance of the Work requires the use of any aircraft that are owned, leased,

rented, or chartered by the Contractor or any of its Subcontractors, the Contractor shall secure and maintain Aircraft Liability Insurance for property damage and bodily injury, including passengers and crew. If the performance of the Work requires the use of any watercraft that are owned, leased, rented or chartered by the Contractor or any of its subcontractors, the Contractor shall secure and maintain Watercraft Liability insurance for property damage and bodily injury.

15.3 The Owner's specification or approval of insurance in this Contract or of its amount shall not relieve, limit or decrease the liability of the Contractor under the Contract Documents or otherwise. Coverages are the minimum to be provided and are not limitations of liability under the Contract, indemnification, or applicable law provisions. The Contractor may, at its expense, purchase larger coverage amounts or additional insurance.

15.4 Waiver of Rights

15.4.1 The Owner and Contractor waive all rights against each other for losses and damages caused by any of the perils covered by the policies of insurance provided in response to Paragraphs 15.1.2 and 15.1.3 and any other property insurance applicable to the Work, and also waive such rights against the Subcontractors, Architect, consultants and other parties named as insureds in such policies for losses and damages so caused. Each subcontract between the Contractor and a Subcontractor will contain similar waiver provisions by the Subcontractor in favor of the Owner, Contractor, Architect, consultants and all other parties named as insureds. None of these waivers shall extend to the rights that any of the insured parties may have to the proceeds of insurance held by the Owner as Trustee or otherwise payable under any policy so issued.

15.4.2 The Owner and Contractor intend that any policies provided in response to Paragraphs 15.1.2 and 15.1.3 shall protect the parties insured and provide primary coverage for losses and damages caused by the perils covered thereby. Accordingly, such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any of the parties named as insureds or additional insureds, and if the insurers require separate waiver forms to be signed by the Architect or its consultant, the Owner will obtain the same, and if such waiver forms are required of any Subcontractor, the Contractor will obtain the same.

15.5 Any insured loss under the policies of insurance required by Paragraphs 15.1.2 and 15.1.3 will be adjusted with the Owner and made payable to the Owner as Trustee for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause. The Owner shall deposit in a separate account any money so received, and shall distribute it in accordance with such agreement as the parties in interest may reach. If no agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Contract Modification or Written Amendment, or be a separate contract, at the Owner's option.

15.6 Endorsements.

15.6.1 The Owner, its officer and employees shall be named as a primary, non-contributing additional insured and coverage shall apply on a primary and non-contributory basis on such policies other than Workers' Compensation. Additional insured status shall be evidenced by internal policy provision or by separate external endorsement. Policies shall contain a provision that the Owner shall be given *thirty (30) days'* written notice by certified mail before cancellation of any insurance or reduction of the amount thereof, or any alteration, modification, restriction or material change thereto. No such cancellation, reduction, alteration, modification, restriction or material change in any policy shall relieve the Contractor of its obligation to maintain coverages in accordance with the Contract Documents.

15.6.2 All insurance policies to be maintained by the Contractor shall provide for Waiver of Subrogation in favor of the Owner.

15.6.3 All insurance policies, except Workers' Compensation, to be maintained by the Contractor shall provide Severability of Interests or Cross Liability Clause and provide that the insurance shall be primary and not excess to or contributing with any insurance or self-insurance maintained by the Owner.

15.7 Certificates evidencing that satisfactory coverage of the type and limits set forth in the Contract Documents shall be furnished to the Owner in a form acceptable to the Owner and shall contain provisions consistent with Paragraph 15.6.

15.8 Irrespective of the requirements of the Contract Documents as to insurance to be carried by the Contractor, insolvency, bankruptcy or failure of any insurance company to pay all claims accruing, shall not be held to relieve the Contractor of any of its obligations.

15.9 The Contractor shall defend, indemnify and hold the Owner harmless from any failure of the Contractor or its Subcontractors of any tier to secure and maintain insurance as required by this Contract.

ARTICLE 16
CORRECTION OF WORK

16.1 The Contractor shall promptly correct Work rejected or failing to conform to the requirements of the Contract Documents at any time through a period of *one (1) year* from the date of Substantial Completion of this Contract or by terms of a longer

manufacturer's warranty or an applicable special warranty required by the Contract Documents.

16.2 If the Contractor fails to carry out or correct Work that is not in accordance with the Contract Documents, the Owner may, by written order, require the Contractor to stop the Work or any portions thereof until the cause for the order has been eliminated, and the Owner may take over and correct some or all of the non- conforming Work at the Contractor's cost.

16.3 Nothing in this Article shall be construed to establish a period of limitation with respect to other obligations that the Contractor might have under the Contract Documents.

ARTICLE 17
MISCELLANEOUS PROVISIONS

17.1 Applicable Law. This Contract shall be governed by the internal law of the State of Washington, without regard to its choice-of-law provisions.

17.2 Compliance with Law. The Contractor shall give notices and comply with applicable laws, rules, regulations and orders of public authorities, including but not limited to RCW 39.06 and RCW 18.27 (Registration), RCW 49.60 (Discrimination), RCW 70.92 (Aged and Handicapped Persons), WAC 296-155 (Safety Standards), RCW 50.24 (Unemployment Compensation), RCW 51 (Industrial Insurance); RCW 82 (State Excise Tax Registration), RCW 39.12.065(3) (prevailing wage violations), Drug-Free Workplace Act of 1988 (Drug-Free Workplace) and RCW 49.26 (any asbestos removal).

17.3 Assignment. The Contractor shall not let, assign or transfer this Contract, or any interest in it or part of it, without the written consent of the Owner.

17.4 The Owner's Site Rules. The Contractor shall comply with the Owner's site and conduct rules.

17.5 Survival of Clauses. The warranty, dispute resolution, and indemnification provisions of this Contract shall survive the termination, cancellation or expiration of this Contract.

17.6 Writing Required. No addition to or modification of this Contract or waiver of any provisions of this Contract shall be binding on either Party unless explicitly made in writing and executed by the Contractor and the Owner.

ARTICLE 18
TERMINATION OF THE CONTRACT

18.1 Termination for Cause by the Contractor. If the Owner fails to make payment of undisputed amounts for a period of *sixty (60) days* through no fault of the Contractor, the Contractor may, upon *seven (7) additional days'* written notice (during which time the Owner has the right to cure), terminate the Contract and recover from the Owner payment for all Work executed in accordance with the Contract Documents.

18.2 Termination for Cause by the Owner. The Owner may, upon *seven (7) days'* written notice to the Contractor, terminate without prejudice the whole or any portion of the Work for cause, including but not limited to the Contractor's material breach of this Contract; failure to prosecute the Work or any portion thereof with sufficient diligence to ensure the Substantial Completion of the Work within the Contract Time; failure to supply a sufficient number of properly skilled workers or proper materials; material disregard of laws, ordinances, rules, regulations or orders of any public authority having jurisdiction; or being adjudged bankrupt, making a general assignment for the benefit of its creditors, or having a receiver appointed on account of the Contractor's insolvency.

18.3 Termination for Convenience by the Owner. The Owner may, at any time upon *seven (7) days'* written notice to the Contractor, terminate (without prejudice to any right or remedy of the Owner) the whole or any portion of the Work for the convenience of the Owner. The Owner shall be liable to Contractor only for the amount reasonably incurred to date and due under Article 13 for the performance of the Work terminated and other pre-approved costs, consistent with the Paragraph 11.2, necessary and reasonably incurred in connection with the termination of the Work.

18.4 Effects of Termination.

18.4.1 The total sum to be paid to the Contractor under this Article 18 shall not exceed the Contract Sum as reduced by the amount of payments otherwise made.

18.4.2 Unless the Owner directs otherwise, after receipt of a notice of termination by the Owner, the Contractor shall promptly stop Work as specified in the notice of termination; place no further orders or subcontracts, except as necessary for completion of non-terminated Work; procure cancellation of all orders and subcontracts to the extent related to the performance of terminated Work; assign to the Owner all of the right, title and interest of the Contractor under all orders and subcontracts; with the Owner's approval, settle outstanding liabilities and claims arising out of such termination of orders and subcontracts not assigned to the Owner; transfer title and deliver to the entity or entities designated by the Owner the fabricated or unfabricated parts, Work in process, partially completed supplies and equipment, materials, parts, tools, dies, jigs and other fixtures, completed Work, supplies

and other material produced as part of, or acquired in connection with the performance of, the Work terminated, and the completed or partially completed plans, drawings, information and other property related to the Work; take such action as may be necessary or as directed by the Owner to preserve and protect the Work and property related to the Project in the possession of the Contractor in which the Owner has an interest; and continue performance only to the extent not terminated.

18.5 Suspension. The Owner may, at its option and at any time, suspend the Contractor's performance of some or all of the Work. The Owner will give the Contractor notice of any such suspension, including the scope of the suspension and the Owner's estimate of the duration of such suspension. During the period of suspension, the Contractor shall use its best efforts to minimize costs associated with such suspension and to protect and maintain the Work. As full compensation for any such suspension, the Contractor will be eligible for an equitable adjustment, which shall not include consequential or indirect damages. Upon receipt of the Owner's notice to resume the suspended performance, the Contractor shall immediately resume performance to the extent required in the notice.

ARTICLE 19
DISPUTE RESOLUTION

19.1 All claims, disputes and other matters in question of the Contractor, direct or indirect, arising out of, or relating to, the Contract Documents or the breach thereof ("Claims") shall be decided exclusively by the following dispute resolution procedure. Failure to comply with the requirements of this Article 19 shall constitute waiver of the Claim.

19.2 Notice of Claim. The Contractor shall submit notice of all Claims to the Owner in writing within *seven (7) days* of the event giving rise to them and shall include a reasonable description of the event and its probable effect.

19.3 Claim Submission. Within *thirty (30) days* of the effective date of submitting the notice in Paragraph 19.2, the Contractor shall provide the Owner with a written Claim that includes a clear description of the Claim, all changes in cost and in time (direct, indirect, impact, consequential, and otherwise) to which the Contractor and Subcontractors of any tier are entitled, and data supporting the Claim. No act, omission, or knowledge, actual or constructive, of the Owner or any Architect shall in any way be deemed to be a waiver of the requirement for a timely written notice and a timely written Claim unless the Owner and the Contractor sign an explicit, unequivocal written waiver.

19.4 Effective Date. Unless otherwise specified in the Contract Documents, the effective date of any notice or request given in connection with this Contract shall be the date on which it is delivered to the Owner.

19.5 Informal Resolution. The Owner will make a determination of the Claim submitted. If the Contractor disagrees with the determination and wishes to pursue the Claim further, the Contractor must, within *fourteen (14) days* of receipt of the determination, provide the Owner with a written request that a representative of the Contractor, any Architect, and the Owner meet, confer, and attempt to resolve the claim. This meeting will then take place at mutually convenient time and place within *fourteen (14) days* of the Contractor's request.

19.6 Mediation. The Contractor may not bring any litigation against the Owner unless the Claim is first subject to mediation under the Construction Industry Mediation Procedures of the American Arbitration Association ("AAA"). This requirement cannot be waived except by an explicit written waiver signed by the Owner and the Contractor. To initiate the mediation process, the Contractor shall submit a written mediation request to the Owner within thirty (30) days after the meeting undertaken in Paragraph 19.5. If the parties are unable to agree to a mediator within *thirty (30) days* after the Owner's receipt of the written request for mediation, either party may submit a request for mediation to the AAA. An officer of the Contractor and the General Manager or designee of the Owner, both having full authority to settle the Claim, must attend the mediation session. To the extent there are other parties in interest, such as Subcontractors and insurers, their representatives, with full authority to settle the Claim, shall also attend the mediation session. All unresolved Claims in the Project shall be considered at a single mediation session that shall occur prior to Final Acceptance by Owner.

19.7 Litigation. The provisions of Paragraphs 19.1, 19.2, 19.5, and 19.6 are each a condition precedent to the Contractor bringing litigation. All unresolved Claims of the Contractor shall be waived and released unless the Contractor has strictly complied with the time limits of the Contract Documents, and litigation is served and filed within *120 days* after the Date of Substantial Completion as designated in writing by the Owner. This requirement cannot be waived except by an explicit written waiver signed by the Owner and the Contractor. The pendency of mediation shall toll this filing requirement.

19.8 Maintenance of Responsibilities. The parties shall diligently carry on their respective obligations and responsibilities and maintain the Progress Schedule during any dispute resolution proceedings, unless otherwise agreed by both parties in writing.

19.9 Waiver. The requirements of this Article 19 cannot be waived except by an explicit written waiver signed by the Owner and the Contractor. The fact that the Owner and the Contractor may continue to discuss or negotiate a Claim that has or may have been defective or untimely under the Contract Documents shall not constitute waiver of the provisions of the Contract Documents unless the Owner and Contractor sign an explicit, unequivocal written waiver approved by the Owner's Board of Commissioners.

Supplemental Conditions

1. **Progress Payments.** Progress payments shall be made monthly for Work that is duly approved and performed during the calendar month preceding the Application for Payment according to the following procedure.

1.1 Schedule of Values. Prior to submitting its first Application for Payment, the Contractor shall submit to the Owner a schedule of values allocating the Contract Sum to the various portions that comprise the Work. The schedule of values shall be prepared in such form and supported by such data as the Owner may require. The schedule of values shall allocate at least three percent (3%) of the original Contract Sum to that portion of the Work between Substantial Completion of the Work and Final Completion, which will be earned upon Final Completion and distributed in the final payment.

1.2 Draft Application. Within the first *seven (7) days* of each month, the Contractor shall submit to the Owner a report on the current status of the Work as compared to the Progress Schedule and a draft, itemized Application for Payment for Work performed through the prior calendar month. This shall not constitute a payment request. The Contractor, the Owner and the Architect or Engineer (if any) shall meet within the next *seven (7) days* and confer regarding the current progress of the Work and the amount of payment to which the Contractor is entitled. The Owner may request the Contractor to provide data substantiating the Contractor's right to payment, such as copies of requisitions or invoices from Subcontractors. The Contractor shall not be entitled to make a payment request, nor is any payment due the Contractor, until such data is furnished.

1.3 Payment Request. Within *seven (7) days* after the Contractor and the Owner have met and conferred regarding the draft Application for Payment and the Contractor has furnished all data requested, the Contractor may submit a payment request in the agreed-upon amount, in the form of a notarized, itemized Application for Payment for Work performed during the prior calendar month on a form supplied or approved by the Owner. Among other things, the Application shall state that prevailing wages have been paid in accordance with the pre-filed statement(s) of intent to pay prevailing wages on file with the Owner and that all payments due Subcontractors from the Owner's prior payments have been made. The Application shall constitute the Contractor's representation that (1) all payments due Subcontractors from the Owner's prior payments have been made and (2) the Work is current on the Progress Schedule, unless otherwise noted on the Application. If the Contractor believes it is entitled to payment for Work performed during the prior calendar month in addition to the agreed-upon amount, the Contractor may, within the same time period, submit to the Owner a separate written payment request specifying the exact additional amount due, the category in the schedule of values in which the payment is due, the specific Work for which the additional amount is due, and why the additional payment is due.

1.4 Payments to Subcontractors. No payment request shall include amounts the Contractor does not intend to pay to a Subcontractor. If, after making a request for payment but before paying a Subcontractor for its performance covered by the payment request, the Contractor discovers that part or all of the payment otherwise due to the Subcontractor is subject to withholding from the Subcontractor for unsatisfactory performance, the Contractor may withhold the amount as allowed under the subcontract, but it shall give the Subcontractor and the Owner written notice of the remedial actions that must be taken as soon as practicable after determining the cause for the withholding but before the due date for the Subcontractor payment, and pay the Subcontractor within *eight (8) working days* after the Subcontractor satisfactorily completes the remedial action identified in the notice.

1.5 Retainage. Pursuant to RCW 60.28, the Owner will reserve five percent (5%) from the moneys the Contractor earns on estimates during the progress of the Work, to be retained as a trust fund for the protection and payment of the claims of any person arising under this Contract and the state with respect to taxes imposed pursuant to Title 82 RCW, which may be due from the Contractor. The moneys reserved will be retained in a fund by the Owner until *forty-five (45) days* following formal acceptance of the Project by the Owner ("Final Acceptance"). The Contractor may retain payment of not more than five percent (5%) from the moneys earned by any Subcontractor.

Scope of Work

List of Drawings and Specifications

Site Conditions and Coordination

GRANT CONDITIONS

Bid Checklist

Bidders must bid on all items contained in the Proposal. The omission or deletion of any bid item will be considered non-responsive and shall be cause for rejection of the bid.

Please check to make sure you have accomplished the following:

- ☐ **Has bid bond or certified check been enclosed with your bid?**
- ☐ **Is the amount of the bid guarantee at least five (5) percent of the total amount of the bid?**
- ☐ **Has the proposal been properly signed?**
- ☐ **Have you bid on ALL ITEMS?**
- ☐ **Have you certified receipt of addenda?**

PART 1 – GENERAL

Available Information

A. The following documents are bound into the Project Manual as an attachment to this Section:
    1. Geotechnical Engineering Report prepared by Landau Associates, July 15, 2019.
    2. Log Yard Road Roundabout Plans, June 2019.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

Not used

END OF SECTION

MASON TRANSIT AUTHORITY
MTA – BELFAIR PARK AND RIDE PROJECT

Geotechnical Engineering Report

Geotechnical Engineering Report
Mason Transit Authority
Park and Ride Site Improvements
Belfair Site
Shelton, Washington

July 15, 2019

Prepared for

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Geotechnical Engineering Report
Mason Transit Authority
Park and Ride Site Improvements
Belfair Site
Shelton, Washington

This document was prepared by, or under the direct supervision of, the undersigned, whose seal is affixed below.

Name: Lance Levine
Washington/No. 45853

Date: July 15, 2019

7/15/2019

Document prepared by: _____ Lance Levine, PE
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LANDAU ASSOCIATES

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APPENDICES

Appendix	Title
A	Field Explorations
B	Laboratory Testing

LIST OF ABBREVIATIONS AND ACRONYMS

AASHTO ..... American Association of State Highway and Transportation Officials
ASTM ..... ASTM International
bgs ..... below ground surface
CBR ..... California Bearing Ratio
CSBC ..... crushed surfacing base course
ESAL ..... equivalent single-axle load
ft ..... foot/feet
GDM ..... Geotechnical Design Manual
H:V ..... horizontal to vertical
IBC ..... International Building Code
LAI ..... Landau Associates, Inc.
MDD ..... maximum dry density
MTA ..... Mason Transit Authority
PCC ..... Portland cement concrete
pcf ..... pounds per cubic foot
PIT ..... pilot infiltration test
psf ..... pounds per square foot
SCJ ..... SCJ Alliance
SWMMWW ..... Stormwater Management Manual for Western Washington
WAC ..... Washington Administrative Code
WSDOT ..... Washington State Department of Transportation

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1.0 INTRODUCTION

This report presents the results of our field investigation and provides geotechnical engineering conclusions and recommendations for Mason Transit Authority's (MTA's) proposed Park and Ride Improvements project, located near the Mason County–Kitsap County border, southeast of the intersection of Log Yard Road and State Highway 3 near Belfair, Washington (site). The purpose of our investigation was to compile and review available subsurface information for the project area, complete site investigations to characterize subsurface soil and groundwater conditions, and develop geotechnical conclusions and recommendations for design of the proposed improvements.

The general project location is shown on Figure 1. Figure 2 shows some of the site features and the approximate locations of the explorations completed for this study. Appendix A includes a description of our field explorations and summary logs of the conditions observed during our field investigation. Test results and a description of our laboratory testing program are provided in Appendix B.

This report has been prepared based on conversations with and information provided by SCJ Alliance (SCJ), data collected during our field investigation, the results of our laboratory testing program, our familiarity with geologic conditions in the vicinity of the project area, and our experience with similar projects. Our services were provided in accordance with amendment number one to the subconsultant agreement for professional services, issued by SCJ on July 28, 2017 and authorized on August 1, 2017.

1.1 Project Understanding

We understand a park and ride will be constructed on an undeveloped, 4-acre site in a future commercial/industrial development near the Mason County–Kitsap County border. Proposed improvements include a 1,500-square-foot MTA office building, two bus shelters, illumination (i.e., light poles), paved parking and drive lanes, and stormwater management facilities. The proposed site layout is subject to minor changes and will be finalized during design.

1.2 Scope of Services

The objective of our services was to explore subsurface soil and groundwater conditions at the site as a basis for developing geotechnical recommendations in support of the proposed improvements. Our scope of services includes the following tasks:

- reviewing available published geologic maps and geotechnical reports for the project area;
- coordinating public and private utility locates;
- completing a subsurface exploration program by advancing a series of exploratory test pits;
- collecting representative soil samples and completing laboratory testing to aid in the classification and determination of certain engineering soil properties;

- providing seismic spectral acceleration coefficients for the proposed structures using map-based methods in accordance with International Building Code (IBC) criteria. We also assessed the risk for seismically induced soil liquefaction and lateral spreading;
- providing recommendations for earthwork and grading, including stripping depth, subgrade preparation, utility trench excavation, construction dewatering, the reuse of onsite materials and structural fill, and structural fill placement and compaction;
- providing geotechnical recommendations for shallow foundation support of the proposed bus shelters and MTA office building, including allowable soil bearing capacity, minimum footing width and depth, lateral resistance criteria, and elastic settlement estimates;
- providing geotechnical recommendations for design of foundations for new illumination in accordance with section 17.2.1 of the Washington State Department of Transportation's *Geotechnical Design Manual* (WSDOT GDM; WSDOT 2015);
- providing recommendations for pavement sections using assumed traffic loading conditions;
- assessing the feasibility of infiltrating stormwater on site, including feasible infiltration locations, depth-to-groundwater, and a design infiltration rate estimated by correlation to grain size characteristics; and
- preparing this geotechnical engineering report, summarizing the results of our field investigation and laboratory testing program and presenting our conclusions and recommendations along with supporting data.

2.0 EXISTING CONDITIONS

The following sections describe the surface conditions observed during our field explorations, the results of our geologic review, our subsurface exploration program, and the subsurface soil and groundwater conditions observed in our explorations.

2.1 Surface Conditions

The site includes undeveloped forestland with several trails and primitive gravel roads. Topography is generally flat in the areas of the proposed improvements, though the eastern portion of the site slopes gently down to the west with a vertical relief of about 10 feet (ft). The site is vegetated with mostly trees and some brush. Evidence of surface water or ponding was not observed during our August 2017 site visits.

2.2 Geologic Review

The geology of the area is described on the *Geologic Map of the Belfair 7.5-minute Quadrangle, Mason, Kitsap, and Pierce Counties, Washington* (Polenz 2009). Vashon glacial ice-contact deposits (Qgic) are mapped at the project site, with Vashon till (Qgt) mapped to the east. Ice-contact deposits are described as sand, gravel, lodgment till, and flow till with minor silt and clay beds. This unit is light brown to gray, loose to compact, and massive to well stratified. The unit was formed in the presence of meltwater alongside ice, generally near the end of the glaciation, and commonly is accompanied by stagnant-ice features, such as kettles, eskers, and subglacial outwash channels. The soils observed in our explorations are consistent with the mapped geology.

2.3 Subsurface Explorations

We explored subsurface conditions at the site on August 15, 2017 by advancing 10 test pits (TP-1 through T-10) between 12.5 and 16.3 ft below ground surface (bgs). The test pits were advanced by Howard's Construction & Excavating of Olympia, Washington, under subcontract to Landau Associates, Inc. (LAI). The approximate locations of the test pits are shown on Figure 2. The following sections summarize the subsurface conditions observed in our explorations. More detailed information, including summary exploration logs, is provided in Appendix A.

2.3.1 Soil Conditions

We categorized the soils observed in our explorations into two general units:

- **Forest duff/topsoil:** A forest duff/topsoil layer was observed in all the explorations, except test pit TP-1, where the forest duff was removed at the time the primitive gravel road was constructed. The combined thickness of the forest duff and topsoil ranged from 0.75 to 2.5 ft. Forest duff detritus observed typically included leaves, fir needles, and other non-decomposed organics above the soil surface. Where observed in our explorations, the thickness of the forest duff layer ranged from 3 to 12 inches. The topsoil observed at the

surface in test pit TP-1 and below the forest duff at the remaining test pit locations was typically a brown, loose to medium dense, silty sand with variable gravel and organic content.

- **Ice-contact deposits:** Ice-contact deposits were observed below the forest duff/topsoil unit to the depths explored. This unit typically consists of brown to gray, medium dense to very dense sand with variable silt, gravel, and cobble content or brown to gray, dense to very dense gravel with variable silt, sand, and cobble content.

Although not observed in all of our explorations, cobbles and boulders are often present in glacial deposits and may be present throughout the site. The contractor should be prepared to handle oversized material.

2.3.2 Groundwater Conditions

During our August 2017 explorations, groundwater was not observed in the test pits to 16.3 ft bgs, the maximum depth explored. No evidence of mottling was observed. The groundwater conditions reported herein and on the exploration logs in Appendix A are for the specific locations and date indicated and may not be indicative of other locations and/or times. Furthermore, we anticipate groundwater conditions will vary depending on local subsurface conditions, weather conditions, and other factors. Groundwater levels in the project area are expected to fluctuate seasonally, with maximum groundwater levels occurring during late winter and early spring.

3.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our field explorations, laboratory testing, and engineering analyses, it is our opinion that subsurface conditions at the project site are suitable for the proposed improvements. We interpret the ice-contact deposits to be suitable for onsite infiltration of stormwater, provided the base of the infiltration facility is situated below restrictive layers. The ice-contact deposits observed in our explorations are also suitable for shallow foundation support of structures (e.g., bus pad, shelters, MTA office building, and light poles), provided the recommendations in Section 3.1 of this report are followed.

The following sections of this report provide geotechnical conclusions and recommendations pertaining to earthwork; underground utilities; structures, including seismic design criteria, allowable bearing capacity, foundation settlement, resistance to lateral loads, footing overexcavations, and slabs-on-grade; illumination; pavement design; and stormwater infiltration.

3.1 Earthwork

To accommodate construction of the proposed improvements, earthwork likely will include clearing, grubbing, and stripping of areas where improvements are planned; cuts and fills; subgrade preparation for structures and pavement areas; and construction of temporary and permanent slopes.

3.1.1 Wet Weather Considerations

Some of the onsite soils contain up to about 16 percent fines (material passing the U.S. Standard No. 200 sieve, by weight) and are considered moisture sensitive. Imported fill also could be moisture sensitive. When the moisture content of soil is more than a few percent above or below the optimum moisture content, the soil may become unstable, and meeting the required compaction criteria may be difficult. Optimum moisture content is the moisture content at which the greatest compacted dry density can be achieved. Disturbance of near surface soils should be expected if earthwork is completed during periods of wet weather or under wet conditions.

The wet weather season in the project area generally begins in late October and continues through June. However, periods of wet weather may occur throughout the year. If wet weather earthwork is unavoidable, we recommend:

- the ground surface be sloped so that surface water is collected and directed away from the work area to an approved collection/dispersion point;
- excavation of temporary drywells to expose cleaner underlying soils;
- earthwork activities not take place during periods of heavy precipitation;
- measures are taken to prevent onsite soil and soil stockpiles from becoming wet or unstable;
- structural fill materials used during periods of wet weather should be limited to imported, all-weather fill;

- a smooth-drum roller is used to seal the surface prior to periods of precipitation to reduce the extent to which the soil becomes wet or unstable;
- construction traffic is restricted to specific areas of the site, preferably areas surfaced with materials that are not susceptible to wet weather disturbance;
- a minimum 1-ft-thick layer of 4- to 6-inch quarry spalls is used in high-traffic areas to protect the subgrade soil from disturbance; and
- contingencies are included in the project schedule and budget to allow for the above elements.

3.1.2 Site Preparation Activities

Site preparation activities are expected to include clearing, grubbing, and stripping of the existing vegetation, duff, and topsoil and removal of pavement and utilities, if present. Sod, topsoil, and organic-rich soils or fill located within the bus pad shelter or pavement areas should be stripped. We estimate an average stripping depth of approximately 20 inches for removal of forest duff and near surface topsoil. If the forest duff is removed during logging activities, the remaining topsoil will range from 0.5 to 1.5 ft thick. These estimates do not include the removal of existing tree roots or debris, if present.

All incidental excavations associated with site preparation activities should be backfilled in accordance with the recommendations set forth in Section 3.1.4 of this report.

3.1.3 Subgrade Preparation

Prior to placing structural fill, the prepared subgrade should be proof-rolled in the presence of a qualified civil or geotechnical engineer, who is familiar with the site conditions and can check for any soft and/or disturbed areas. Areas of limited access that cannot be proof-rolled can be evaluated using a steel T-probe. Loose and/or disturbed subgrades identified during the proof-roll should be repaired by overexcavating the disturbed soil and replacing it with compacted structural fill, meeting the requirements described in Section 3.1.4 of this report. Unsuitable soils also can repaired with additional scarification, moisture conditioning, and recompacting. Repaired subgrades should be recompacted in accordance with Section 3.1.4.5 of this report.

3.1.4 Structural Fill

The following sections provide recommendations for the use of onsite soils, imported fill, and recycled materials as structural fill and structural fill placement and compaction.

3.1.4.1 General

The suitability of excavated or imported soil for use as structural fill will depend on the gradation and moisture content of the soil when it is placed. As the amount of fines increases, the soil becomes increasingly sensitive to small changes in moisture content, and adequate compaction may become more difficult to achieve. Soil containing more than about 5 percent fines cannot be compacted

consistently to a dense, non-yielding condition when the water content is more than about 2 to 3 percent above or below optimum moisture content.

During dry, warm weather (generally July through early October), structural fill should consist of well-graded sand and gravel with a maximum particle size of 6 inches and at least 75 percent of the material passing the 3-inch sieve. The material should contain less than 30 percent fines and be maintained at a moisture content near optimum. If wet weather construction is anticipated, the amount of fines should not exceed 5 percent, based on the minus ¾-inch fraction. Structural fill should be free of debris, organic material, and rock fragments larger than 6 inches.

3.1.4.2 Imported Fill

During dry, warm weather (generally July through early October), imported structural fill should consist of well-graded sand and gravel with a maximum particle size of 6 inches and at least 75 percent of the material passing the 3-inch sieve. The material should contain less than 30 percent fines and be maintained at a moisture content near optimum. Imported structural fill should be free of debris, organic material, and rock fragments larger than 6 inches.

During wet weather conditions, imported all-weather fill should consist of well-graded sand and gravel or crushed rock with a maximum particle size of 4 inches and less than 5 percent passing a U.S. Standard No. 200 sieve, based on the minus ¾-inch fraction. Organic matter, debris, or other deleterious material should not be present. Gravel Borrow, as described in Section 9-03.14(1) of the Washington State Department of Transportation's *2016 Standard Specifications for Road, Bridge, and Municipal Construction* (*2016 WSDOT Standard Specifications*), is a suitable source of imported all-weather fill, provided the requirements set forth in this paragraph are satisfied.

3.1.4.3 Onsite Soil

The ice-contact deposits observed in our explorations contain up to about 16 percent fines and are generally well suited for use as structural fill during dry weather. If onsite soils are reused as structural fill, they will require significant moisture conditioning to satisfy the compaction criteria recommended herein. We recommend a representative of LAI is present to review onsite material for use as structural fill prior to placement.

3.1.4.4 Recycled Materials

If practical, recycled concrete materials can be considered for use as structural fill. Recycled concrete materials used as structural fill should meet the requirements set forth in Section 9-03.21 of the *2016 WSDOT Standard Specifications;* the materials also must meet the minimum gradation criteria for Select Borrow, outlined in Section 9-03.14(2) of the *2016 WSDOT Standard Specifications.* In all instances, use of recycled concrete should comply with current environmental policies.

3.1.4.5 Fill Placement and Compaction

Structural fill should be placed on an approved subgrade that consists of uniformly firm and unyielding, inorganic native soils or compacted structural fill prepared as described in Section 3.1.3 of this report. Structural fill should be compacted at a near-optimum moisture content. Optimum moisture content varies with the soil gradation and should be evaluated during construction.

In structure and pavement areas, structural fill should be placed and compacted in accordance with Section 2-03.3(14)C, Method C of the *2016 WSDOT Standard Specifications.* Method A of the *2016 WSDOT Standard Specifications* is appropriate for non-structural areas, such as landscaping. Structural fill should be placed in loose, horizontal lifts, not exceeding 12-inch thickness, and thoroughly compacted. Compaction and moisture control tests should be completed in accordance with Section 2-03.3(14)D of the *2016 WSDOT Standard Specifications.* Alternatively, the maximum dry density (MDD) and optimum moisture content can be determined using ASTM International test method D1557 (i.e., modified Proctor).

3.1.5 Temporary and Permanent Slopes

Based on the soil conditions observed in our explorations, the maximum inclination for temporary excavation slopes less than 20 vertical ft in height, and in the absence of groundwater seepage, is 1½ horizontal to 1 vertical (1½H:1V). If groundwater is present, unstable conditions may develop in the temporary slope, and flatter slopes or shoring will be necessary. Temporary excavation slopes should be covered with plastic sheets, straw, or other materials to prevent erosion. In addition, the contractor should implement measures to prevent surface water runoff from entering excavations.

Temporary excavation slopes should be the responsibility of the contractor. All applicable local, state, and federal safety codes should be followed. Open cuts should be monitored by the contractor during excavation for evidence of instability. If instability is detected, the contractor should flatten the side slopes or install temporary shoring. If groundwater or groundwater seepage is present and the excavation is not properly dewatered, the soil may be prone to caving, channeling, and running.

Permanent cut-or-fill slopes constructed as recommended in this report should be sloped no steeper than 2H:1V. This ratio is not intended for use in the design of stormwater pond slopes; these slopes are typically 3H:1V or flatter and should be designed in compliance with local stormwater code requirements. Permanent slopes should be protected from erosion (see the preceding recommendations for protecting temporary excavations) and seeded or vegetated as soon as practical.

3.2 Site Utilities

The following sections provide geotechnical recommendations for design and construction of new site utilities. Geotechnical recommendations include trench excavation and support, construction

dewatering, pipe foundation support, pipe bedding and initial backfill, and trench backfill and compaction criteria.

Please note for any new utilities within the public right-of-way, local standards may supersede the following recommendations.

3.2.1 Trench Excavation and Support

We anticipate excavations for underground utilities will be primarily within the ice-contact deposits. Conventional construction equipment with sufficient reach should be able to excavate the proposed trenches to the expected depth of 12 ft bgs. Upon reaching the trench bottom, we suggest that a smooth-bladed bucket be used to remove any loose and/or disturbed soil. The final trench bottom should be firm and free of loose and disturbed soil.

Trench configurations and maintenance of safe working conditions, including temporary excavation stability, should be the responsibility of the contractor. All applicable local, state, and federal safety codes should be followed. Temporary excavations for utilities should be sloped no steeper than 1½H:1V, based on the governing regulations for safe excavation practice in the State of Washington (Washington State Department of Labor and Industries, Chapter 296-155 Washington Administrative Code [WAC]). If groundwater seepage is present, flatter slopes, temporary shoring, and/or dewatering may be required.

Trench boxes should provide adequate support for shallow excavations, provided the trench is properly dewatered and settlement-sensitive structures and utilities are not situated immediately adjacent to the excavation. Trench boxes should meet the requirements in Safety Standards for Construction Work, Part N (WAC Chapter 296-155).

3.2.2 Construction Dewatering

We anticipate underground utilities at the site can be installed without encountering significant groundwater. However, localized zones of perched groundwater may be encountered within the trench zone, particularly during the winter and spring months. If perched, water-bearing zones are encountered, construction dewatering using conventional sumps and pumps within the excavations should be sufficient to handle groundwater inflow. If dewatering is necessary, the contractor should be responsible for design and implementation of the dewatering system.

3.2.3 Pipe Foundation Support

Based on the conditions observed in our explorations, medium dense to very dense granular soils are expected to be present at the base of utility trenches. This soil type typically will provide adequate foundation support for utilities, provided the foundation soil remains in a relatively undisturbed condition. If the bottom of the trench becomes disturbed due to excavation and/or foot traffic during the laying of the pipe, the disturbed material should be overexcavated to expose undisturbed

foundation soil. The overexcavation should be backfilled with suitable foundation material to provide a firm trench bottom. Foundation material should be free of roots, topsoil, lumps of silt and clay, cobbles, and debris.

3.2.4 Pipe Bedding and Initial Backfill

Pipe zone bedding material should consist of crushed, processed, or naturally occurring granular material, free of organic matter and other deleterious material, and should meet the gradation requirements of Gravel Backfill for Pipe Zone Bedding outlined in Section 9-03.12(3) of the *2016 WSDOT Standard Specifications.*

Pipe bedding material should extend at least 6 inches below the invert of the pipe and be compacted to a relative density of at least 90 percent of the MDD (ASTM test method D1557). The initial pipe backfill should be brought up evenly around the pipe in relatively horizontal lifts, not exceeding 6 inches, and worked under the haunches of the pipe by slicing with a shovel, vibration, or other approved procedure. Pipe zone backfill should extend 6 inches above the crown of the pipe. In order to prevent damage to the pipe, the initial backfill directly over the pipe should be compacted with hand-operated compaction equipment. Specific material and compaction requirements provided by pipe manufacturers may supersede the recommendations provided in this report.

3.2.5 Trench Backfill and Compaction

Granular portions of the ice-contact deposits may be utilized for trench backfill, provided all soil particles greater than 4 inches in diameter are removed and the soil is properly moisture conditioned and compacted to the required density. Trench backfill should be compacted as described in Section 3.1.4.5 of this report.

3.3 Structures

The following sections provide geotechnical engineering conclusions and recommendations for foundation design of structures. Recommendations are provided for seismic design, allowable bearing capacity, settlement, resistance to lateral loads, footing excavations, drainage considerations, slabs-on-grade, and illumination pole foundations.

Table 1 provides a summary of design parameters for the structural engineer. The design parameters should be used in conjunction with the complete recommendations provided in this report.

Table 1. Summary of Design Parameters

Allowable soil bearing pressure = 3,500 pounds per square foot
Friction coefficient (factored) = 0.35
Passive resistance (factored) = 280 pounds per cubic foot
Minimum foundation width = 18 inches (continuous), 24 inches (isolated)
Maximum foundation width (for settlement considerations) = 5 feet (continuous), 10 feet (isolated)

3.3.1 Seismic Design Considerations

We understand that seismic design will be performed using the 2015 IBC standards (ICC 2014). The parameters listed in Table 2 can be used to compute seismic base shear forces.

Table 2. 2015 International Building Code Seismic Design Parameters

Spectral response acceleration at short periods (S_s) = 1.483g
Spectral response acceleration at 1-second periods (S_1) = 0.586g
Site class = C
Site coefficient (F_a) = 1.0
Site coefficient (F_v) = 1.3

g = force of gravity

The site is underlain by medium dense to very dense glacial deposits, and the groundwater table is relatively deep. On this basis, it is our opinion that there is a low risk for seismically induced soil liquefaction or lateral spreading at the site. Considering the location of the site with respect to the nearest known active crustal faults and the presence of a relatively thick layer of glacial deposits, it is our opinion that the risk of ground rupture due to surface faulting is low.

3.3.2 Bearing Capacity

We recommend an allowable soil bearing pressure of 3,500 pounds per square foot (psf) for shallow foundations that are established on medium dense to very dense glacial soils or structural fill extending to such soils. This allowable soil bearing pressure applies to long-term dead and live loads, exclusive of the weight of the footing and any overlying backfill. The allowable soil bearing pressure can be increased by one-third when considering total loads, including transient loads, such as those induced by wind and seismic forces.

The bus pad slab-on-grade foundation may utilize a thickened-edge slab design. For that reason, we recommend a minimum width of 18 inches for continuous footings. For settlement considerations, we have assumed a maximum width of 5 ft for continuous footings. For frost protection, footings should be embedded at least 12 inches below the lowest adjacent grade where the ground is flat adjacent to the footing.

3.3.3 Settlement

Settlement of shallow foundations will depend on the foundation size and bearing pressure as well as the strength and compressibility characteristics of the underlying bearing soil. Assuming construction is accomplished as previously recommended, we estimate the settlement of continuous or isolated spread footings will be on the order of 1 inch or less. Differential settlement between similarly loaded foundation elements may be assumed to be on the order of ½ inch or less.

3.3.4 Resistance to Lateral Loads

Resistance to lateral loads can be provided by friction acting on the base of footings and by passive lateral earth pressures acting against the sides of footings. An allowable coefficient of sliding resistance of 0.35, applied to the vertical dead loads only, may be used to compute frictional resistance. The allowable coefficient of sliding resistance includes a factor of safety of 1.5 on the calculated ultimate value. For design purposes, the passive resistance of properly compacted structural fill placed against the sides of foundations may be considered equivalent to a fluid with a density of 280 pounds per cubic foot (pcf). The foundation passive earth pressure has been reduced by a factor of 1.5 to limit deflections to less than 2 percent of the embedded depth. In addition, the recommended foundation passive earth pressure assumes drained conditions within the depth of the foundation.

The passive earth pressure and friction components can be combined, provided the passive component does not exceed two-thirds of the total. The top foot of soil should be excluded when calculating passive resistance unless the foundation perimeter area is covered by a slab-on-grade or pavement.

3.3.5 Footing Overexcavations

We do not anticipate that appreciable overexcavations will be required for the proposed improvements. Medium dense to very dense ice-contact deposits soils should be present at or within about 2 ft of the ground surface. However, overexcavations could be required if the soils become saturated or disturbed by foot traffic. If overexcavations are required, the overexcavation zone should extend a horizontal distance equal to at least one-half of the overexcavation depth on each side of the footing. For example, a 2-ft-wide footing with a 2-ft-deep overexcavation should have a 4-ft-wide overexcavation zone. All footing overexcavations should be backfilled with structural fill. Alternatively, the depth of the footing could be increased to bear on the base of the overexcavation. The base of the overexcavation should be evaluated by a qualified civil or geotechnical engineer prior to placement of structural fill or concrete.

3.3.6 Foundation Drainage Considerations

We recommend installing a footing drain around the perimeter of the proposed MTA office building. The drain should consist of a minimum 4-inch-diameter, perforated pipe surrounded by clean drain rock, wrapped in filter fabric. The drain pipe should be connected to a positive outlet and should include cleanouts. Roof drains should not be connected to footing drain.

3.3.7 Slabs-On-Grade

Slabs-on-grade should be established on a subgrade that consists of uniformly firm and unyielding soil. A modulus of vertical subgrade reaction (subgrade modulus) can be used to design the slab. The subgrade modulus varies based on the dimensions of the slab and the magnitude of applied loads on

the slab surface; slabs with larger dimensions and loads are influenced by soil to a greater depth. We recommend a subgrade modulus value of 225 pounds per cubic inch for the design of on-grade floor slabs with floor loads up to 500 psf. This subgrade modulus is for a 1-ft by 1-ft square plate and is not the overall modulus of a larger area. We are available to provide alternate recommendations during design, based on specific loading information available at that time.

3.3.8 Illumination Pole Foundations

Illumination structures (i.e., light poles) are proposed at the site. In our test pits, we observed medium dense to very dense soils with an estimated allowable lateral bearing pressure of 3,500 psf. The lateral bearing pressure provided was developed in general accordance with the methods described in Section 17.2.1 of the WSDOT GDM.

3.4 Pavement Design

Pavement sections should be constructed on a subgrade that consists of 1 ft of uniformly firm and unyielding, compacted native subgrade or imported structural fill as described in Section 3.1 of this report. The structural fill should be prepared as described in Section 3.1.4 of this report. The design pavement sections were developed using the American Association of State Highway and Transportation Officials' (AASHTO's) Guide for Design of Pavement Structures (AASHTO 1993). The standard duty asphalt pavement section recommendations provided in Table 3 assume a 20-year design life, a maximum equivalent single-axle load (ESAL) of 100,000, and an assumed California Bearing Ratio (CBR) of 12 percent for the section. The heavy-duty asphalt pavement section assumes at least 65 buses per day, a 20-year design life, a loading of 2,000,000 ESALs, and an assumed CBR of 12 percent for the section. The assumed CBR value is estimated to correspond to a subgrade soil with a density equal to 90 percent of the MDD, determined by ASTM test method D1557.

For any new pavement installed within the public right-of-way, local standards may supersede the recommendations below.

Table 3. Recommended Asphalt Pavement Design Section

Pavement Section Type	Asphalt Concrete Pavement Thickness	Crushed Surfacing Base Course Thickness	Compacted Native or Structural Fill Thickness
Standard duty	3 inches	4 inches	12 inches
Heavy duty	4 inches	4 inches	12 inches

Asphalt concrete should be Class B aggregate material or hot-mix asphalt class ½ inch, PG64-22, conforming to Section 5-04 of the *2016 WSDOT Standard Specifications.* The asphalt should be compacted to at least 91 percent of the Rice density. Base course material should be compacted to at least 95 percent of the MDD (ASTM test method D1557) and should meet the requirements for crushed surfacing base course (CSBC) in Section 9-03.9(3) of the *2016 WSDOT Standard Specifications.*

The upper 2 inches of crushed surfacing could consist of crushed surfacing top course to facilitate fine grading of the surface.

For our Portland cement concrete (PCC) pavement design, we assumed a design life of 20 years. For bus turnarounds, 2,000,000 ESALs were assumed in our rigid pavement design. A reliability of 85 percent, a terminal serviceability index of 2.5, a design serviceability loss of 2, and load transfer coefficient of 3.2 (assumes continuous reinforcement and tied shoulders) were used in the design. The design assumed a CBR of 12 percent (equates to a resilient modulus of 12,533) and at least 4 inches of CSBC placed below the PCC pavement. The following table summarizes the PCC pavement section for the bus turnarounds.

Table 4. Recommended Portland Cement Concrete Pavement Design Section

Pavement Section Type	Portland Cement Concrete Pavement Thickness	Crushed Surfacing Base Course Thickness	Compacted Native or Structural Fill Thickness
Heavy Duty	8 inches	4 inches	12 inches

Base course material should be compacted to at least 95 percent of the MDD determined using ASTM test method D1557 and should meet the requirements for CSBC in Section 9-03.9(3) of the *2016 WSDOT Standard Specifications.* PCC pavement should meet the requirements in Section 5-05 of the *2016 WSDOT Standard Specifications.* The pavement edges should be fully supported with either a thickened edge or an integral curb, and the joint spacing should be no more than 15 ft apart. To provide load transfer across the joints between panels, the panels should be fully doweled. Dowels should be placed at a depth of one-half the slab thickness and spaced 12 inches on center. The dowel bar diameter should be 1.5 inches and should have a minimum embedment of 9 inches on each side of the joint.

Prevention of road base saturation is essential for pavement durability. Thus, efforts should be made to limit the amount of water entering the base course.

3.5 Stormwater Infiltration Feasibility

Stormwater improvements may include ponds or underground infiltration facilities. Site soils suitable for stormwater infiltration were observed in our explorations but vary with depth and location. Groundwater was not observed during our site investigation in August 2017 to a maximum depth of 16.3 ft bgs. Groundwater levels in the project area are expected to fluctuate seasonally, with maximum groundwater levels occurring during the late winter and early spring months.

Long-term preliminary infiltration rates are provided in Table 5 and are based on the soil grain size infiltration rate determination methods in the Washington State Department of Ecology's *2005 Stormwater Management Manual for Western Washington* (*2005 SWMMWW*) and on the results of our laboratory tests (Appendix B). Appendix III-A of the *2005 SWMMWW* provides the method and

recommended correction factors to be used to estimate the infiltration rates. The following assumed correction factors were used to account for pond size (CFsize = 1.0), biofouling and siltation effects for ponds (CFsilt/bio = 0.9), and aspect ratio correction factor (CFaspect = 1.0). We also assumed a ponded water depth of 4 ft and a depth-to-groundwater of 20 ft. These assumptions should be verified or modified in final design to calculate final infiltration rates.

The preliminary (factored) infiltration rates using the correction factors mentioned above are provided in Table 5. The highest estimated infiltration rates are for soils located in the vicinity of test pits TP-2, TP-3, TP-6, and TP-9 site. The rates assume at least 10 ft of separation to seasonal high groundwater.

Table 5. Preliminary Factored Infiltration Rates

Exploration Designation	Preliminary Factored Infiltration Rate(inches/hour)	Depth Interval (ft)
TP-2	0.9	1.0 – 12.5
TP-3	0.7	1.5 – 13.5
TP-4	0.3	2.0 – 14.0
TP-5	0.3	1.7 – 14.0
TP-6	0.4	2.0 – 13.0
TP-6	1.0	13.0 – 15.0
TP-9	1.8	2.5 – 14.0
TP-10	0.3	0.75 – 10.0
TP-10	0.1	10.0 – 14.0

ft = feet
TP = test pit

It is our opinion that the collection of seasonal high groundwater information is not warranted, given the site conditions. Final design infiltration rates should be confirmed by pilot infiltration test (PIT) evaluations at the specific locations and depths of the proposed facilities. Typically, the infiltration rates provided in Table 5 can be increased through the completion of onsite infiltration testing.

A roundabout is planned west of the site, at the intersection of Log Yard Road and State Highway 3. Soils in this area are mapped as ice-contact deposits. Because subsurface conditions are similar in both areas, site infiltration rates were extrapolated to the proposed roundabout location. We recommend a preliminary infiltration rate of 1 inch per hour for clean sand (SP, SW) and gravels (GP, GW). For silty sands (SP-SM, SW-SM, SM) and gravel with silt (GP-GM, GW-GM), we recommend a preliminary infiltration rate of 0.4 inches per hour. For predominantly silty soils (ML), we recommend a preliminary infiltration rate of 0.1 inch per hour. Compost-amended vegetated filter strips (CAVFS) are proposed for stormwater treatment.

4.0 CONSTRUCTION SUPPORT

Landau Associates, Inc. (LAI) should be asked to review the geotechnical portions of the plans and specifications for the proposed project in advance of project bidding. The purpose of the review is to verify that the recommendations presented in this geotechnical report have been properly interpreted and implemented in the design and project specifications.

We recommend that monitoring, testing, and consultation be provided during construction to confirm that the conditions observed are consistent with those indicated by our explorations, to provide expedient recommendations should conditions be revealed during construction that differ from those anticipated, and to evaluate whether geotechnical activities comply with the project plans, specifications, and the recommendations contained in this report. Such geotechnical activities include but are not limited to observation of foundation subgrades, compaction testing of structural fill, and observation of the prepared slab and pavement subgrades. The purpose of these services would be to observe compliance with the design concepts, specifications, and recommendations in this report. In the event subsurface conditions differ from those anticipated before the start of construction, LAI can provide revised recommendations appropriate to the conditions revealed during construction. LAI would be pleased to provide these services for you.

5.0 USE OF THIS REPORT

Landau Associates, Inc. prepared this report for the exclusive use of Mason Transit Authority and SCJ Alliance for the proposed Belfair Park and Ride Improvements project, located southeast of the intersection of Log Yard Road and State Highway 3 near Belfair, Washington. Within the limitations of scope, schedule, and budget, our services have been conducted in accordance with generally accepted practices of the geotechnical engineering profession; no other warranty, express or implied, is made as to the professional advice included in this report.

The conclusions and recommendations contained in this report are based on the conditions observed/interpreted in the explorations advanced for this study and on our experience in the project area. There may be some variation in subsurface soil and groundwater conditions, and the nature and extent of the variations may not become evident until construction. Accordingly, a contingency for unanticipated conditions should be included in the construction budget and schedule.

If variations in subsurface conditions are encountered during construction, LAI should be notified for review of the recommendations in this report and revision of such if necessary. If there is a substantial lapse of time between submission of this report and the start of construction, we recommend that we review this report to determine the applicability of the conclusions and recommendations contained herein.

We appreciate the opportunity to be of service to you on this project. Please contact us at (360) 791-3178 if you have questions or require additional information.

6.0 REFERENCES

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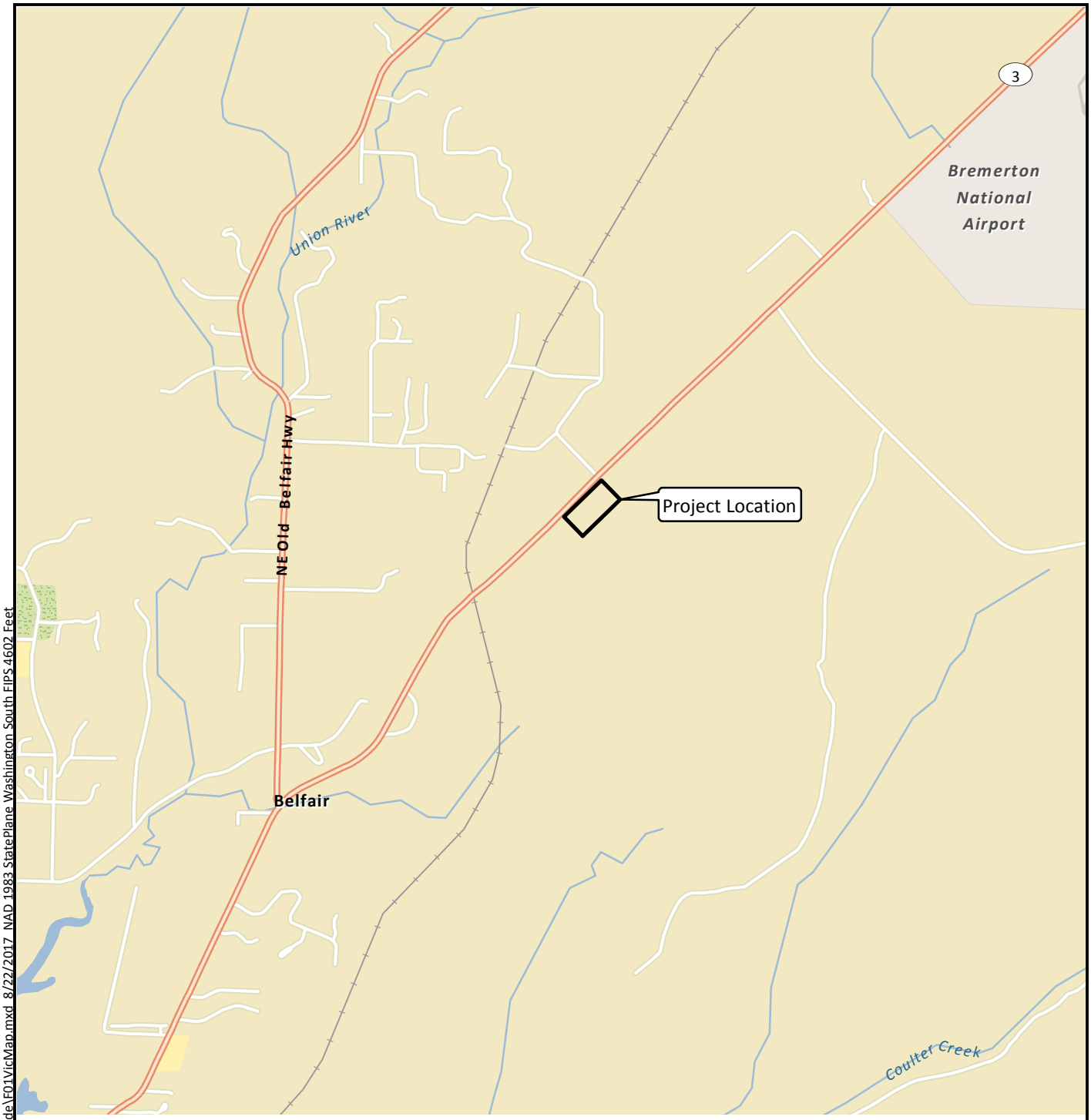

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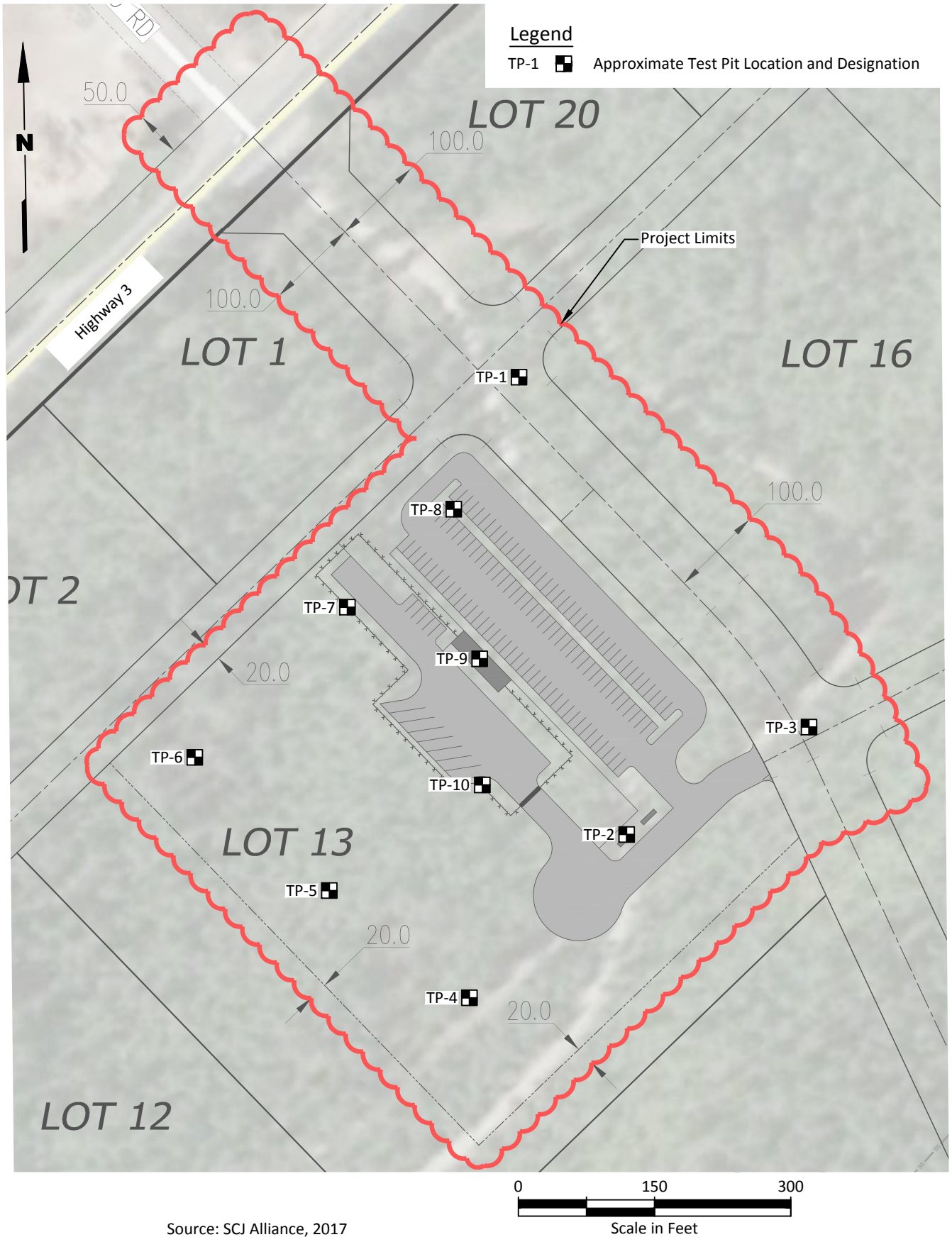
Mason Transit Authority Park and Ride Improvements Belfair Site Belfair, Washington	**Vicinity Map**	Figure 1



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Mason Transit Authority Park and Ride Improvements Belfair Site Belfair, Washington	**Site and Exploration Location Plan**	Figure 2

APPENDIX A

Field Explorations

APPENDIX A
FIELD EXPLORATIONS

Subsurface conditions at the site were explored on August 15, 2017 by advancing 10 test pits (TP-1 through TP-10) 12.5 to 16.3 feet below ground surface. The approximate locations of the explorations are shown on Figure 2. The test pits were advanced by Howard's Construction & Excavating of Olympia, Washington, under subcontract to Landau Associates, Inc. (LAI).

The field explorations were coordinated and monitored by LAI personnel, who also obtained representative soil samples, maintained a detailed record of the subsurface soil and groundwater conditions observed, and described the soil encountered by visual and textural examination. In general accordance with ASTM International test method D2488, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*, each representative soil type observed was described using the soil classification system shown on Figure A-1. Logs of the explorations are presented on Figures A-2 through A-6. These logs represent LAI's interpretation of subsurface conditions identified during the field explorations. The stratigraphic contacts shown on the individual logs represent the approximate boundaries between soil types; actual transitions may be more gradual. A further discussion of the soil and groundwater conditions observed is contained in the main text of this report.

Samples obtained from the test pits were taken to LAI's soils laboratory for further examination and testing. The test results and a discussion of the testing procedures are presented in Appendix B. Upon completion of excavation and sampling, the test pits were backfilled with the excavated material. The backfill material was compacted using the bucket of the backhoe.

Soil Classification System

MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL[1]	TYPICAL DESCRIPTIONS [2][3]
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
				GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
				GC	Clayey gravel; gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
				SP	Poorly graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SM	Silty sand; sand/silt mixture(s)
				SC	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL			PT	Peat; humus; swamp soil with high organic content

OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT		AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK		RK	Rock (See Rock Classification)
WOOD		WD	Wood, lumber, wood chips
DEBRIS		DB	Construction debris, garbage

Notes:
1. USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the Standard Test Method for Classification of Soils for Engineering Purposes, as outlined in ASTM D 2487.
3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:

Primary Constituent:	> 50% - "GRAVEL," "SAND," "SILT," "CLAY," etc.
Secondary Constituents:	> 30% and ≤ 50% - "very gravelly," "very sandy," "very silty," etc.
	> 15% and ≤ 30% - "gravelly," "sandy," "silty," etc.
Additional Constituents:	> 5% and ≤ 15% - "with gravel," "with sand," "with silt," etc.
	≤ 5% - "with trace gravel," "with trace sand," "with trace silt," etc., or not noted.

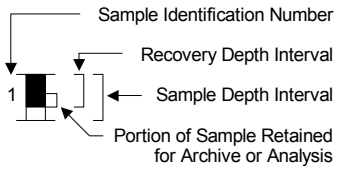
4. Soil density or consistency descriptions are based on judgement using a combination of sampler penetration blow counts, drilling or excavating conditions, field tests, and laboratory tests, as appropriate.

Drilling and Sampling Key

SAMPLER TYPE

Code	Description
a	3.25-inch O.D., 2.42-inch I.D. Split Spoon
b	2.00-inch O.D., 1.50-inch I.D. Split Spoon
c	Shelby Tube
d	Grab Sample
e	Single-Tube Core Barrel
f	Double-Tube Core Barrel
g	2.50-inch O.D., 2.00-inch I.D. WSDOT
h	3.00-inch O.D., 2.375-inch I.D. Mod. California
i	Other - See text if applicable
1	300-lb Hammer, 30-inch Drop
2	140-lb Hammer, 30-inch Drop
3	Pushed
4	Vibrocore (Rotosonic/Geoprobe)
5	Other - See text if applicable

SAMPLE NUMBER & INTERVAL



Field and Lab Test Data

Code	Description
PP = 1.0	Pocket Penetrometer, tsf
TV = 0.5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No. 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate figure for data
GT	Other Geotechnical Testing
CA	Chemical Analysis

Groundwater

▽ Approximate water level at time of drilling (ATD)

▼ Approximate water level at time other than ATD

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Mason Transit Authority
Park and Ride Improvements
Belfair Site
Belfair, Washington

Soil Classification System and Key

Figure A-1

TP- 1

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Excavator Ground Elevation (ft): Not Measured Logged By: BJM	
0						SM	Brown, silty, fine to coarse SAND with gravel and organics (medium dense, dry to moist)	Groundwater not encountered.
						SP-SM	**(TOPSOIL)**	
5		S-1	d				Brown, fine to coarse SAND with gravel and silt (medium dense, moist)	
							(ICE CONTACT)	
10		S-2	d				-Grades to light brown and dense at 2.5 ft bgs	
		S-2	d					
15		S-4	d			GP	Light brown, sandy, fine to coarse GRAVEL with cobbles (dense, moist)	
20								

Test Pit Completed 08/15/17
Total Depth of Test Pit = 15.5 ft.

TP- 2

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Excavator Ground Elevation (ft): Not Measured Logged By: BJM	
0						SM	6 inches of forest duff	Groundwater not encountered.
						SP-SM	**(FOREST DUFF)**	
5		S-1	d	W = 4 GS			Brown, silty, fine to coarse SAND with organics (loose, dry to moist)	
		S-2	d				**(TOPSOIL)**	
10		S-3	d				Brown, gravelly, fine to coarse SAND with silt (dense, moist)	
							(ICE CONTACT)	
15							-Grades to gray at 5.5 ft bgs	
20								

Test Pit Completed 08/15/17
Total Depth of Test Pit = 12.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Mason Transit Authority
Park and Ride Improvements
Belfair Site
Belfair, Washington

Log of Test Pits

Figure
A-2

TP- 3

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Excavator Ground Elevation (ft): Not Measured Logged By: BJM	
0						SM	6 inches of forest duff **(FOREST DUFF)**	Groundwater not encountered.
						SP-SM	Brown, silty, fine to coarse SAND with gravel (loose, dry to moist) **(TOPSOIL)**	
5		S-1	d	W = 3 GS			Gray, very gravelly, fine to coarse SAND with silt and cobbles (dense, moist) **(ICE CONTACT)**	
		S-2	d				-Grades to very dense at 8 ft bgs	
10		S-3	d				-Grades to gravelly at 11 ft bgs	
15								
20								

Test Pit Completed 08/15/17
Total Depth of Test Pit = 13.5 ft.

TP- 4

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Excavator Ground Elevation (ft): Not Measured Logged By: BJM	
0						SM	12 inches of forest duff **(FOREST DUFF)**	Groundwater not encountered.
						SP-SM	Brown, silty, fine to coarse SAND with gravel and organics (loose, dry to moist) **(TOPSOIL)**	
5		S-1	d				Brown, very gravelly, fine to coarse SAND with silt and cobbles (dense, moist) **(ICE CONTACT)**	
		S-2	d	W = 5 GS			-Grades to gray at 3.5 ft bgs	
10		S-3	d	W = 6 GS		SM	-Grades to light brown and very dense at 6 ft bgs	
		S-4	d				Light brown, silty, very gravelly, fine to coarse SAND with cobbles (very dense, moist)	
15								
20								

Test Pit Completed 08/15/17
Total Depth of Test Pit = 14.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Mason Transit Authority
Park and Ride Improvements
Belfair Site
Belfair, Washington

Log of Test Pits

Figure
A-3

TP- 5

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Excavator Ground Elevation (ft): Not Measured Logged By: BJM	
0						SM	8 inches of forest duff **(FOREST DUFF)**	Groundwater not encountered.
		S-1	d	W = 6 GS		SM	Brown, silty, fine to coarse SAND with gravel and organics (loose, dry to moist) **(TOPSOIL)**	
5		S-2	d	W = 6 GS			Light reddish brown, silty, very gravelly, fine to coarse SAND (dense, moist) **(ICE CONTACT)** -Grades to gray and gravelly at 5 ft bgs -Grades to with cobbles at 7.5 ft bgs	
10		S-3	d					
15								
20								

Test Pit Completed 08/15/17
Total Depth of Test Pit = 14.0 ft.

TP- 6

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Excavator Ground Elevation (ft): Not Measured Logged By: BJM	
0						SM	6 inches of forest duff **(FOREST DUFF)**	Groundwater not encountered.
		S-1	d			GP-GM	Brown, silty, fine to coarse SAND with gravel and organics (loose, dry to moist) **(TOPSOIL)**	
5		S-2	d	W = 6 GS			Brown, very sandy, fine to coarse GRAVEL with silt (very dense, moist) **(ICE CONTACT)** -Grades to gray at 6 ft bgs	
10		S-3	d			GP	Gray, very sandy, fine to coarse GRAVEL (dense, moist)	
15		S-4	d	W = 4 GS		GP-GM	Gray, very sandy, fine to coarse GRAVEL with silt (dense, moist)	
20								

Test Pit Completed 08/15/17
Total Depth of Test Pit = 16.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

LANDAU ASSOCIATES

Mason Transit Authority
Park and Ride Improvements
Belfair Site
Belfair, Washington

Log of Test Pits

Figure
A-4

TP- 7

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Excavator Ground Elevation (ft): Not Measured Logged By: BJM	
0						SM	6 inches of forest duff **(FOREST DUFF)**	Groundwater not encountered.
		S-1	d			SP-SM	Brown, silty, fine to coarse SAND with gravel and organics (loose, dry to moist) **(TOPSOIL)**	
5							Gray, fine to coarse SAND with gravel and silt (dense, moist)	
		S-2	d			GP	**(ICE CONTACT)**	
10							Light brown, sandy, fine to coarse GRAVEL (dense, moist)	
		S-3	d					
15								
20								

Test Pit Completed 08/15/17
Total Depth of Test Pit = 15.0 ft.

TP- 8

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Excavator Ground Elevation (ft): Not Measured Logged By: BJM	
0						SM	6 inches of forest duff **(FOREST DUFF)**	Groundwater not encountered.
		S-1	d			SP-SM	Brown, silty, fine to coarse SAND with gravel and organics (loose, dry to moist) **(TOPSOIL)**	
5							Light brown, gravelly, fine to coarse SAND with silt (very dense, moist)	
						SP	**(ICE CONTACT)**	
10		S-2	d				Brown to gray, fine to coarse SAND with gravel (dense, moist) -Grades to with cobbles at 10 ft bgs	
		S-3	d					
15								
20								

Test Pit Completed 08/15/17
Total Depth of Test Pit = 15.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Mason Transit Authority
Park and Ride Improvements
Belfair Site
Belfair, Washington

Log of Test Pits

Figure
A-5

TP- 9

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Excavator Ground Elevation (ft): Not Measured Logged By: BJM	
0						SM	12 inches of forest duff **(FOREST DUFF)**	Groundwater not encountered.
5		S-1	d	W = 3 GS		GW	Brown, silty, fine to coarse SAND with gravel and organics (medium dense, dry to moist) **(TOPSOIL)**	
10		S-2	d				Light brown, very sandy, fine to coarse GRAVEL (very dense, moist) **(ICE CONTACT)** -Grades to brown to gray, with cobbles, and dense at 8.5 ft bgs	
15		S-3	d			SP-SM	Brown, gravelly, fine to coarse SAND with silt (dense, moist)	
20								

Test Pit Completed 08/15/17
Total Depth of Test Pit = 16.3 ft.

TP-10

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Excavator Ground Elevation (ft): Not Measured Logged By: BJM	
0						SM	3 inches of forest duff **(FOREST DUFF)**	Groundwater not encountered.
5		S-1	d	W = 5 GS		SP-SM	Brown, silty, fine to coarse SAND with gravel and organics (loose, dry to moist) **(TOPSOIL)**	
10		S-2	d			SP	Brown, very gravelly, fine to coarse SAND with silt (dense, moist) **(ICE CONTACT)**	
15		S-3	d			SM	Gray, fine to coarse SAND with gravel (dense, moist)	
20		S-4	d			ML	Gray, silty, fine to coarse SAND with gravel (dense, moist)	
		S-5	d			SP	Gray, sandy SILT (hard, moist) Gray, fine to coarse SAND with gravel and trace silt (dense, moist)	

Test Pit Completed 08/15/17
Total Depth of Test Pit = 14.8 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Mason Transit Authority
Park and Ride Improvements
Belfair Site
Belfair, Washington

Log of Test Pits

Figure
A-6

APPENDIX B

Laboratory Testing

APPENDIX B
LABORATORY TESTING

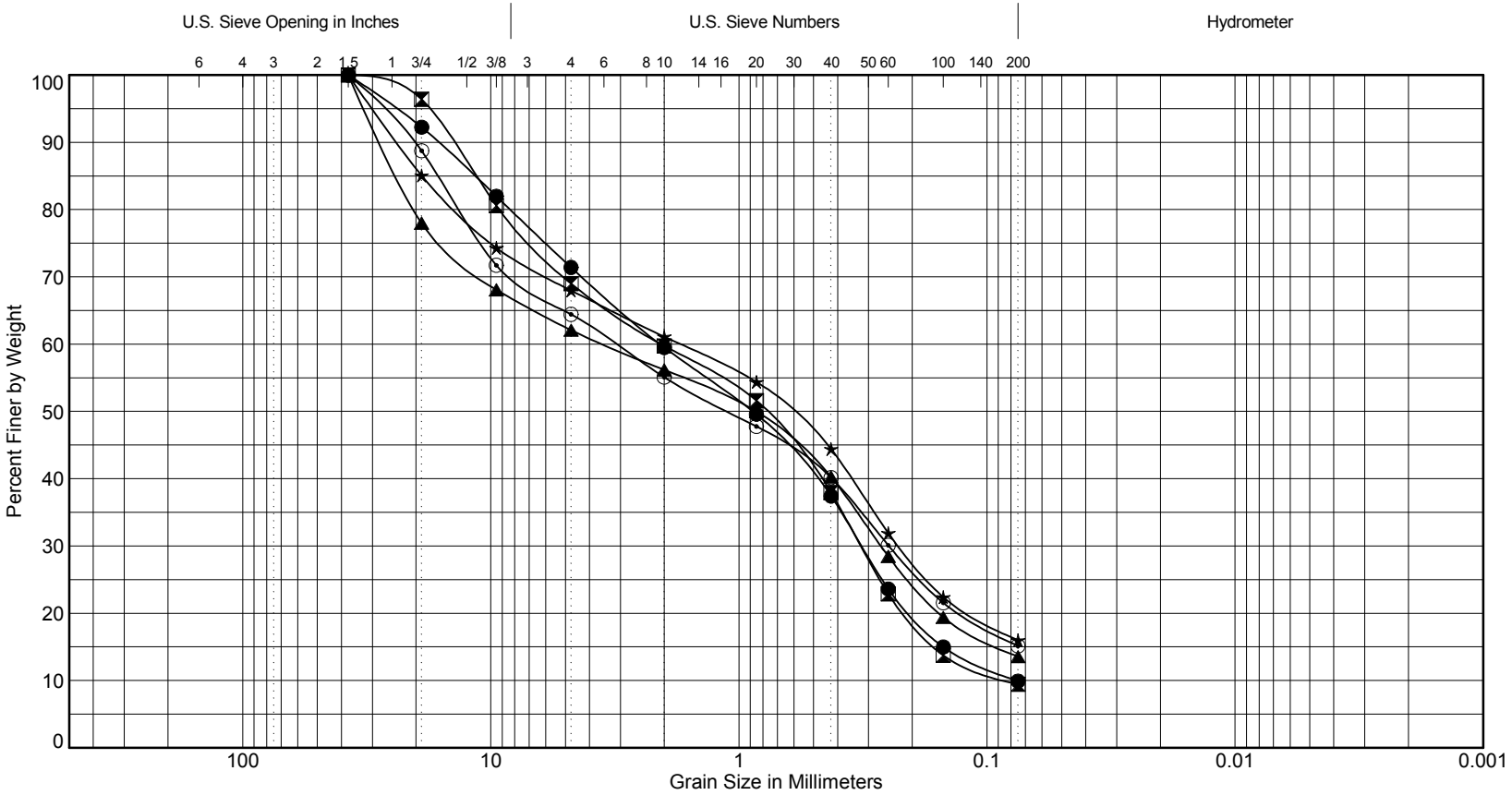
Natural moisture content determinations and grain size analyses were performed on select samples to facilitate soil classification and estimation of infiltration rates. Laboratory testing was performed in general accordance with the ASTM International (ASTM) standard test methods described below. The field log descriptions were checked against the samples and updated where appropriate in general accordance with ASTM standard test method D2487, *Standard Practice for Classification of Soils for Engineering Purposes.*

Natural Moisture Content

In general accordance with ASTM standard test method D2216, natural moisture content determinations were performed on select soil samples. The natural moisture content is shown as W = xx (i.e., percentage of dry weight) at the respective sample depth in the column labeled "Test Data" on the summary exploration logs presented in Appendix A.

Grain Size Analyses

To provide an indication of the grain size distribution of site soil, grain size analyses were conducted on representative soil samples. Analyses were performed in accordance with ASTM standard test method D422. Samples selected for grain size analyses are designated with a "GS" in the column labeled "Test Data" on the summary exploration logs in Appendix A. The results of the grain size analyses are presented in the form of grain size distribution curves on Figures B-1 and B-2 in this appendix.



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Exploration Number	Sample Number	Depth (ft)	Natural Moisture (%)	Soil Description	Unified Soil Classification
●	TP- 2	S-1	3.5	4	Gravelly, fine to coarse SAND with silt	SP-SM
⧓	TP- 3	S-1	4.0	3	Very gravelly, fine to coarse SAND with silt	SP-SM
▲	TP- 4	S-2	6.0	5	Very gravelly, fine to coarse SAND with silt	SP-SM
★	TP- 4	S-3	11.0	6	Silty, very gravelly, fine to coarse SAND	SM
⊙	TP- 5	S-1	3.0	6	Silty, very gravelly, fine to coarse SAND	SM

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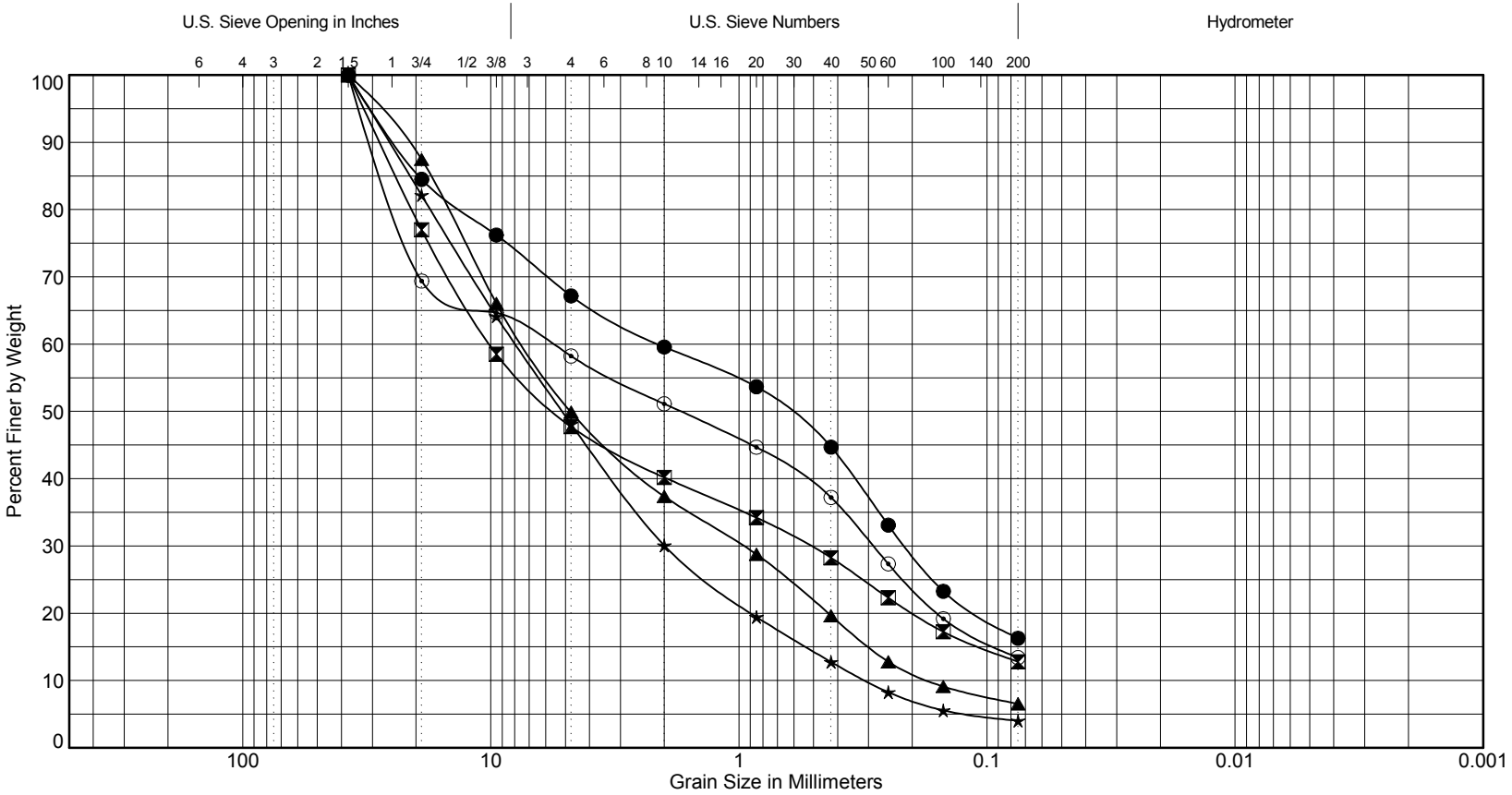
Park and Ride Improvements
Belfair Site
Belfair, Washington

Grain Size Distribution

Figure
B-1



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Exploration Number	Sample Number	Depth (ft)	Natural Moisture (%)	Soil Description	Unified Soil Classification
●	TP- 5	S-2	7.5	6	Silty, very gravelly, fine to coarse SAND	SM
⊠	TP- 6	S-2	6.0	6	Very sandy, fine to coarse GRAVEL with silt	GP-GM
▲	TP- 6	S-4	15.5	4	Very sandy, fine to coarse GRAVEL with silt	GP-GM
★	TP- 9	S-1	4.0	3	Very sandy, fine to coarse GRAVEL	GW
⊙	TP-10	S-1	2.5	5	Very gravelly, fine to coarse SAND with silt	SP-SM

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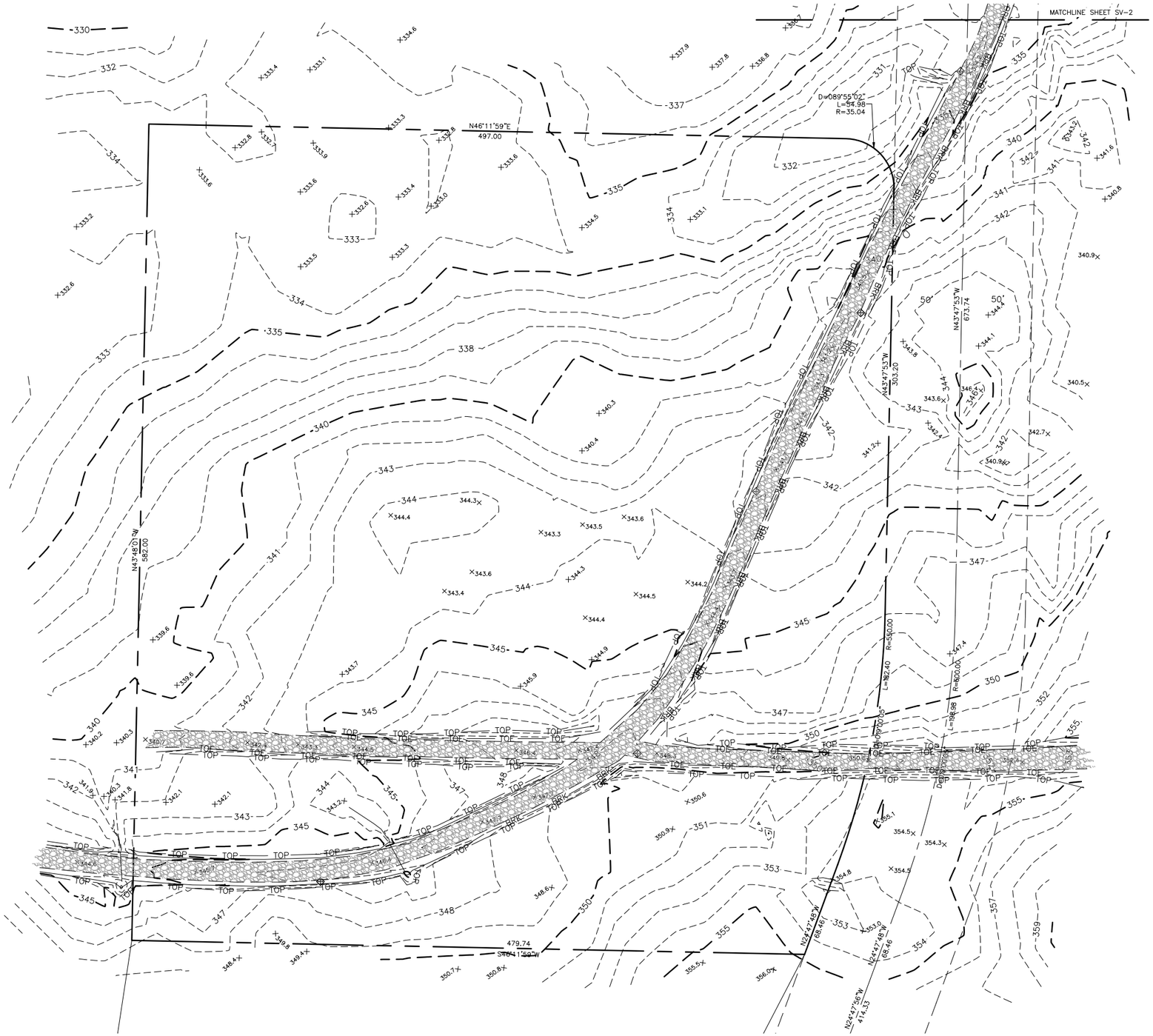
Mason Transit Authority
Park and Ride Improvements
Belfair Site
Belfair, Washington

Grain Size Distribution

Figure
B-2

MASON TRANSIT AUTHORITY
MTA – BELFAIR PARK AND RIDE PROJECT

Site Survey



LEGAL DESCRIPTION

PARCEL 1:
ALL THAT PORTION OF THE EAST HALF (E ½) OF THE SOUTHEAST QUARTER (SE ¼) OF SECTION TWENTYONE (21), TOWNSHIP TWENTYTHREE (23) NORTH, RANGE ONE (1) WEST, W.M., PARTICULARLY DESCRIBED AS FOLLOWS:
COMMENCING AT THE SOUTHEASTERLY CORNER OF SAID SECTION TWENTYONE (21); THENCE NORTH 00°09'15" EAST, ALONG THE EAST LINE OF SAID SECTION TWENTYONE (21), 811.29 FEET; THENCE NORTH 62°45'41" WEST, 5.58 FEET, TO THE BEGINNING OF A CURVE, CONCAVE TO THE NORTHEAST, HAVING A RADIUS OF 500.00 FEET; THENCE WESTERLY, ALONG SAID CURVE, THROUGH A CENTRAL ANGLE OF 37°45'47", FOR AN ARC DISTANCE OF 329.54 FEET; THENCE NORTH 24°59'55" WEST, 414.33 FEET, TO A POINT HEREINAFTER REFERRED TO AS "POINT A"; THENCE SOUTH 65°00'05" WEST, 50.00 FEET, TO THE POINT OF BEGINNING OF THE TRACT OF LAND HEREBY DESCRIBED; THENCE SOUTH 46°00'00" WEST, 479.74 FEET; THENCE NORTH 44°00'00" WEST, 582.00 FEET; THENCE NORTH 46°00'00" EAST, 497.00 FEET, TO THE BEGINNING OF A CURVE, CONCAVE TO THE SOUTH, HAVING A RADIUS OF 35.00 FEET; THENCE EASTERLY, ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 90°00'00, FOR AN ARC DISTANCE OF 54.98 FEET; THENCE SOUTH 44°00'00" EAST, 303.19 FEET, TO THE BEGINNING OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 550.00 FEET; THENCE SOUTHERLY, ALONG SAID CURVE, THROUGH A CENTRAL ANGLE OF 19°00'05", FOR AN ARC DISTANCE OF 182.40 FEET; THENCE SOUTH 24°59'55" EAST, 68.46 FEET, TO THE POINT OF BEGINNING.
PORTION OF PARCEL NOS. 12321 41 00000 AND 12321 44 00000

PARCEL 2:
AN EASEMENT FOR INGRESS, EGRESS AND UTILITIES, OVER, UNDER AND ACROSS THAT PORTION OF THE EAST HALF (E ½) OF THE SOUTHEAST QUARTER (SE ¼) OF SECTION TWENTYONE (21), TOWNSHIP TWENTYTHREE (23) NORTH, RANGE ONE (1) WEST, W.M., LYING 50.00 FEET ON EACH SIDE OF A CENTERLINE, PARTICULARLY DESCRIBED AS FOLLOWS:
BEGINNING AT "POINT A" AS REFERENCED IN THE ABOVE PARCEL 1; THENCE NORTH 24°59'55" WEST, 68.46 FEET, TO THE BEGINNING OF A CURVE, CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 600.00 FEET; THENCE NORTHERLY, ALONG SAID CURVE, THROUGH A CENTRAL ANGLE OF 19°00'05", FOR AN ARC DISTANCE OF 198.98 FEET; THENCE NORTH 44°00'00" WEST, 673.76 FEET, MORE OR LESS, TO THE SOUTHEASTERLY RIGHT-OF-WAY LINE OF STATE ROUTE 3, AND THE TERMINUS OF THE HEREIN DESCRIBED CENTERLINE.

N

0' 40' 80'

SCALE 1" = 40'

LINE TYPES

- GROUND TOE
- GROUND TOP
- GROUND BREAK
- STORM LINE
- SANITARY SEWER LINE
- BURIED TELEPHONE
- OVERHEAD TELEPHONE
- BURIED POWER
- OVERHEAD POWER
- WATER LINE
- NATURAL GAS LINE
- BURIED CABLE TV LINE
- MAJOR CONTOUR
- MINOR CONTOUR

LEGEND

- BRASS CAP
- HUB AND TACK
- IRON PIPE
- PK NAIL
- REBAR AND CAP

HATCHING

- GRAVEL
- ASPHALT

LEGEND (UTILITIES)

- CABLE RISER/ PEDESTAL
- CABLE VAULT/MANHOLE
- CULVERT
- LUMINAIRE WITH ARM
- NATURAL GAS MARKER POST
- NATURAL GAS METER
- NATURAL GAS VALVE
- POWER CONDUIT
- GUY ANCHOR
- GUY POLE
- POWER JUNCTION BOX
- POWER MARKER POST
- POWER METER
- POWER POLE
- PP WITH DROP LINE
- PP WITH DROP AND LIGHT
- PP WITH DROP, LIGHT AND TRANSFORMER
- POWER TRANSFORMER
- POWER VAULT/ MANHOLE
- TELEPHONE CABINET
- TELEPHONE JUNCTION BOX
- TELEPHONE RISER
- TELEPHONE MARKER POST
- TELEPHONE VAULT/MANHOLE
- WATER AIR RELEASE VALVE
- WATER BLOW OFF
- FIRE DEPARTMENT CONNECTION
- HOSE BIB
- IRRIGATION CONTROL VALVE
- WATER MARKER POST
- WATER METER
- WATER POST INDICATOR VALVE
- SPRINKLER HEAD
- WATER VALVE
- WATER FIRE HYDRANT
- WATER VAULT/MANHOLE
- WELL
- STORM CATCH BASIN
- STORM MANHOLE
- STORM YARD DRAIN

SURVEY NOTES

1. INSTRUMENT USED: SOKKIA SRX 3 TOTAL STATION AND TOPCON GR5 GPS.
2. THIS SURVEY MEETS OR EXCEEDS THE STANDARDS OF WAC 332-130-090
3. SURVEY COMPLETED 9/28/2017
4. ALL MONUMENTS SHOWN AS FOUND VISITED 9/2017.

UTILITY NOTE

UTILITIES SHOWN HEREON ARE FROM MAPPING VISIBLE SURFACE APPURTENANCES, AND MAPPING UTILITY PAINT MARKS FROM A UTILITY LOCATING SERVICE. BURIED UTILITIES ARE ONLY SHOWN AS APPROXIMATE AND SHOULD BE VERIFIED BEFORE CONSTRUCTION.

DATUM

HORIZONTAL – WASHINGTON STATE PLANE COORDINATES, SOUTH ZONE, NAD 83/2011 BASED ON TIES TO WSDOT MON 4599.

VERTICAL – NAVD 88 BASED ON TIES TO WSDOT MONUMENT 4599, ELEVATION 298.73.

DATE	9/19/2018
SCALE	1" = 40'
M2C PROJECT NO.:	17-625
DRAWN	SEP
CHECKED	BEP
APPROVED	BEP

BLAIR E. PRIGGE
STATE OF WASHINGTON
29278
REGISTERED
PROFESSIONAL LAND SURVEYOR

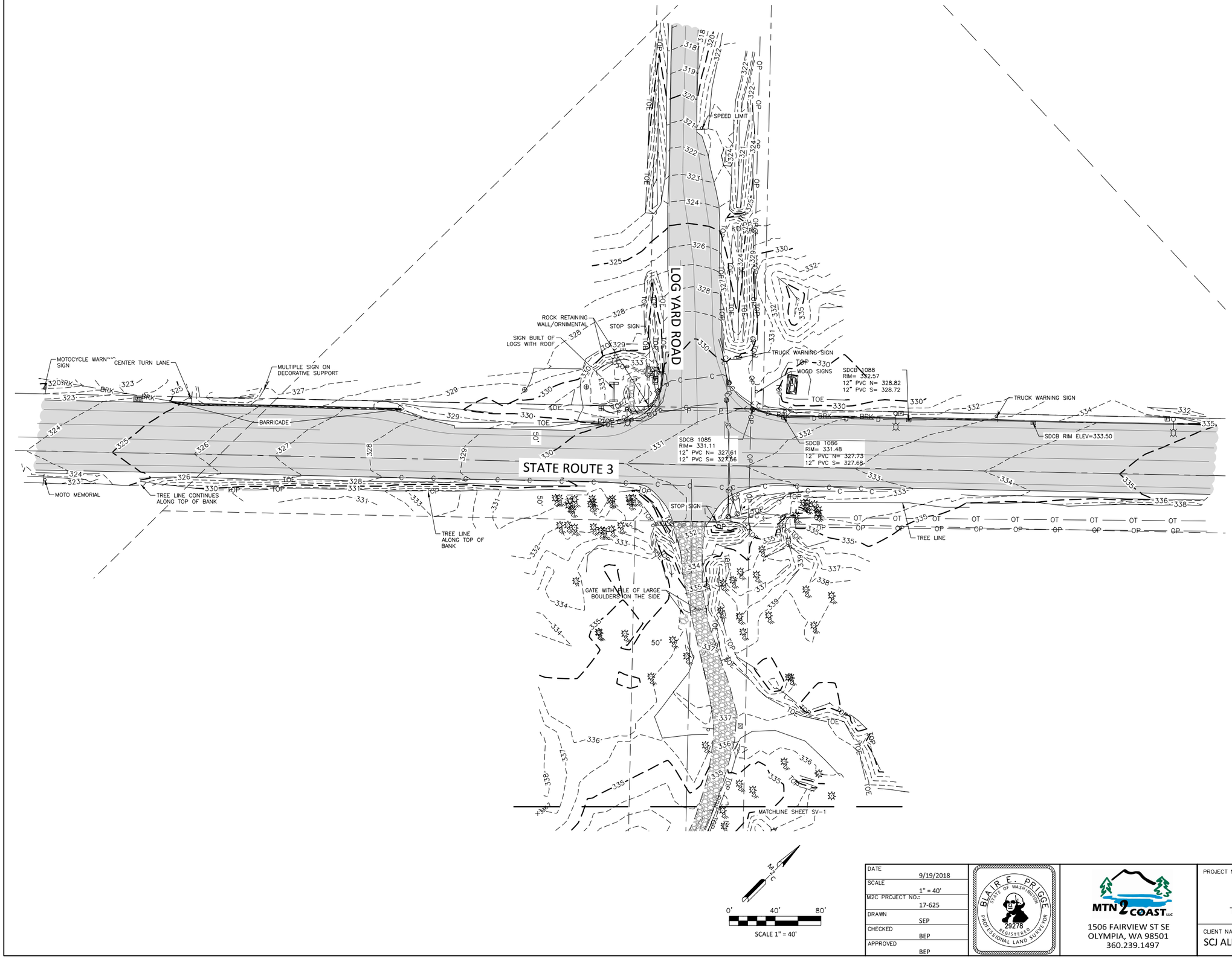
MTN 2 COAST LLC
1506 FAIRVIEW ST SE
OLYMPIA, WA 98501
360.239.1497

PROJECT NAME:
MASON TRANSIT AUTHORITY, BELFAIR TOPOGRAPHIC MAPPING

CLIENT NAME:
SCJ ALLIANCE

SHEET NAME:
SV-1

SHEET NO. 1 OF 2



DATE	9/19/2018
SCALE	1" = 40'
M2C PROJECT NO.:	17-625
DRAWN	SEP
CHECKED	BEP
APPROVED	BEP

BLAIR E. PRIGGE
STATE OF WASHINGTON
29278
REGISTERED
PROFESSIONAL LAND SURVEYOR

MTN 2 COAST LLC
1506 FAIRVIEW ST SE
OLYMPIA, WA 98501
360.239.1497

PROJECT NAME:
MASON TRANSIT AUTHORITY, BELFAIR TOPOGRAPHIC MAPPING

CLIENT NAME:
SCJ ALLIANCE

SHEET NAME:
SV-2

SHEET NO. 2 OF 2

MASON TRANSIT AUTHORITY
MTA – BELFAIR PARK AND RIDE PROJECT

Log Yard Road Roundabout Plans (For Reference Only)

T. 23 N., R. 01 W., S. 21, W.M.

BELFAIR
SR-3 AND LOG YARD ROAD INTERSECTION

BELFAIR, WASHINGTON
MASON COUNTY

OWNER/APPLICANT
MASON TRANSIT AUTHORITY
790 EAST JOHNS PRAIRIE ROAD
SHELTON, WA 98584
(360) 426-9434
CONTACT: DANETTE BRANNIN, GENERAL MANAGER

CONSULTANTS
SCJ ALLIANCE
8730 TALLON LANE NE. STE 200
LACEY, WA 98516
(360) 352-1465
CONTACT: PATRICK HOLM, P.E.

SURVEY:
MTN2COAST, LLC
1506 FAIRVIEW ST SE
OLYMPIA, WA 98501
(360) 239-1497
CONTACT: BLAIR PRIGGE, PLS., E.I.T.

UTILITIES
POWER: PUD3
(360) 432-5268
CONTACT: TOM JOHNSON

PHONE:
CENTURYLINK
(360) 478-5530
CONTACT: ROYCE KLEIN

STORMWATER:
MASON COUNTY
(360) 427-9670 EXT 769
CONTACT: LORETTA SWANSON

WATER:
BELFAIR WATER DISTRICT
(360) 275-3008
CONTACT: DALE WEBB

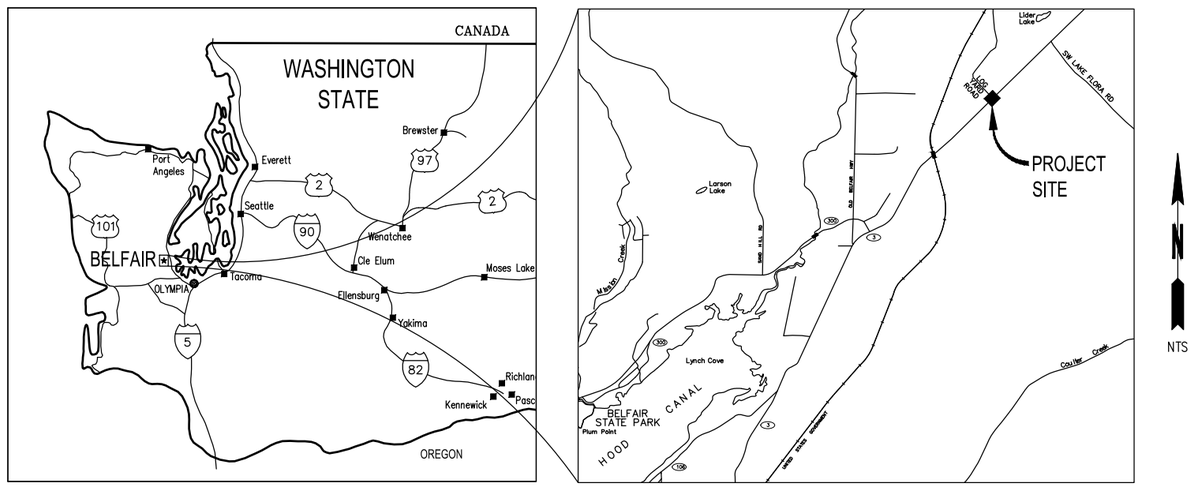
UTILITY NOTE
UTILITIES SHOWN HEREON ARE FROM MAPPING VISIBLE SURFACE APPURTENANCES, AND MAPPING UTILITY PAINT MARKS FROM A UTILITY LOCATING SERVICE. BURIED UTILITIES ARE ONLY SHOWN AS APPROXIMATE AND SHOULD BE VERIFIED BEFORE CONSTRUCTION.

NOTES
1. WORK FOR THIS PROJECT SHALL MEET OR EXCEED THE PROJECT SPECIFICATIONS AND THE 2018 WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION WHICH ARE HEREBY REFERENCED AS A PART OF THESE PLANS.

2. THE DESIGN SHOWN IS BASED UPON THE ENGINEER'S UNDERSTANDING OF THE EXISTING CONDITIONS. THE EXISTING CONDITIONS SHOWN ON THIS PLAN SET ARE BASED UPON SURVEY, PREPARED BY MTN 2 COAST LLC. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING FIELD CONDITIONS PRIOR TO BIDDING THE PROPOSED WORK IMPROVEMENTS. IF CONFLICTS ARE DISCOVERED, THE CONTRACTOR SHALL NOTIFY THE OWNER OR ENGINEER PRIOR TO INSTALLATION OF ANY PORTION OF THE WORK WHICH WOULD BE AFFECTED.

CAUTION – NOTICE TO CONTRACTOR

THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON THE PROJECT SURVEY AND OTHER RECORDS OF UTILITIES. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR SHALL CALL 811 A MINIMUM OF 48 HOURS PRIOR TO PLANNED EXCAVATION.
TO REQUEST UTILITY LOCATES, CALL OR 811.



BID PACKAGE SHEET SET

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2	AL-1	HORIZONTAL ALIGNMENT
3	AL-2	HORIZONTAL ALIGNMENT
4	RM-1	REMOVAL AND TESC PLANS
5	RM-2	REMOVAL AND TESC PLANS
6	RM-3	REMOVAL AND TESC PLANS
7	RM-4	REMOVAL AND TESC PLANS
8	RM-5	REMOVAL AND TESC PLANS
9	RM-6	EROSION CONTROL DETAILS
10	XS-1	ROADWAY TYPICAL SECTIONS
11	XS-2	ROADWAY TYPICAL SECTIONS
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16	SD-1	STORM PLAN AND PROFILE
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29	PP-1	PLAN AND PROFILE
30	PP-2	PLAN AND PROFILE
31	PP-3	PLAN AND PROFILE
32	PP-4	PLAN AND PROFILE
33	PP-5	PLAN AND PROFILE
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35	ADA-1	ACCESSIBILITY DETAIL
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38	CH-2	CHANNELIZATION AND SIGNAGE PLAN
39	CH-3	CHANNELIZATION AND SIGNAGE PLAN
40	CH-4	CHANNELIZATION AND SIGNAGE PLAN
41	CH-5	CHANNELIZATION AND SIGNAGE PLAN
42	CH-6	SIGN SPECIFICATION SHEET
43	CH-7	RECTANGULAR RAPID FLASHING BEACON (RRFB) DETAIL
44	IL-1	ILLUMINATION PLAN
45	UT-1	UTILITY RELOCATION PLAN
46	TC-01	TRAFFIC CONTROL PLAN
47	TC-02	TRAFFIC CONTROL PLAN
48	TC-03	TRAFFIC CONTROL PLAN
49	TC-04	TRAFFIC CONTROL PLAN
50	TC-05	TRAFFIC CONTROL PLAN
51	TC-06	TRAFFIC CONTROL PLAN
52	TC-07	TRAFFIC CONTROL PLAN

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738,05
DRAWING FILE No.: 0738,05-CV-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 24420 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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SCJALLIANCE.COM

PROJECT NAME:

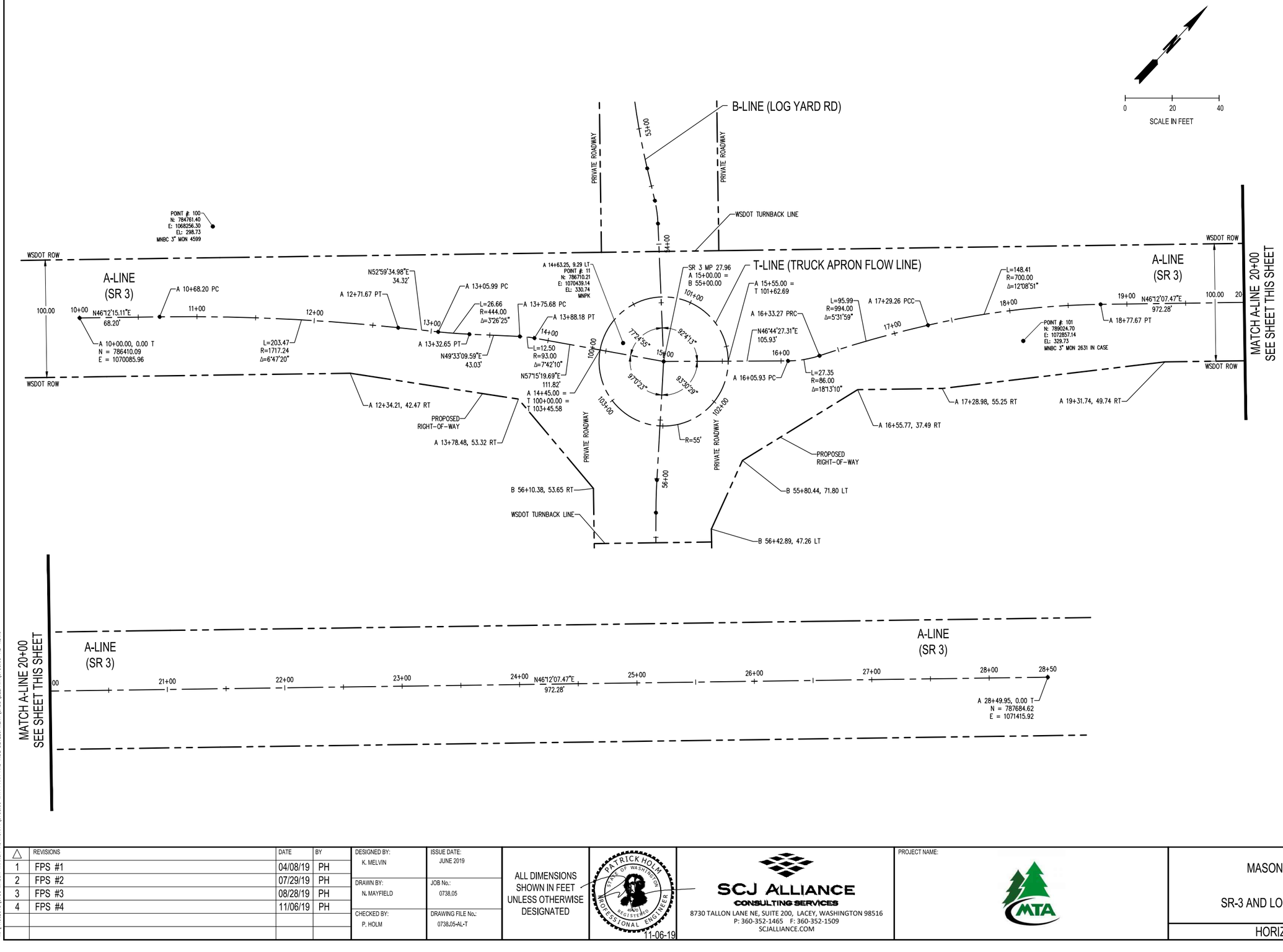
MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

COVER SHEET

DRAWING No.: CV-T
SHEET No.: 1 OF 52

T. 23 N., R. 01 W., S. 21, W.M.



ALIGNMENT LEGEND

- PROPERTY LINE/RIGHT-OF-WAY
- PROPOSED RIGHT-OF-WAY
- BRASS CAP
- SURVEY MARKER

DATUM

HORIZONTAL – WASHINGTON STATE PLANE COORDINATES, SOUTH ZONE, NAD 83/2011 BASED ON TIES TO WSDOT MON 4599.

VERTICAL – NAVD 88 BASED ON TIES TO WSDOT MONUMENT 4599, ELEVATION 298.73.

SURVEY NOTES

1. INSTRUMENT USED: SOKKIA SRX 3 TOTAL STATION AND TOPCON GR5 GPS.
2. THIS SURVEY MEETS OR EXCEEDS THE STANDARDS OF WAC 332-130-090
3. SURVEY COMPLETED 9/28/2017
4. ALL MONUMENTS SHOWN AS FOUND VISITED 9/2017.

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-AL-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 49625 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

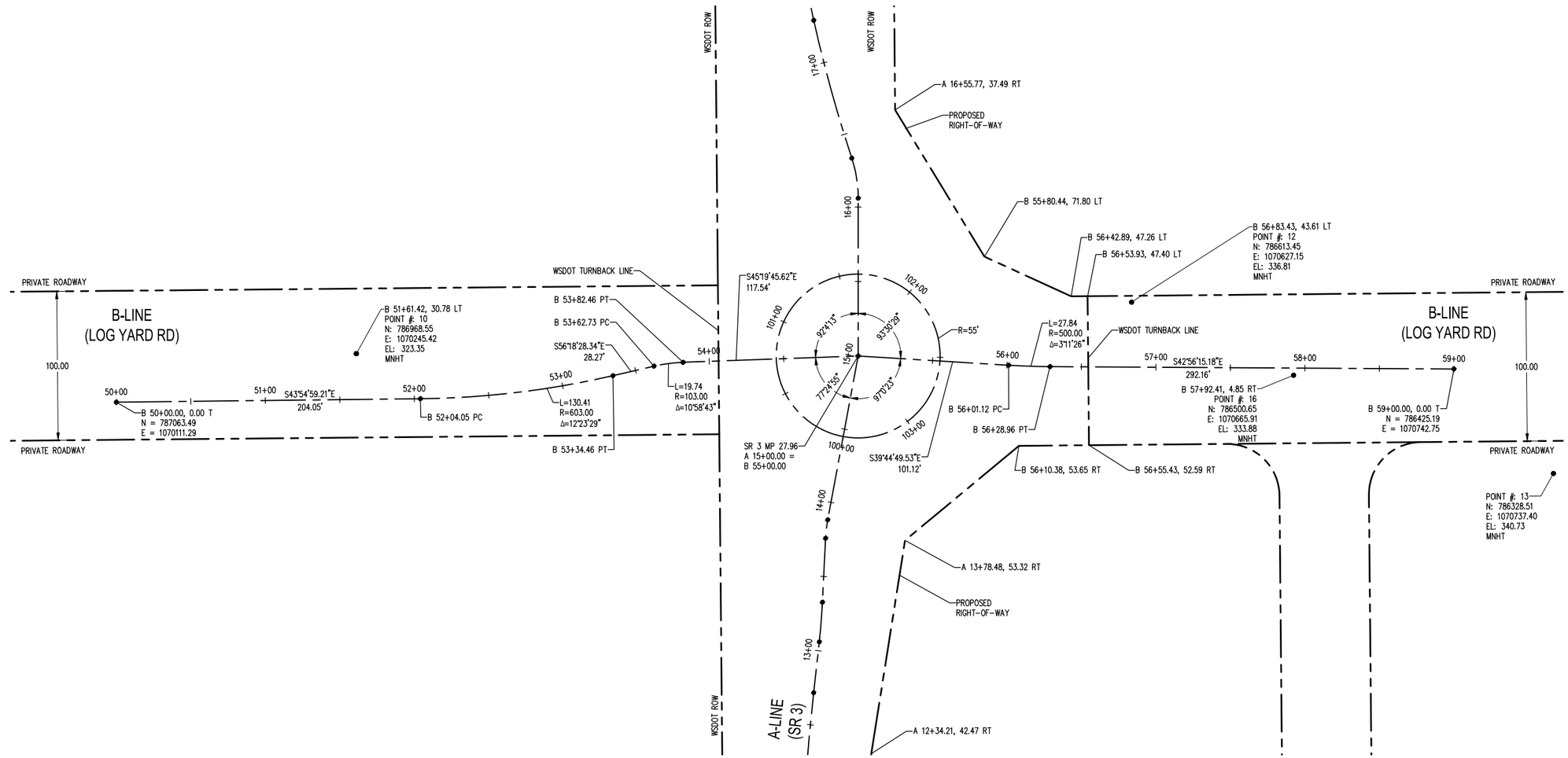
MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

HORIZONTAL ALIGNMENT

DRAWING No.: AL-1

SHEET No.: 2 OF 52

T. 23 N., R. 01 W., S. 21, W.M.



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SCALE IN FEET

ALIGNMENT LEGEND

- PROPERTY LINE/RIGHT-OF-WAY
- PROPOSED RIGHT-OF-WAY
- BRASS CAP
- SURVEY MARKER

DATUM

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VERTICAL – NAVD 88 BASED ON TIES TO WSDOT MONUMENT 4599, ELEVATION 298.73.

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2. THIS SURVEY MEETS OR EXCEEDS THE STANDARDS OF WAC 332-130-090
3. SURVEY COMPLETED 9/28/2017
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DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-AL-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 19008 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

MTA

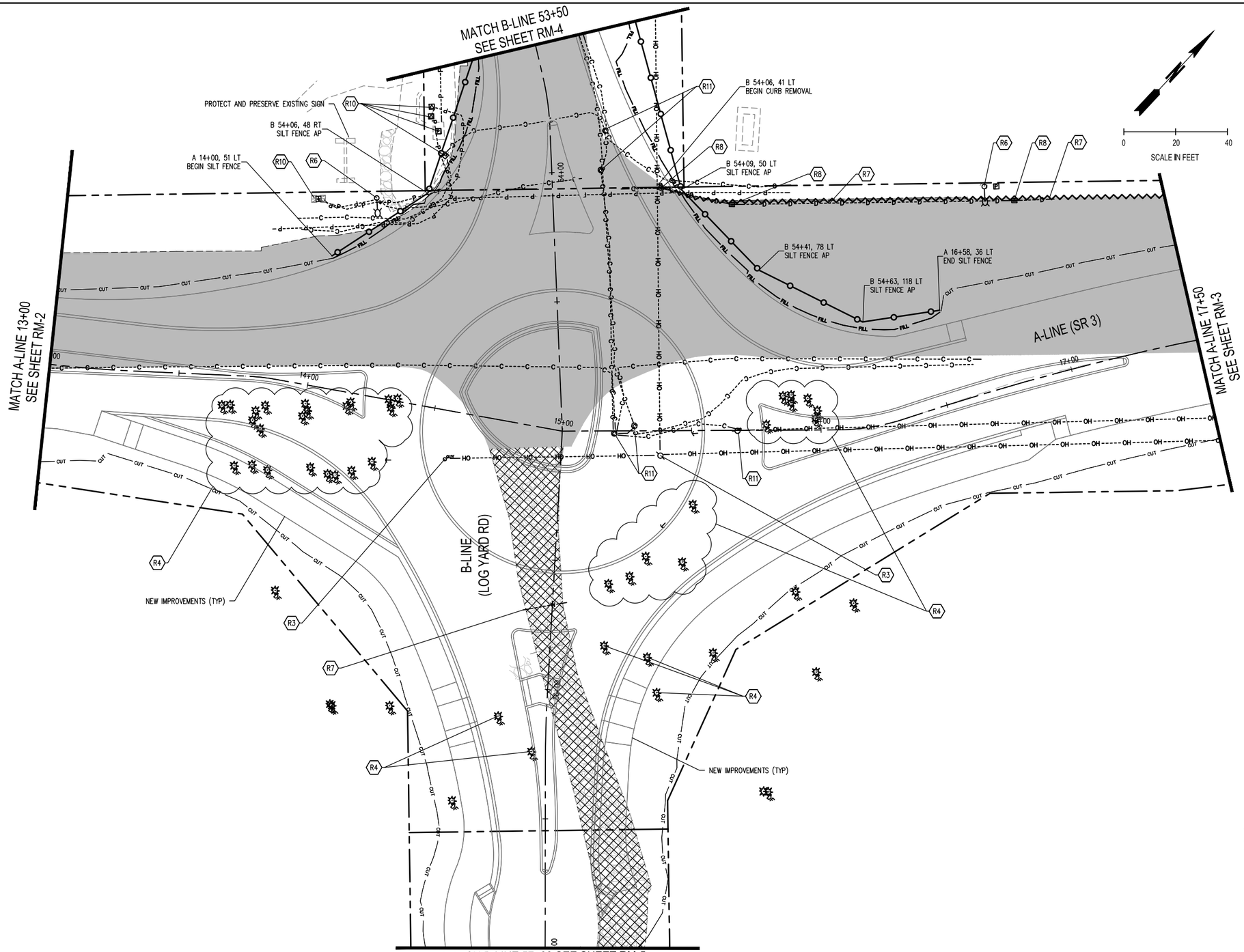
MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

HORIZONTAL ALIGNMENT

DRAWING No.: AL-2

SHEET No.: 3 OF 52

Nov 06, 2019 - 3:27:11pm - User: kono.melvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CAD\BELFAIR\0738.05-AL-T.DWG



REMOVAL LEGEND

- SAWCUT
- ASPHALT CONCRETE REMOVAL
- PLANING BITUMINOUS PAVEMENT (SEE DETAIL ON XS-1)
- GRAVEL REMOVAL
- REMOVE CURB AND GUTTER
- SILT FENCE — WSDOT STD PLAN I-30.10
- PAVEMENT MARKING REMOVAL
- CUT — CUT LINE
- FILL — FILL LINE

REMOVAL NOTES

- R1 PROTECT AND PRESERVE COMMUNICATION PEDESTAL
- R2 SEE STORM PLANS FOR CATCH BASIN ADJUSTMENT
- R3 MASON PUD 3 TO PERFORM POWER RELOCATIONS. CONTRACTOR TO NOTIFY MASON PUD 3 SIX WEEKS IN ADVANCE OF ANTICIPATED RELOCATION.
- R4 REMOVE TREE AND STUMP, BACKFILL WITH GRANULAR MATERIAL
- R5 REMOVE CURB
- R6 REMOVE LUMINAIRE. SEE SPECIAL PROVISIONS FOR SALVAGE.
- R7 REMOVE STORM DRAINAGE PIPE
- R8 PROTECT AND PRESERVE DRAINAGE STRUCTURE
- R9 PROTECT AND PRESERVE EXISTING CONCRETE JERSEY BARRIER
- R10 PROTECT AND PRESERVE POWER EQUIPMENT
- R11 CENTURYLINK TO RELOCATE/ADJUST COMMUNICATIONS FACILITIES. CONTRACTOR TO NOTIFY CENTURYLINK THREE WEEKS IN ADVANCE OF ANTICIPATED RELOCATION.

LINE TYPES

- STORM LINE
- SANITARY SEWER LINE
- BURIED TELEPHONE
- OVERHEAD TELEPHONE
- BURIED POWER
- OVERHEAD POWER
- WATER LINE
- NATURAL GAS LINE
- BURIED CABLE TV LINE

LEGEND (UTILITIES)

- CABLE RISER/ PEDESTAL
- CABLE VAULT/MANHOLE
- CULVERT
- LUMINAIRE WITH ARM
- NATURAL GAS MARKER POST
- NATURAL GAS METER
- NATURAL GAS VALVE
- POWER CONDUIT
- GUY ANCHOR
- GUY POLE
- POWER JUNCTION BOX
- POWER MARKER POST
- POWER METER
- POWER POLE
- PP WITH DROP LINE
- PP WITH DROP AND LIGHT
- PP WITH DROP, LIGHT AND TRANSFORMER
- POWER TRANSFORMER
- POWER VAULT/ MANHOLE
- TELEPHONE CABINET
- TELEPHONE JUNCTION BOX
- TELEPHONE RISER
- TELEPHONE MARKER POST
- TELEPHONE VAULT/MANHOLE
- WATER AIR RELEASE VALVE
- WATER BLOW OFF
- FIRE DEPARTMENT CONNECTION
- HOSE BIB
- IRRIGATION CONTROL VALVE
- WATER MARKER POST
- WATER METER
- WATER POST INDICATOR VALVE
- SPRINKLER HEAD
- WATER VALVE
- WATER FIRE HYDRANT
- WATER VAULT/MANHOLE
- WELL
- STORM CATCH BASIN
- STORM MANHOLE
- STORM YARD DRAIN

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-RM-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 19008 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

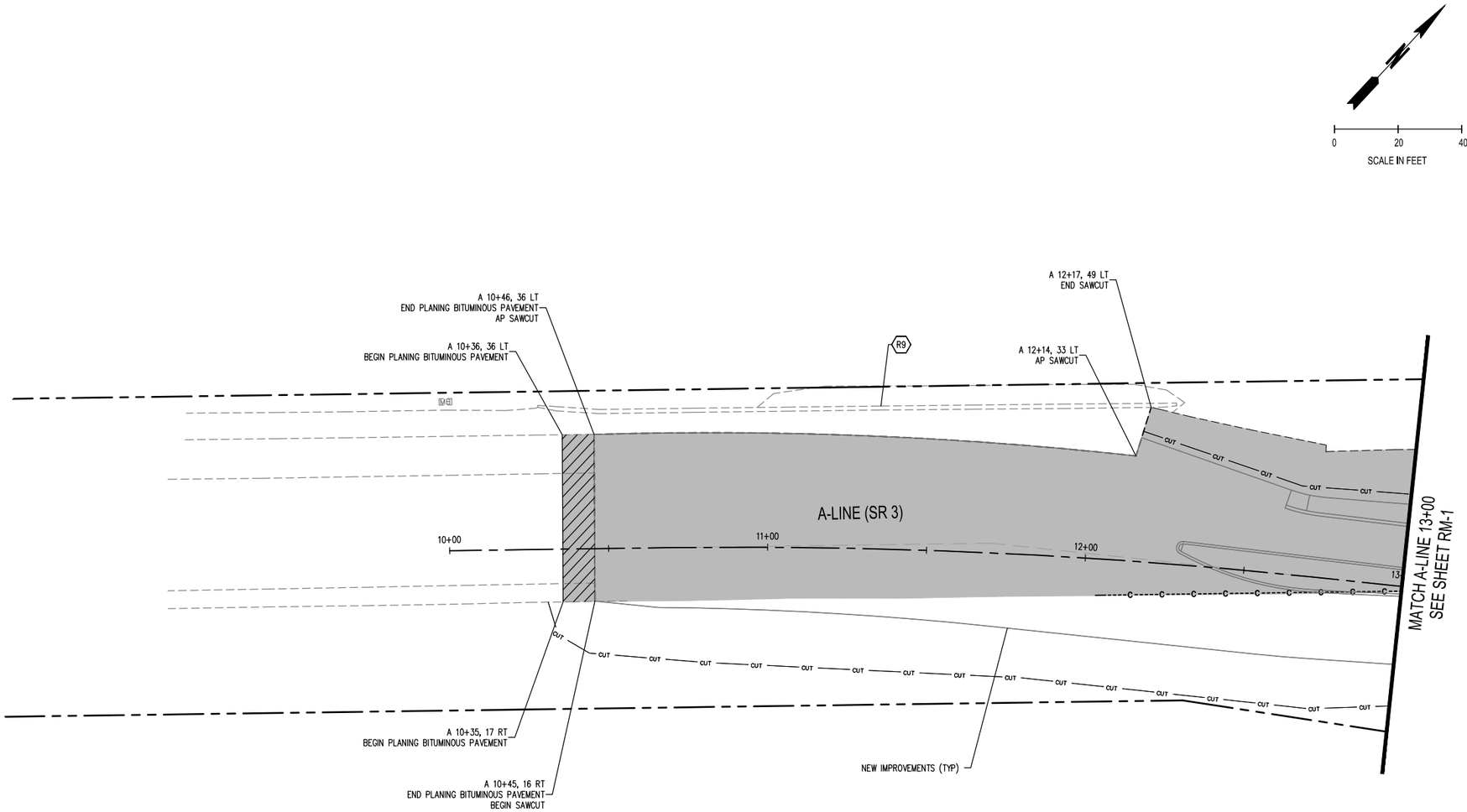
MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

REMOVAL AND TESC PLANS

DRAWING No.: RM-1
SHEET No.: 4 OF 52

Nov 06, 2019 - 3:27:35pm - User: kono.melvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05-RM-T.DWG



REMOVAL LEGEND

- SAWCUT
- ASPHALT CONCRETE REMOVAL
- PLANING BITUMINOUS PAVEMENT (SEE DETAIL ON XS-1)
- GRAVEL REMOVAL
- REMOVE CURB AND GUTTER
- SILT FENCE — WSDOT STD PLAN I-30.10
- PAVEMENT MARKING REMOVAL
- CUT — CUT LINE
- FILL — FILL LINE

REMOVAL NOTES

- R1 PROTECT AND PRESERVE COMMUNICATION PEDESTAL
- R2 SEE STORM PLANS FOR CATCH BASIN ADJUSTMENT
- R3 MASON PUD 3 TO PERFORM POWER RELOCATIONS. CONTRACTOR TO NOTIFY MASON PUD 3 SIX WEEKS IN ADVANCE OF ANTICIPATED RELOCATION.
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- R10 PROTECT AND PRESERVE POWER EQUIPMENT
- R11 CENTURYLINK TO RELOCATE/ADJUST COMMUNICATIONS FACILITIES. CONTRACTOR TO NOTIFY CENTURYLINK THREE WEEKS IN ADVANCE OF ANTICIPATED RELOCATION.

LINE TYPES

- STORM LINE
- SANITARY SEWER LINE
- BURIED TELEPHONE
- OVERHEAD TELEPHONE
- BURIED POWER
- OVERHEAD POWER
- WATER LINE
- NATURAL GAS LINE
- BURIED CABLE TV LINE

LEGEND (UTILITIES)

- CABLE RISER/ PEDESTAL
- CABLE VAULT/MANHOLE
- CULVERT
- LUMINAIRE WITH ARM
- NATURAL GAS MARKER POST
- NATURAL GAS METER
- NATURAL GAS VALVE
- POWER CONDUIT
- GUY ANCHOR
- GUY POLE
- POWER JUNCTION BOX
- POWER MARKER POST
- POWER METER
- POWER POLE
- PP WITH DROP LINE
- PP WITH DROP AND LIGHT
- PP WITH DROP, LIGHT AND TRANSFORMER
- POWER TRANSFORMER
- POWER VAULT/ MANHOLE
- TELEPHONE CABINET
- TELEPHONE JUNCTION BOX
- TELEPHONE RISER
- TELEPHONE MARKER POST
- TELEPHONE VAULT/MANHOLE
- WATER AIR RELEASE VALVE
- WATER BLOW OFF
- FIRE DEPARTMENT CONNECTION
- HOSE BIB
- IRRIGATION CONTROL VALVE
- WATER MARKER POST
- WATER METER
- WATER POST INDICATOR VALVE
- SPRINKLER HEAD
- WATER VALVE
- WATER FIRE HYDRANT
- WATER VAULT/MANHOLE
- WELL
- STORM CATCH BASIN
- STORM MANHOLE
- STORM YARD DRAIN

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-RM-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 40429 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

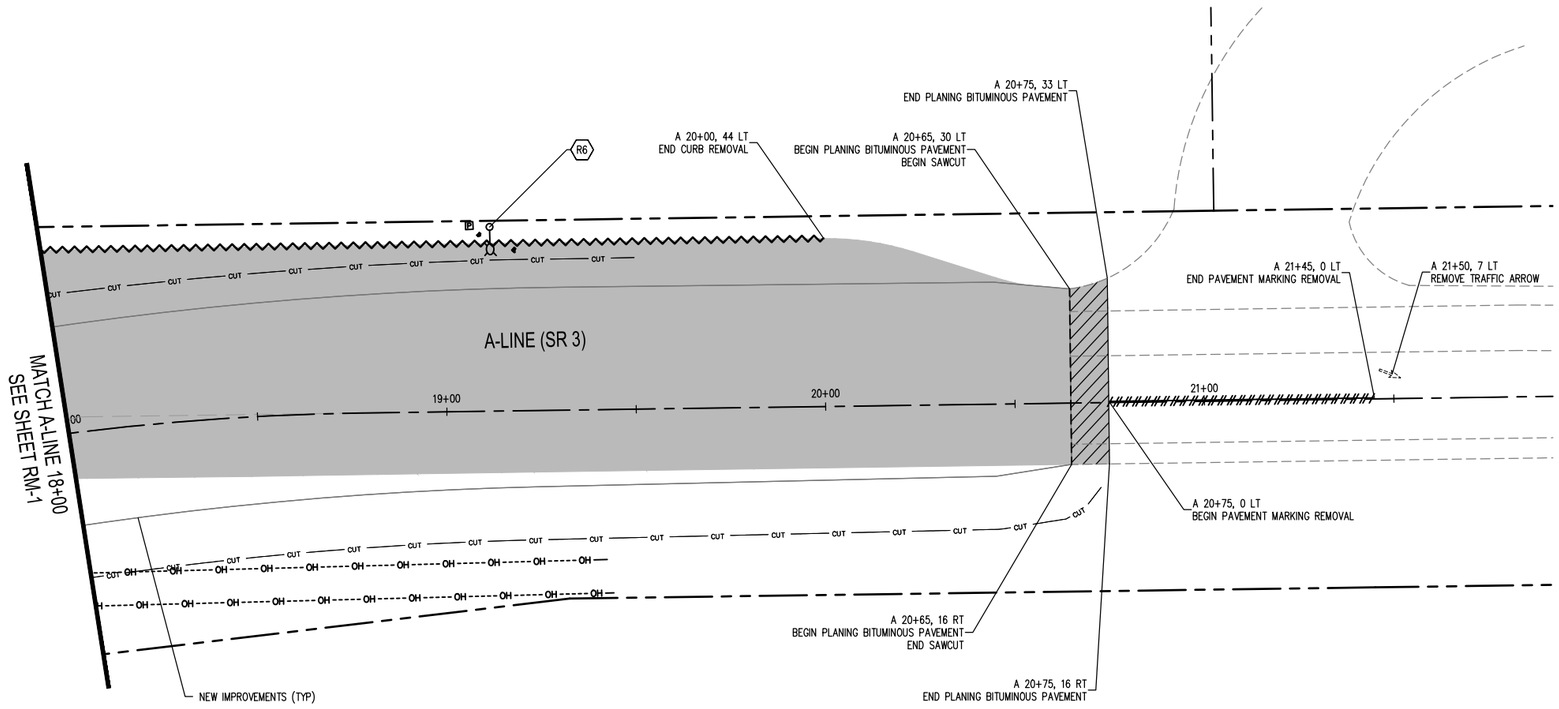
MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

REMOVAL AND TESC PLANS

DRAWING No.: RM-2
SHEET No.: 5 OF 52

Nov 06, 2019 - 3:27:44pm - User: kmcmelvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05-RM-T.DWG



0 20 40

SCALE IN FEET

REMOVAL LEGEND

- SAWCUT
- ASPHALT CONCRETE REMOVAL
- PLANING BITUMINOUS PAVEMENT (SEE DETAIL ON XS-1)
- GRAVEL REMOVAL
- REMOVE CURB AND GUTTER
- SILT FENCE — WSDOT STD PLAN I-30.10
- PAVEMENT MARKING REMOVAL
- CUT — CUT LINE
- FILL — FILL LINE

REMOVAL NOTES

- R1 PROTECT AND PRESERVE COMMUNICATION PEDESTAL
- R2 SEE STORM PLANS FOR CATCH BASIN ADJUSTMENT
- R3 MASON PUD 3 TO PERFORM POWER RELOCATIONS. CONTRACTOR TO NOTIFY MASON PUD 3 SIX WEEKS IN ADVANCE OF ANTICIPATED RELOCATION.
- R4 REMOVE TREE AND STUMP, BACKFILL WITH GRANULAR MATERIAL
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- R6 REMOVE LUMINAIRE. SEE SPECIAL PROVISIONS FOR SALVAGE.
- R7 REMOVE STORM DRAINAGE PIPE
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- R9 PROTECT AND PRESERVE EXISTING CONCRETE JERSEY BARRIER
- R10 PROTECT AND PRESERVE POWER EQUIPMENT
- R11 CENTURYLINK TO RELOCATE/ADJUST COMMUNICATIONS FACILITIES. CONTRACTOR TO NOTIFY CENTURYLINK THREE WEEKS IN ADVANCE OF ANTICIPATED RELOCATION.

LINE TYPES

- D — STORM LINE
- SS — SANITARY SEWER LINE
- T — BURIED TELEPHONE
- SD — OVERHEAD TELEPHONE
- P — BURIED POWER
- OH — OVERHEAD POWER
- W — WATER LINE
- G — NATURAL GAS LINE
- C — BURIED CABLE TV LINE

LEGEND (UTILITIES)

- CABLE RISER/ PEDESTAL
- CABLE VAULT/MANHOLE
- CULVERT
- LUMINAIRE WITH ARM
- NATURAL GAS MARKER POST
- NATURAL GAS METER
- NATURAL GAS VALVE
- POWER CONDUIT
- GUY ANCHOR
- GUY POLE
- POWER JUNCTION BOX
- POWER MARKER POST
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- POWER POLE
- PP WITH DROP LINE
- PP WITH DROP AND LIGHT
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- WATER BLOW OFF
- FIRE DEPARTMENT CONNECTION
- HOSE BIB
- IRRIGATION CONTROL VALVE
- WATER MARKER POST
- WATER METER
- WATER POST INDICATOR VALVE
- SPRINKLER HEAD
- WATER VALVE
- WATER FIRE HYDRANT
- WATER VAULT/MANHOLE
- WELL
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- STORM MANHOLE
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DESIGNED BY: K. MELVIN
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PATRICK HOLM — STATE OF WASHINGTON — 40825 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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SCJALLIANCE.COM

PROJECT NAME:

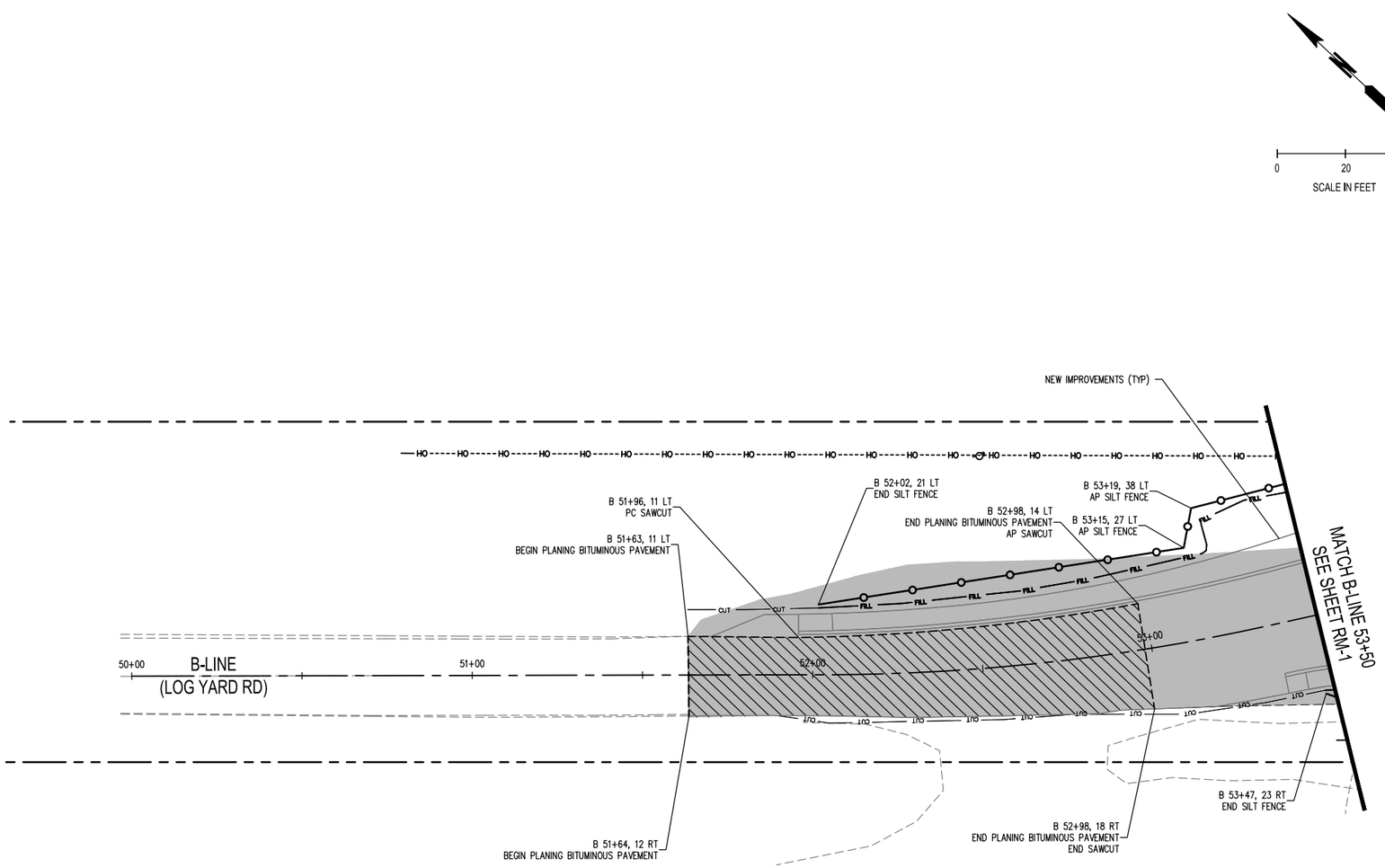
MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

REMOVAL AND TESC PLANS

DRAWING No.: RM-3
SHEET No.: 6 OF 52

Nov 06, 2019 - 3:27:53pm - User: kenn.melvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05-RM-T.DWG



0 20 40
SCALE IN FEET

REMOVAL LEGEND

- SAWCUT
- ASPHALT CONCRETE REMOVAL
- PLANING BITUMINOUS PAVEMENT (SEE DETAIL ON XS-1)
- GRAVEL REMOVAL
- REMOVE CURB AND GUTTER
- SILT FENCE — WSDOT STD PLAN I-30.10
- PAVEMENT MARKING REMOVAL
- CUT — CUT LINE
- FILL — FILL LINE

REMOVAL NOTES

(R1) PROTECT AND PRESERVE COMMUNICATION PEDESTAL

(R2) SEE STORM PLANS FOR CATCH BASIN ADJUSTMENT

(R3) MASON PUD 3 TO PERFORM POWER RELOCATIONS. CONTRACTOR TO NOTIFY MASON PUD 3 SIX WEEKS IN ADVANCE OF ANTICIPATED RELOCATION.

(R4) REMOVE TREE AND STUMP, BACKFILL WITH GRANULAR MATERIAL

(R5) REMOVE CURB

(R6) REMOVE LUMINAIRE. SEE SPECIAL PROVISIONS FOR SALVAGE.

(R7) REMOVE STORM DRAINAGE PIPE

(R8) PROTECT AND PRESERVE DRAINAGE STRUCTURE

(R9) PROTECT AND PRESERVE EXISTING CONCRETE JERSEY BARRIER

(R10) PROTECT AND PRESERVE POWER EQUIPMENT

(R11) CENTURYLINK TO RELOCATE/ADJUST COMMUNICATIONS FAOILITIES. CONTRACTOR TO NOTIFY CENTURYLINK THREE WEEKS IN ADVANCE OF ANTICIPATED RELOCATION.

LINE TYPES

- STORM LINE
- SANITARY SEWER LINE
- BURIED TELEPHONE
- OVERHEAD TELEPHONE
- BURIED POWER
- OVERHEAD POWER
- WATER LINE
- NATURAL GAS LINE
- BURIED CABLE TV LINE

LEGEND (UTILITIES)

- CABLE RISER/ PEDESTAL
- CABLE VAULT/MANHOLE
- CULVERT
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- NATURAL GAS MARKER POST
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- SPRINKLER HEAD
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- WATER FIRE HYDRANT
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- WELL
- STORM CATCH BASIN
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- STORM YARD DRAIN

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-RM-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 19008 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

REMOVAL AND TESC PLANS

DRAWING No.: RM-4
SHEET No.: 7 OF 52

Nov 06, 2019 - 3:27:59pm - User: kono.melvin
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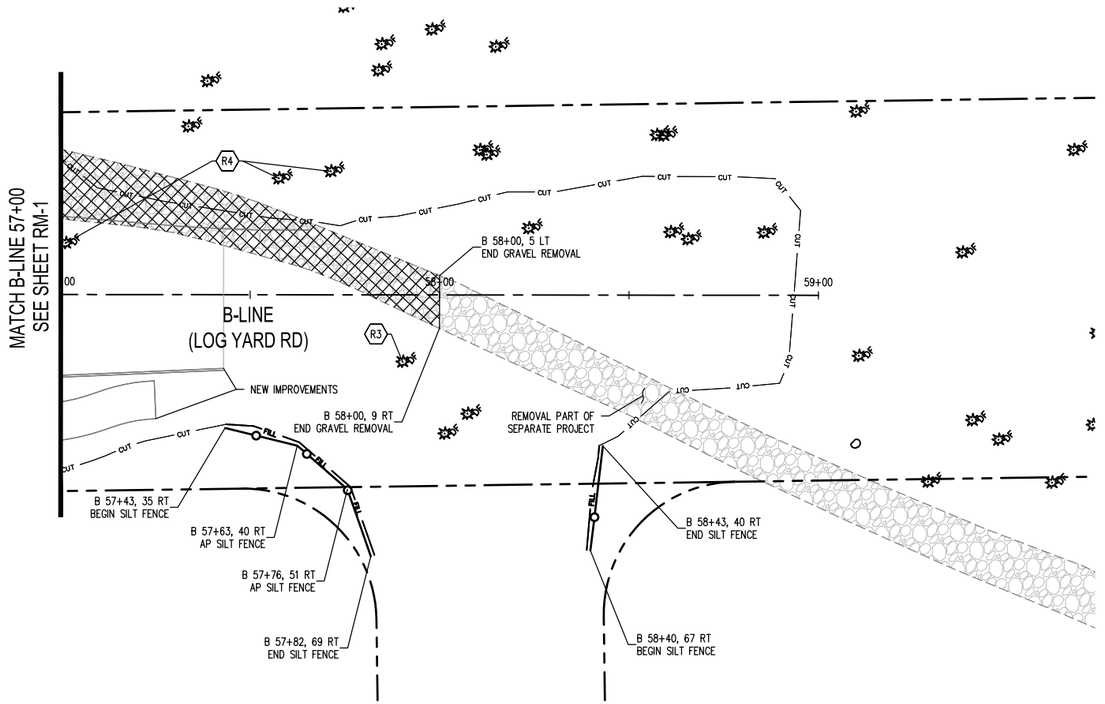

0 20 40
SCALE IN FEET

REMOVAL LEGEND

- SAWCUT
- ASPHALT CONCRETE REMOVAL
- PLANING BITUMINOUS PAVEMENT (SEE DETAIL ON XS-1)
- GRAVEL REMOVAL
- REMOVE CURB AND GUTTER
- SILT FENCE — WSDOT STD PLAN I-30.10
- PAVEMENT MARKING REMOVAL
- CUT — CUT LINE
- FILL — FILL LINE

REMOVAL NOTES

- R1 PROTECT AND PRESERVE COMMUNICATION PEDESTAL
- R2 SEE STORM PLANS FOR CATCH BASIN ADJUSTMENT
- R3 MASON PUD 3 TO PERFORM POWER RELOCATIONS. CONTRACTOR TO NOTIFY MASON PUD 3 SIX WEEKS IN ADVANCE OF ANTICIPATED RELOCATION.
- R4 REMOVE TREE AND STUMP, BACKFILL WITH GRANULAR MATERIAL
- R5 REMOVE CURB
- R6 REMOVE LUMINAIRE. SEE SPECIAL PROVISIONS FOR SALVAGE.
- R7 REMOVE STORM DRAINAGE PIPE
- R8 PROTECT AND PRESERVE DRAINAGE STRUCTURE
- R9 PROTECT AND PRESERVE EXISTING CONCRETE JERSEY BARRIER
- R10 PROTECT AND PRESERVE POWER EQUIPMENT
- R11 CENTURYLINK TO RELOCATE/ADJUST COMMUNICATIONS FACILITIES. CONTRACTOR TO NOTIFY CENTURYLINK THREE WEEKS IN ADVANCE OF ANTICIPATED RELOCATION.

LINE TYPES

- STORM LINE
- SANITARY SEWER LINE
- BURIED TELEPHONE
- OVERHEAD TELEPHONE
- BURIED POWER
- OVERHEAD POWER
- WATER LINE
- NATURAL GAS LINE
- BURIED CABLE TV LINE

LEGEND (UTILITIES)

- CABLE RISER/ PEDESTAL
- CABLE VAULT/MANHOLE
- CULVERT
- LUMINAIRE WITH ARM
- NATURAL GAS MARKER POST
- NATURAL GAS METER
- NATURAL GAS VALVE
- POWER CONDUIT
- GUY ANCHOR
- GUY POLE
- POWER JUNCTION BOX
- POWER MARKER POST
- POWER METER
- POWER POLE
- PP WITH DROP LINE
- PP WITH DROP AND LIGHT
- PP WITH DROP, LIGHT AND TRANSFORMER
- POWER TRANSFORMER
- POWER VAULT/ MANHOLE
- TELEPHONE CABINET
- TELEPHONE JUNCTION BOX
- TELEPHONE RISER
- TELEPHONE MARKER POST
- TELEPHONE VAULT/MANHOLE
- WATER AIR RELEASE VALVE
- WATER BLOW OFF
- FIRE DEPARTMENT CONNECTION
- HOSE BIB
- IRRIGATION CONTROL VALVE
- WATER MARKER POST
- WATER METER
- WATER POST INDICATOR VALVE
- SPRINKLER HEAD
- WATER VALVE
- WATER FIRE HYDRANT
- WATER VAULT/MANHOLE
- WELL
- STORM CATCH BASIN
- STORM MANHOLE
- STORM YARD DRAIN

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
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3	FPS #3	08/28/19	PH
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DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
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PATRICK HOLM — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

REMOVAL AND TESC PLANS

DRAWING No.: RM-5
SHEET No.: 8 OF 52

Nov 06, 2019 3:28:08pm – User: kono.melvin
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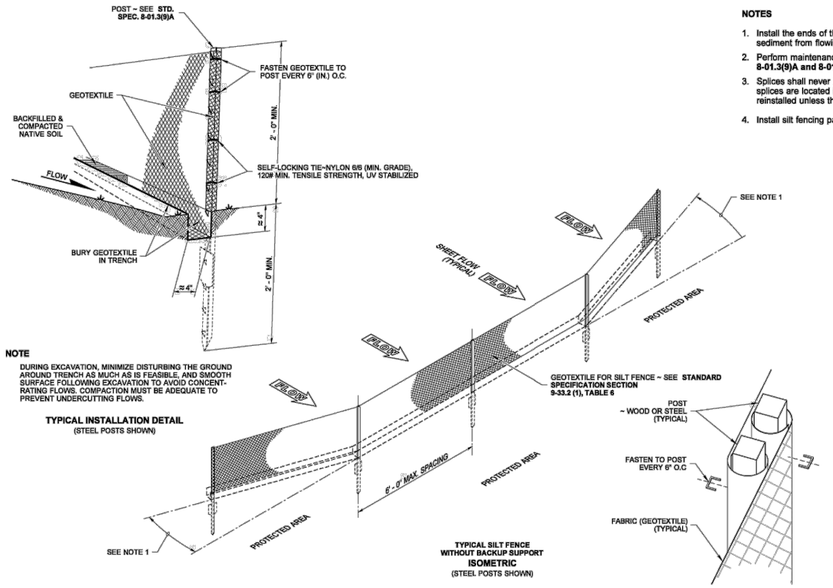
DRAWN BY: BILL BERENS



NOTE

DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

TYPICAL SILT FENCE WITHOUT BACKUP SUPPORT
ISOMETRIC
(STEEL POSTS SHOWN)

SPLICED FENCE SECTIONS SHALL BE CLOSE ENOUGH TOGETHER TO PREVENT SILT LADEN WATER FROM ESCAPING THROUGH THE FENCE AT THE OVERLAP.

SPLICE DETAIL
(WOOD POSTS SHOWN)

NOTES

1. Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
2. Perform maintenance in accordance with **Standard Specifications 8-01.3(9)A and 8-01.3(15).**
3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.
4. Install silt fencing parallel to mapped contour lines.

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT
SANDRA L. SALISBURY
CERTIFICATE NO. 000860

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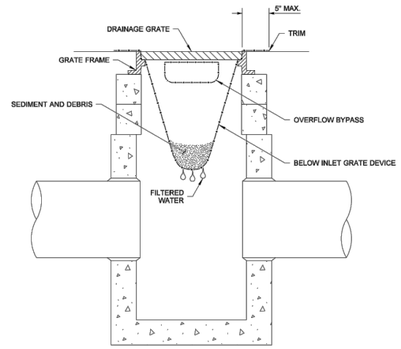
SILT FENCE

STANDARD PLAN I-30.15-02

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Pasco Bakotich III 3/22/13
STATE DESIGN ENGINEER DATE
Washington State Department of Transportation

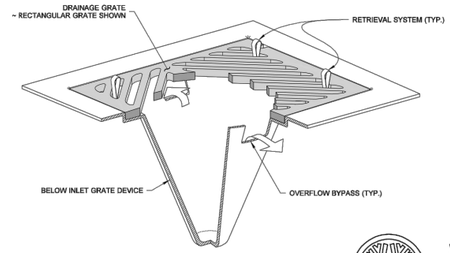
DRAWN BY: LISA CYFORD



SECTION VIEW
NOT TO SCALE

NOTES

1. Size the Below Inlet Grate Device (BIGD) for the storm water structure it will service.
2. The BIGD shall have a built-in high-flow relief system (overflow bypass).
3. The retrieval system must allow removal of the BIGD without spilling the collected material.
4. Perform maintenance in accordance with Standard Specification 8-01.3(15).



ISOMETRIC VIEW

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT
MARK W. MAURER
CERTIFICATE NO. 000598

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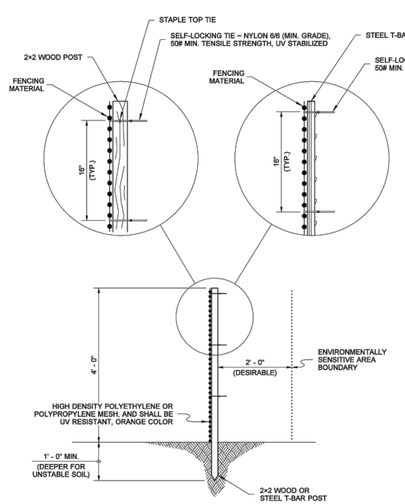
STORM DRAIN INLET PROTECTION

STANDARD PLAN I-40.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Pasco Bakotich III 09-20-07
STATE DESIGN ENGINEER DATE
Washington State Department of Transportation

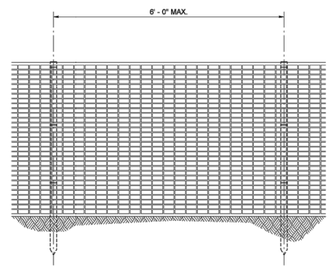
DRAWN BY: BILL BERENS



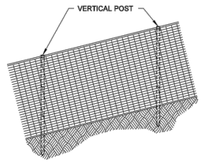
TYPICAL SECTION

NOTE

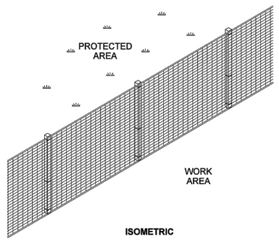
1. Post shall have sufficient strength and durability to support the fence through the life of the project.



ELEVATION



ELEVATION
FENCE ON SLOPE



ISOMETRIC

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT
MARK W. MAURER
CERTIFICATE NO. 000598

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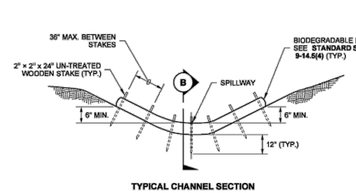
HIGH VISIBILITY FENCE

STANDARD PLAN I-10.10-01

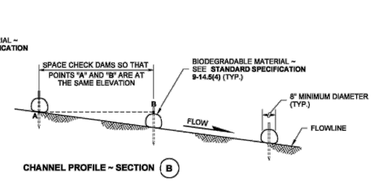
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Pasco Bakotich III 08-11-09
STATE DESIGN ENGINEER DATE
Washington State Department of Transportation

DRAWN BY: FERN LIDDELL



TYPICAL CHANNEL SECTION



CHANNEL PROFILE ~ SECTION (B)

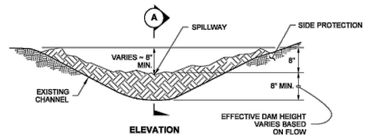
BIODEGRADABLE CHECK DAM

BIODEGRADABLE CHECK DAM NOTE

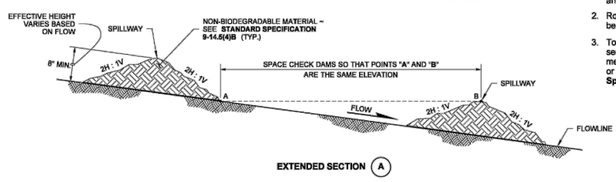
1. Biodegradable Check Dams may need additional or modified staking to prevent undercutting or scouring.

GENERAL NOTES

1. Check Dams shall meet the requirements of **Standard Specifications 8-01.3(6) and 9-14.5(4).**
2. In channels, install the sloped ends of the Check Dam a minimum of 8" higher than the spillway to ensure water flows over the dam and not around it.
3. Perform maintenance in accordance with **Standard Specification 8-01.3(15).**
4. Remove Check Dams in accordance with **Standard Specification 8-01.3(16).**



ELEVATION



EXTENDED SECTION (A)

NON-BIODEGRADABLE CHECK DAM

NON-BIODEGRADABLE CHECK DAM NOTES

1. Non-Biodegradable Manufactured Check Dam devices approved for use under **Standard Specification 9-14.5(4)** shall be installed per manufacturer's recommendations and shall perform in accordance with **Standard Specification 8-01.3(6).**
2. Rock Check Dams shall be placed outside of the clear zone or behind traffic barrier.
3. To ensure adequate damming time, Rock Check Dams used as sediment control may need to be enhanced with plastic that meets the requirements of **Standard Specification 9-14.5(3)** or fabric that meets the geotextile requirements of **Standard Specification 9-33.2(1), Table 6.**

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT
Sandra L. Salisbury
SANDRA L. SALISBURY
LICENSE NO. 860
DATE: June 6, 2013

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CHECK DAMS ON CHANNELS

STANDARD PLAN I-50.20-01

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Pasco Bakotich III 6/10/13
STATE DESIGN ENGINEER DATE
Washington State Department of Transportation

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DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
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PATRICK HOLM — STATE OF WASHINGTON — 40478 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

EROSION CONTROL DETAILS

DRAWING No.: RM-6

SHEET No.: 9 OF 52

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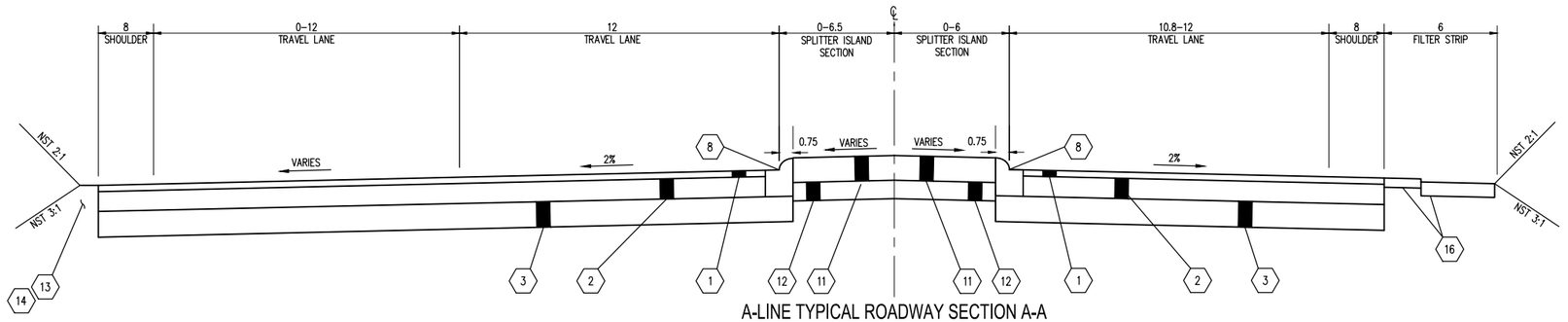
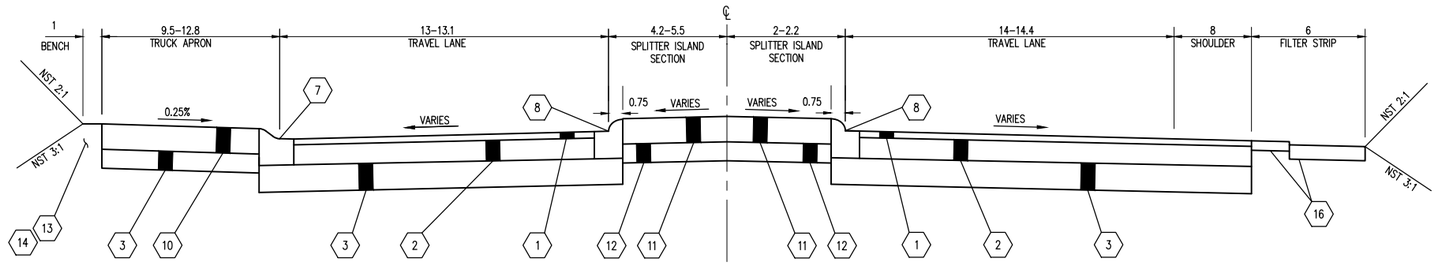


A-LINE TYPICAL ROADWAY SECTION A-A

NTS

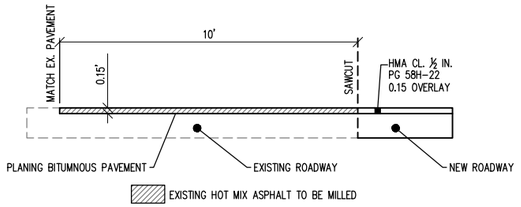
A 10+46 TO A 12+61



A-LINE TYPICAL ROADWAY SECTION B-B

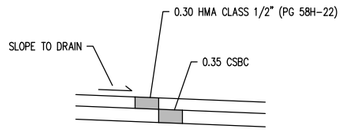
NTS

A 12+61 TO A 13+19



PLANING BITUMINOUS PAVEMENT

NTS



TEMPORARY PAVEMENT SECTION

NTS

ROADWAY SECTION KEY NOTES:

1. 0.15' HMA CLASS 1/2" PG. 58H–22 (TYPICAL).
2. 0.55' HMA CLASS 1/2" PG. 58H–22 (TYPICAL).
3. 0.70' CRUSHED SURFACING BASE COURSE (CSBC).
4. CEMENT CONCRETE SIDEWALK (PER WSDOT STANDARD PLAN F–30.10).
5. 0.17' CRUSHED SURFACING BASE COURSE (CSBC).
6. CURB 1 (2" MOD) ROUNDABOUT TRUCK APRON CEMENT CONCRETE CURB & GUTTER (SEE DETAIL, SHEET XS–5).
7. CURB 1 ROUNDABOUT TRUCK APRON CEMENT CONCRETE CURB & GUTTER (PER WSDOT STANDARD PLAN F–10.18).
8. CURB 2 ROUNDABOUT CEMENT CONCRETE CURB AND GUTTER (PER WSDOT STANDARD PLAN F–10.18).
9. CURB 3 ROUNDABOUT CENTRAL ISLAND CEMENT CONCRETE CURB (PER WSDOT STANDARD PLAN F–10.18).
10. 0.85' CEMENT CONCRETE PAVEMENT (SEE DETAIL "B" SHEET XS–6).
11. 0.67' CEMENT CONCRETE PAVEMENT (SEE DETAIL "A" SHEET XS–3).
12. 0.50' CRUSHED SURFACING BASE COURSE (CSBC).
13. 0.33' TOP SOIL, TYPE A.
14. SEEDING, FERTILIZING, AND MULCHING.
15. STAMPED COLORED CEMENT CONCRETE SIDEWALK (PER WSDOT STANDARD PLAN F–30.10, SEE SPECIAL PROVISIONS).
16. COMPOST–AMENDED VEGETATIVE FILTER STRIP (SEE DETAIL C, SHEET XS–6).

NOTES:

1. ALL SURFACING AND PAVING DEPTHS ARE COMPACTED DEPTHS
2. NST = NO STEEPER THAN
3. SEE SHEETS PP–1 TO PP–5 FOR SPOT ELEVATIONS AT FLOWLINE TO ESTABLISH CROSS SLOPES.
4. SEE STANDARD SPECIFICATION 5–04.3(7)A FOR HMA MIX DESIGN APPROVAL.
5. WHERE THE ENGINEER DETERMINES THAT THE EXISTING SUBGRADE CONTAINS FINE–GRAINED SOIL, A NON–WOVEN SEPARATION GEOTEXTILE SHALL BE USED THAT MEETS THE REQUIREMENTS OF STANDARD SPECIFICATION 9–33.

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
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3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
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PATRICK HOLM — STATE OF WASHINGTON — 19008 — REGISTERED PROFESSIONAL ENGINEER
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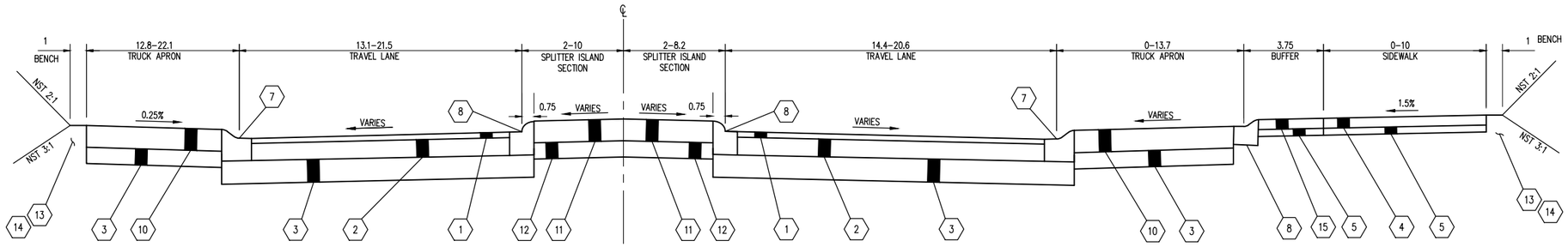
PROJECT NAME:

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

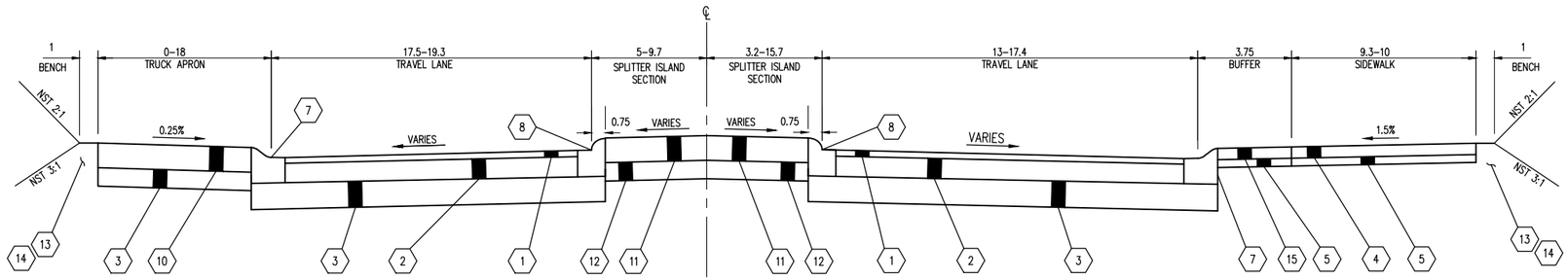
ROADWAY TYPICAL SECTIONS

DRAWING No.: XS-1
SHEET No.: 10 OF 52



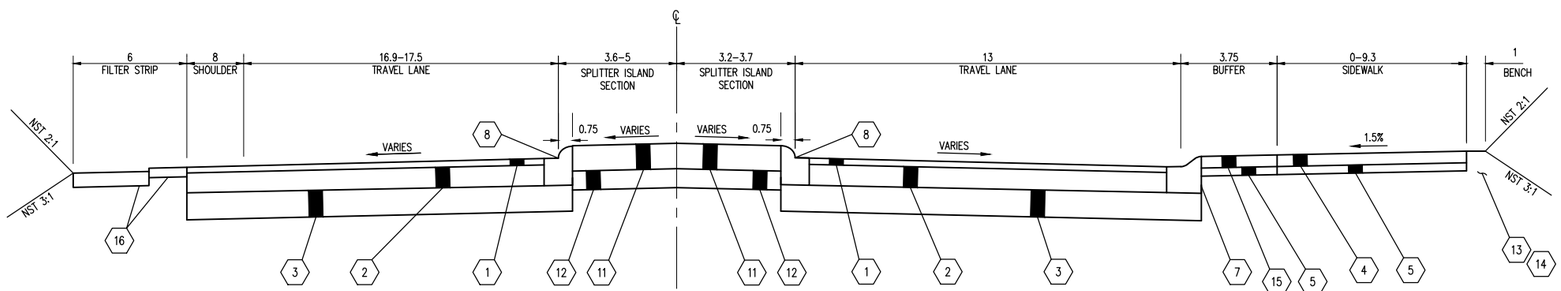
A-LINE TYPICAL ROADWAY SECTION C-C

NTS
A 13+19 TO A 14+23



A-LINE TYPICAL ROADWAY SECTION D-D

NTS
A 15+77 TO A 16+64



A-LINE TYPICAL ROADWAY SECTION E-E

NTS
A 16+64 TO A 16+93

ROADWAY SECTION KEY NOTES:

1. 0.15' HMA CLASS 1/2" PG. 58H–22 (TYPICAL).
2. 0.55' HMA CLASS 1/2" PG. 58H–22 (TYPICAL).
3. 0.70' CRUSHED SURFACING BASE COURSE (CSBC).
4. CEMENT CONCRETE SIDEWALK (PER WSDOT STANDARD PLAN F–30.10).
5. 0.17' CRUSHED SURFACING BASE COURSE (CSBC).
6. CURB 1 (2" MOD) ROUNDABOUT TRUCK APRON CEMENT CONCRETE CURB & GUTTER (SEE DETAIL, SHEET XS–5).
7. CURB 1 ROUNDABOUT TRUCK APRON CEMENT CONCRETE CURB & GUTTER (PER WSDOT STANDARD PLAN F–10.18).
8. CURB 2 ROUNDABOUT CEMENT CONCRETE CURB AND GUTTER (PER WSDOT STANDARD PLAN F–10.18).
9. CURB 3 ROUNDABOUT CENTRAL ISLAND CEMENT CONCRETE CURB (PER WSDOT STANDARD PLAN F–10.18).
10. 0.85' CEMENT CONCRETE PAVEMENT (SEE DETAIL "B" SHEET XS–6).
11. 0.67' CEMENT CONCRETE PAVEMENT (SEE DETAIL "A" SHEET XS–3).
12. 0.50' CRUSHED SURFACING BASE COURSE (CSBC).
13. 0.33' TOP SOIL, TYPE A.
14. SEEDING, FERTILIZING, AND MULCHING.
15. STAMPED COLORED CEMENT CONCRETE SIDEWALK (PER WSDOT STANDARD PLAN F–30.10, SEE SPECIAL PROVISIONS).
16. COMPOST–AMENDED VEGETATIVE FILTER STRIP (SEE DETAIL C, SHEET XS–6).

NOTES:

1. ALL SURFACING AND PAVING DEPTHS ARE COMPACTED DEPTHS
2. NST = NO STEEPER THAN
3. SEE SHEETS PP–1 TO PP–5 FOR SPOT ELEVATIONS AT FLOWLINE TO ESTABLISH CROSS SLOPES.
4. SEE STANDARD SPECIFICATION 5–04.3(7)A FOR HMA MIX DESIGN APPROVAL.
5. WHERE THE ENGINEER DETERMINES THAT THE EXISTING SUBGRADE CONTAINS FINE–GRAINED SOIL, A NON–WOVEN SEPARATION GEOTEXTILE SHALL BE USED THAT MEETS THE REQUIREMENTS OF STANDARD SPECIFICATION 9–33.

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-XS-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 19400 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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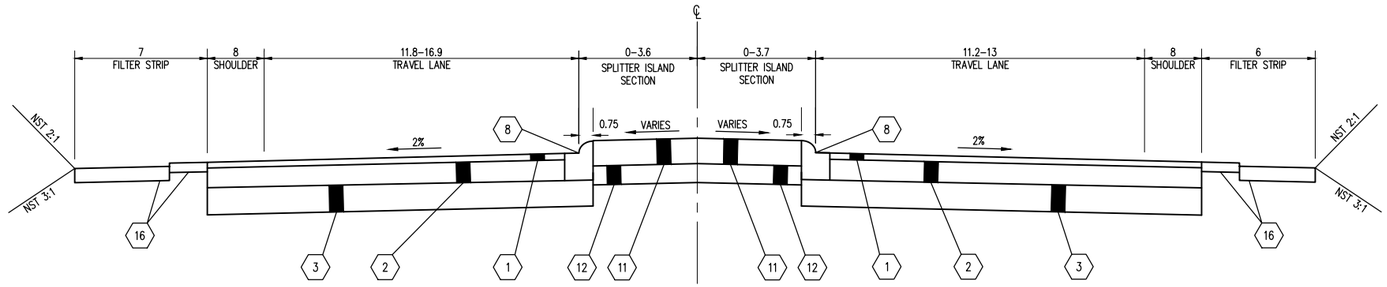
PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

ROADWAY TYPICAL SECTIONS

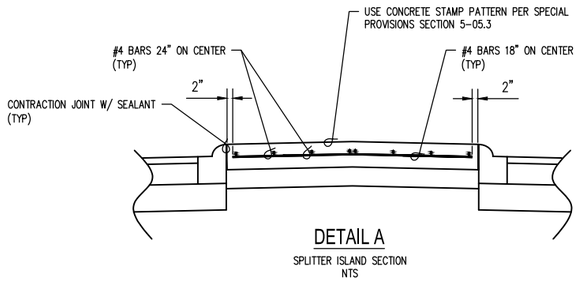
DRAWING No.: XS-2
SHEET No.: 11 OF 52



A-LINE TYPICAL ROADWAY SECTION F-F

NTS

A 16+93 TO A 20+65



DETAIL A

SPLITTER ISLAND SECTION
NTS

ROADWAY SECTION KEY NOTES:

1. 0.15' HMA CLASS 1/2" PG. 58H-22 (TYPICAL).
2. 0.55' HMA CLASS 1/2" PG. 58H-22 (TYPICAL).
3. 0.70' CRUSHED SURFACING BASE COURSE (CSBC).
4. CEMENT CONCRETE SIDEWALK (PER WSDOT STANDARD PLAN F-30.10).
5. 0.17' CRUSHED SURFACING BASE COURSE (CSBC).
6. CURB 1 (2" MOD) ROUNDABOUT TRUCK APRON CEMENT CONCRETE CURB & GUTTER (SEE DETAIL, SHEET XS-5).
7. CURB 1 ROUNDABOUT TRUCK APRON CEMENT CONCRETE CURB & GUTTER (PER WSDOT STANDARD PLAN F-10.18).
8. CURB 2 ROUNDABOUT CEMENT CONCRETE CURB AND GUTTER (PER WSDOT STANDARD PLAN F-10.18).
9. CURB 3 ROUNDABOUT CENTRAL ISLAND CEMENT CONCRETE CURB (PER WSDOT STANDARD PLAN F-10.18).
10. 0.85' CEMENT CONCRETE PAVEMENT (SEE DETAIL "B" SHEET XS-6).
11. 0.67' CEMENT CONCRETE PAVEMENT (SEE DETAIL "A" SHEET XS-3).
12. 0.50' CRUSHED SURFACING BASE COURSE (CSBC).
13. 0.33' TOP SOIL, TYPE A.
14. SEEDING, FERTILIZING, AND MULCHING.
15. STAMPED COLORED CEMENT CONCRETE SIDEWALK (PER WSDOT STANDARD PLAN F-30.10, SEE SPECIAL PROVISIONS).
16. COMPOST-AMENDED VEGETATIVE FILTER STRIP (SEE DETAIL C, SHEET XS-6).

NOTES:

1. ALL SURFACING AND PAVING DEPTHS ARE COMPACTED DEPTHS
2. NST = NO STEEPER THAN
3. SEE SHEETS PP-1 TO PP-5 FOR SPOT ELEVATIONS AT FLOWLINE TO ESTABLISH CROSS SLOPES.
4. SEE STANDARD SPECIFICATION 5-04.3(7)A FOR HMA MIX DESIGN APPROVAL.
5. WHERE THE ENGINEER DETERMINES THAT THE EXISTING SUBGRADE CONTAINS FINE-GRAINED SOIL, A NON-WOVEN SEPARATION GEOTEXTILE SHALL BE USED THAT MEETS THE REQUIREMENTS OF STANDARD SPECIFICATION 9-33.

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4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
ISSUE DATE: JUNE 2019
DRAWN BY: N. MAYFIELD
JOB No.: 0738.05
CHECKED BY: P. HOLM
DRAWING FILE No.: 0738.05-XS-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 40629 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

ROADWAY TYPICAL SECTIONS

DRAWING No.: XS-3
SHEET No.: 12 OF 52

Nov 06, 2019 - 3:28:34pm - User: kenc.melvin
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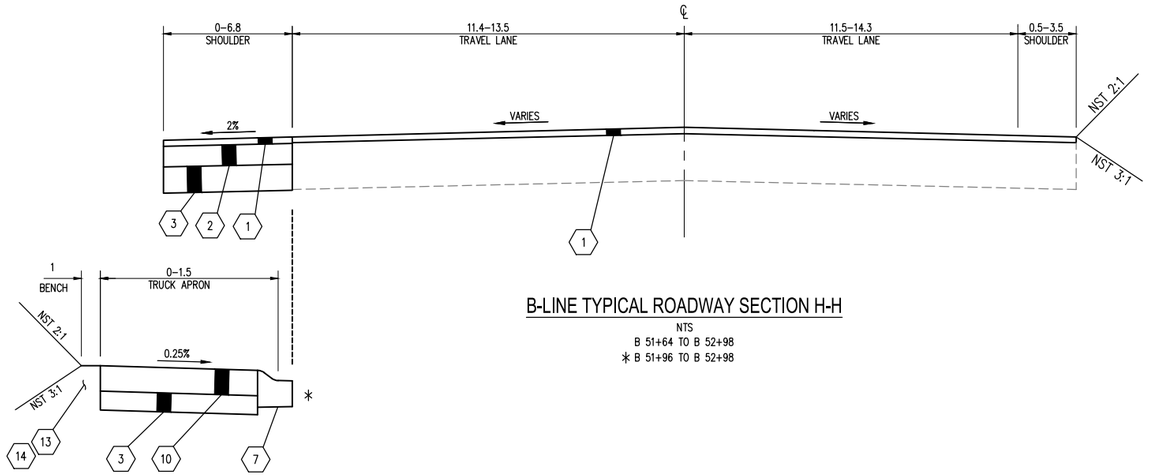
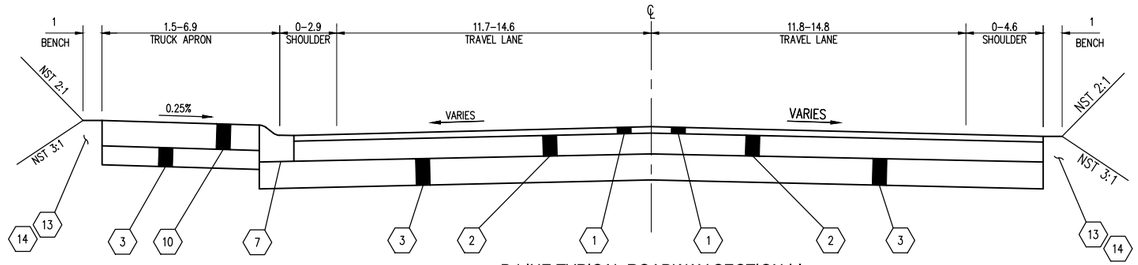


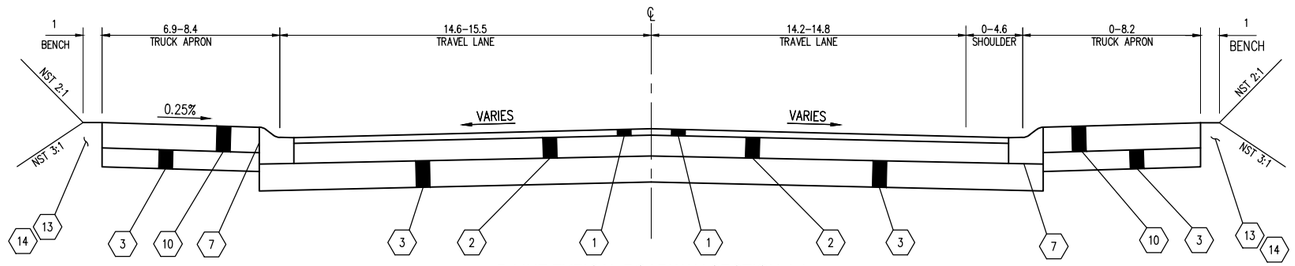
B-LINE TYPICAL ROADWAY SECTION H-H

NTS
B 51+64 TO B 52+98
* B 51+96 TO B 52+98



B-LINE TYPICAL ROADWAY SECTION I-I

NTS
B 52+98 TO B 53+37



B-LINE TYPICAL ROADWAY SECTION J-J

NTS
B 53+37 TO B 53+79

ROADWAY SECTION KEY NOTES:

1. 0.15' HMA CLASS 1/2" PG. 58H-22 (TYPICAL).
2. 0.55' HMA CLASS 1/2" PG. 58H-22 (TYPICAL).
3. 0.70' CRUSHED SURFACING BASE COURSE (CSBC).
4. CEMENT CONCRETE SIDEWALK (PER WSDOT STANDARD PLAN F-30.10).
5. 0.17' CRUSHED SURFACING BASE COURSE (CSBC).
6. CURB 1 (2" MOD) ROUNDABOUT TRUCK APRON CEMENT CONCRETE CURB & GUTTER (SEE DETAIL, SHEET XS-5).
7. CURB 1 ROUNDABOUT TRUCK APRON CEMENT CONCRETE CURB & GUTTER (PER WSDOT STANDARD PLAN F-10.18).
8. CURB 2 ROUNDABOUT CEMENT CONCRETE CURB AND GUTTER (PER WSDOT STANDARD PLAN F-10.18).
9. CURB 3 ROUNDABOUT CENTRAL ISLAND CEMENT CONCRETE CURB (PER WSDOT STANDARD PLAN F-10.18).
10. 0.85' CEMENT CONCRETE PAVEMENT (SEE DETAIL "B" SHEET XS-6).
11. 0.67' CEMENT CONCRETE PAVEMENT (SEE DETAIL "A" SHEET XS-3).
12. 0.50' CRUSHED SURFACING BASE COURSE (CSBC).
13. 0.33' TOP SOIL, TYPE A.
14. SEEDING, FERTILIZING, AND MULCHING.
15. STAMPED COLORED CEMENT CONCRETE SIDEWALK (PER WSDOT STANDARD PLAN F-30.10, SEE SPECIAL PROVISIONS).
16. COMPOST-AMENDED VEGETATIVE FILTER STRIP (SEE DETAIL C, SHEET XS-6).

NOTES:

1. ALL SURFACING AND PAVING DEPTHS ARE COMPACTED DEPTHS
2. NST = NO STEEPER THAN
3. SEE SHEETS PP-1 TO PP-5 FOR SPOT ELEVATIONS AT FLOWLINE TO ESTABLISH CROSS SLOPES.
4. SEE STANDARD SPECIFICATION 5-04.3(7)A FOR HMA MIX DESIGN APPROVAL.
5. WHERE THE ENGINEER DETERMINES THAT THE EXISTING SUBGRADE CONTAINS FINE-GRAINED SOIL, A NON-WOVEN SEPARATION GEOTEXTILE SHALL BE USED THAT MEETS THE REQUIREMENTS OF STANDARD SPECIFICATION 9-33.

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1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-XS-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 49251 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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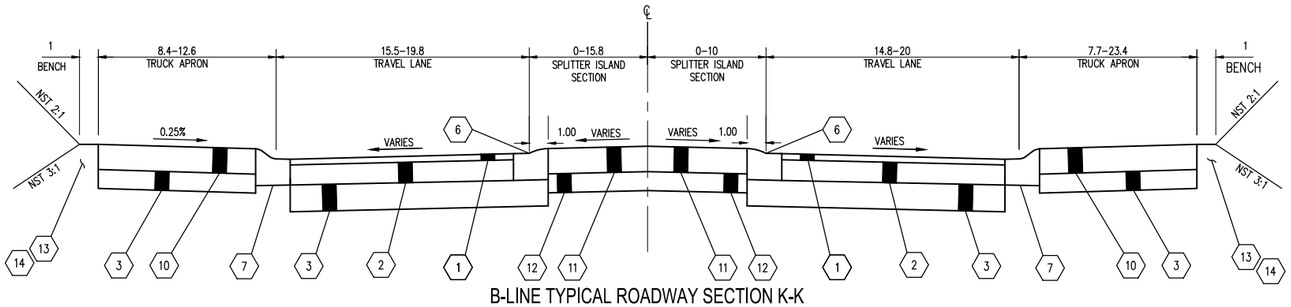
PROJECT NAME:

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

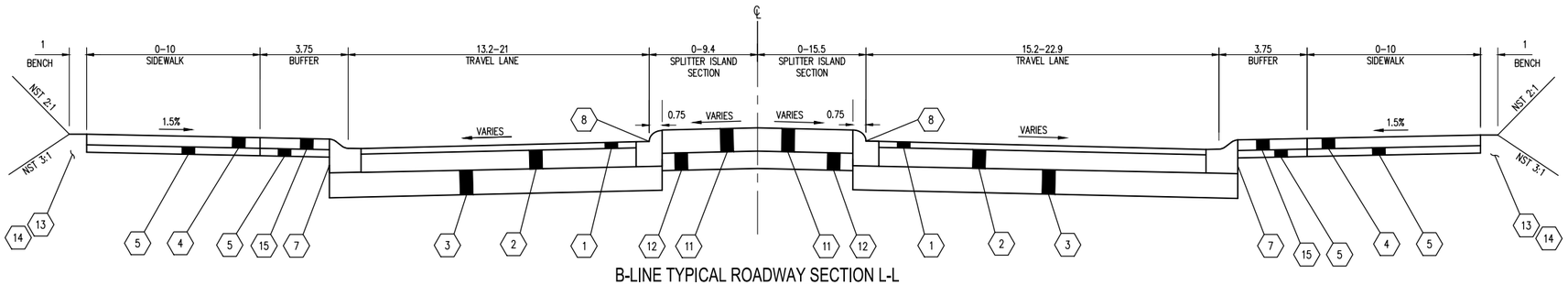
ROADWAY TYPICAL SECTIONS

DRAWING No.: XS-4
SHEET No.: 13 OF 52



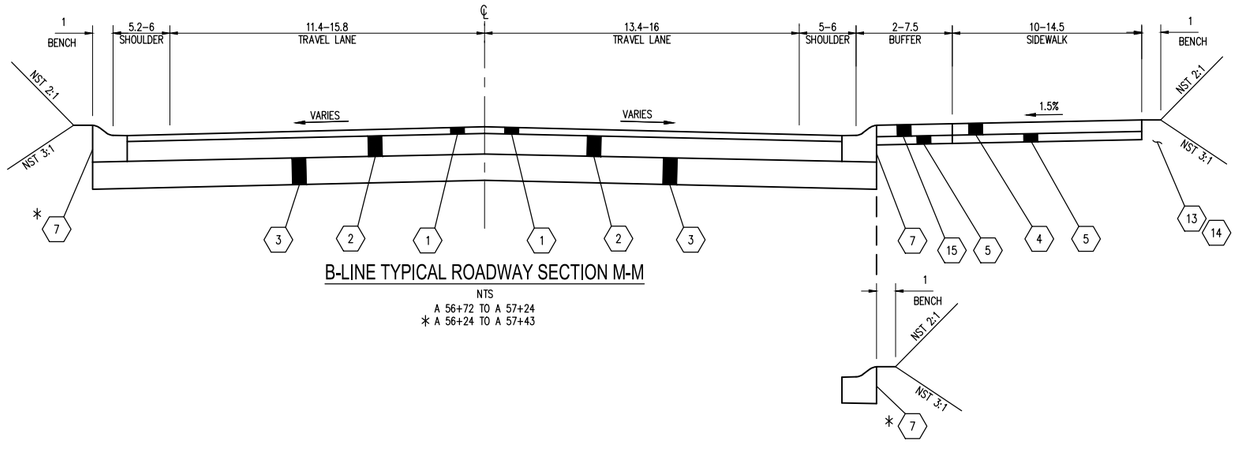
B-LINE TYPICAL ROADWAY SECTION K-K

NTS
B 53+79 TO 54+24



B-LINE TYPICAL ROADWAY SECTION L-L

NTS
B 55+77 TO 56+72



B-LINE TYPICAL ROADWAY SECTION M-M

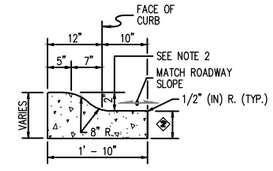
NTS
A 56+72 TO A 57+24
* A 56+24 TO A 57+43

ROADWAY SECTION KEY NOTES:

1. 0.15' HMA CLASS 1/2" PG. 58H–22 (TYPICAL).
2. 0.55' HMA CLASS 1/2" PG. 58H–22 (TYPICAL).
3. 0.70' CRUSHED SURFACING BASE COURSE (CSBC).
4. CEMENT CONCRETE SIDEWALK (PER WSDOT STANDARD PLAN F–30.10).
5. 0.17' CRUSHED SURFACING BASE COURSE (CSBC).
6. CURB 1 (2" MOD) ROUNDABOUT TRUCK APRON CEMENT CONCRETE CURB & GUTTER (SEE DETAIL, SHEET XS–5).
7. CURB 1 ROUNDABOUT TRUCK APRON CEMENT CONCRETE CURB & GUTTER (PER WSDOT STANDARD PLAN F–10.18).
8. CURB 2 ROUNDABOUT CEMENT CONCRETE CURB AND GUTTER (PER WSDOT STANDARD PLAN F–10.18).
9. CURB 3 ROUNDABOUT CENTRAL ISLAND CEMENT CONCRETE CURB (PER WSDOT STANDARD PLAN F–10.18).
10. 0.85' CEMENT CONCRETE PAVEMENT (SEE DETAIL "B" SHEET XS–6).
11. 0.67' CEMENT CONCRETE PAVEMENT (SEE DETAIL "A" SHEET XS–3).
12. 0.50' CRUSHED SURFACING BASE COURSE (CSBC).
13. 0.33' TOP SOIL, TYPE A.
14. SEEDING, FERTILIZING, AND MULCHING.
15. STAMPED COLORED CEMENT CONCRETE SIDEWALK (PER WSDOT STANDARD PLAN F–30.10, SEE SPECIAL PROVISIONS).
16. COMPOST–AMENDED VEGETATIVE FILTER STRIP (SEE DETAIL C, SHEET XS–6).

NOTES:

1. ALL SURFACING AND PAVING DEPTHS ARE COMPACTED DEPTHS
2. NST = NO STEEPER THAN
3. SEE SHEETS PP–1 TO PP–5 FOR SPOT ELEVATIONS AT FLOWLINE TO ESTABLISH CROSS SLOPES.
4. SEE STANDARD SPECIFICATION 5–04.3(7)A FOR HMA MIX DESIGN APPROVAL.
5. WHERE THE ENGINEER DETERMINES THAT THE EXISTING SUBGRADE CONTAINS FINE–GRAINED SOIL, A NON–WOVEN SEPARATION GEOTEXTILE SHALL BE USED THAT MEETS THE REQUIREMENTS OF STANDARD SPECIFICATION 9–33.



CURB 1 (2" MODIFIED)

ROUNDABOUT TRUCK APRON
CEMENT CONCRETE CURB & GUTTER
(ROLLED CURB)
PER WSDOT STANDARD PLAN F–10.18

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
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DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-XS-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 49623 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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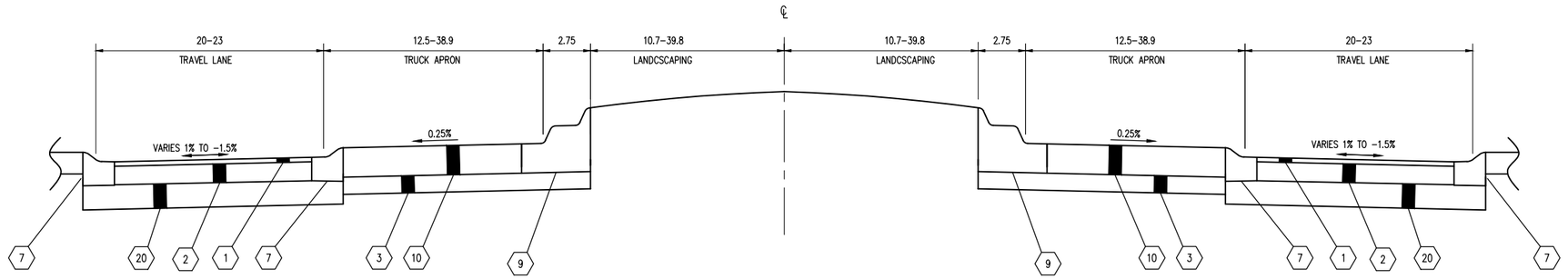
PROJECT NAME:

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

ROADWAY TYPICAL SECTIONS

DRAWING No.: XS-5
SHEET No.: 14 OF 52

Nov 06, 2019 - 3:26:46pm - User: kcmc.melvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05-XS-T.DWG



ROUNDABOUT TYPICAL ROADWAY SECTION N-N

NTS

INTERSECTION OF A–LINE AND B–LINE

ROADWAY SECTION KEY NOTES:

1. 0.15' HMA CLASS 1/2" PG. 58H–22 (TYPICAL).
2. 0.55' HMA CLASS 1/2" PG. 58H–22 (TYPICAL).
3. 0.70' CRUSHED SURFACING BASE COURSE (CSBC).
4. CEMENT CONCRETE SIDEWALK (PER WSDOT STANDARD PLAN F–30.10).
5. 0.17' CRUSHED SURFACING BASE COURSE (CSBC).
6. CURB 1 (2" MOD) ROUNDABOUT TRUCK APRON CEMENT CONCRETE CURB & GUTTER (SEE DETAIL, SHEET XS–5).
7. CURB 1 ROUNDABOUT TRUCK APRON CEMENT CONCRETE CURB & GUTTER (PER WSDOT STANDARD PLAN F–10.18).
8. CURB 2 ROUNDABOUT CEMENT CONCRETE CURB AND GUTTER (PER WSDOT STANDARD PLAN F–10.18).
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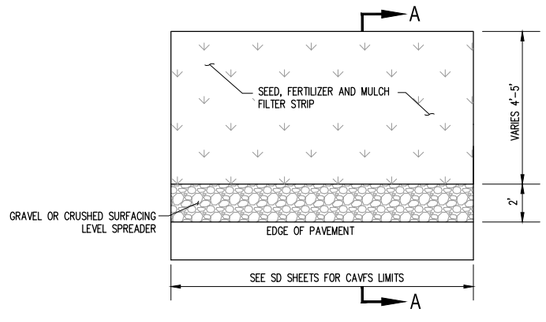
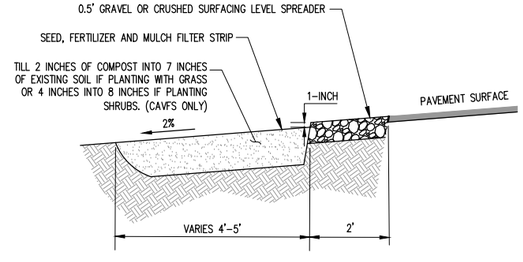
10. 0.85' CEMENT CONCRETE PAVEMENT (SEE DETAIL "B" SHEET XS–6).
11. 0.67' CEMENT CONCRETE PAVEMENT (SEE DETAIL "A" SHEET XS–3).
12. 0.50' CRUSHED SURFACING BASE COURSE (CSBC).
13. 0.33' TOP SOIL, TYPE A.
14. SEEDING, FERTILIZING, AND MULCHING.
15. STAMPED COLORED CEMENT CONCRETE SIDEWALK (PER WSDOT STANDARD PLAN F–30.10, SEE SPECIAL PROVISIONS).
16. COMPOST–AMENDED VEGETATIVE FILTER STRIP (SEE DETAIL C, SHEET XS–6).

NOTES:

1. ALL SURFACING AND PAVING DEPTHS ARE COMPACTED DEPTHS
2. NST = NO STEEPER THAN
3. SEE SHEETS PP–1 TO PP–5 FOR SPOT ELEVATIONS AT FLOWLINE TO ESTABLISH CROSS SLOPES.
4. SEE STANDARD SPECIFICATION 5–04.3(7)A FOR HMA MIX DESIGN APPROVAL.
5. WHERE THE ENGINEER DETERMINES THAT THE EXISTING SUBGRADE CONTAINS FINE–GRAINED SOIL, A NON–WOVEN SEPARATION GEOTEXTILE SHALL BE USED THAT MEETS THE REQUIREMENTS OF STANDARD SPECIFICATION 9–33.





SECTION A-A

DETAIL C

COMPOST–AMENDED VEGETATIVE FILTER STRIP

NTS

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
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PATRICK HOLM — STATE OF WASHINGTON — 45051 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

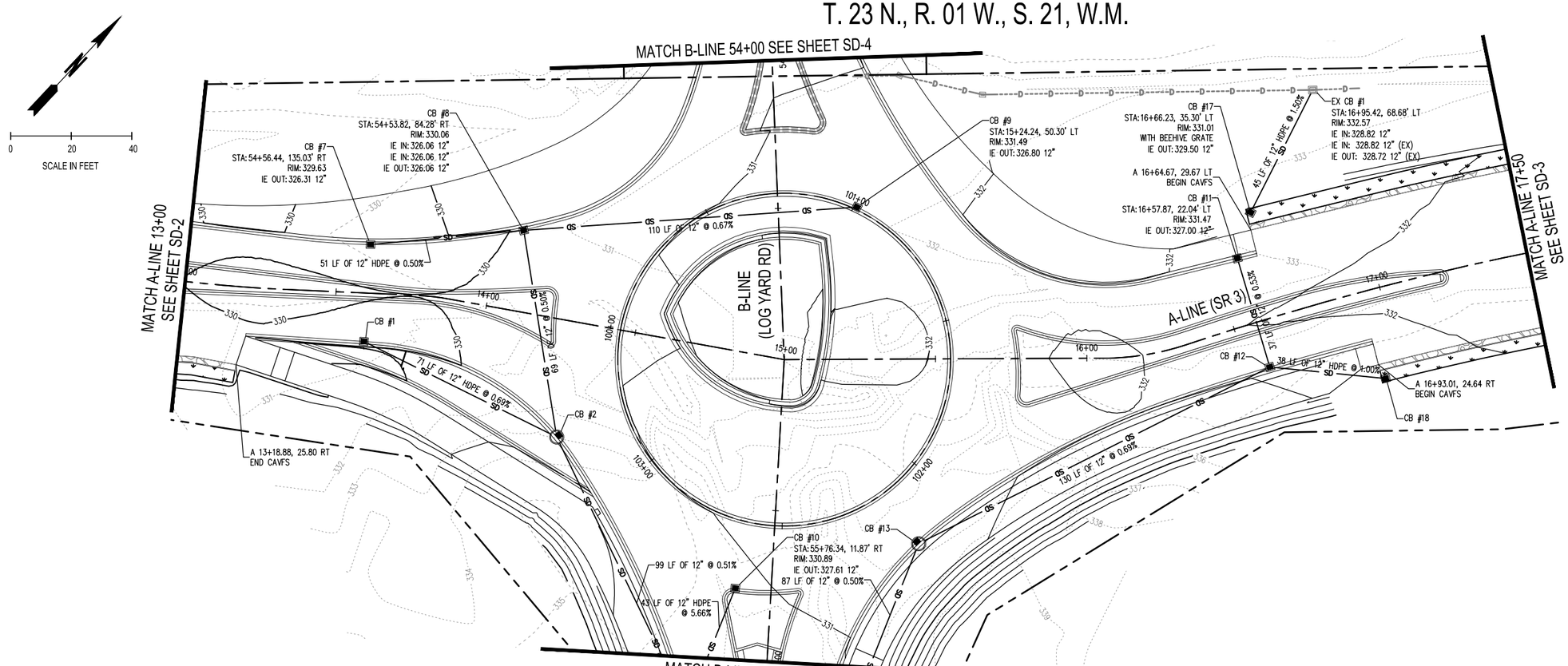
ROADWAY TYPICAL SECTIONS

DRAWING No.: XS-6

SHEET No.: 15 OF 52

Nov 06, 2019 - 3:28:49pm - User: kmcmelvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05-XS-T.DWG

T. 23 N., R. 01 W., S. 21, W.M.

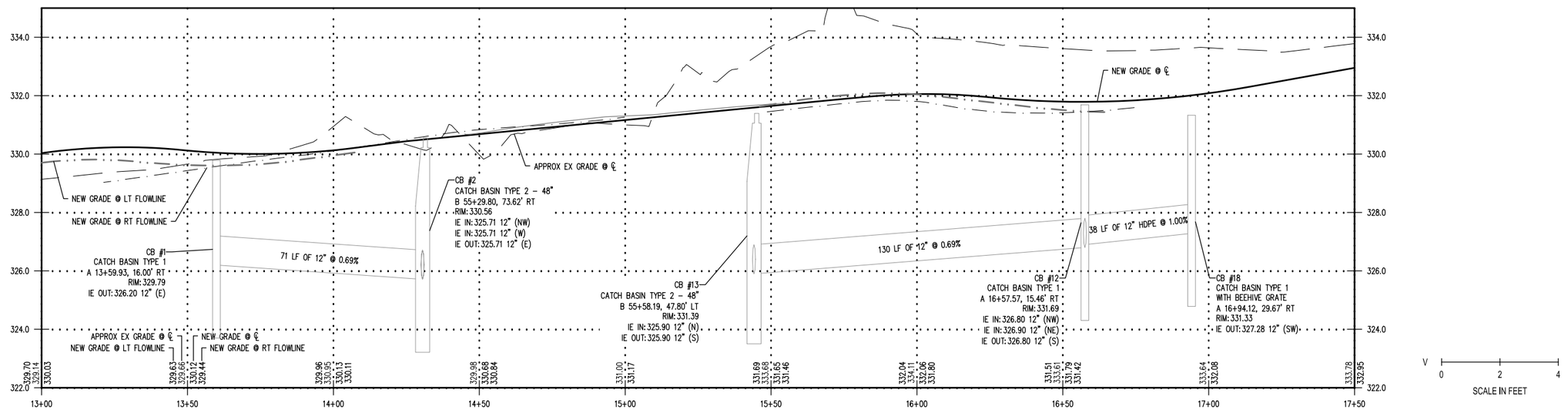


LEGEND

- RIGHT OF WAY
- SD — SCHEDULE A STORM SEWER PIPE
- CATCH BASIN TYPE 1
- CATCH BASIN TYPE 2
- COMPOST-AMENDED VEGETATIVE FILTER STRIP (SEE DETAIL "C" SHEET XS-6)
- 5'x6'x1' DEEP HAND PLACED RIPRAP

GENERAL NOTES

1. CATCH BASINS LOCATED ALONG THE CURB AND GUTTER ARE LOCATED (STATION, OFFSET, AND ELEVATION) IN RELATION TO FLOW LINE FACE OF CURB AT THE MIDPOINT BACK OF RIM. ALL OTHER CATCH BASINS ARE LOCATED TO CENTER OF STRUCTURE.
2. ALL CATCH BASIN GRATES SHALL HAVE GRATES, PER WSDOT STANDARD PLAN B-30.30, UNLESS OTHERWISE NOTED.
3. INSTALL CEMENT CONCRETE CURB AND GUTTER PAN, PER WSDOT STANDARD PLAN F-10.16, AT ALL CATCH BASINS LOCATED ALONG THE CURB AND GUTTER.



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DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
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PATRICK HOLM — STATE OF WASHINGTON — 19851 REGISTERED PROFESSIONAL ENGINEER
11-06-19

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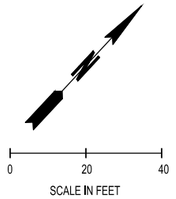
PROJECT NAME:

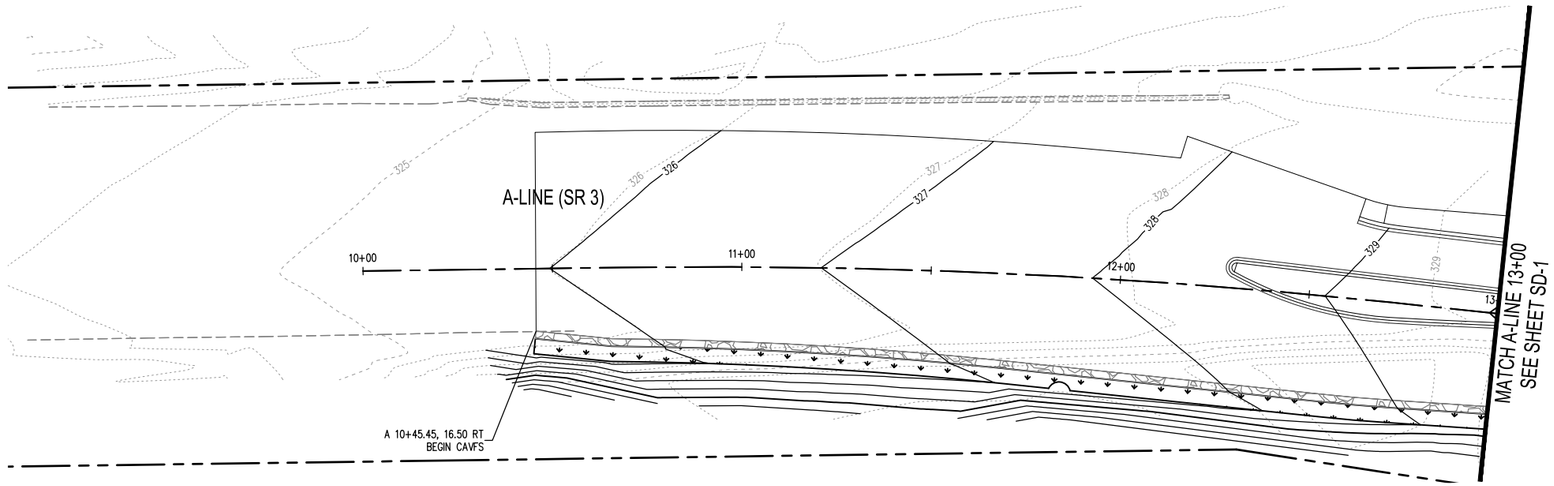
MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

STORM PLAN AND PROFILE

DRAWING No.: SD-1
SHEET No.: 16 OF 52

T. 23 N., R. 01 W., S. 21, W.M.



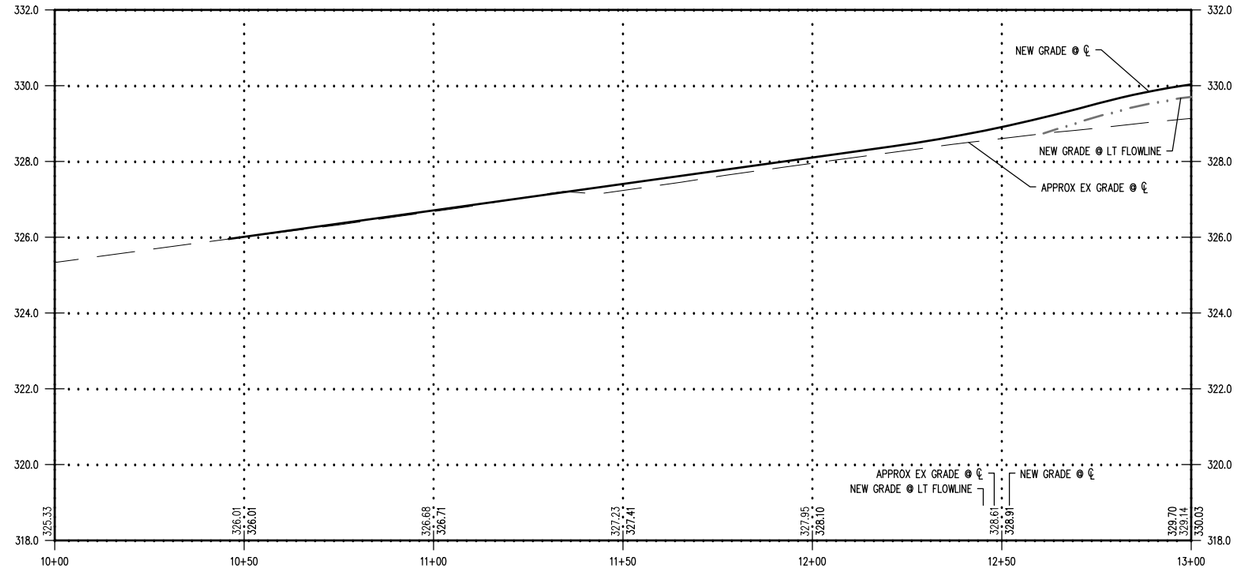


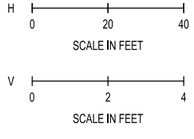
LEGEND

- RIGHT OF WAY
- SD — SCHEDULE A STORM SEWER PIPE
- CATCH BASIN TYPE 1
- CATCH BASIN TYPE 2
- COMPOST-AMENDED VEGETATIVE FILTER STRIP (SEE DETAIL "C" SHEET XS-6)
- 5'x6'x1' DEEP HAND PLACED RIPRAP

GENERAL NOTES

1. CATCH BASINS LOCATED ALONG THE CURB AND GUTTER ARE LOCATED (STATION, OFFSET, AND ELEVATION) IN RELATION TO FLOW LINE FACE OF CURB AT THE MIDPOINT BACK OF RIM. ALL OTHER CATCH BASINS ARE LOCATED TO CENTER OF STRUCTURE.
2. ALL CATCH BASIN GRATES SHALL HAVE GRATES, PER WSDOT STANDARD PLAN B-30.30, UNLESS OTHERWISE NOTED.
3. INSTALL CEMENT CONCRETE CURB AND GUTTER PAN, PER WSDOT STANDARD PLAN F-10.16, AT ALL CATCH BASINS LOCATED ALONG THE CURB AND GUTTER.





△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-SD-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 40625 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

SCJ ALLIANCE
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PROJECT NAME:

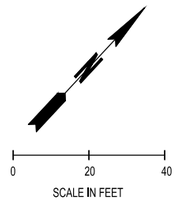
MTA

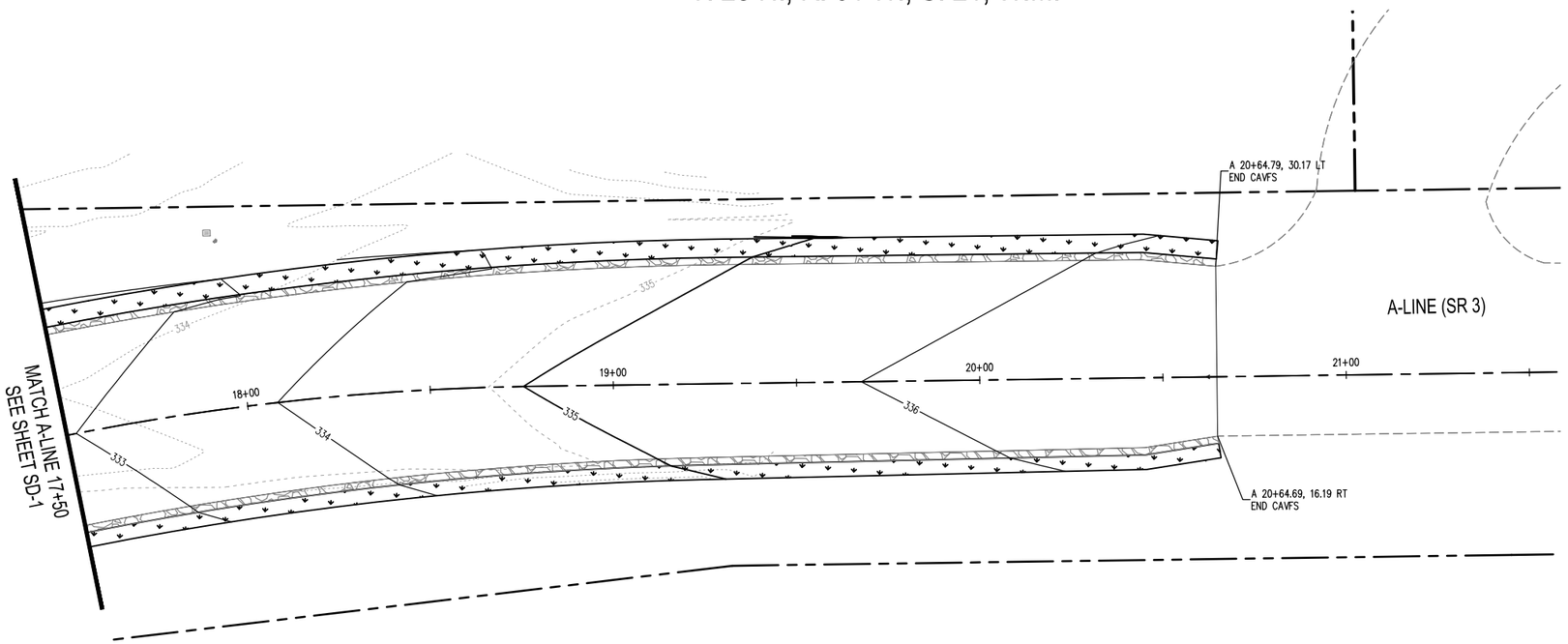
MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

STORM PLAN AND PROFILE

DRAWING No.: SD-2
SHEET No.: 17 OF 52

T. 23 N., R. 01 W., S. 21, W.M.





LEGEND

- RIGHT OF WAY
- SD — SCHEDULE A STORM SEWER PIPE
- CATCH BASIN TYPE 1
- CATCH BASIN TYPE 2
- COMPOST-AMENDED VEGETATIVE FILTER STRIP (SEE DETAIL "C" SHEET XS-6)
- 5'x6'x1' DEEP HAND PLACED RIPRAP

GENERAL NOTES

1. CATCH BASINS LOCATED ALONG THE CURB AND GUTTER ARE LOCATED (STATION, OFFSET, AND ELEVATION) IN RELATION TO FLOW LINE FACE OF CURB AT THE MIDPOINT BACK OF RIM. ALL OTHER CATCH BASINS ARE LOCATED TO CENTER OF STRUCTURE.
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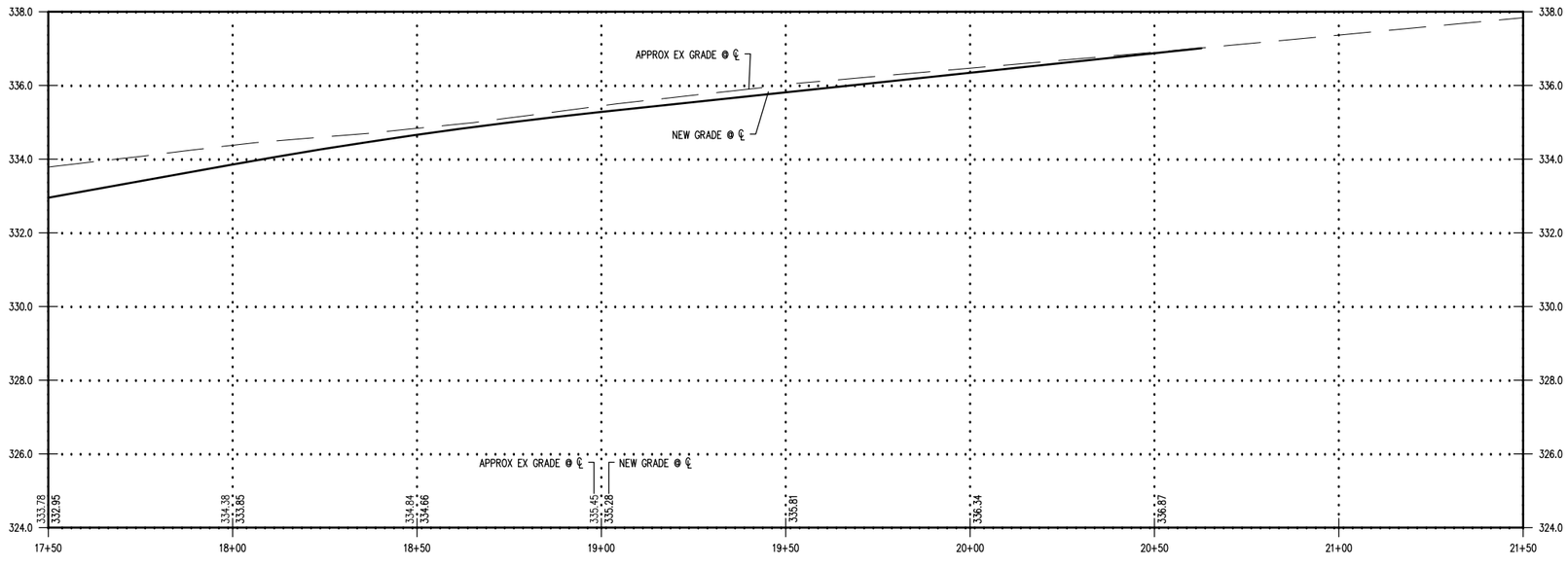

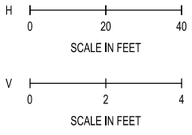

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DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
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DRAWING FILE No.: 0738.05-SD-T

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PATRICK HOLM — STATE OF WASHINGTON — 40625 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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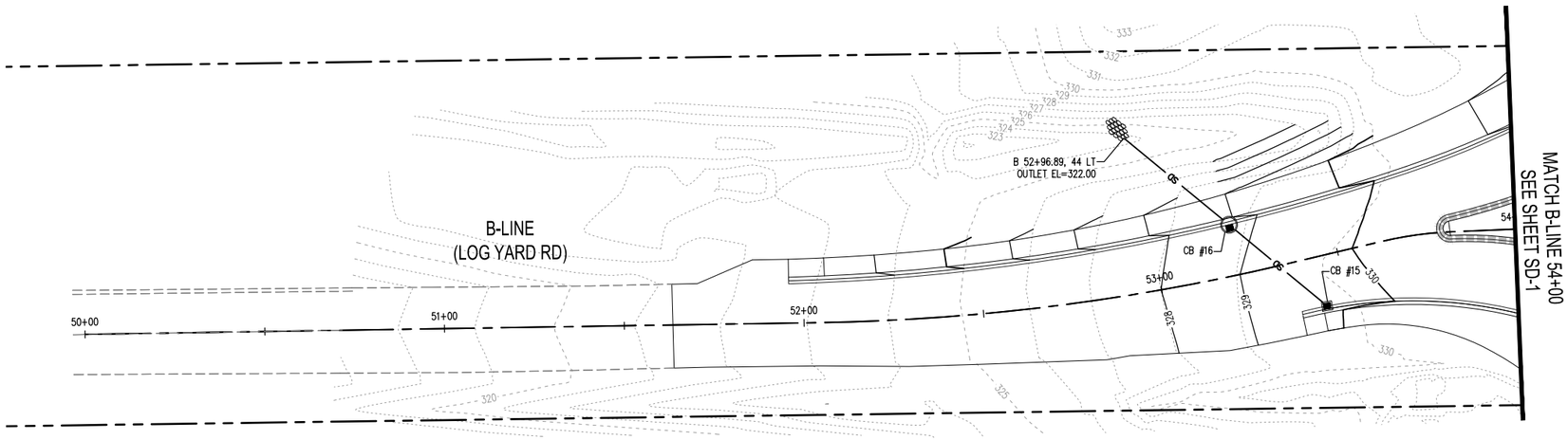
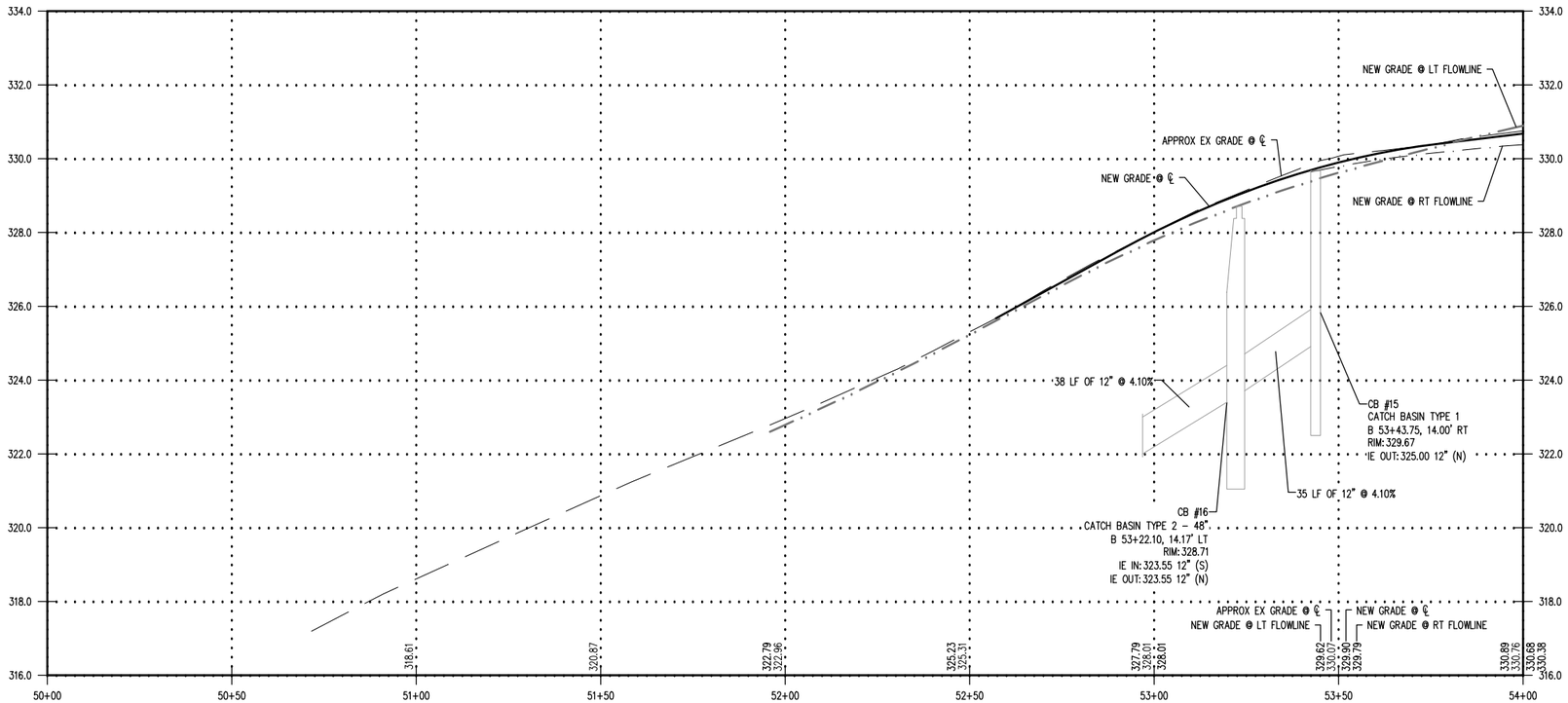
MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

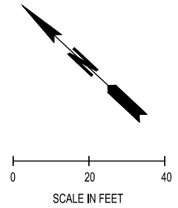
STORM PLAN AND PROFILE

DRAWING No.: SD-3
SHEET No.: 18 OF 52

T. 23 N., R. 01 W., S. 21, W.M.







LEGEND

- RIGHT OF WAY
- SD — SCHEDULE A STORM SEWER PIPE
- CATCH BASIN TYPE 1
- CATCH BASIN TYPE 2
- COMPOST-AMENDED VEGETATIVE FILTER STRIP (SEE DETAIL "C" SHEET XS-6)
- 5'x6'x1' DEEP HAND PLACED RIPRAP

GENERAL NOTES

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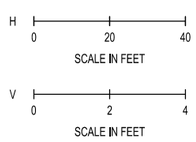

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DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
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DRAWING FILE No.: 0738.05-SD-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 14409 — REGISTERED PROFESSIONAL ENGINEER
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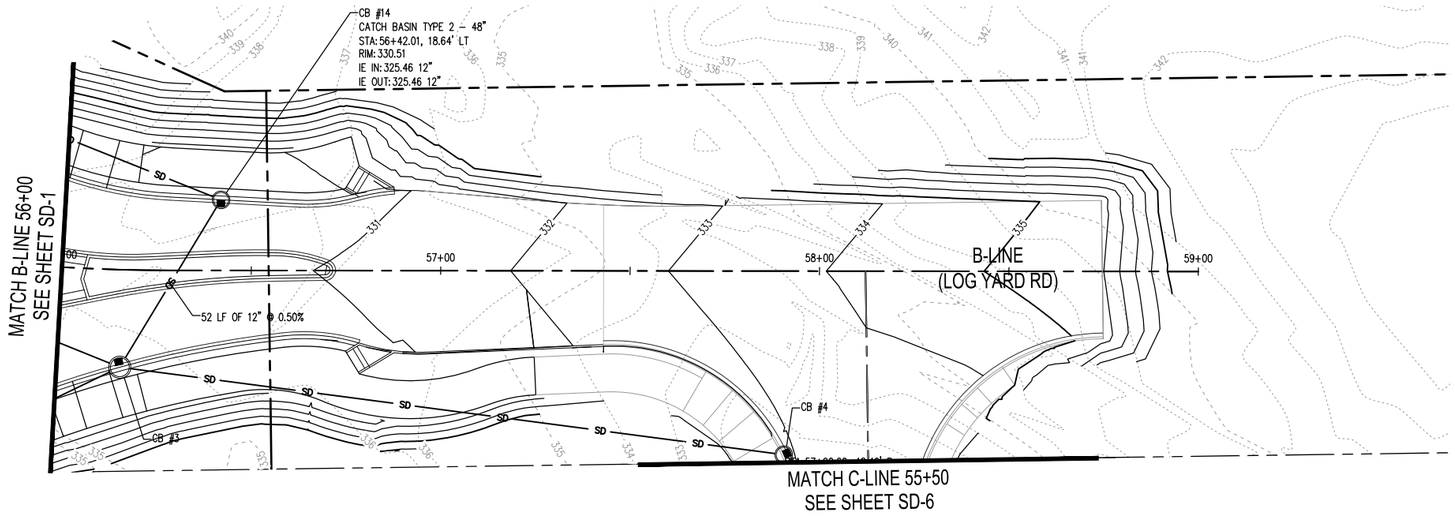
MTA

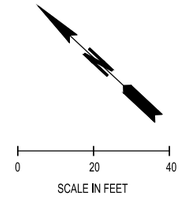
MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

STORM PLAN AND PROFILE

DRAWING No.: SD-4
SHEET No.: 19 OF 52

T. 23 N., R. 01 W., S. 21, W.M.





LEGEND

- RIGHT OF WAY
- SD — SCHEDULE A STORM SEWER PIPE
- CATCH BASIN TYPE 1
- CATCH BASIN TYPE 2
- COMPOST–AMENDED VEGETATIVE FILTER STRIP (SEE DETAIL "C" SHEET XS–6)
- 5'x6'x1' DEEP HAND PLACED RIPRAP

GENERAL NOTES

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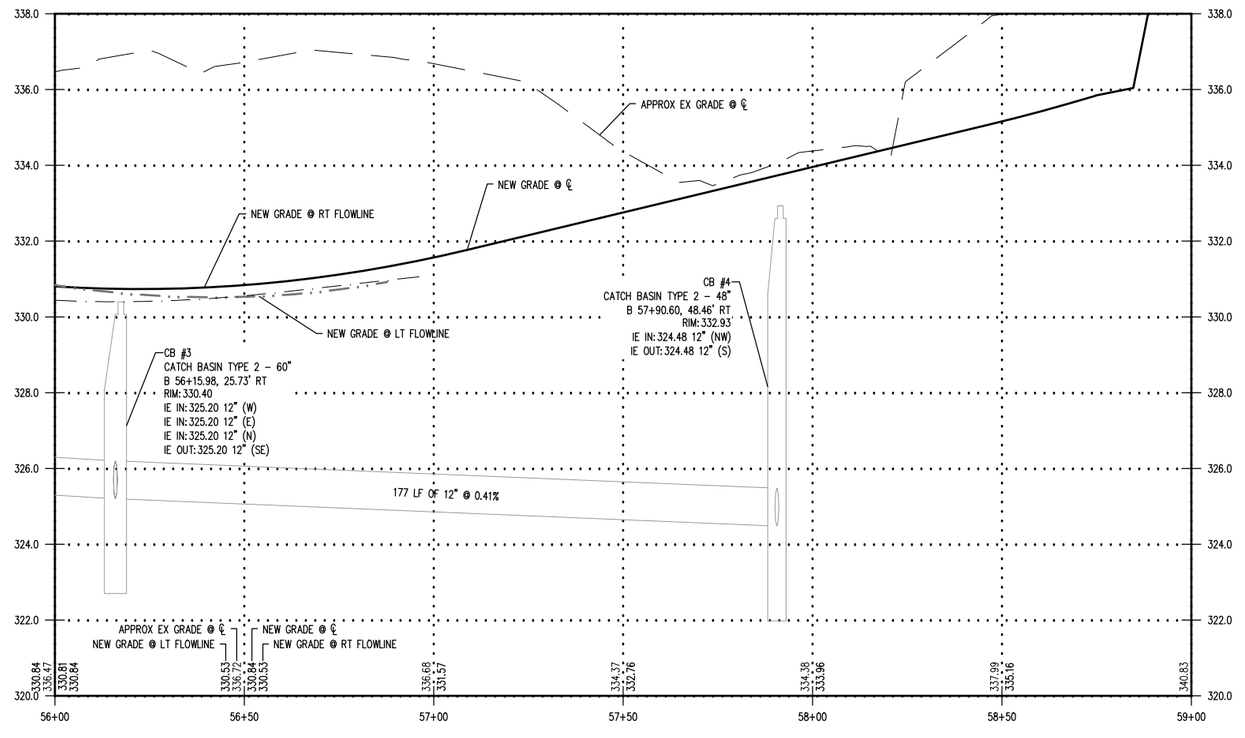

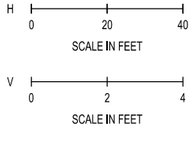

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DESIGNED BY: K. MELVIN
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CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
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ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 49453 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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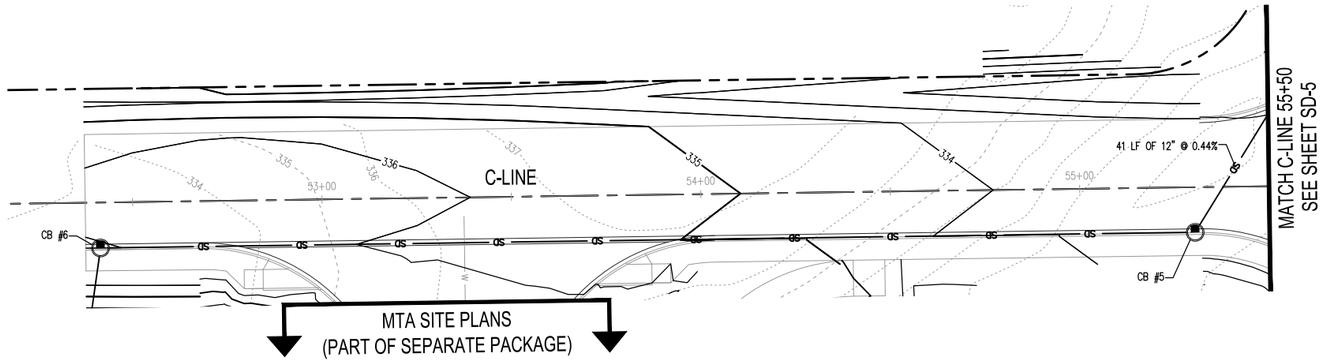
PROJECT NAME:

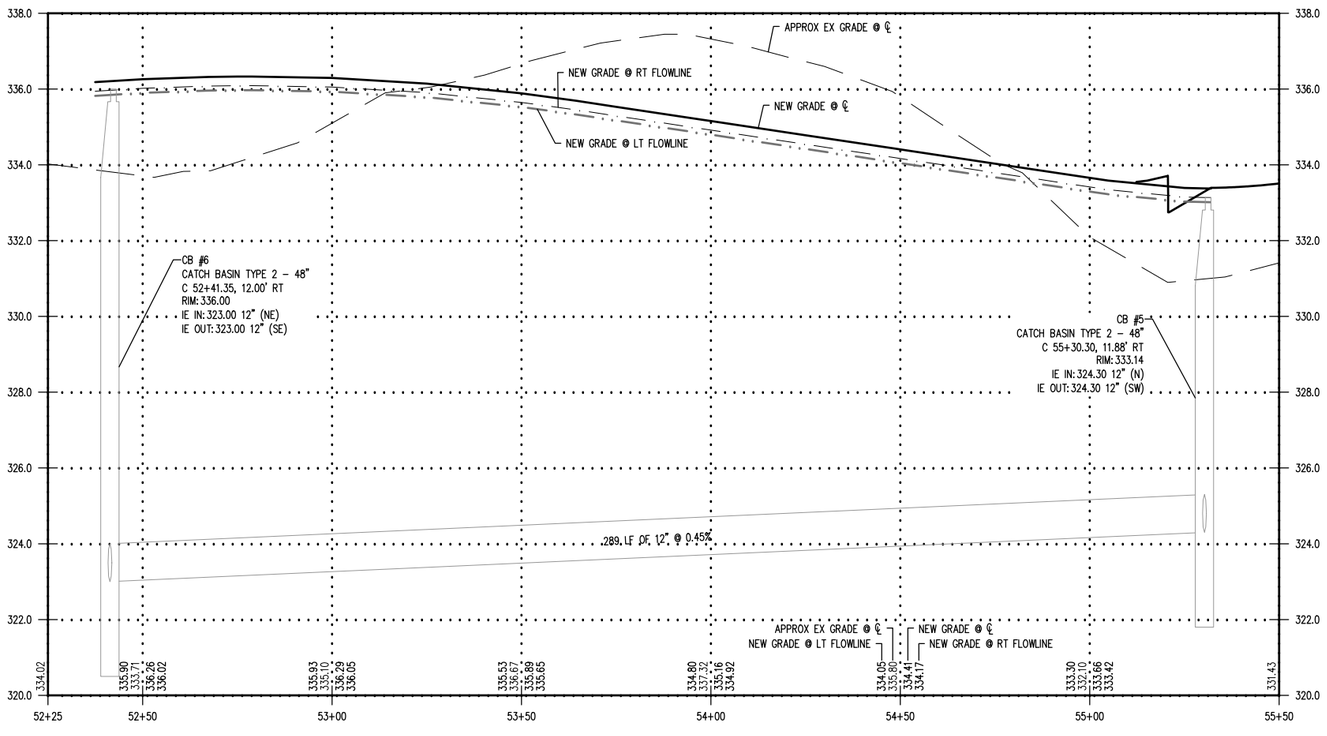
MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

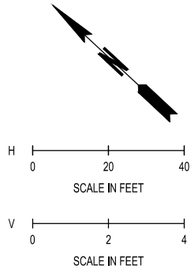
STORM PLAN AND PROFILE

DRAWING No.: SD-5
SHEET No.: 20 OF 52

T. 23 N., R. 01 W., S. 21, W.M.







LEGEND

- RIGHT OF WAY
- SD — SCHEDULE A STORM SEWER PIPE
- CATCH BASIN TYPE 1
- CATCH BASIN TYPE 2
- COMPOST–AMENDED VEGETATIVE FILTER STRIP (SEE DETAIL "C" SHEET XS–6)
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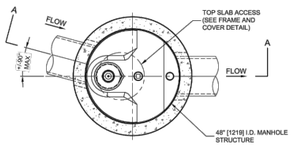
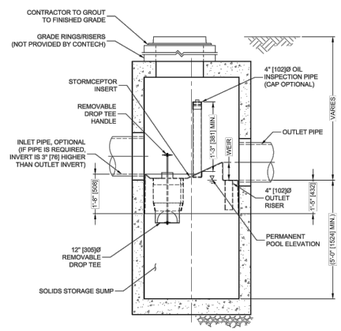


PLAN VIEW
TOP SLAB NOT SHOWN



SECTION A-A

Stormceptor®

STORMCEPTOR DESIGN NOTES

THE STANDARD STC450I CONFIGURATION WITH ROUND, SOLID FRAME AND COVER, AND INLET PIPE IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			
WATER QUALITY FLOW RATE (cfs [L/s])			
PEAK FLOW RATE (cfs [L/s])			
RETURN PERIOD OF PEAK FLOW (yrs)			
RIM ELEVATION			
PIPE DATA:	INVERT	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
NOTES / SPECIAL REQUIREMENTS:			

FRAME AND COVER
(MAY VARY)
NOT TO SCALE

FRAME AND GRATE
(MAY VARY)
NOT TO SCALE

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE, www.ContechES.com
3. STORMCEPTOR WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. STORMCEPTOR STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 2' [610], AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
5. STORMCEPTOR STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C478 AND AASHTO LOAD FACTOR DESIGN METHOD.
6. ALTERNATE UNITS ARE SHOWN IN MILLIMETERS [mm].

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMCEPTOR MANHOLE STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPE(S). MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. ALL PIPE CENTERLINES TO MATCH PIPE OPENING CENTERLINES.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

STC450i
STORMCEPTOR
STANDARD DETAIL

I:\COMMON\CAD\TREATMENT\03 STORMCEPTOR\45 STANDARD DRAWINGS\IN PROCESS\STC450i-DTL.DWG 2/1/2019 5:13 PM

Nov 06, 2019 3:30:22pm – User: kane.melvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CAD\BELFAIR\0738.05-SD-T.DWG

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
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DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
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PATRICK HOLM — STATE OF WASHINGTON — 19425 — REGISTERED PROFESSIONAL ENGINEER — 11-06-19

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PROJECT NAME:

MTA

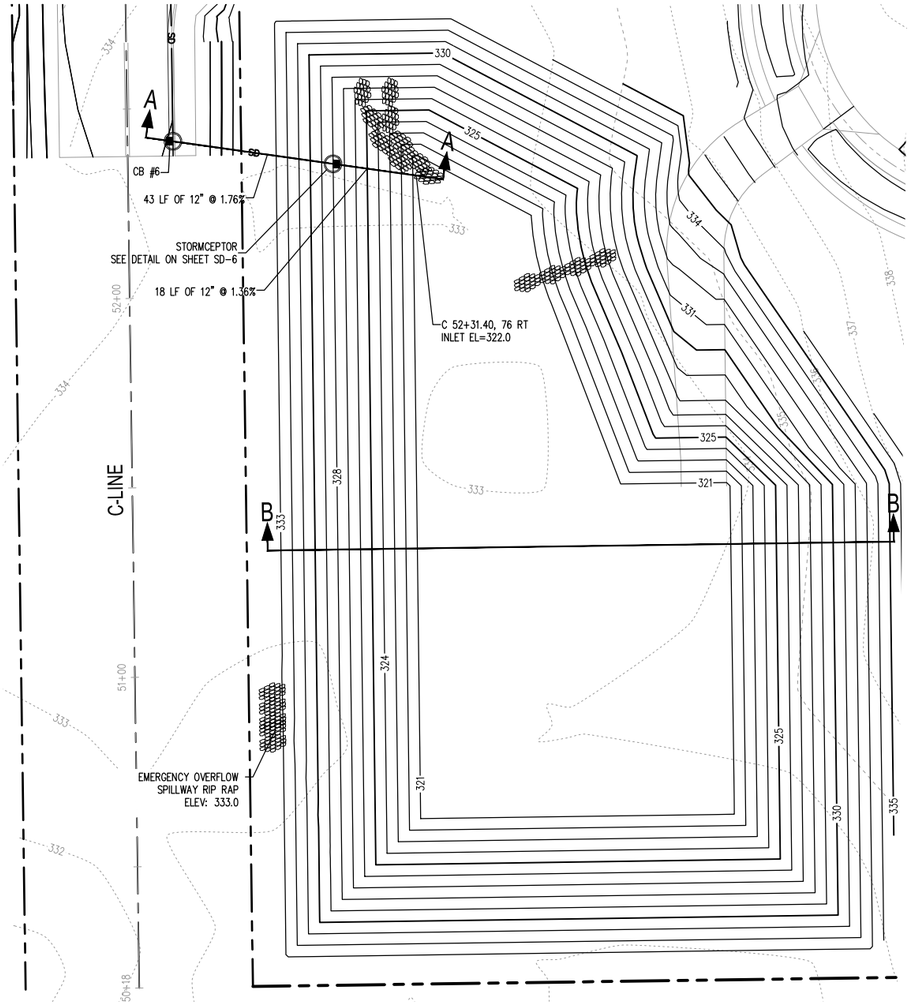
MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

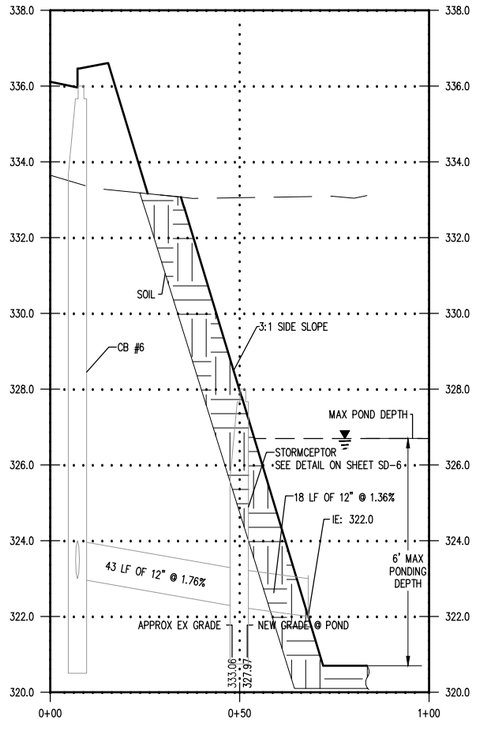
STORM PLAN AND PROFILE

DRAWING No.: SD-6

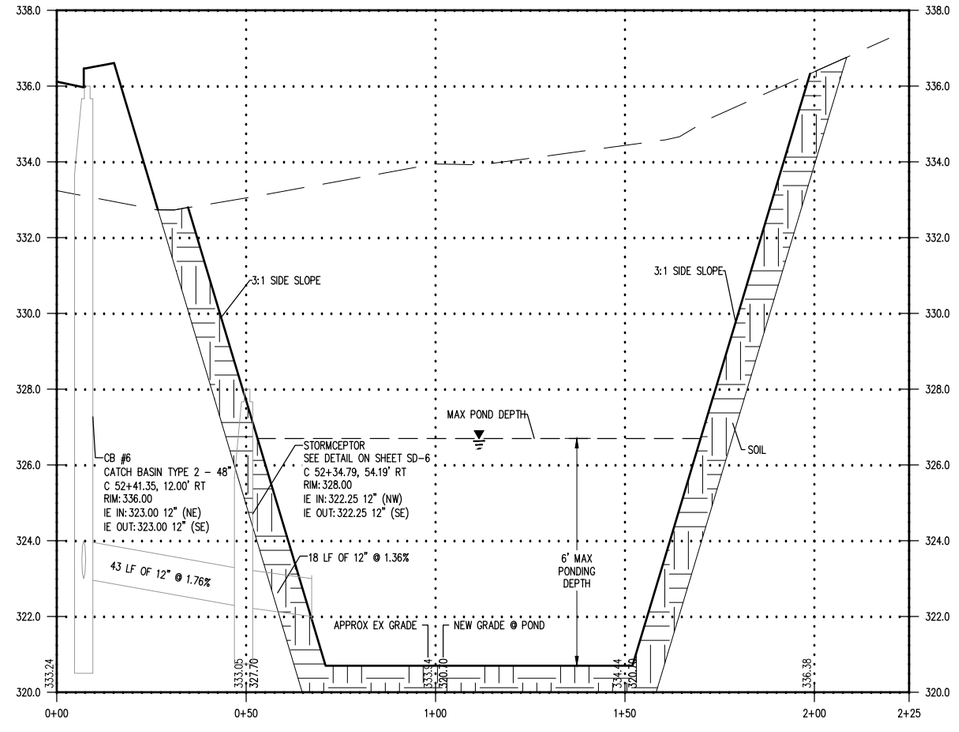
SHEET No.: 21 OF 52

T. 23 N., R. 01 W., S. 21, W.M.

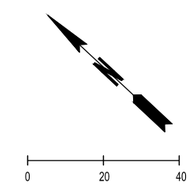




SECTION A-A



SECTION B-B



LEGEND

- RIGHT OF WAY
- SD — SCHEDULE A STORM SEWER PIPE
- CATCH BASIN TYPE 1
- CATCH BASIN TYPE 2
- COMPOST–AMENDED VEGETATIVE FILTER STRIP (SEE DETAIL "C" SHEET XS–6)
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GENERAL NOTES

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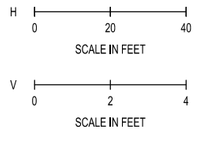

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3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
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11-06-19

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PROJECT NAME:

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BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

STORM PLAN AND PROFILE

DRAWING No.: SD-7
SHEET No.: 22 OF 52

Nov 06, 2019 - 3:30:32pm - User: kenn.melvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CAD\BELFAIR\0738.05-SD-T.DWG

T. 23 N., R. 01 W., S. 21, W.M.

MATCH B-LINE 53+50 SEE SHEET PV-4

MATCH A-LINE 13+00 SEE SHEET PV-2

MATCH A-LINE 17+50 SEE SHEET PV-3

MATCH B-LINE 57+00 SEE SHEET PV-5

A-LINE (SR 3)

B-LINE (LOG YARD RD)

A 13+39.65, 17.38 RT RC&G

A 13+21.25, 16.12 RT BEGIN RC&G

A 16+64.27, 21.68 LT END RC&G

A 16+93.09, 16.64 RT END RC&G

A 15+00.00 = B 55+00.00

B 55+47.50, 61.27 RT RC&G

B 56+86.92, 21.55 RT END SIDEWALK

B 56+96.14, 21.50 RT END RC&G

B 56+86.94, 22.00 LT BEGIN SIDEWALK

B 56+95.70, 21.03 LT BEGIN RC&G

R1 R2 R3 R4 R5 R6 R7 R8

PAVING NOTES

1. SEE TYPICAL SECTIONS FOR FLOWLINE LOCATION.
2. ALL CURB AND GUTTER, STREET GRADES, SIDEWALK GRADES, AND ANY OTHER VERTICAL AND/OR HORIZONTAL ALIGNMENT SHALL BE STAKED BY AN ENGINEERING OR SURVEYING FIRM CAPABLE OF PERFORMING SUCH WORK.
3. INSTALL DETECTABLE WARNING SURFACE PER WSDOT STD. DWG. NO. F-45.10-01 AT ALL PEDESTRIAN RAMP LOCATIONS.
4. UNLESS NOTED OTHERWISE, CURB OFFSETS ARE TO FACE OF CURB. ELEVATIONS ARE TO BOTTOM FACE OF CURB.

0 20 40

SCALE IN FEET

LEGEND

SAWCUT	SEE RM-1
CENTERLINE RUMBLE STRIP	WSDOT STD. PLAN M-65.10
HMA CLASS 1/2" PG. 58H-22	SEE XS-1
CEMENT CONCRETE SIDEWALK	SEE XS-1
PLANING BITUMINOUS PAVEMENT	SEE XS-1
CEMENT CONCRETE PAVEMENT	SEE XS-1
STAMPED COLORED CEMENT CONCRETE SIDEWALK	WSDOT STD. PLAN F-30.10
CURB 1 (2" MOD) ROUNDABOUT TRUCK APRON CEM. CONC. CURB AND GUTTER	SEE XS-5
CURB 1 ROUNDABOUT TRUCK APRON CEM. CONC. CURB AND GUTTER (RC&G)	WSDOT STD. PLAN F-10.18
CURB 2 ROUNDABOUT CEMENT CONCRETE CURB AND GUTTER	WSDOT STD. PLAN F-10.18
ROUNDABOUT CENTRAL ISLAND CEMENT CONCRETE CURB	WSDOT STD. PLAN F-10.18
*ROUNDABOUT SPLITTER ISLAND NOSING CURB	WSDOT STD. PLAN F-10.18
**DETECTABLE WARNING SURFACE	WSDOT STD. PLAN F-45.10
CEMENT CONCRETE TYPE COMBINATION	WSDOT STD PLAN F-40.14
(#) CURB RAMP NUMBER	SEE ADA-1 & ADA-2

*CONTRACTOR SHALL MODIFY ROUNDABOUT SPLITTER ISLAND NOSING CURB HEIGHT TO MATCH SPLITTER ISLAND HEIGHT

**DETECTABLE WARNING SURFACES PAY ITEM ONLY USED WHEN INSTALLED IN INSTANCES WITHOUT A COMBINATION CURB RAMP. COMBINATION CURB RAMP PAY ITEM INCLUDES DETECTABLE WARNING SURFACE.

Tables were updated. There were some busts.

LINE TABLE

LINE #	LENGTH	DIRECTION	BEGIN STA. & OFFSET	END STA. & OFFSET
L34	16.55	S66°23'15"E	B 51+70.49, 11.39 LT	B 51+85.79, 17.72 LT
L35	10.06	S44°14'28"E	B 51+85.79, 17.72 LT	B 51+95.85, 17.77 LT
L36	26.19	N33°13'03"E	A 16+39.31, 31.33 LT	A 16+64.71, 29.66 LT
L37	43.15	N50°49'49"E	A 13+21.25, 16.12 RT	A 13+63.97, 16.93 RT
L38	114.17	N46°19'33"E	A 19+30.62, 30.46 LT	A 20+44.80, 32.21 LT
L39	36.87	N33°13'21"E	A 16+26.23, 24.00 LT	A 16+64.27, 21.68 LT
L41	57.72	S79°00'32"W	A 13+92.72, 37.80 RT	B 55+52.20, 60.49 RT
L42	20.10	N52°01'50"E	A 20+44.80, 32.21 LT	A 20+64.79, 30.17 LT
L43	42.06	N79°00'32"E	A 13+89.01, 47.08 RT	B 55+53.43, 79.03 RT
L44	46.91	S45°26'55"E	B 56+96.14, 21.50 RT	B 57+43.00, 19.44 RT
L45	10.00	N44°33'05"E	B 57+24.71, 22.75 RT	B 57+25.15, 32.74 RT
L46	7.00	N15°49'17"E	B 56+74.91, 21.24 RT	B 56+78.54, 27.22 RT
L47	9.22	S37°00'57"W	A 13+64.55, 32.87 LT	A 13+73.56, 34.80 LT
L48	26.06	S51°40'09"W	A 12+73.41, 25.33 LT	A 12+99.47, 25.94 LT
L49	49.77	S66°17'55"W	A 12+14.91, 39.05 LT	A 12+62.41, 26.53 LT
L55	7.95	S49°17'00"E	B 54+60.42, 15.61 LT	B 54+68.35, 16.16 LT

CURVE TABLE

CURVE #	LENGTH	RADIUS	DELTA	BEGIN STA. & OFFSET	END STA. & OFFSET
C4	30.22	128.50	13°28'26"	A 13+54.85, 35.97 RT	A 13+89.01, 47.08 RT
C6	27.22	50.00	31°11'32"	B 55+53.43, 79.03 RT	B 55+72.23, 59.80 RT
C7	82.59	267.00	17°43'26"	B 55+72.23, 59.80 RT	B 56+47.20, 31.91 RT
C8	22.11	39.85	31°47'43"	B 56+47.20, 31.91 RT	B 56+68.88, 34.45 RT
C11	104.05	1085.33	5°29'34"	A 10+65.44, 18.77 RT	A 11+70.63, 23.07 RT
C12	17.74	470.00	2°09'46"	A 12+55.76, 25.93 RT	A 12+73.74, 25.67 RT
C14	31.39	50.00	35°58'33"	B 56+78.54, 27.22 RT	B 57+09.39, 25.87 RT
C16	12.56	40.00	17°59'36"	B 57+12.89, 35.23 RT	B 57+25.15, 32.74 RT
C17	33.97	142.25	13°40'51"	A 13+58.14, 22.61 RT	A 13+94.11, 34.31 RT
C18	5.76	2.00	165°03'43"	A 12+29.49, 3.56 LT	A 12+30.62, 7.35 LT
C19	43.31	100.00	24°48'58"	A 12+29.49, 3.56 LT	A 12+71.67, 4.73 RT
C20	11.29	449.00	1°26'26"	A 12+71.67, 4.73 RT	A 12+82.95, 4.19 RT
C21	47.44	91.00	29°52'10"	A 13+75.68, 2.00 RT	A 14+22.52, 8.73 RT
C22	2.16	1.00	124°01'19"	A 14+22.52, 8.73 RT	A 14+23.87, 7.59 RT
C23	14.00	78.00	10°17'14"	A 14+23.87, 7.59 RT	A 14+22.24, 6.30 LT
C24	5.37	3.00	102°31'13"	A 14+22.24, 6.30 LT	A 14+18.51, 9.12 LT
C25	29.72	500.00	3°24'20"	A 13+89.49, 2.75 LT	A 14+18.51, 9.12 LT
C26	18.94	151.00	7°11'08"	A 13+70.88, 1.91 LT	A 13+89.49, 2.75 LT
C27	10.94	50.00	12°32'26"	A 12+61.02, 20.70 LT	A 12+71.73, 19.33 LT
C28	33.07	138.50	13°40'51"	A 13+57.12, 26.21 RT	A 13+92.72, 37.80 RT
C29	88.46	230.00	22°02'10"	A 13+37.01, 17.44 LT	A 14+20.16, 33.29 LT
C30	53.57	60.00	51°09'06"	A 14+20.16, 33.29 LT	B 54+17.84, 30.14 RT
C31	4.88	81.00	3°27'08"	B 54+13.39, 28.14 RT	B 54+17.84, 30.14 RT
C32	68.30	125.00	31°18'26"	B 53+43.11, 14.81 RT	B 54+13.39, 28.14 RT
C33	6.49	125.00	2°58'29"	B 53+36.62, 14.74 RT	B 53+43.11, 14.81 RT
C37	49.95	191.00	14°59'07"	A 13+38.95, 16.37 RT	A 13+63.97, 16.93 RT
C38	54.95	82.00	38°23'37"	A 14+13.02, 56.61 LT	B 53+89.83, 32.38 RT
C39	35.32	60.00	33°43'24"	B 53+51.39, 21.42 RT	B 53+89.83, 32.38 RT
C40	11.32	119.00	5°26'55"	B 53+40.09, 20.73 RT	B 53+51.39, 21.42 RT
C41	3.60	602.00	0°20'35"	B 53+36.50, 20.67 RT	B 53+40.09, 20.73 RT

CURVE TABLE

CURVE #	LENGTH	RADIUS	DELTA	BEGIN STA. & OFFSET	END STA. & OFFSET
C42	2.11	1.00	121°00'11"	B 54+23.21, 10.58 RT	B 54+24.60, 9.54 RT
C43	22.21	76.00	16°44'39"	B 54+25.05, 12.58 LT	B 54+24.60, 9.54 RT
C44	6.40	3.00	122°11'02"	B 54+20.94, 15.85 LT	B 54+25.05, 12.58 LT
C45	40.95	201.00	11°40'26"	B 53+81.83, 4.03 LT	B 54+20.94, 15.85 LT
C46	8.86	3.00	169°17'55"	B 53+81.43, 3.95 LT	B 53+81.97, 2.00 RT
C47	42.42	101.00	24°04'00"	B 53+81.97, 2.00 RT	B 54+23.21, 10.58 RT
C48	5.71	3.00	109°06'37"	B 55+77.09, 11.93 RT	B 55+80.83, 15.07 RT
C49	20.77	78.00	15°15'34"	B 55+76.00, 8.75 LT	B 55+77.09, 11.93 RT
C50	2.11	1.00	121°06'28"	B 55+76.00, 8.75 LT	B 55+77.33, 9.88 LT
C51	46.56	101.00	26°24'42"	B 55+77.33, 9.88 LT	B 56+23.27, 3.56 LT
C52	15.94	249.00	3°40'07"	B 56+40.49, 4.43 LT	B 56+56.48, 4.68 LT
C53	14.06	40.00	20°08'33"	B 56+56.48, 4.68 LT	B 56+70.21, 2.02 LT
C54	5.52	2.00	158°05'21"	B 56+69.52, 1.85 LT	B 56+70.21, 2.02 LT
C55	45.77	251.00	10°26'53"	B 56+11.60, 7.19 RT	B 56+56.81, 2.04 RT
C56	38.90	394.00	5°39'24"	B 57+26.71, 18.43 LT	B 57+65.57, 17.10 LT
C57	17.82	50.00	20°25'17"	B 56+78.05, 19.36 LT	B 56+95.7, 21.03 LT
C58	16.29	50.00	18°39'50"	B 56+61.93, 17.58 LT	B 56+78.05, 19.36 LT
C59	86.96	100.00	49°49'27"	B 55+51.07, 55.36 LT	B 56+28.65, 19.35 LT
C60	84.18	275.00	17°32'17"	A 16+22.92, 16.94 RT	B 55+51.07, 55.36 LT
C61	25.09	600.00	2°23'46"	A 16+22.92, 16.94 RT	A 16+46.21, 16.17 RT
C62	46.12	988.00	2°40'27"	A 16+58.47, 16.30 RT	A 16+93.09, 16.64 RT
C63	4.50	60.00	4°17'45"	B 56+72.05, 33.98 LT	B 56+76.33, 35.34 LT
C64	19.90	50.00	22°48'24"	B 56+40.49, 4.43 LT	B 56+72.05, 33.98 LT
C65	75.66	87.00	49°49'28"	B 55+60.98, 63.78 LT	B 56+29.35, 32.33 LT
C66	80.20	262.00	17°32'17"	B 55+60.98, 63.78 LT	A 16+24.25, 29.83 RT
C67	52.00	743.64	4°00'24"	A 16+24.25, 29.83 RT	A 16+74.36, 29.46 RT
C68	231.10	980.00	13°30'40"	A 16+86.87, 24.58 RT	A 19+24.04, 20.11 RT
C69	21.20	78.00	15°34'30"	A 15+75.96, 9.11 LT	A 15+77.08, 12.00 RT
C70	5.87	3.00	112°08'47"	A 15+77.08, 12.00 RT	A 15+80.97, 15.11 RT
C71	82.59	1001.00	4°43'38"	A 16+37.30, 3.08 RT	A 17+20.18, 3.90 RT

LINE TABLE

LINE #	LENGTH	DIRECTION	BEGIN STA. & OFFSET	END STA. & OFFSET
L3	31.65	N50°49'49"E	A 12+73.66, 23.67 RT	A 13+05.37, 24.47 RT
L4	38.21	N65°19'44"E	A 13+18.88, 25.80 RT	A 13+54.85, 35.97 RT
L6	20.12	N52°40'21"E	A 10+45.38, 16.50 RT	A 10+65.44, 18.77 RT
L7	83.96	N52°59'35"E	A 11+70.63, 23.07 RT	A 12+55.76, 25.93 RT
L9	14.30	N57°32'47"E	A 13+05.37, 24.47 RT	A 13+18.88, 25.80 RT
L10	19.21	S65°19'41"W	A 13+39.65, 17.38 RT	A 13+58.14, 22.61 RT
L11	54.78	S79°00'32"W	A 13+94.11, 34.31 RT	A 14+44.98, 54.61 RT
L12	92.93	N49°33'10"E	A 12+82.95, 4.19 RT	A 13+75.68, 2.00 RT
L13	140.49	S53°45'29"W	A 12+30.62, 7.35 LT	A 13+70.88, 1.91 LT
L14	37.70	S65°19'41"W	A 13+21.25, 16.12 RT	A 13+57.12, 26.21 RT
L15	64.21	S53°45'29"W	A 12+71.73, 19.33 LT	A 13+37.01, 17.44 LT
L17	40.70	N33°13'03"E	A 16+64.71, 29.66 LT	A 17+04.20, 28.43 LT
L19	18.00	S45°57'11"E	B 52+98.00, 17.75 RT	B 53+15.27, 20.17 RT
L22	0.42	S56°18'28"E	B 53+81.43, 3.95 LT	B 53+81.83, 4.03 LT
L23	17.24	S45°41'54"E	B 56+23.27, 3.56 LT	B 56+40.49, 4.43 LT
L24	12.72	N43°47'53"W	B 56+56.81, 2.04 RT	B 56+69.52, 1.85 RT
L25	31.94	N54°14'46"W	B 55+80.83, 15.07 RT	B 56+11.60, 7.19 RT
L26	31.12	S38°08'29"E	B 56+95.70, 21.03 LT	B 57+26.71, 18.43 LT
L27	33.32	S39°53'55"E	B 56+28.65, 19.35 LT	B 56+61.93, 17.58 LT
L28	8.00	S31°35'26"W	B 56+76.33, 35.34 LT	B 56+78.47, 27.63 LT
L29	23.17	N39°53'55"W	B 56+29.35, 32.33 LT	B 56+52.48, 31.10 LT
L30	13.12	N9°25'23"E	A 16+74.36, 29.46 RT	A 16+86.87, 24.58 RT
L31	120.74	N45°41'42"E	A 19+24.04, 20.11 RT	A 20+44.77, 19.05 RT
L32	20.12	N38°02'34"E	A 19+44.77, 19.05 RT	A 20+64.69, 16.19 RT
L33	59.35	N29°20'38"E	A 15+80.97, 15.11 RT	A 16+37.30, 3.08 RT

CURVE TABLE

CURVE #	LENGTH	RADIUS	DELTA	BEGIN STA. & OFFSET	END STA. & OFFSET
C72	5.90	2.00	169°06'03"	A 17+20.18, 3.90 RT	A 17+20.60, 0.06 LT
C73	49.76	200.00	14°15'19"	A 16+71.33, 5.00 LT	A 17+20.60, 0.06 LT
C74	37.65	1005.84	2°08'41"	A 16+33.87, 5.00 LT	A 16+71.33, 5.00 LT
C75	55.62	81.00	39°20'35"	A 15+77.29, 10.23 LT	A 16+33.87, 5.00 LT
C76	2.12	1.00	121°31'37"	A 15+75.96, 9.11 LT	A 15+77.29, 10.23 LT
C77	40.49	582.00	3°59'11"	B 51+95.85, 17.77 LT	B 52+37.34, 18.79 LT
C78	133.16	450.00	16°57'18"	B 52+37.34, 18.79 LT	B 53+71.12, 28.60 LT
C79	33.41	301.00	6°21'33"	B 53+71.12, 28.6 LT	B 53+98.64, 41.07 LT
C80	61.54	170.00	20°44'24"	B 53+98.64, 41.07 LT	A 15+75.93, 55.24 LT
C81	57.63	80.00	41°16'39"	B 15+75.93, 55.24 LT	B 16+39.31, 31.33 LT
C82	233.34	1020.00	13°06'27"	A 17+04.20, 28.43 LT	A 19+30.62, 32.46 LT
C83	45.07	60.00	43°02'18"	B 56+68.88, 34.45 RT	B 57+12.89, 35.23 RT
C84	175.44	588.00	17°05'43"	B 51+95.87, 11.77 LT	B 53+72.42, 18.27 LT
C85	94.83	265.00	20°30'15"	B 53+72.42, 18.27 LT	B 54+54.98, 59.98 LT
C86	69.25	62.00	63°59'32"	A 54+54.98, 59.98 LT	A 16+26.23, 24.00 LT
C87	135.48	280.00	27°43'26"	A 14+36.72, 44.27 RT	B 56+58.41, 17.26 RT
C88	77.32	84.89	52°11'02"	A 13+63.97, 16.93 RT	A 14+36.72, 44.27 RT
C89	116.64	277.00	24°07'33"	B 55+52.20, 60.49 RT	B 56+58.75, 20.24 RT
C90	16.27	47.10	19°47'41"	B 56+58.75, 20.24 RT	B 56+74.91, 21.24 RT
C91	17.41	50.00	19°56'54"	B 56+78.96, 19.25 RT	B 56+96.14, 21.50 RT
C92	20.80	50.00	23°49'58"	B 56+58.41, 17.26 RT	B 56+78.96, 19.25 RT
C93	21.87	602.00	2°04'54"	B 53+15.27, 20.17 RT	B 53+36.50, 20.67 RT
C94	63.94	250.00	14°39'12"	A 12+99.47, 25.94 LT	A 13+64.55, 32.87 LT
C95	11.23	44.00	14°37'46"	A 12+62.41, 26.53 LT	A 12+73.41, 25.33 LT
C96	65.51	42.55	88°13'12"	B 54+83.16, 39.07 RT	B 54+68.35, 16.16 LT
C97	41.25	110.00	21°29'18"	B 54+68.35, 16.16 LT	B 55+07.93, 12.14 LT
C98	13.16	10.00	75°23'44"	B 55+07.93, 12.14 LT	B 55+15.85, 2.82 LT
C99	55.69	44.00	72°31'10"	B 55+15.85, 2.82 LT	B 54+83.16, 39.07 RT

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-PV-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 19429 — REGISTERED PROFESSIONAL ENGINEER — 11-06-19

SCJ ALLIANCE
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PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

PAVING PLAN

DRAWING No.: PV-1

SHEET No.: 23 OF 52

Nov 06, 2019 - 3:31:12pm - User: kono.melvin
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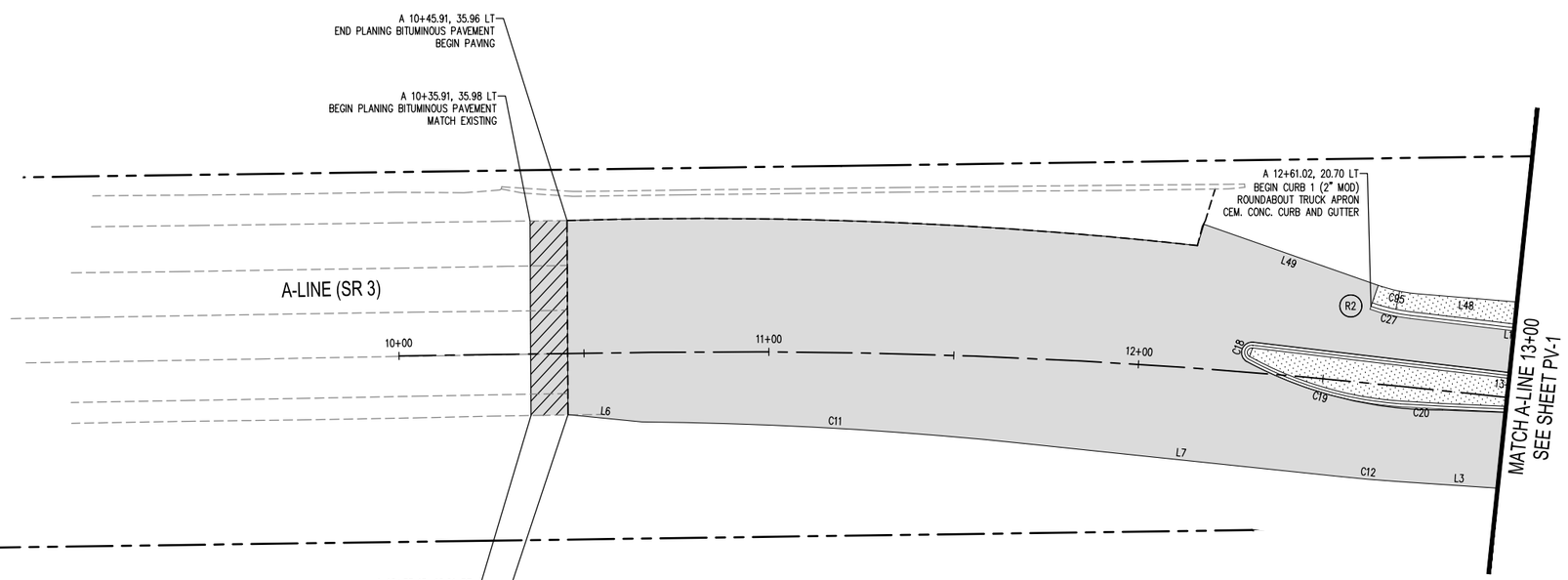
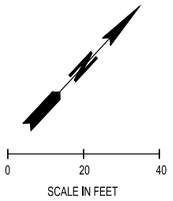
T. 23 N., R. 01 W., S. 21, W.M.





LEGEND

	SAWCUT	SEE RM-1
	CENTERLINE RUMBLE STRIP	WSDOT STD. PLAN M-65.10
	HMA CLASS 1/2" PG. 58H-22	SEE XS-1
	CEMENT CONCRETE SIDEWALK	SEE XS-1
	PLANING BITUMINOUS PAVEMENT	SEE XS-1
	CEMENT CONCRETE PAVEMENT	SEE XS-1
	STAMPED COLORED CEMENT CONCRETE SIDEWALK	WSDOT STD. PLAN F-30.10
	CURB 1 (2" MOD) ROUNDABOUT TRUCK APRON CEM. CONC. CURB AND GUTTER	SEE XS-5
	CURB 1 ROUNDABOUT TRUCK APRON CEM. CONC. CURB AND GUTTER (RC&G)	WSDOT STD. PLAN F-10.18
	CURB 2 ROUNDABOUT CEMENT CONCRETE CURB AND GUTTER	WSDOT STD. PLAN F-10.18
	ROUNDABOUT CENTRAL ISLAND CEMENT CONCRETE CURB	WSDOT STD. PLAN F-10.18
	*ROUNDABOUT SPLITTER ISLAND NOSING CURB	WSDOT STD. PLAN F-10.18
	**DETECTABLE WARNING SURFACE	WSDOT STD. PLAN F-45.10
	CEMENT CONCRETE TYPE COMBINATION	WSDOT STD PLAN F-40.14
#	CURB RAMP NUMBER	SEE ADA-1 & ADA-2

*CONTRACTOR SHALL MODIFY ROUNDABOUT SPLITTER ISLAND NOSING CURB HEIGHT TO MATCH SPLITTER ISLAND HEIGHT

**DETECTABLE WARNING SURFACES PAY ITEM ONLY USED WHEN INSTALLED IN INSTANCES WITHOUT A COMBINATION CURB RAMP. COMBINATION CURB RAMP PAY ITEM INCLUDES DETECTABLE WARNING SURFACE.

PAVING NOTES

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4. UNLESS NOTED OTHERWISE, CURB OFFSETS ARE TO FACE OF CURB. ELEVATIONS ARE TO BOTTOM FACE OF CURB.

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
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DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
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ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 19251 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

SCJ ALLIANCE
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PROJECT NAME:

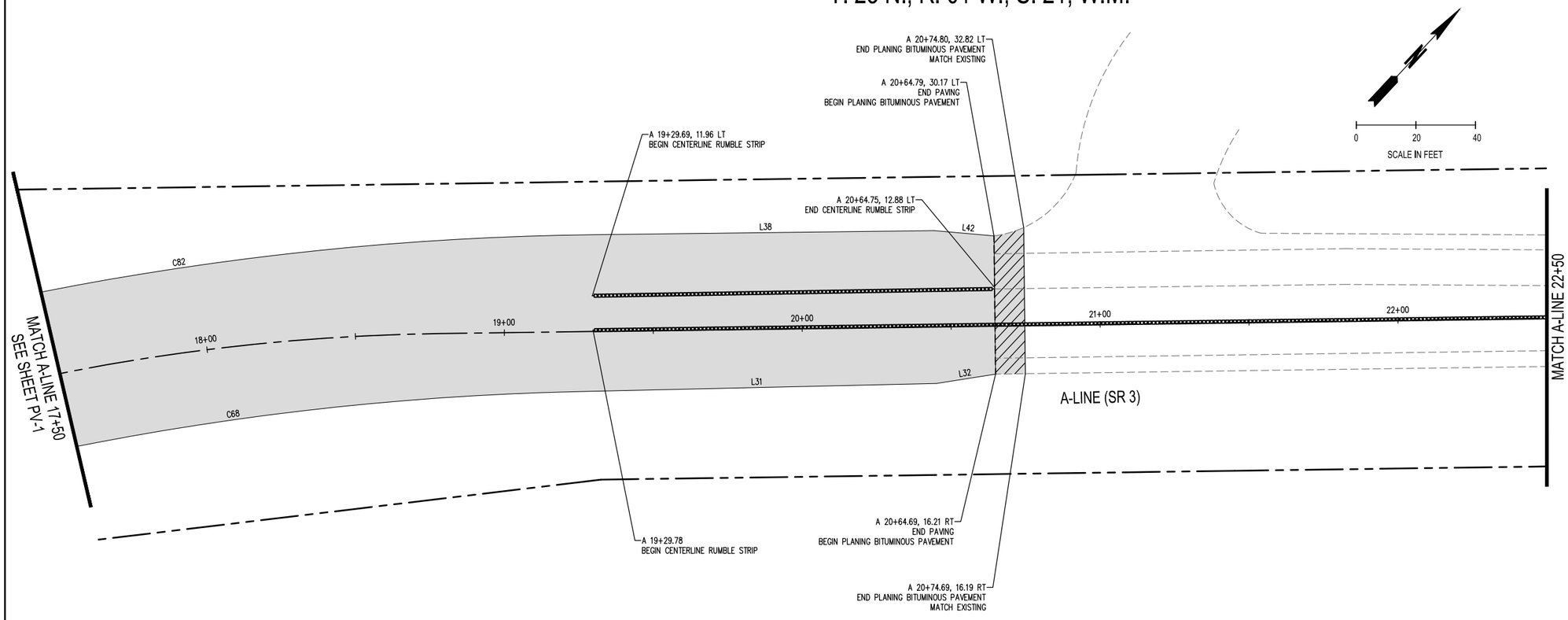
MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

PAVING PLAN

DRAWING No.: PV-2
SHEET No.: 24 OF 52

T. 23 N., R. 01 W., S. 21, W.M.



LEGEND

SAWCUT	SEE RM-1
CENTERLINE RUMBLE STRIP	WSDOT STD. PLAN M-65.10
HMA CLASS 1/2" PG. 58H-22	SEE XS-1
CEMENT CONCRETE SIDEWALK	SEE XS-1
PLANING BITUMINOUS PAVEMENT	SEE XS-1
CEMENT CONCRETE PAVEMENT	SEE XS-1
STAMPED COLORED CEMENT CONCRETE SIDEWALK	WSDOT STD. PLAN F-30.10
CURB 1 (2" MOD) ROUNDABOUT TRUCK APRON CEM. CONC. CURB AND GUTTER	SEE XS-5
CURB 1 ROUNDABOUT TRUCK APRON CEM. CONC. CURB AND GUTTER (RC&G)	WSDOT STD. PLAN F-10.18
CURB 2 ROUNDABOUT CEMENT CONCRETE CURB AND GUTTER	WSDOT STD. PLAN F-10.18
ROUNDABOUT CENTRAL ISLAND CEMENT CONCRETE CURB	WSDOT STD. PLAN F-10.18
*ROUNDABOUT SPLITTER ISLAND NOSING CURB	WSDOT STD. PLAN F-10.18
**DETECTABLE WARNING SURFACE	WSDOT STD. PLAN F-45.10
CEMENT CONCRETE TYPE COMBINATION	WSDOT STD PLAN F-40.14
(#) CURB RAMP NUMBER	SEE ADA-1 & ADA-2

*CONTRACTOR SHALL MODIFY ROUNDABOUT SPLITTER ISLAND NOSING CURB HEIGHT TO MATCH SPLITTER ISLAND HEIGHT

**DETECTABLE WARNING SURFACES PAY ITEM ONLY USED WHEN INSTALLED IN INSTANCES WITHOUT A COMBINATION CURB RAMP. COMBINATION CURB RAMP PAY ITEM INCLUDES DETECTABLE WARNING SURFACE.

PAVING NOTES

1. SEE TYPICAL SECTIONS FOR FLOWLINE LOCATION.
2. ALL CURB AND GUTTER, STREET GRADES, SIDEWALK GRADES, AND ANY OTHER VERTICAL AND/OR HORIZONTAL ALIGNMENT SHALL BE STAKED BY AN ENGINEERING OR SURVEYING FIRM CAPABLE OF PERFORMING SUCH WORK.
3. INSTALL DETECTABLE WARNING SURFACE PER WSDOT STD. DWG. NO. F-45.10-01 AT ALL PEDESTRIAN RAMP LOCATIONS.
4. UNLESS NOTED OTHERWISE, CURB OFFSETS ARE TO FACE OF CURB. ELEVATIONS ARE TO BOTTOM FACE OF CURB.

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-PV-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 40251 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
SCJALLIANCE.COM

PROJECT NAME:

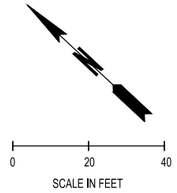
MTA

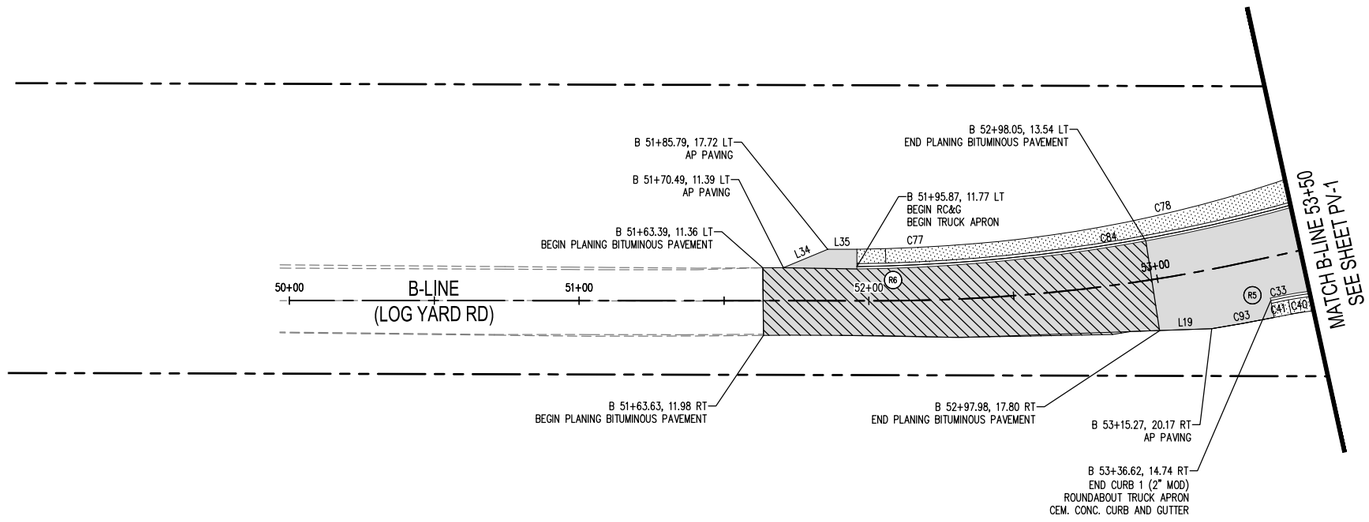
MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

PAVING PLAN

DRAWING No.: PV-3
SHEET No.: 25 OF 52

T. 23 N., R. 01 W., S. 21, W.M.





LEGEND

	SAWCUT	SEE RM-1
	CENTERLINE RUMBLE STRIP	WSDOT STD. PLAN M-65.10
	HMA CLASS 1/2" PG. 58H-22	SEE XS-1
	CEMENT CONCRETE SIDEWALK	SEE XS-1
	PLANING BITUMINOUS PAVEMENT	SEE XS-1
	CEMENT CONCRETE PAVEMENT	SEE XS-1
	STAMPED COLORED CEMENT CONCRETE SIDEWALK	WSDOT STD. PLAN F-30.10
	CURB 1 (2" MOD) ROUNDABOUT TRUCK APRON CEM. CONC. CURB AND GUTTER	SEE XS-5
	CURB 1 ROUNDABOUT TRUCK APRON CEM. CONC. CURB AND GUTTER (RC&G)	WSDOT STD. PLAN F-10.18
	CURB 2 ROUNDABOUT CEMENT CONCRETE CURB AND GUTTER	WSDOT STD. PLAN F-10.18
	ROUNDABOUT CENTRAL ISLAND CEMENT CONCRETE CURB	WSDOT STD. PLAN F-10.18
	*ROUNDABOUT SPLITTER ISLAND NOSING CURB	WSDOT STD. PLAN F-10.18
	**DETECTABLE WARNING SURFACE	WSDOT STD. PLAN F-45.10
	CEMENT CONCRETE TYPE COMBINATION	WSDOT STD PLAN F-40.14
(#)	CURB RAMP NUMBER	SEE ADA-1 & ADA-2

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2	FPS #2	07/29/19	PH
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4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-PV-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 49431 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

MTA

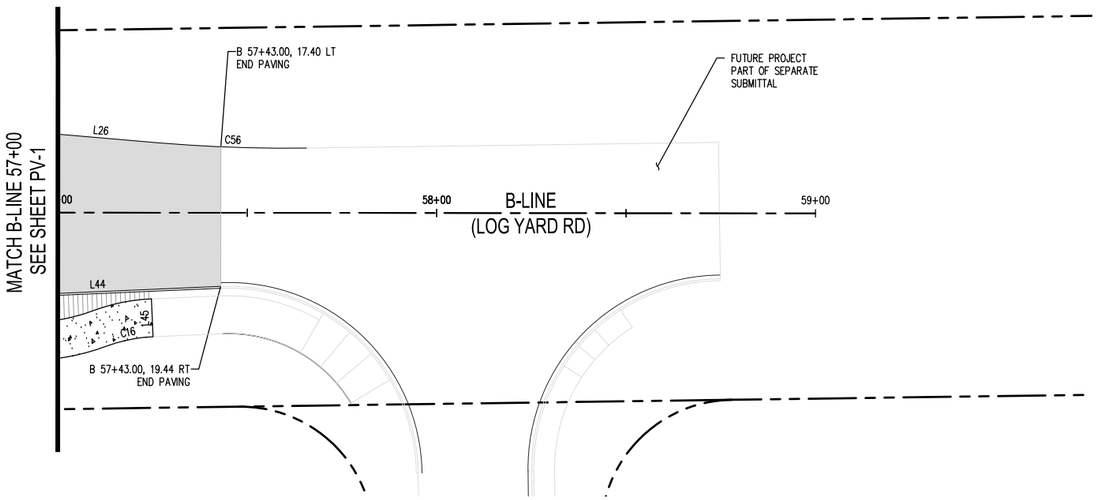
MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

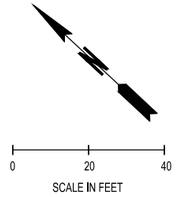
PAVING PLAN

DRAWING No.: PV-4
SHEET No.: 26 OF 52

Nov 06, 2019 - 3:31:27pm - User: kono.melvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05-PV-T.DWG

T. 23 N., R. 01 W., S. 21, W.M.





LEGEND

	SAWCUT	SEE RM-1
	CENTERLINE RUMBLE STRIP	WSDOT STD. PLAN M-65.10
	HMA CLASS 1/2" PG. 58H-22	SEE XS-1
	CEMENT CONCRETE SIDEWALK	SEE XS-1
	PLANING BITUMINOUS PAVEMENT	SEE XS-1
	CEMENT CONCRETE PAVEMENT	SEE XS-1
	STAMPED COLORED CEMENT CONCRETE SIDEWALK	WSDOT STD. PLAN F-30.10
	CURB 1 (2" MOD) ROUNDABOUT TRUCK APRON CEM. CONC. CURB AND GUTTER	SEE XS-5
	CURB 1 ROUNDABOUT TRUCK APRON CEM. CONC. CURB AND GUTTER (RC&G)	WSDOT STD. PLAN F-10.18
	CURB 2 ROUNDABOUT CEMENT CONCRETE CURB AND GUTTER	WSDOT STD. PLAN F-10.18
	ROUNDABOUT CENTRAL ISLAND CEMENT CONCRETE CURB	WSDOT STD. PLAN F-10.18
	*ROUNDABOUT SPLITTER ISLAND NOSING CURB	WSDOT STD. PLAN F-10.18
	**DETECTABLE WARNING SURFACE	WSDOT STD. PLAN F-45.10
	CEMENT CONCRETE TYPE COMBINATION	WSDOT STD PLAN F-40.14
#	CURB RAMP NUMBER	SEE ADA-1 & ADA-2

*CONTRACTOR SHALL MODIFY ROUNDABOUT SPLITTER ISLAND NOSING CURB HEIGHT TO MATCH SPLITTER ISLAND HEIGHT

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PAVING NOTES

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1	FPS #1	04/08/19	PH
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3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-PV-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 19651 REGISTERED PROFESSIONAL ENGINEER
11-06-19

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SCJALLIANCE.COM

PROJECT NAME:

MTA

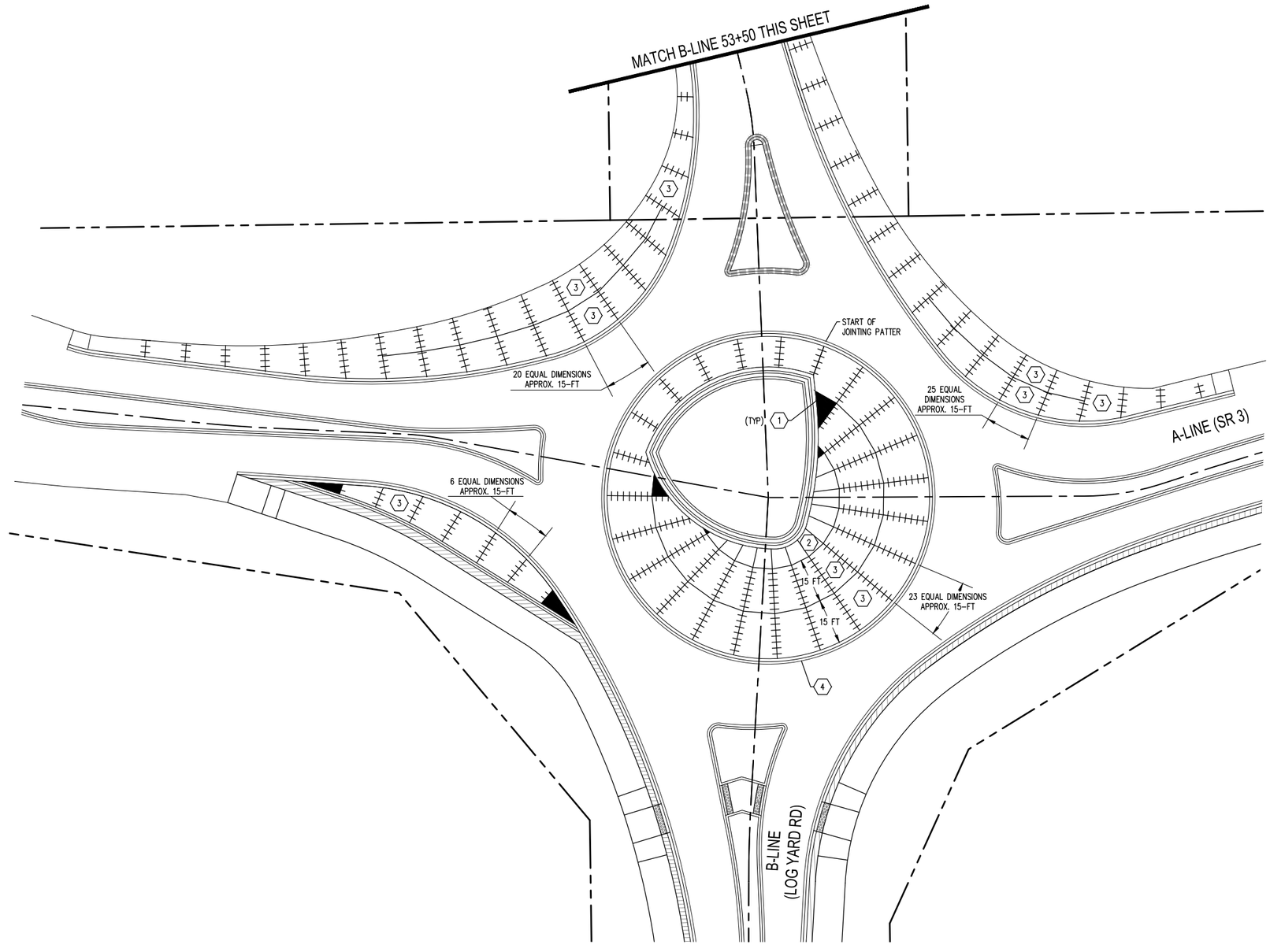
MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

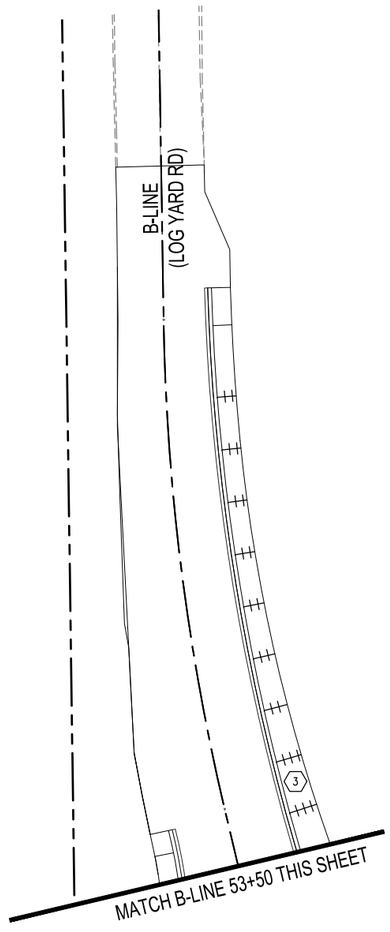
PAVING PLAN

DRAWING No.: PV-5
SHEET No.: 27 OF 52

Nov 06, 2019 - 3:31:32pm - User: kmcmelvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05-PV-T.DWG

T. 23 N., R. 01 W., S. 21, W.M.





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SCALE IN FEET

GENERAL NOTES

1. SHADED AREAS CONTINUOUS REINFORCED CONCRETE PAVEMENT (CRCP) WITH #4 REBAR @ 12" O.C.
2. INNER APRON CONCRETE PANELS: CONSTRUCTION JOINTS ONLY, NO DOWEL BARS.
3. OUTSIDE AND MIDDLE APRON CONCRETE PANELS: DOWEL BARS PER STANDARD PLAN A-40.10-03, NO TIE-BARS.
4. CURB 1 ROUNDABOUT TRUCK APRON CEM. CONC. CURB AND GUTTER: STANDARD PLAN F-10.18

ALL WORK AND MATERIALS SHALL MEET THE REQUIREMENTS OF SECTION 5-05 OF WSDOT STANDARD SPECIFICATIONS.

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-PV-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 40451 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

TRUCK APRON JOINTING DETAIL

DRAWING No.: PV-6

SHEET No.: 28 OF 52

Nov 06, 2019 - 3:31:38pm - User: kano.melvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CAD\BELFAIR\0738.05-PV-T.DWG

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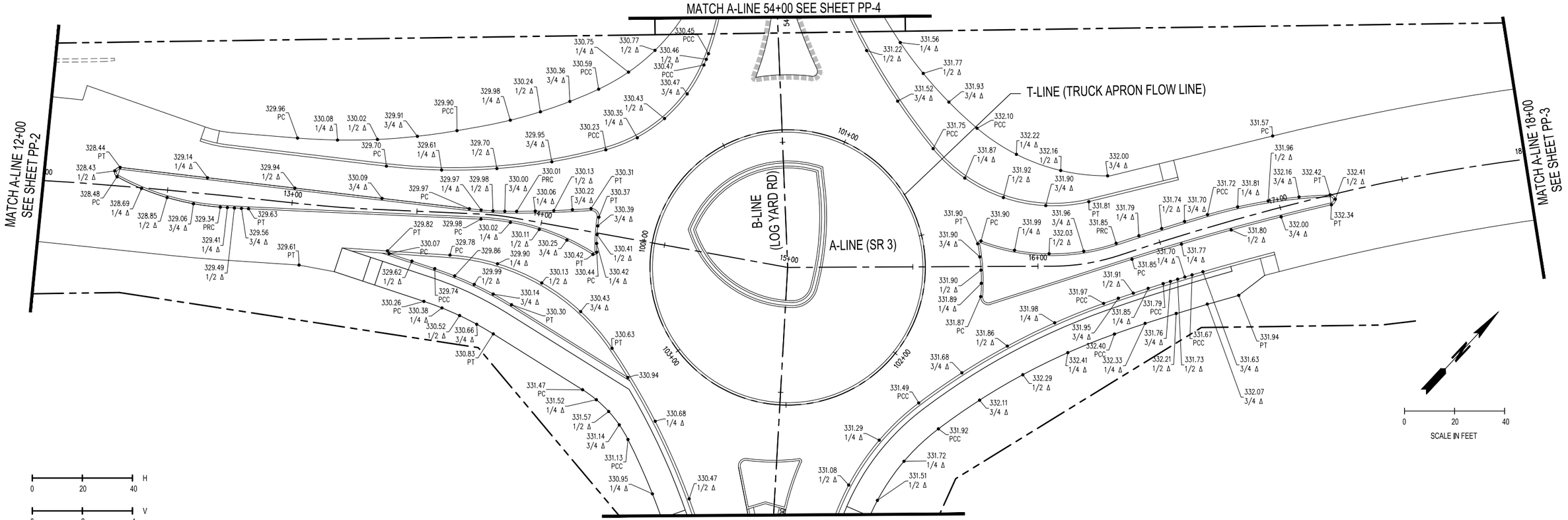

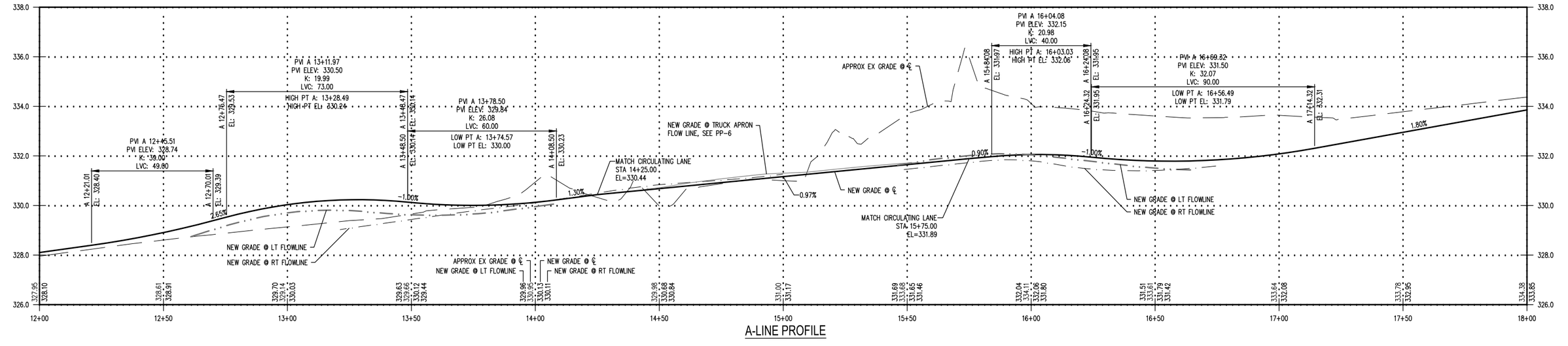

A-LINE PROFILE

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-PP-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 49625 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
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PROJECT NAME:

MTA

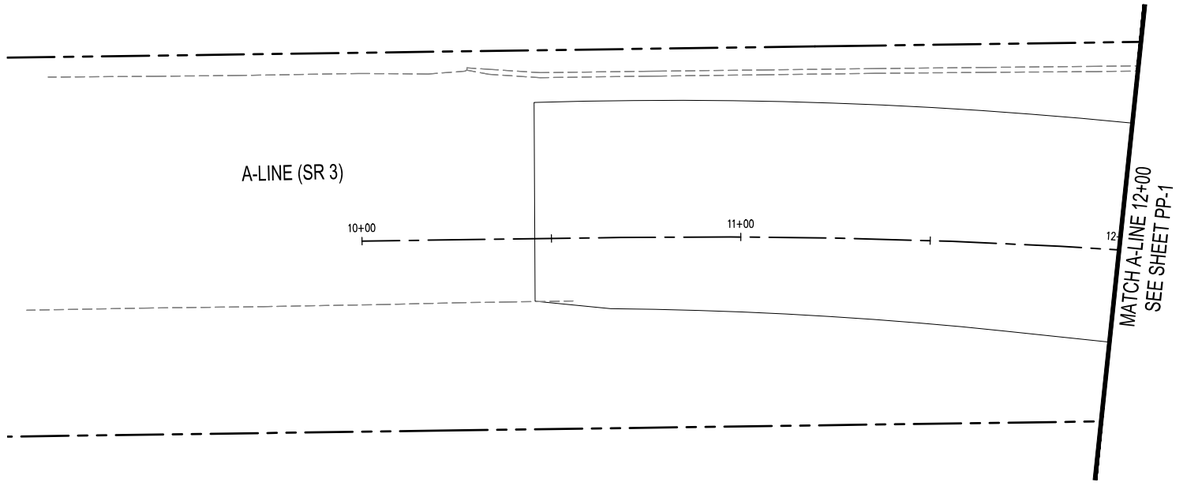
MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

PLAN AND PROFILE

DRAWING No.: PP-1
SHEET No.: 29 OF 52

Nov 06, 2019 3:32:11pm – User: kami.melvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CAD\BELFAIR\0738.05-PP-T.DWG

T. 23 N., R. 01 W., S. 21, W.M.



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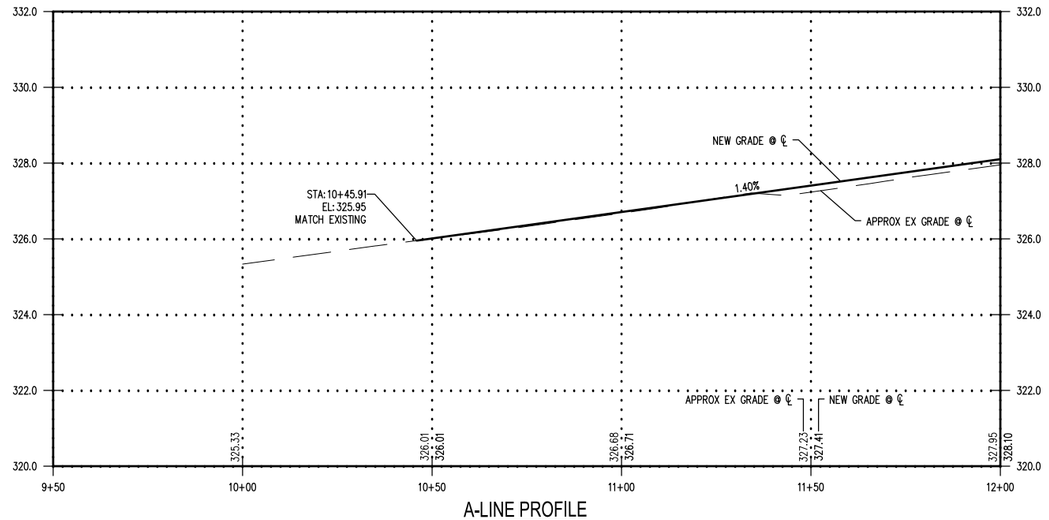

A-LINE PROFILE

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△	REVISIONS	DATE	BY
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2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-PP-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 40625 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
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PROJECT NAME:

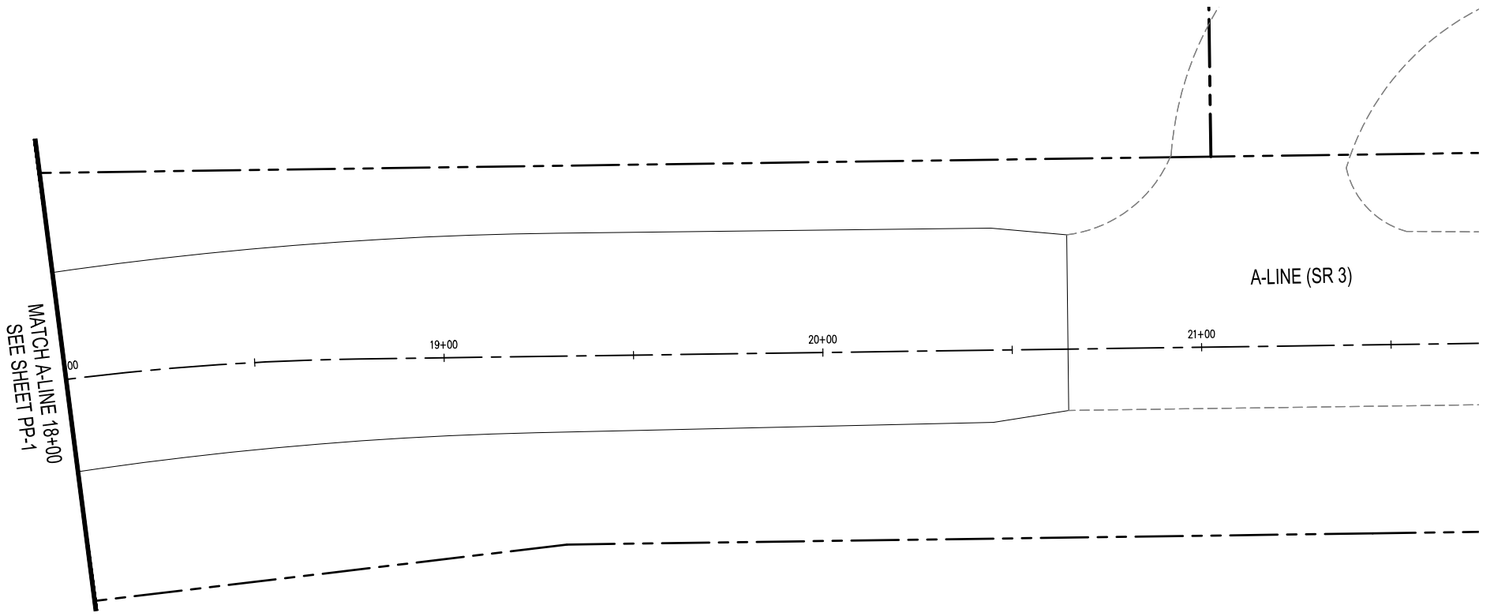
MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

PLAN AND PROFILE

DRAWING No.: PP-2
SHEET No.: 30 OF 52

T. 23 N., R. 01 W., S. 21, W.M.



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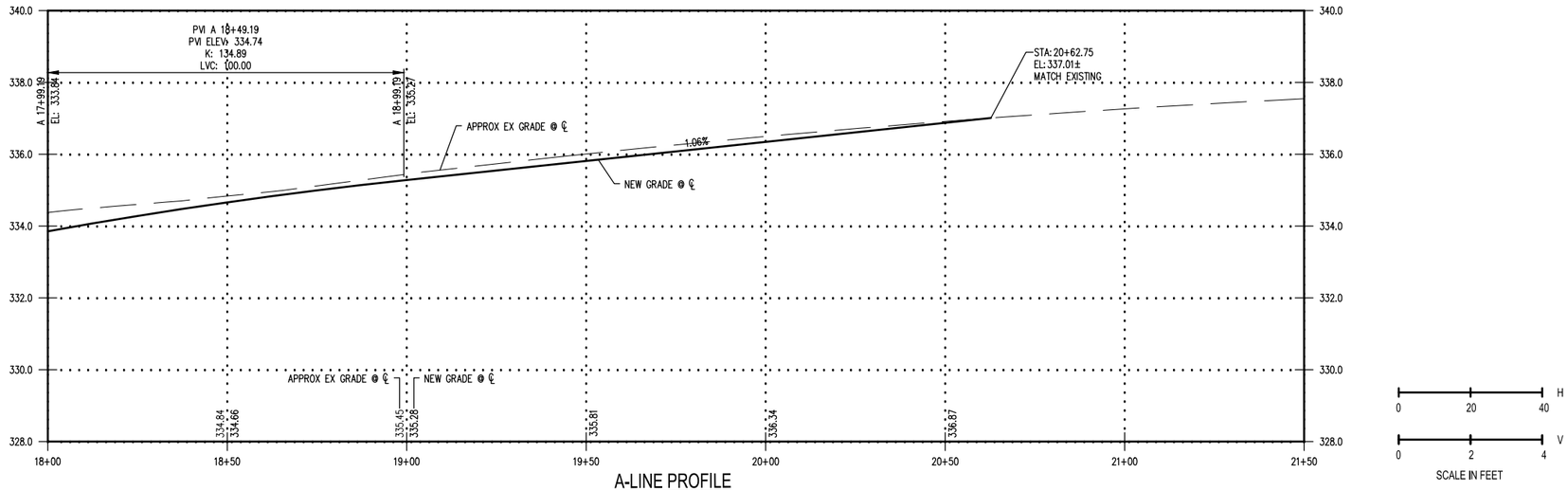

A-LINE PROFILE

0 20 40 H
0 2 4 V
SCALE IN FEET

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-PP-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 40825 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

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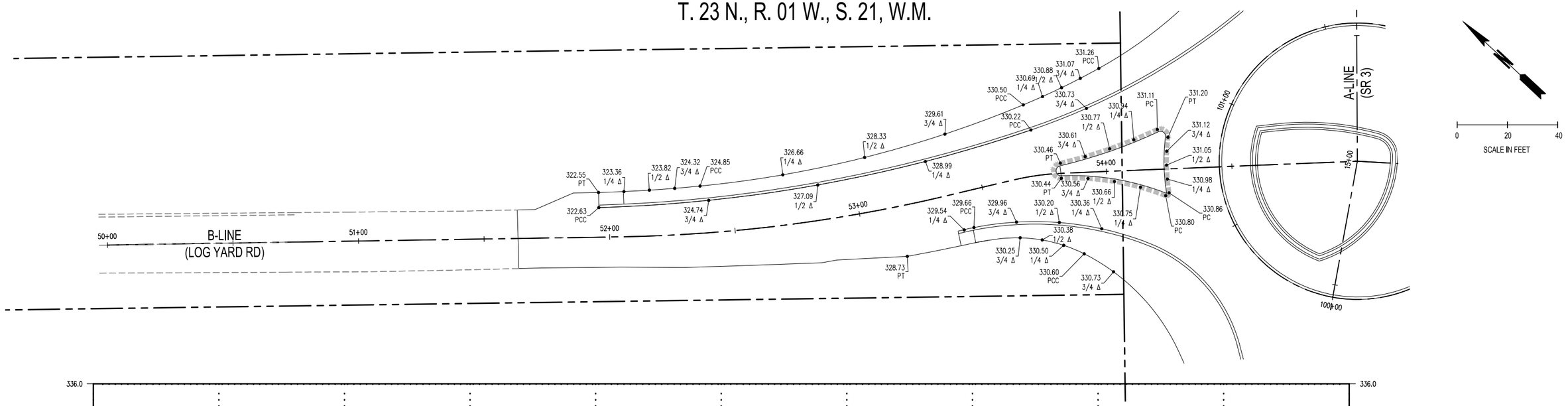
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

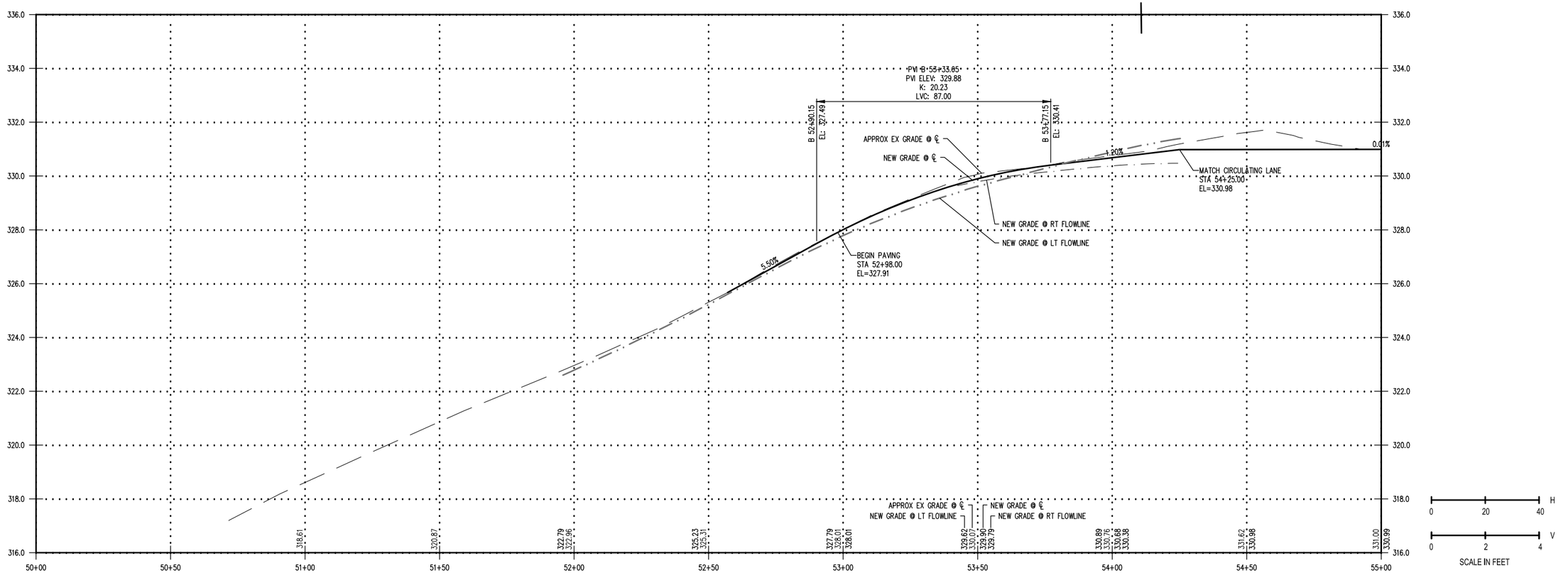
PLAN AND PROFILE

DRAWING No.: PP-3
SHEET No.: 31 OF 52

Nov 06, 2019 - 3:32:29pm - User: kenc.melvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05-PP-T.DWG

T. 23 N., R. 01 W., S. 21, W.M.





B-LINE PROFILE

△	REVISIONS	DATE	BY
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2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738,05
DRAWING FILE No.: 0738,05-PP-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 40429 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
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PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION
PLAN AND PROFILE

DRAWING No.: PP-4
SHEET No.: 32 OF 52

Nov 06, 2019 - 3:32:39pm — User: kenzmelvin
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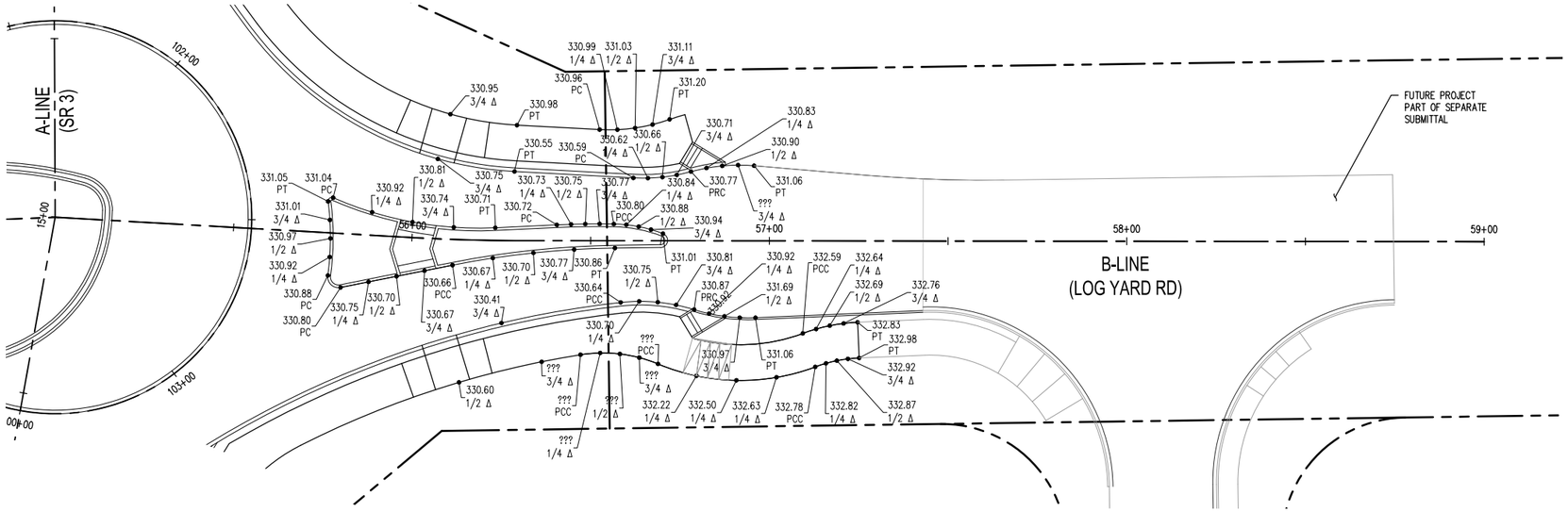

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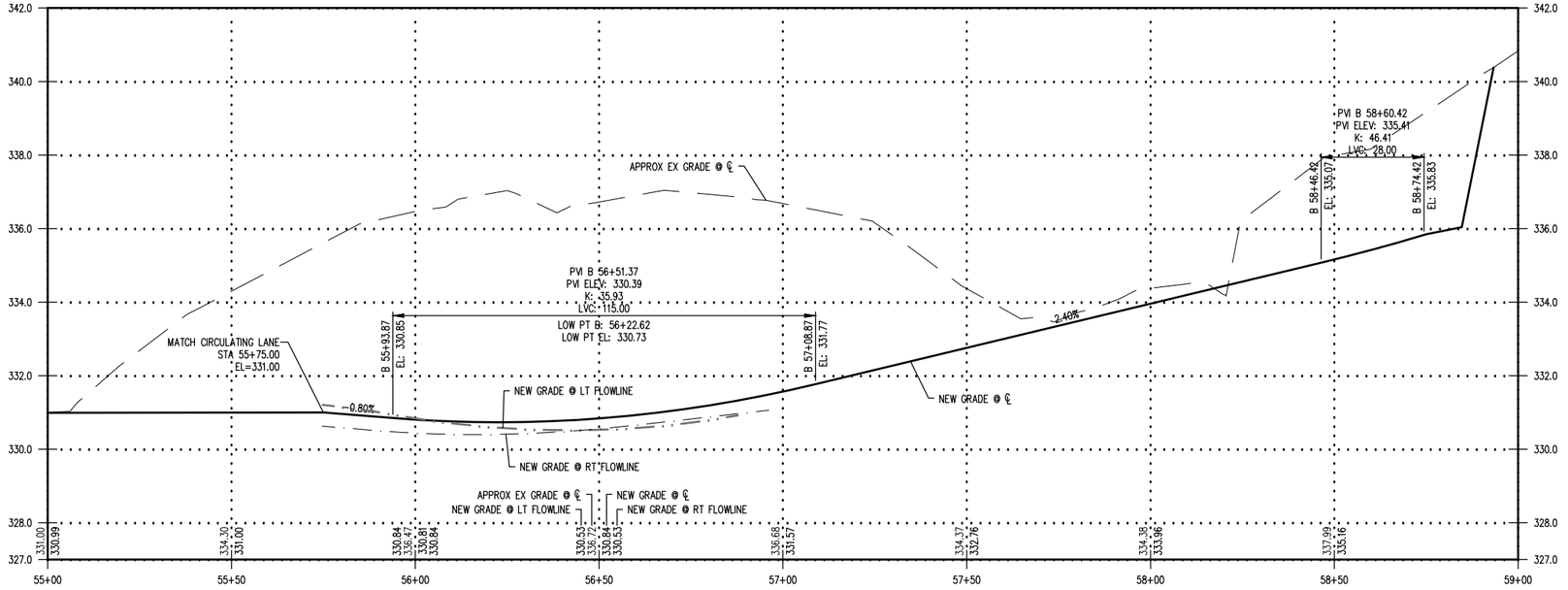

B-LINE PROFILE

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SCALE IN FEET

△	REVISIONS	DATE	BY
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2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-PP-T

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PATRICK HOLM — STATE OF WASHINGTON — 40251 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

MTA

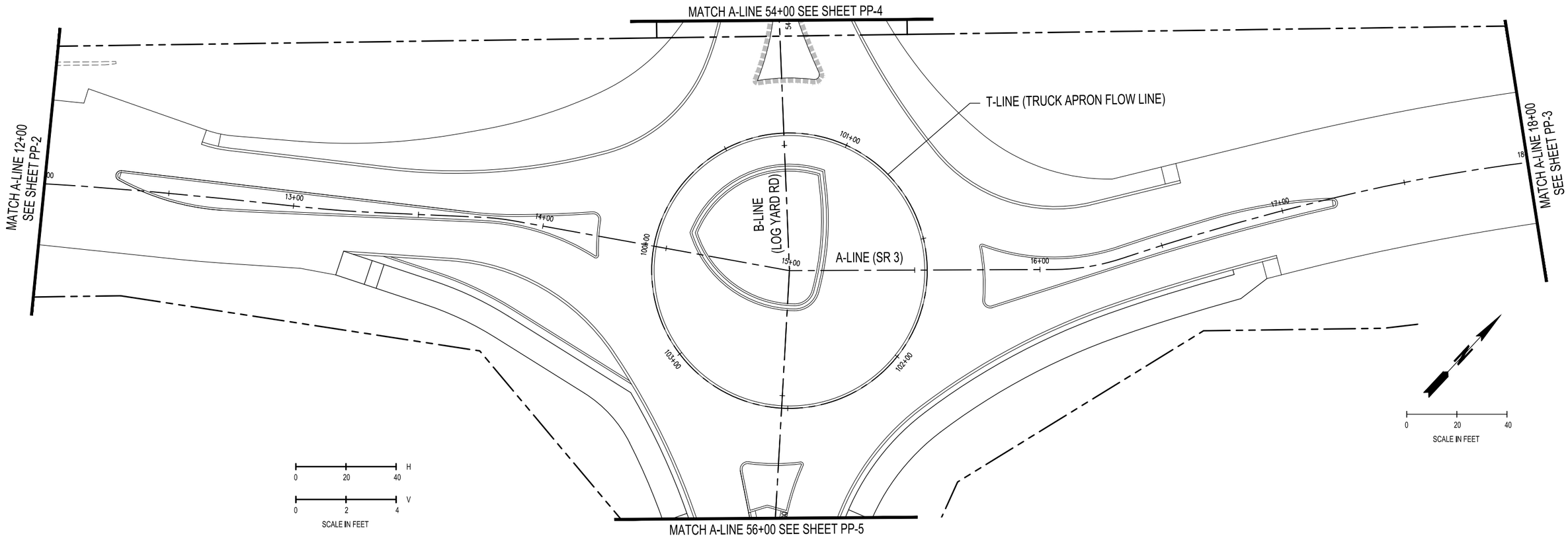
MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

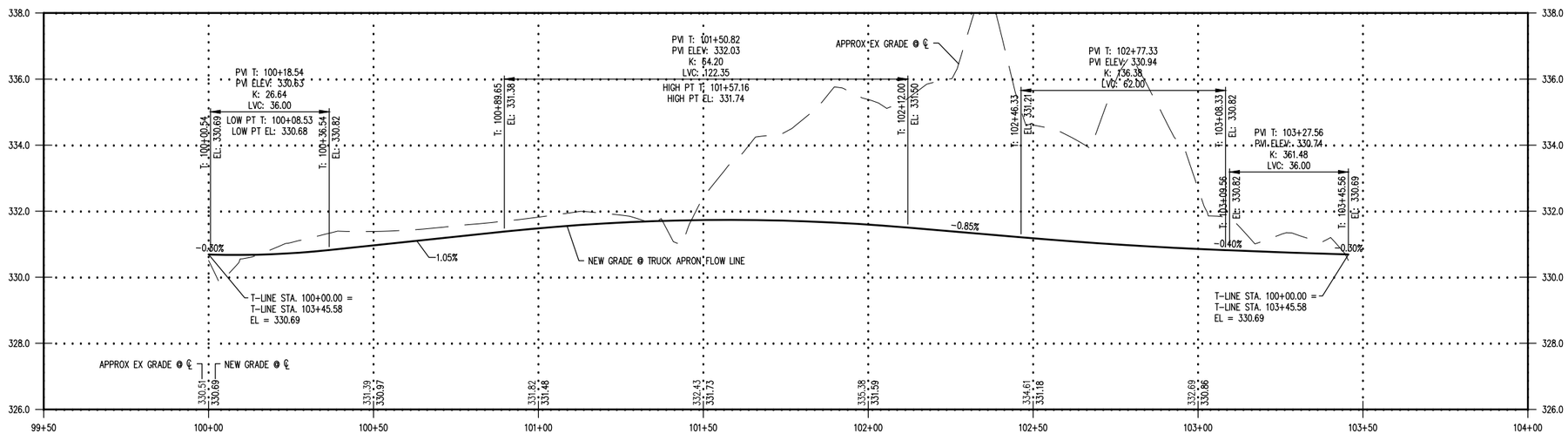
PLAN AND PROFILE

DRAWING No.: PP-5
SHEET No.: 33 OF 52

Nov 06, 2019 - 3:32:48pm - User kenc.melvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CAD\BELFAIR\0738.05-PP-T.DWG

T. 23 N., R. 01 W., S. 21, W.M.





△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-PP-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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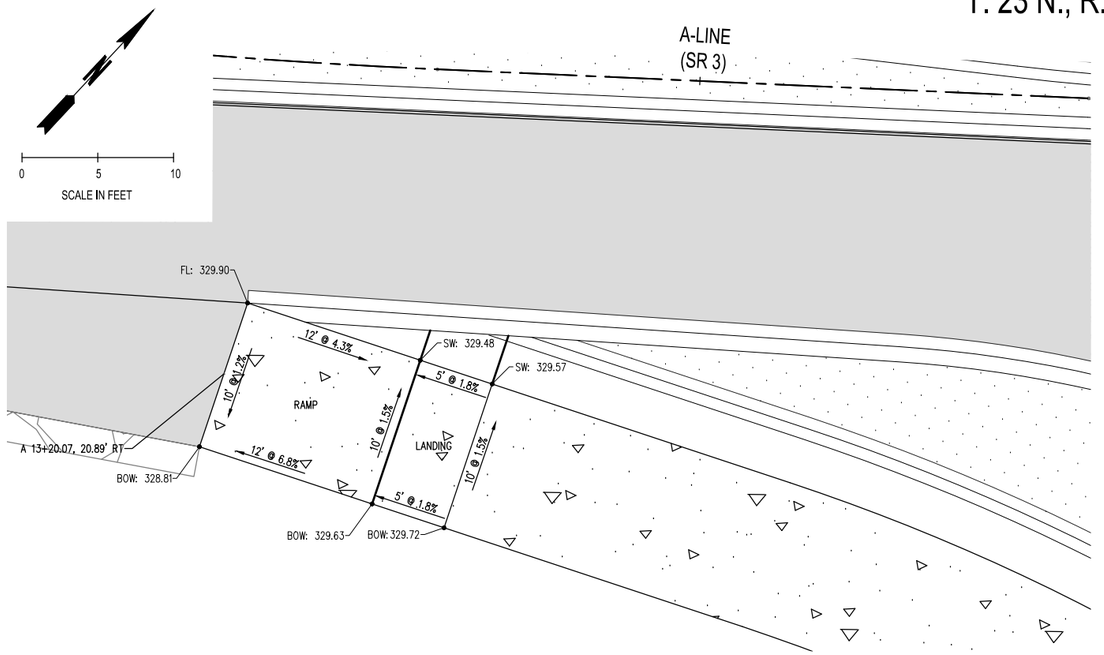
PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION
PLAN AND PROFILE

DRAWING No.: PP-6
SHEET No.: 34 OF 52

T. 23 N., R. 01 W., S. 21, W.M.



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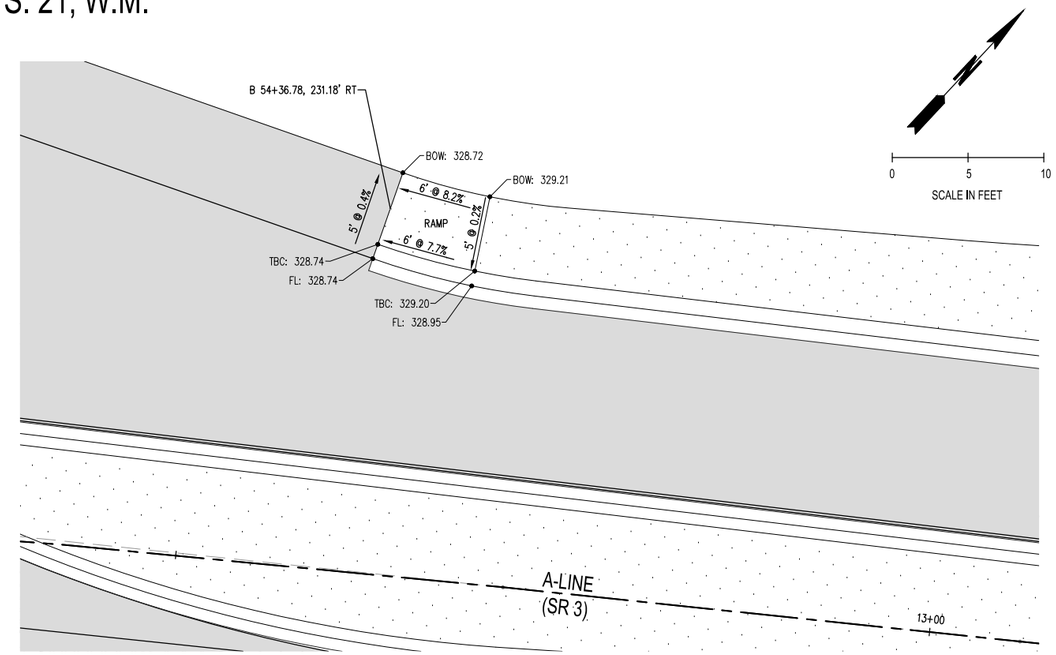

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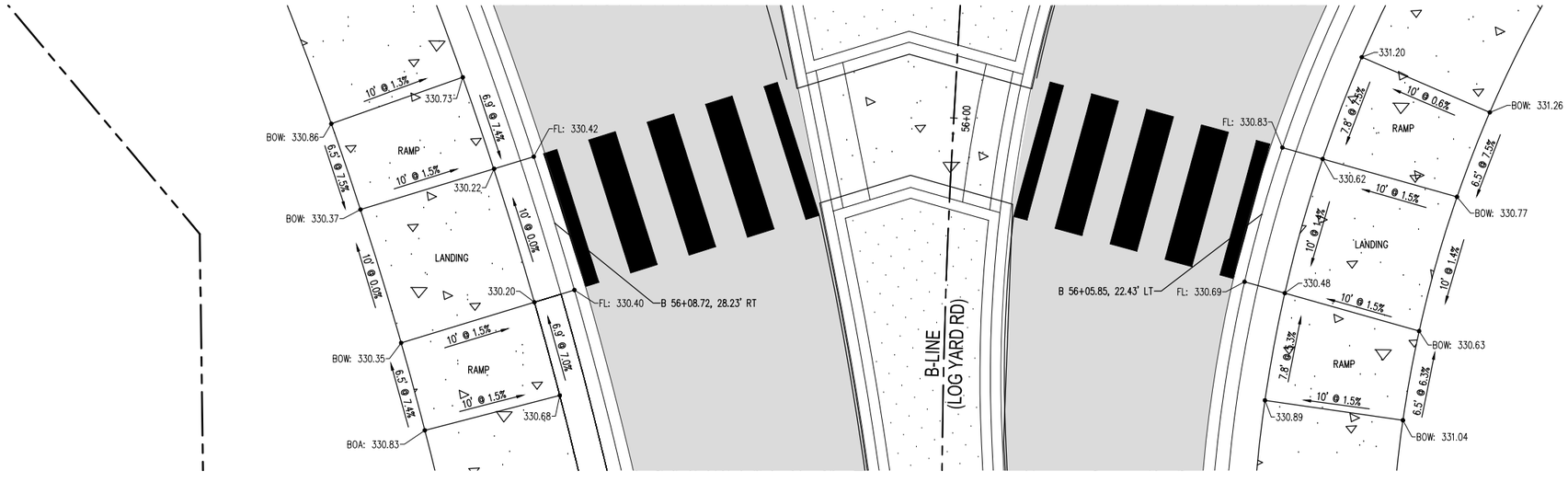

R3 EAST OF SR 3 AND LOG YARD RD INTERSECTION

R4 EAST OF SR 3 AND LOG YARD RD INTERSECTION

0
5
10
SCALE IN FEET

ABBREVIATIONS

BOA	BACK OF TRUCK APRON
BOW	BACK OF WALK
FL	FLOW LINE
FG	FINISHED GRADE
TBC	TOP BACK OF CURB

△	REVISIONS	DATE	BY
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CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
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DRAWING FILE No.: 0738.05-ADA-T

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PATRICK HOLM — STATE OF WASHINGTON — 40625 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

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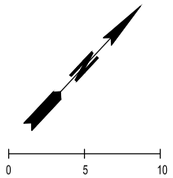
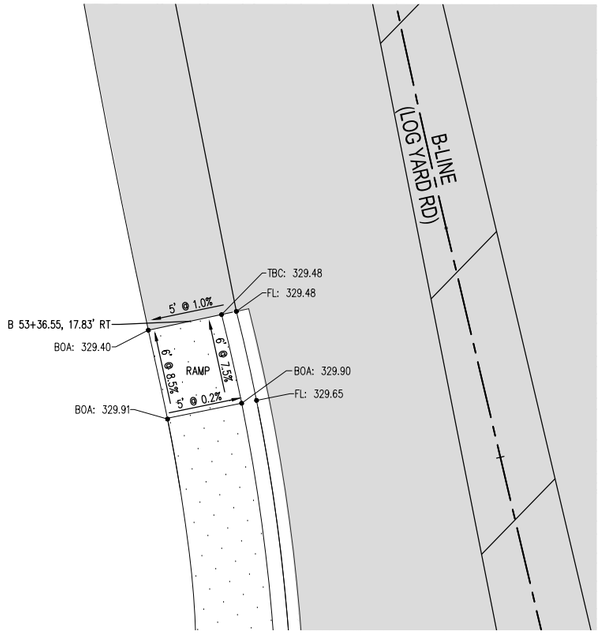
MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

ACCESSIBILITY DETAIL

DRAWING No.: ADA-1
SHEET No.: 35 OF 52

T. 23 N., R. 01 W., S. 21, W.M.





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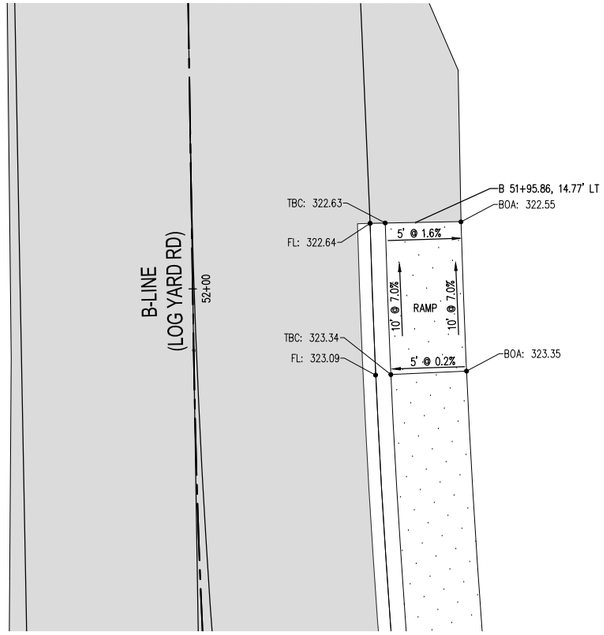

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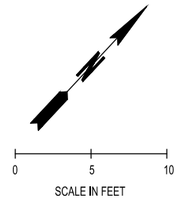
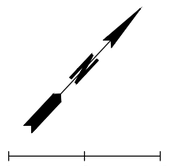
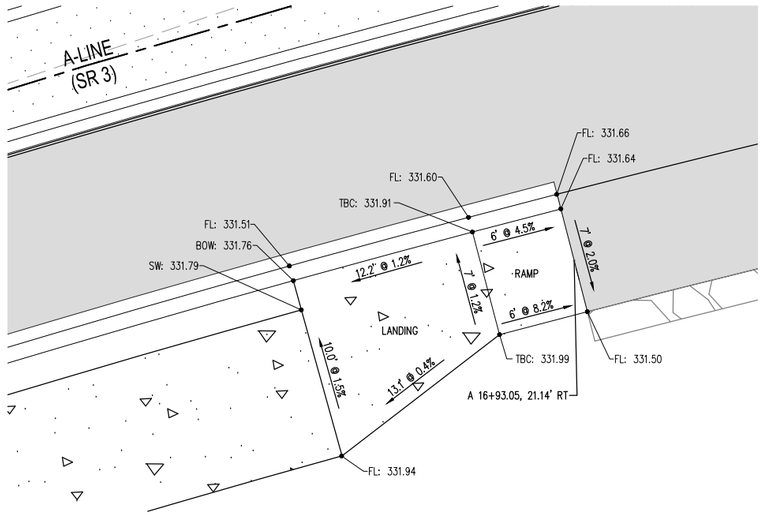


ABBREVIATIONS

BOA	BACK OF TRUCK APRON
BOW	BACK OF WALK
FL	FLOW LINE
FG	FINISHED GRADE
TBC	TOP BACK OF CURB





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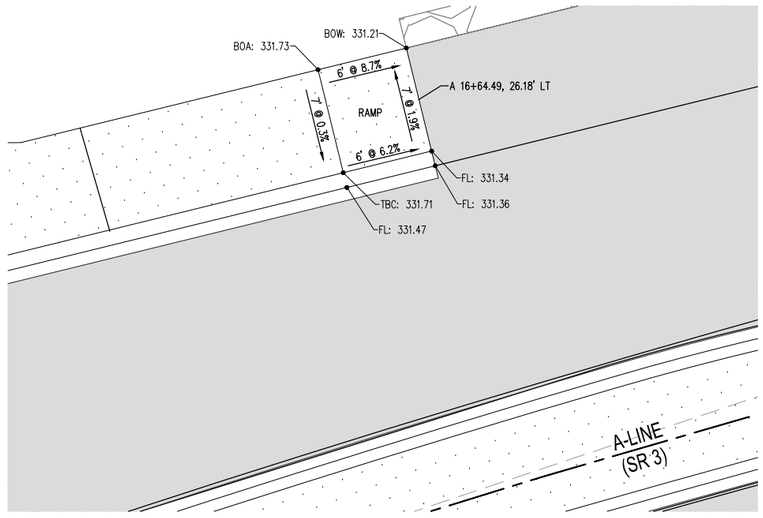

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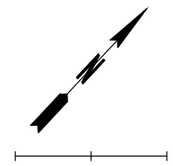

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DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
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DRAWING FILE No.: 0738.05-ADA-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 40625 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

ACCESSIBILITY DETAIL

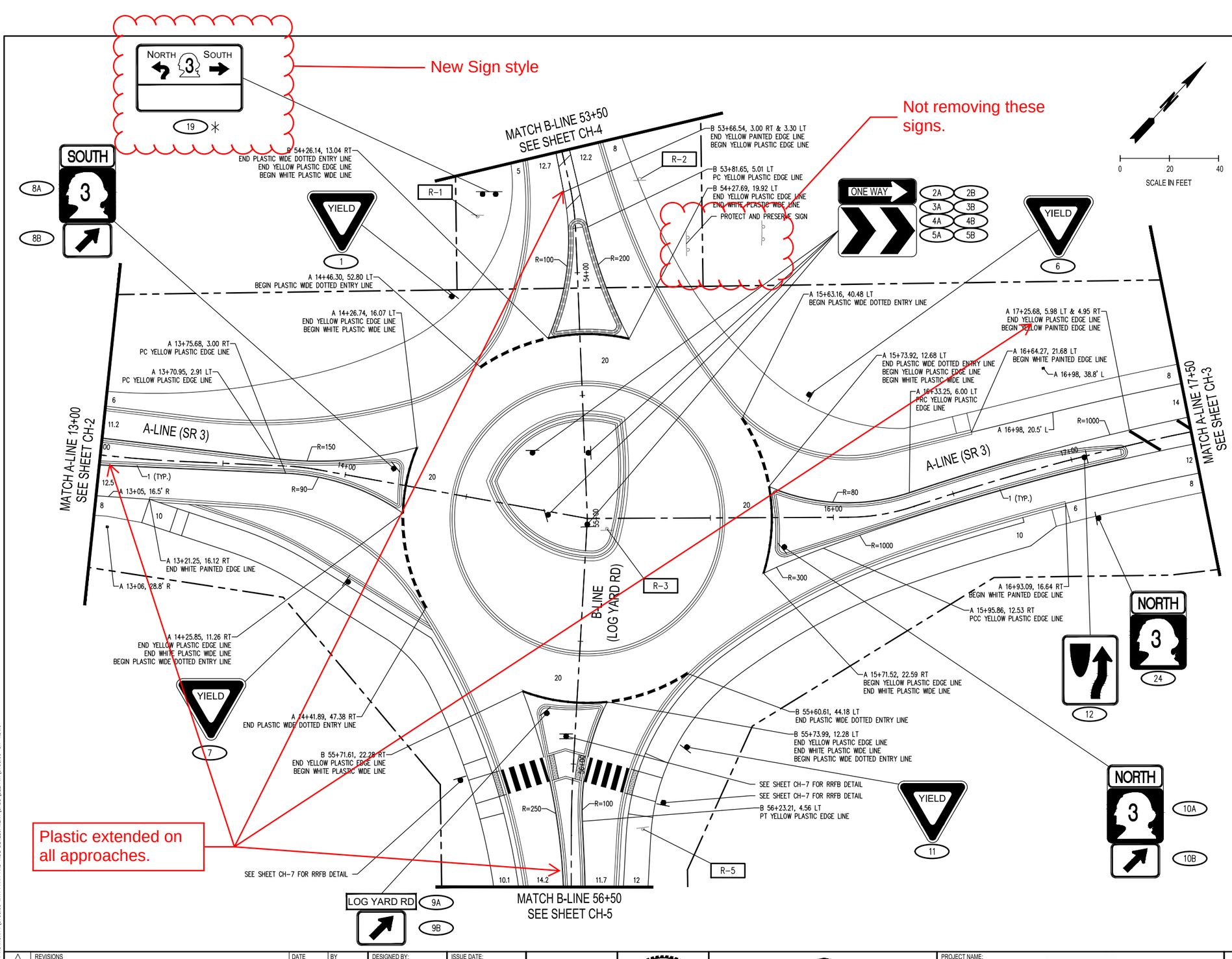
DRAWING No.: ADA-2
SHEET No.: 36 OF 52

Nov 06, 2019 - 3:33:33pm - User: kenc.melvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05-ADA-T.DWG

New Sign style

Not removing these signs.

Plastic extended on all approaches.



PAVEMENT MARKING LEGEND

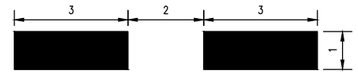
- WHITE PLASTIC WIDE LINE (PER WSDOT STD PLAN M-20.10)
- PAINTED EDGE LINE (PER WSDOT STD PLAN M-20.10)
- PAINTED DOUBLE YELLOW CENTER LINE (DYCL) (PER WSDOT STANDARD PLAN M-20.10)
- PAINTED TWO WAY LEFT TURN LINE (TWLTL) (PER WSDOT STD PLAN M-20.10)
- PAINTED LANE LINE (PER WSDOT STD PLAN M-20.10)
- PLASTIC BIKE LANE SYMBOL (PER WSDOT STD PLAN M-9.50)
- PLASTIC CROSSWALK (PER WSDOT STD PLAN M-15.10)
- TYPE 2SL PLASTIC ARROW (PER WSDOT STD PLAN M-24.40)
- PLASTIC WIDE DOTTED ENTRY LINE (PER WSDOT STD PLAN M-12.10)
- DIAGONAL CROSS HATCH MARKING (PER WSDOT STD PLAN M-24.60)

PAVEMENT MARKING NOTES

1. ALL PLASTIC SHALL BE TYPE D1 MMA EXTRUDED PLASTIC PER WSDOT STANDARD SPECIFICATIONS SECTION 9-34.
2. SEE WSDOT STD PLAN M-20.30 AND M-20.40 FOR INSTALLATION OF SUPPLEMENTAL RAISED PAVEMENT MARKINGS.
3. ALL EDGE LINES ARE WHITE UNLESS OTHERWISE NOTED.
4. ALL EXISTING PAVEMENT MARKING SHALL BE REMOVED WITHIN PROJECT LIMITS. PAID AS REMOVING MISCELLANEOUS TRAFFIC ITEM. CONTRACTOR SHALL CONFIRM NECESSARY REMOVALS PRIOR TO BID..
5. THE CONTRACTOR SHALL REMOVE ALL RAISED PAVEMENT MARKING ASSOCIATED WITH PAVEMENT MARKING REMOVALS. PAID AS REMOVING MISCELLANEOUS TRAFFIC ITEM.
6. FOR WIDE LINE INSTALLATION FOLLOW WSDOT STANDARD PLAN M-20.40 FOR SUPPLEMENTAL RPM'S
7. RPM = RAISED PAVEMENT MARKER
8. CENTER TRAFFIC ARROWS IN MIDDLE OF DESIGNATED LANE.
9. SEE WSDOT STD PLAN M-24.65-00 FOR STORMWATER BMP DELINEATION

SIGN LEGEND

- (X) SIGN NOTE
- [R-X] SIGN REMOVAL NOTE
- [REL X] PROPOSED LOCATION / SIGN RELOCATION NOTE / EXISTING LOCATION
- EXISTING SIGN & POST
- NEW / RELOCATED SIGN ON POST
- EXISTING SIGN & DOUBLE POST
- NEW / RELOCATED SIGN ON DOUBLE POST
- EXISTING DOUBLE SIGN
- NEW SIGN WITH BAND MOUNTING
- FLEXABLE GUIDE POST



WIDE DOTTED ENTRY LINE DETAIL

✳ SEE SHEET CH-5 FOR SIGN DIMENSIONS AND LETTER/ARROW/SHIELD SIZES.

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1	FPS #1	04/08/19	PH
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DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
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11-06-19

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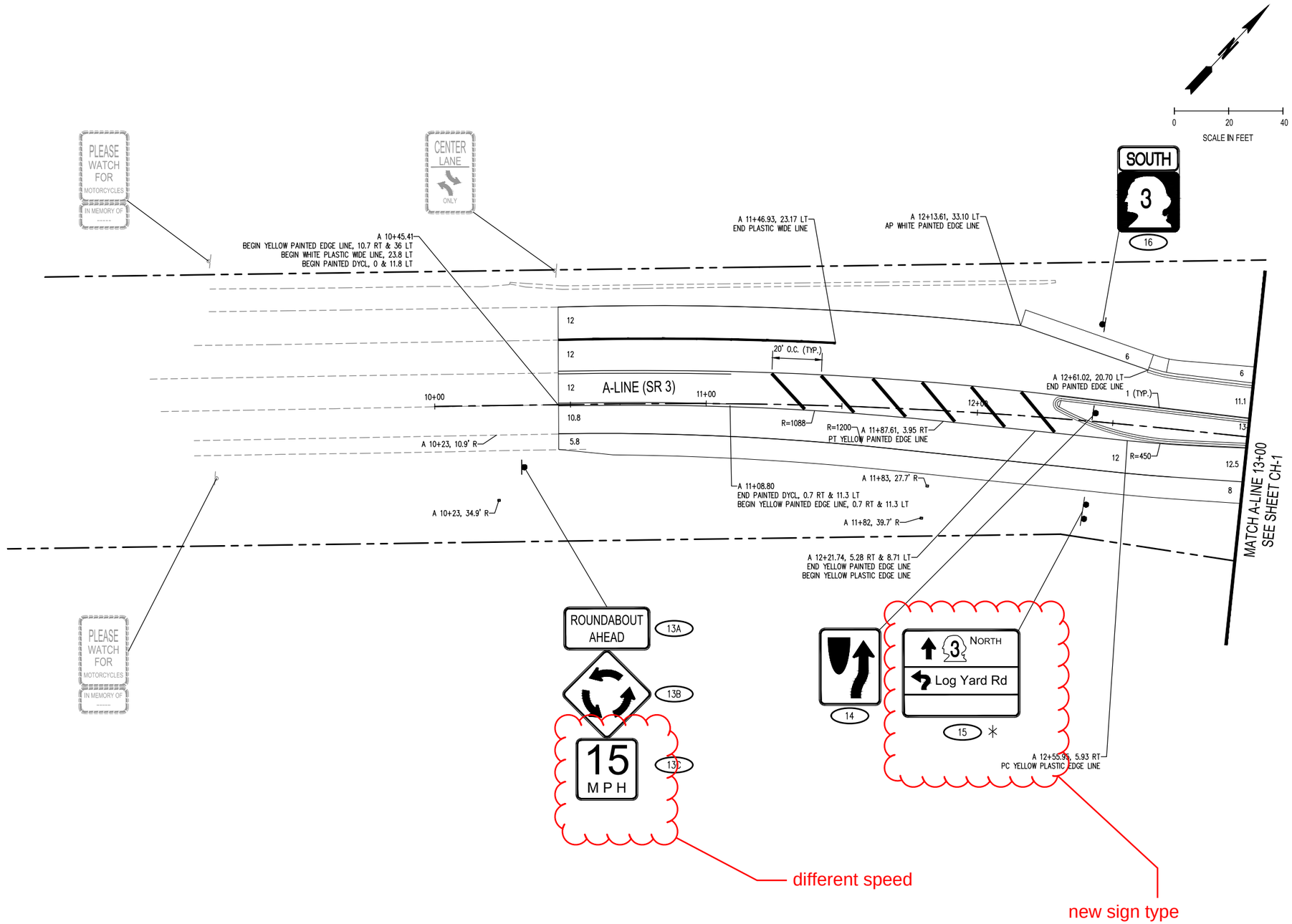
PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

CHANNELIZATION AND SIGNAGE PLAN

DRAWING No.: CH-1
SHEET No.: 37 OF 52



PAVEMENT MARKING LEGEND

- WHITE PLASTIC WIDE LINE (PER WSDOT STD PLAN M-20.10)
- PAINTED EDGE LINE (PER WSDOT STD PLAN M-20.10)
- PAINTED DOUBLE YELLOW CENTER LINE (DYCL) (PER WSDOT STANDARD PLAN M-20.10)
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- PLASTIC WIDE DOTTED ENTRY LINE (PER WSDOT STD PLAN M-12.10)
- DIAGONAL CROSS HATCH MARKING (PER WSDOT STD PLAN M-24.60)

PAVEMENT MARKING NOTES

1. ALL PLASTIC SHALL BE TYPE D1 MMA EXTRUDED PLASTIC PER WSDOT STANDARD SPECIFICATIONS SECTION 9-34.
2. SEE WSDOT STD PLAN M-20.30 AND M-20.40 FOR INSTALLATION OF SUPPLEMENTAL RAISED PAVEMENT MARKINGS.
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4. ALL EXISTING PAVEMENT MARKING SHALL BE REMOVED WITHIN PROJECT LIMITS. PAID AS REMOVING MISCELLANEOUS TRAFFIC ITEM. CONTRACTOR SHALL CONFIRM NECESSARY REMOVALS PRIOR TO BID..
5. THE CONTRACTOR SHALL REMOVE ALL RAISED PAVEMENT MARKING ASSOCIATED WITH PAVEMENT MARKING REMOVALS. PAID AS REMOVING MISCELLANEOUS TRAFFIC ITEM.
6. FOR WIDE LINE INSTALLATION FOLLOW WSDOT STANDARD PLAN M-20.40 FOR SUPPLEMENTAL RPM'S
7. RPM = RAISED PAVEMENT MARKER
8. CENTER TRAFFIC ARROWS IN MIDDLE OF DESIGNATED LANE.
9. SEE WSDOT STD PLAN M-24.65-00 FOR STORMWATER BMP DELINEATION

SIGN LEGEND

- X — SIGN NOTE
- R-X — SIGN REMOVAL NOTE
- REL X — PROPOSED LOCATION SIGN RELOCATION NOTE / EXISTING LOCATION
- EXISTING SIGN & POST
- NEW / RELOCATED SIGN ON POST
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11-06-19

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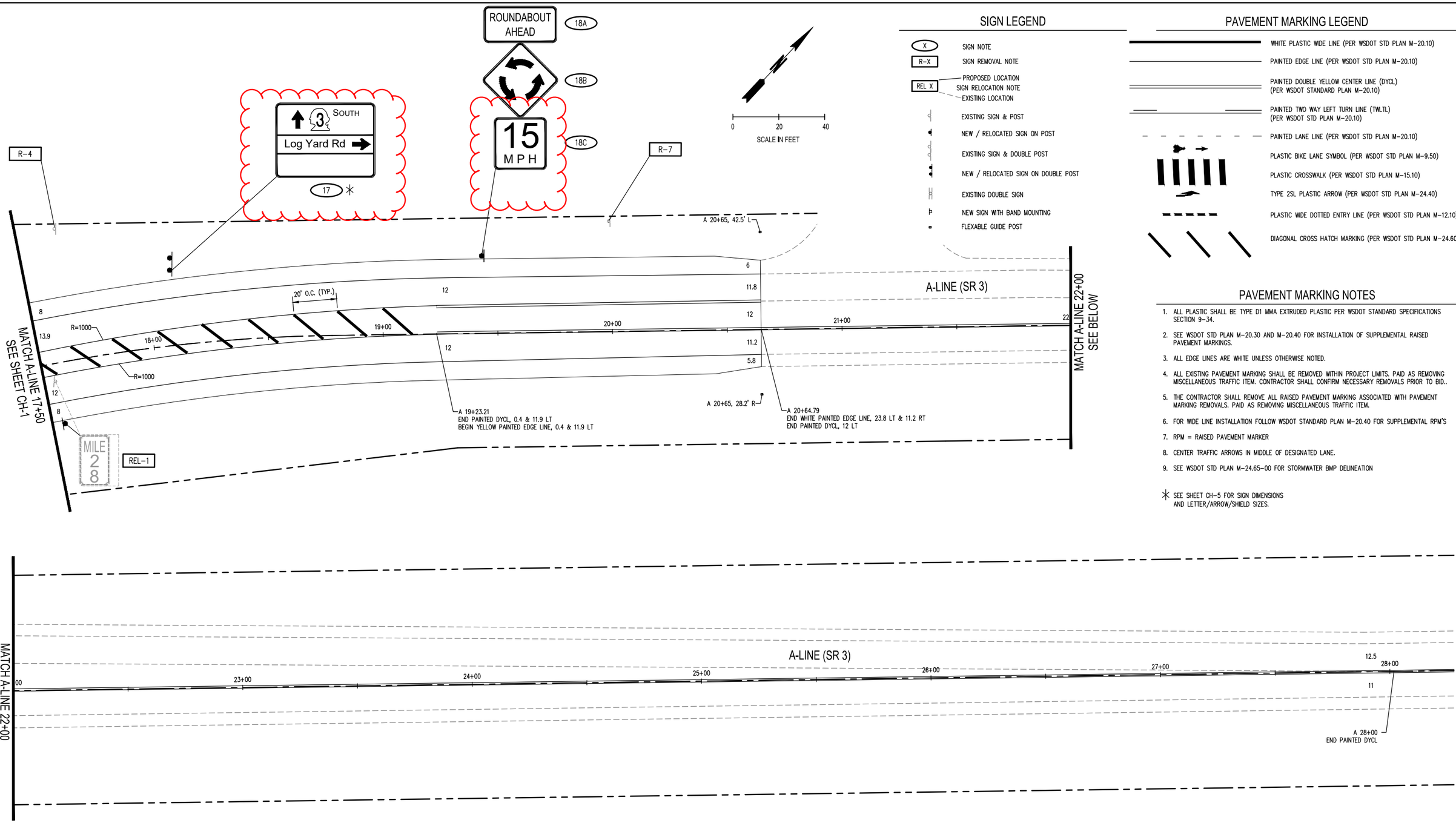
PROJECT NAME: MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

CHANNELIZATION AND SIGNAGE PLAN

DRAWING No.: CH-2
SHEET No.: 38 OF 52

Nov 06, 2019 - 3:34:16pm - User: kmcmelvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05-CH-T.DWG



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11-06-19

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BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

CHANNELIZATION AND SIGNAGE PLAN

DRAWING No.: CH-3
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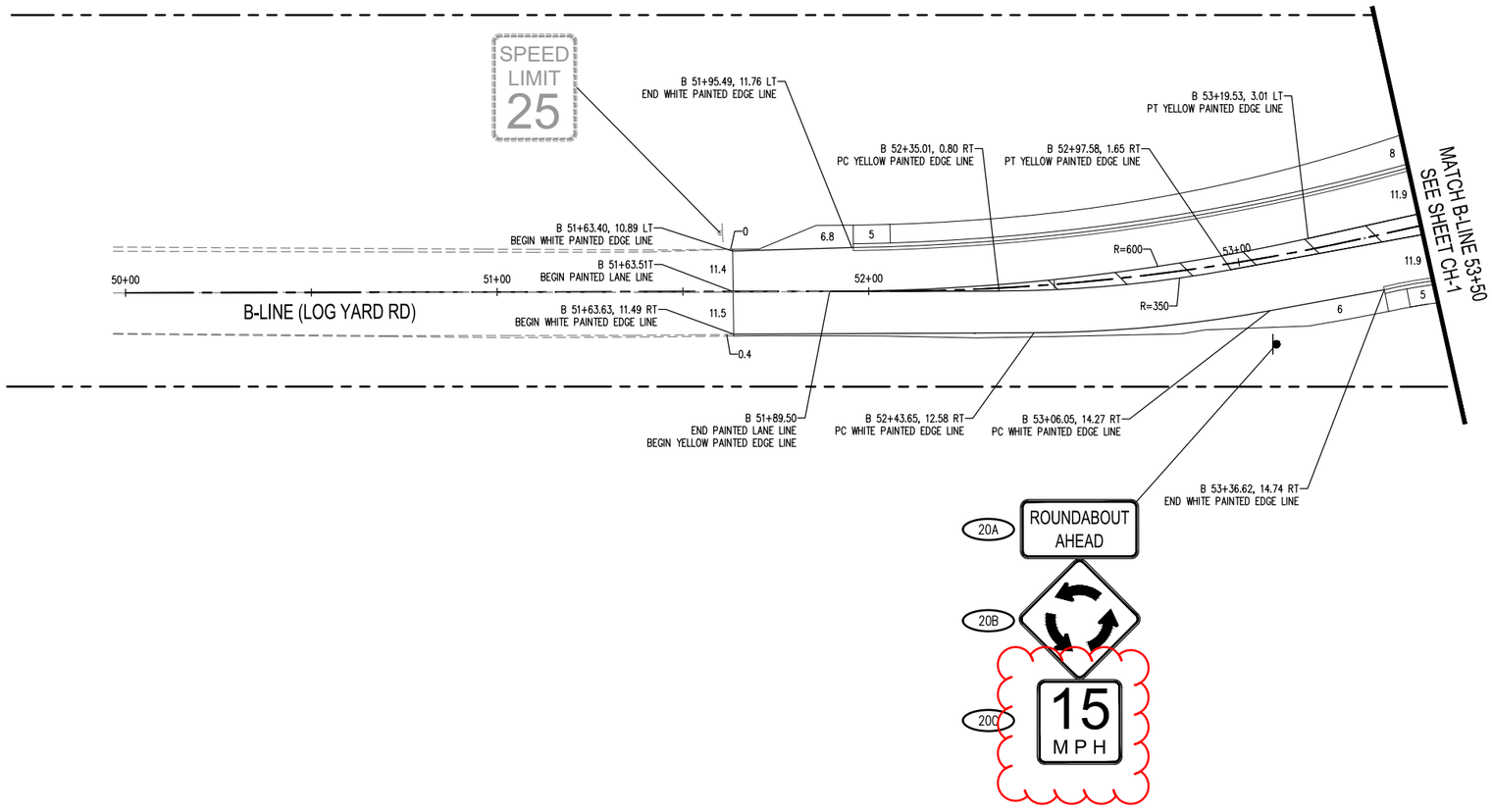
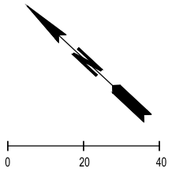
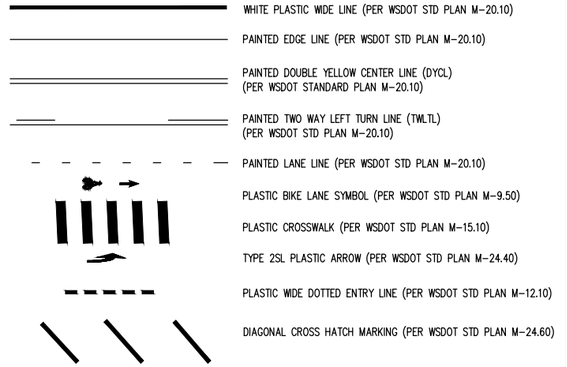




PAVEMENT MARKING LEGEND



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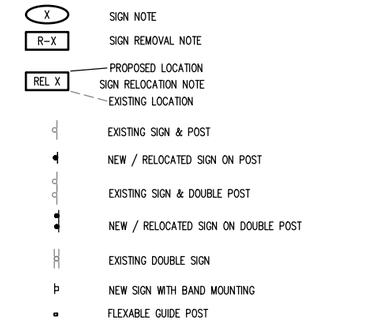
SIGN LEGEND



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SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
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PROJECT NAME:

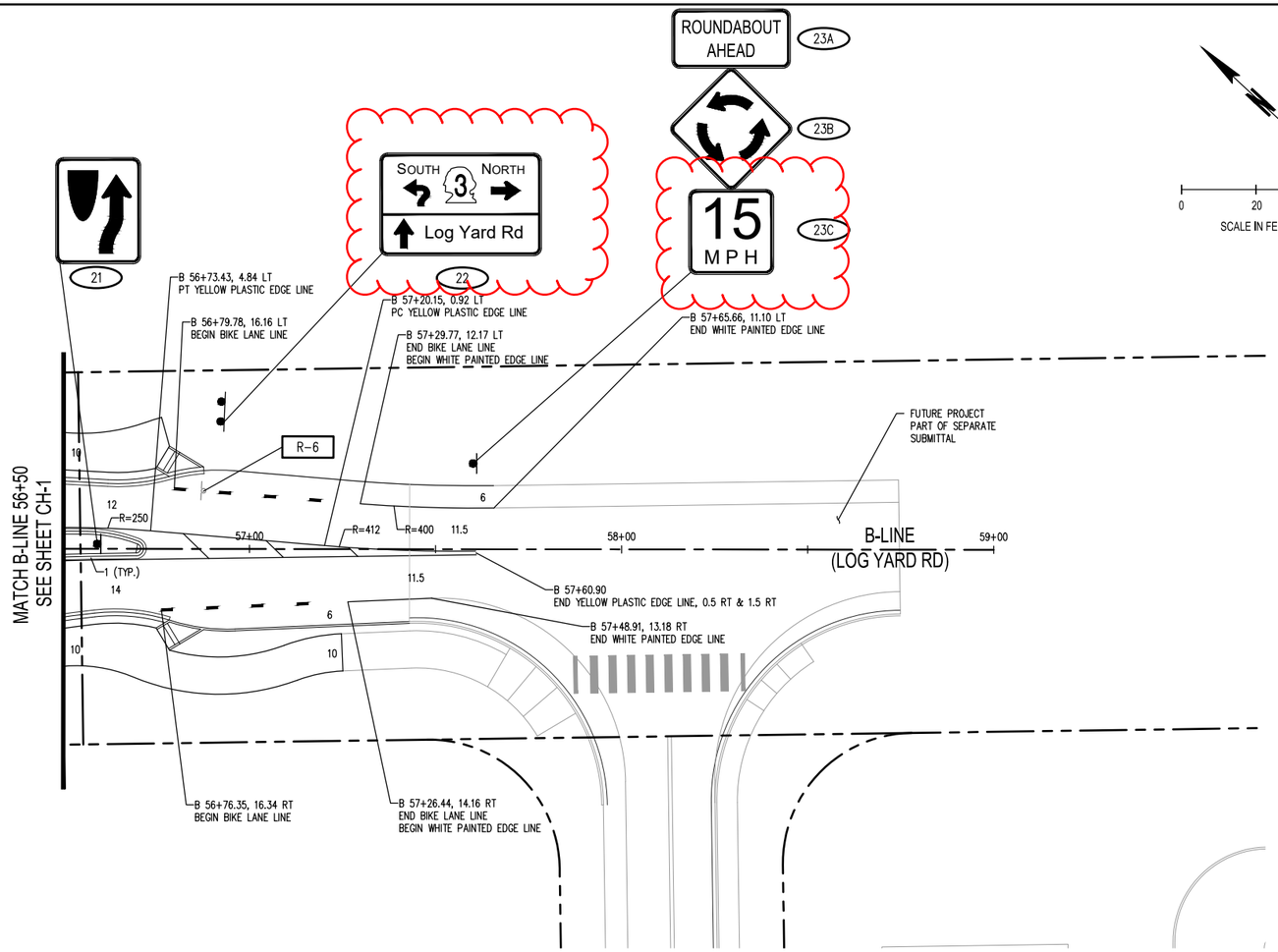
MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

CHANNELIZATION AND SIGNAGE PLAN

DRAWING No.: CH-4
SHEET No.: 40 OF 52

Nov 06, 2019 - 3:34:34pm - User: kono.melvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05-CH-T.DWG



0 20 40
SCALE IN FEET

PAVEMENT MARKING LEGEND

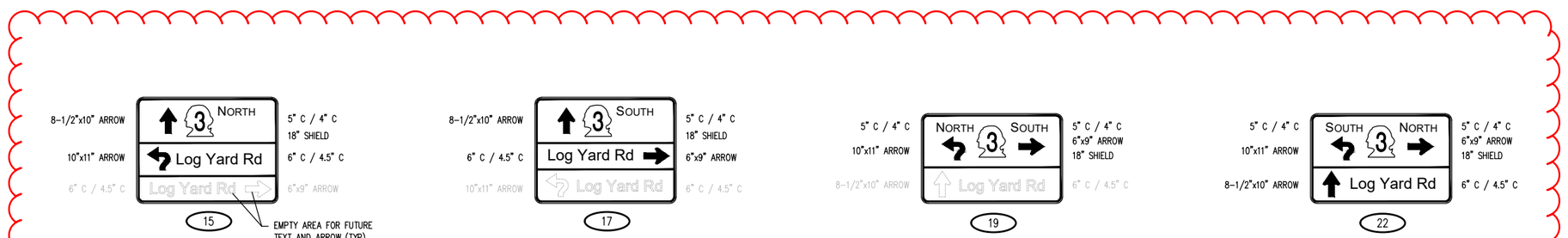
- WHITE PLASTIC WIDE LINE (PER WSDOT STD PLAN M-20.10)
- PAINTED EDGE LINE (PER WSDOT STD PLAN M-20.10)
- PAINTED DOUBLE YELLOW CENTER LINE (DYCL) (PER WSDOT STANDARD PLAN M-20.10)
- PAINTED TWO WAY LEFT TURN LINE (TWLTL) (PER WSDOT STD PLAN M-20.10)
- PAINTED LANE LINE (PER WSDOT STD PLAN M-20.10)
- PLASTIC BIKE LANE SYMBOL (PER WSDOT STD PLAN M-9.50)
- PLASTIC CROSSWALK (PER WSDOT STD PLAN M-15.10)
- TYPE 2SL PLASTIC ARROW (PER WSDOT STD PLAN M-24.40)
- PLASTIC WIDE DOTTED ENTRY LINE (PER WSDOT STD PLAN M-12.10)
- DIAGONAL CROSS HATCH MARKING (PER WSDOT STD PLAN M-24.60)

PAVEMENT MARKING NOTES

1. ALL PLASTIC SHALL BE TYPE D1 MMA EXTRUDED PLASTIC PER WSDOT STANDARD SPECIFICATIONS SECTION 9-34.
2. SEE WSDOT STD PLAN M-20.30 AND M-20.40 FOR INSTALLATION OF SUPPLEMENTAL RAISED PAVEMENT MARKINGS.
3. ALL EDGE LINES ARE WHITE UNLESS OTHERWISE NOTED.
4. ALL EXISTING PAVEMENT MARKING SHALL BE REMOVED WITHIN PROJECT LIMITS. PAID AS REMOVING MISCELLANEOUS TRAFFIC ITEM. CONTRACTOR SHALL CONFIRM NECESSARY REMOVALS PRIOR TO BID..
5. THE CONTRACTOR SHALL REMOVE ALL RAISED PAVEMENT MARKING ASSOCIATED WITH PAVEMENT MARKING REMOVALS. PAID AS REMOVING MISCELLANEOUS TRAFFIC ITEM.
6. FOR WIDE LINE INSTALLATION FOLLOW WSDOT STANDARD PLAN M-20.40 FOR SUPPLEMENTAL RPM'S
7. RPM = RAISED PAVEMENT MARKER
8. CENTER TRAFFIC ARROWS IN MIDDLE OF DESIGNATED LANE.
9. SEE WSDOT STD PLAN M-24.65-00 FOR STORMWATER BMP DELINEATION

SIGN LEGEND

- X — SIGN NOTE
- R-X — SIGN REMOVAL NOTE
- REL X — PROPOSED LOCATION SIGN RELOCATION NOTE / EXISTING LOCATION
- EXISTING SIGN & POST
- NEW / RELOCATED SIGN ON POST
- EXISTING SIGN & DOUBLE POST
- NEW / RELOCATED SIGN ON DOUBLE POST
- EXISTING DOUBLE SIGN
- NEW SIGN WITH BAND MOUNTING
- FLEXABLE GUIDE POST



△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-CH-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 19041 REGISTERED PROFESSIONAL ENGINEER
11-06-19

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BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

CHANNELIZATION AND SIGNAGE PLAN

DRAWING No.: CH-5
SHEET No.: 41 OF 52

Nov 06, 2019 - 3:34:46pm - User: kenomelvin
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SIGN SPECIFICATIONS
ROADSIDE SIGN STRUCTURES

SIGN NO.	SIGN CODE NUMBER	SIGN DESCRIPTION	LOCATION (STATION/OFFSET)	SIGN SIZE		SHEETING TYPE	LETTER SIZE OR CODE	POST MATERIAL	POST SIZE (INCH x INCH)	POST LENGTH		CLEARANCE		REMARKS
				X (INCH)	Y (INCH)					H 1	H 2	V	W	
1	R1-2	YIELD	B 54+08, 51.5 RT	36	36	III OR IV	STANDARD	STEEL	2.5 X 2.5	9.5	---	7	4	MOUNT NEW SIGN ON NEW POST
2A	R6-4	DOUBLE CHEVRON	B 54+73, 2 LT	30	24	III OR IV	STANDARD	STEEL	2.5 X 2.5	7	---	5	15	MOUNT NEW SIGN ON NEW POST
2B	R6-1R	ONE WAY	–	36	12	III OR IV	STANDARD	---	–	–	---	–	–	MOUNT NEW SIGN ON NEW POST
3A	R6-4	DOUBLE CHEVRON	B 55+02	30	24	III OR IV	STANDARD	STEEL	2.5 X 2.5	7	---	5	13	MOUNT NEW SIGN ON NEW POST
3B	R6-1R	ONE WAY	–	36	12	III OR IV	STANDARD	---	–	–	---	–	–	MOUNT NEW SIGN ON NEW POST
4A	R6-4	DOUBLE CHEVRON	A 14+73, 22 LT	30	24	III OR IV	STANDARD	STEEL	2.5 X 2.5	7	---	5	8	MOUNT NEW SIGN ON NEW POST
4B	R6-1R	ONE WAY	–	36	12	III OR IV	STANDARD	---	–	–	---	–	–	MOUNT NEW SIGN ON NEW POST
5A	R6-4	DOUBLE CHEVRON	A 14+84, 1 RT	30	24	III OR IV	STANDARD	STEEL	2.5 X 2.5	7	---	5	12	MOUNT NEW SIGN ON NEW POST
5B	R6-1R	ONE WAY	–	36	12	III OR IV	STANDARD	---	–	–	---	–	–	MOUNT NEW SIGN ON NEW POST
6	R1-2	YIELD	A 15+90, 50 LT	36	36	III OR IV	STANDARD	STEEL	2.5 X 2.5	9.5	---	7	4	MOUNT NEW SIGN ON NEW POST
7	R1-2	YIELD	A 14+09, 42.5 RT	36	36	III OR IV	STANDARD	STEEL	2.5 X 2.5	9.5	---	7	3	MOUNT NEW SIGN ON NEW POST
8A	M1-701	STATE ROUTE 3 (SOUTH)	A 14+19, 6 LT	24	36	III OR IV	STANDARD	STEEL	2.5 X 2.5	9.5	---	7	6	MOUNT NEW SIGN ON NEW POST
8B	M6-2R	DIRECTIONAL ARROW 45 DEG.		21	15	III OR IV	STANDARD	---	---	---	---	5.5	---	MOUNT BELOW M1-701
9A	D1-101	LOG YARD ROAD	B 55+80, 12 LT	60	12	III OR IV	STANDARD	STEEL	2.5 X 2.5	9.5	---	7	6	MOUNT NEW SIGN ON NEW POST
9B	M6-2R	DIRECTIONAL ARROW 45 DEG.		21	15	III OR IV	STANDARD	---	---	---	---	5.5	---	MOUNT BELOW D1-101
10A	M1-701	STATE ROUTE 3 (NORTH)	A 55+80, 12 RT	24	36	III OR IV	STANDARD	STEEL	2.5 X 2.5	9.5	---	7	6	MOUNT NEW SIGN ON NEW POST
10B	M6-2R	DIRECTIONAL ARROW 45 DEG.		21	15	III OR IV	STANDARD	---	---	---	---	5.5	---	MOUNT BELOW M1-701
11	R1-2	YIELD	B 55.91, 46 LT	36	36	III OR IV	STANDARD	STEEL	2.5 X 2.5	9.5	---	7	12	MOUNT NEW SIGN ON NEW POST
12	R4-7	KEEP RIGHT SYMBOL	A 17+05	24	30	III OR IV	STANDARD	STEEL	2.5 X 2.5	9.5	---	7	---	MOUNT NEW SIGN ON NEW POST
13A	W2-6P	ROUNDABOUT AHEAD	A 10+33, 23 RT	36	18	III OR IV	STANDARD	---	---	9.5	---	11.5	---	MOUNT NEW SIGN ABOVE ROUNDABOUT SYMBOL
13B	W2-6	ROUNDABOUT SYMBOL		36	36	III OR IV	STANDARD	STEEL	2.5 X 2.5	9.5	---	7	5	MOUNT NEW SIGN ON NEW POST
13C	W13-1	ADVISORY SPEED		24	24	III OR IV	STANDARD	---	---	9.5	---	5	---	MOUNT NEW SIGN BELOW ROUNDABOUT SYMBOL
14	R4-7	KEEP RIGHT SYMBOL	A 12+43, 3 LT	36	36	III OR IV	STANDARD	STEEL	2.5 X 2.5	9.5	---	7	5	MOUNT NEW SIGN ON NEW POST
15	D1-602	EXIT DESTINATIONS	A 12+43, 31 RT	60	60	III OR IV	*	STEEL	2.5 X 2.5	9.5	9.5	7	13	MOUNT NEW SIGN ON NEW DOUBLE POST
16	M1-701	U.S. ROUTE SIGN	A 12+43, 36 LT	24	36	III OR IV	STANDARD	STEEL	2.5 X 2.5	9.5	---	7	10	MOUNT NEW SIGN ON NEW POST
17	D1-602	EXIT DESTINATIONS	A 18+11, 34 LT	60	60	III OR IV	*	STEEL	2.5 X 2.5	9.5	9.5	7	13	MOUNT NEW SIGN ON NEW DOUBLE POST
18A	W2-6P	ROUNDABOUT AHEAD	A 19+43, 34 LT	36	18	III OR IV	STANDARD	---	---	9.5	---	11.5	---	MOUNT NEW SIGN ABOVE ROUNDABOUT SYMBOL
18B	W2-6	ROUNDABOUT SYMBOL		36	36	III OR IV	STANDARD	STEEL	2.5 X 2.5	9.5	---	7	9	MOUNT NEW SIGN ON NEW POST
18C	W13-1	ADVISORY SPEED		24	24	III OR IV	STANDARD	---	---	9.5	---	5	---	MOUNT NEW SIGN BELOW ROUNDABOUT SYMBOL
19	D1-602	EXIT DESTINATIONS	B 53+59, 32.5 RT	60	50	III OR IV	STANDARD	STEEL	2.5 X 2.5	9.5	9.5	7	13	MOUNT NEW SIGN ON NEW DOUBLE POST
20A	W2-6P	ROUNDABOUT AHEAD	B 53+06, 24 RT	36	18	III OR IV	STANDARD	---	---	9.5	---	7	---	MOUNT NEW SIGN ABOVE ROUNDABOUT SYMBOL
20B	W2-6	ROUNDABOUT SYMBOL		36	36	III OR IV	STANDARD	STEEL	2.5 X 2.5	9.5	---	7	9	MOUNT NEW SIGN ON NEW POST
20C	W13-1	ADVISORY SPEED		24	24	III OR IV	STANDARD	---	---	9.5	---	7	---	MOUNT NEW SIGN BELOW ROUNDABOUT SYMBOL
21	R4-7	KEEP RIGHT SYMBOL	B 56+59, 1 LT	24	30	III OR IV	STANDARD	STEEL	2.5 X 2.5	9.5	---	7	4	MOUNT NEW SIGN ON NEW POST
22	D1-602	EXIT DESTINATIONS	B 56+92, 34 LT	60	50	III OR IV	*	STEEL	2.5 X 2.5	9.5	9.5	7	13	MOUNT NEW SIGN ON NEW DOUBLE POST
23A	W2-6P	ROUNDABOUT AHEAD	B 57+60, 23 LT	36	18	III OR IV	STANDARD	---	---	9.5	---	11.5	---	MOUNT NEW SIGN ABOVE ROUNDABOUT SYMBOL
23B	W2-6	ROUNDABOUT SYMBOL		36	36	III OR IV	STANDARD	STEEL	2.5 X 2.5	9.5	---	7	12	MOUNT NEW SIGN ON NEW POST
23C	W13-1	ADVISORY SPEED		24	24	III OR IV	STANDARD	---	---	9.5	---	5	---	MOUNT NEW SIGN BELOW ROUNDABOUT SYMBOL
24	M1-701	U.S. ROUTE SIGN	A 17+05, 26 RT	24	36	III OR IV	STANDARD	STEEL	2.5 X 2.5	9.5	---	7	9	MOUNT NEW SIGN ON NEW POST

* 6 INCH UPPER CASE AND 4.5 INCH LOWER CASE SERIES D LETTERING USED

SIGNING NOTES

1. POST DIMENSIONS SHOWN ARE APPROXIMATE. FINAL VALUES SHALL BE DETERMINED IN THE FIELD PRIOR TO FABRICATION.
2. EXISTING SIGN LOCATIONS ARE APPROXIMATE ONLY.
3. FOR CODE REFERENCES SEE WASHINGTON STATE FABRICATION MANUAL.
4. ALL STATIONS AND OFFSETS ARE TO POST NEAREST CENTERLINE FOR SIGNS WITH MORE THAN ONE POST.
5. USE TYPE ST-4 SIGN SUPPORT, PER WSDOT STANDARD PLAN G-24.50-03, FOR SIGNS WITH SINGLE POST.
6. USE TYPE SB-3 STEEL SIGN SUPPORT, PER WSDOT STANDARD PLAN G-24.40-04, FOR SIGNS WITH MORE THAN ONE POST.
7. ALL NEW SIGN SUPPORTS SHALL BE 2.5 INCH SQUARE STEEL 12 GAUGE TELSPAR.

SIGN RELOCATION SPECIFICATIONS

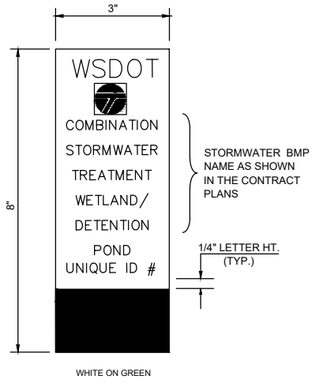
SIGN NO.	SIGN CODE NUMBER	SIGN DESCRIPTION	EXISTING LOCATION	PROPOSED LOCATION	SIGN SIZE		POST MATERIAL	POST SIZE (INCH x INCH)	POST LENGTH		CLEARANCE		REMARKS
					X (INCH)	Y (INCH)			H 1	H 2	V	W	
REL-1	D10-201	MILE POST MARKER	B 17+55, 8 RT	A 17+55, 27 RT	14	27	WOOD	2.5 x 2.5	4	---	7	9	RELOCATE SIGN ON NEW POST

SIGN REMOVAL SPECIFICATIONS

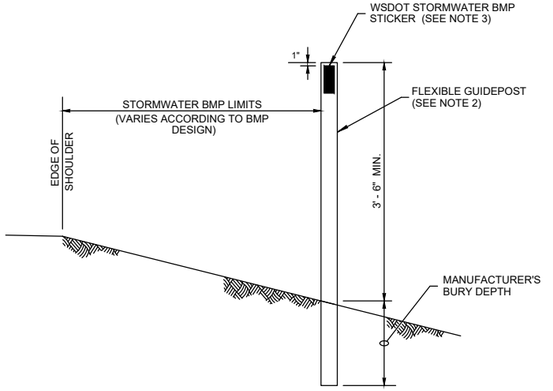
SIGN NO.	SIGN CODE NUMBER	SIGN DESCRIPTION	LOCATION	SIGN SIZE		POST MATERIAL	POST SIZE (INCH x INCH)	REMARKS
				X (INCH)	Y (INCH)			
R-1	R1-1	STOP SIGN	B 53+74, 39 RT	30	30	STEEL	2.5 x 2.5	REMOVE SIGN AND POST (RETURN TO PROPERTY OWNER)
	D3-1	'BELFAIR YARD ROAD'	–	48	12	STEEL	–	REMOVE SIGN AND POST (RETURN TO PROPERTY OWNER)
R-2	W8-6	TRUCK CROSSING	B 53+70, 28 LT	36	18	STEEL	2.5 x 2.5	REMOVE SIGN AND POST (RETURN TO PROPERTY OWNER)
R-3	R1-1	STOP SIGN	A 15+08, 4 RT	30	30	STEEL	2.5 x 2.5	REMOVE SIGN AND POST (RETURN TO WSDOT)
R-4	W8-6	TRUCK CROSSING	A 17+66, 58 LT	30	30	STEEL	2.5 x 2.5	REMOVE SIGN AND POST (RETURN TO WSDOT)
R-5	---	NO TRESPASSING MOD	B 56+26, 29 LT	24	24	WOOD	2.5 x 2.5	REMOVE SIGN AND POST (RETURN TO PROPERTY OWNER)
R-6	---	NO TRESPASSING MOD	B 56+88, 16 LT	24	24	WOOD	2.5 x 2.5	REMOVE SIGN AND POST (RETURN TO PROPERTY OWNER)
R-7	R3-7R	RIGHT LANE MUST TURN RIGHT	A 20+00, 48 LT	24	24	STEEL	2.5 x 2.5	REMOVE SIGN AND POST (RETURN TO WSDOT)

NOTES

1. THE FLEXABLE GUIDE POST SHALL BE BROWN IN COLOR. SEE STANDARD SPECIFICATION SECTION 9-17.
2. WSDOT BMP STICKER TO BE PLACED ON FIRST FLEXIBLE GUIDE POST ONLY.



WSDOT STORMWATER BMP STICKER
(FACING TRAFFIC)
NTS



FLEXIBLE GUIDE POST DETAIL
TYPICAL FOR ALL STORMWATER BMP GUIDE POSTS AS DETAILED ON THIS SHEET

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738,05
DRAWING FILE No.: 0738,05-CH-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 49615 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

SIGN SPECIFICATION SHEET

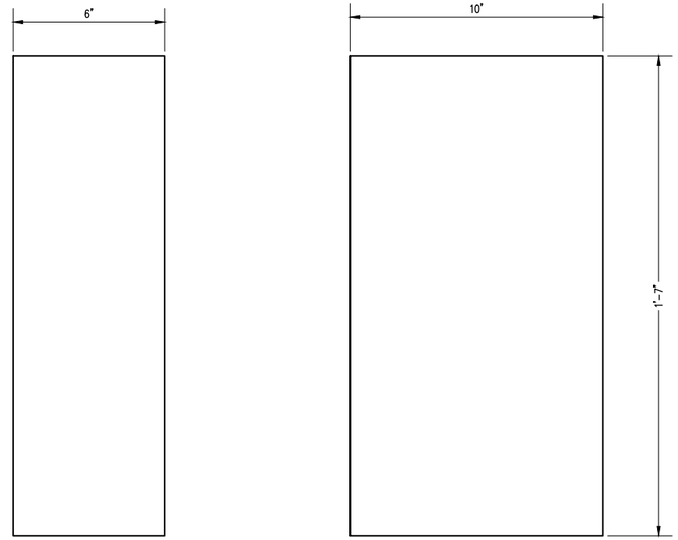
DRAWING No.: CH-6
SHEET No.: 42 OF 52

RRFB GENERAL DETAIL NOTES

1. SEE STANDARD PLAN J-20.26 FOR ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION DETAILS. FACE PLATE (AS DETAILED ON THIS SHEET, SHALL BE SHOWN.
2. SEE STANDARD PLAN J-21.10 FOR SIGNAL STANDARD FOUNDATION DETAILS.
3. SEE STANDARD PLAN J-21.15 FOR SIGNAL STANDARD DETAILS NOT SHOWN.
4. SEE STANDARD PLAN G-30.10 FOR SIGN INSTALLATION ON SIGNAL STANDARDS DETAILS.
5. PEDESTRIAN PUSH BUTTONS SHALL HAVE VIBRO-TACTILE AND AUDIBLE PUSH BUTTON ASSEMBLIES PER SPECIAL PROVISION 8-20.2 (9-29.20).
6. SEE SPECIAL PROVISION 8-20.3 FOR RRFB SYSTEM REQUIREMENTS.

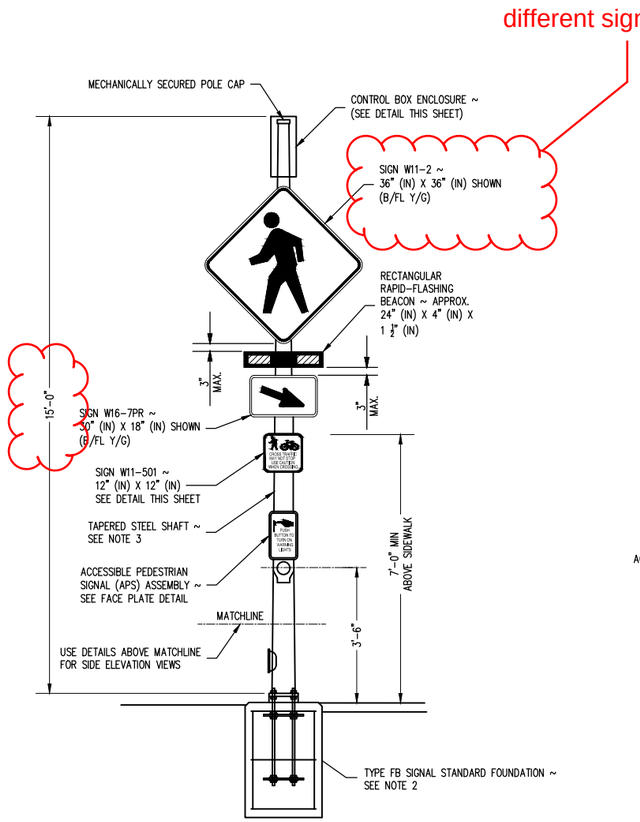
W11-501
(12" x 12")

PEDESTRIAN SYMBOL HEIGHT - 4" (IN)
BICYCLE SYMBOL HEIGHT - 3" (IN)
LETTERS - 1" C
LEGEND - BLACK
BACKGROUND - YELLOW

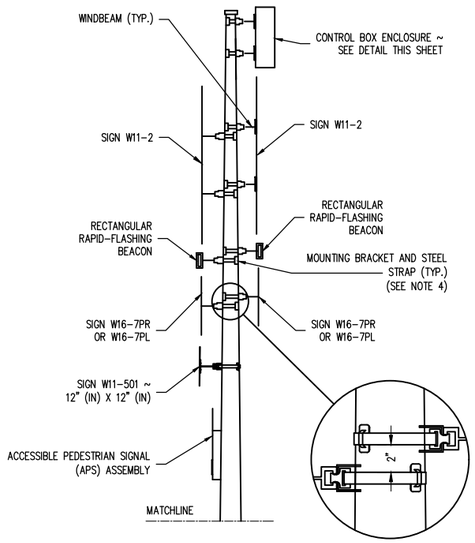


SIDE VIEW

INSIDE VIEW



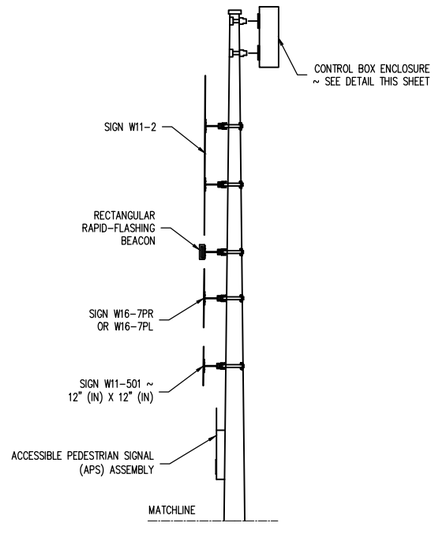
FRONT ELEVATION VIEW



SIDE ELEVATION VIEW

BI-DIRECTIONAL CONFIGURATION DETAILS

LOCATION: B 55+89, 3.6 RT



SIDE ELEVATION VIEW

SINGLE SIDED CONFIGURATION DETAILS

LOCATION: B 56+10, 45.0 RT
B 56+13, 37.5 LT

FRONT ELEVATION VIEW

RECTANGULAR RAPID FLASHING BEACON DETAIL

CONTROL BOX ENCLOSURE

NTS

FACE PLATE DETAIL (SEE NOTE 1)

NTS

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RECTANGULAR RAPID FLASHING BEACON (RRFB) DETAIL

DRAWING No.: CH-7
SHEET No.: 43 OF 52

Nov 06, 2019 - 3:30:09pm - User: kmcmelvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05-CH-T.DWG

LEGEND

EXISTING	NEW	
☒	☒	TYPE 1 JUNCTION BOX, J-40.10
◪	◪	TYPE 2 JUNCTION BOX, J-40.10
◫	◫	TYPE 8 JUNCTION BOX, J-40.30
———	——·——	CONDUIT
▨	▨	ELECTRICAL SERVICE CABINET
P	P	POWER SOURCE
		LIGHT STANDARD
		FB SIGNAL STANDARD, J-21.10 WITH PUSH BUTTON
		FB SIGNAL STANDARD, J-21.10
X	X	WIRE NOTE
X	X	CONSTRUCTION NOTE

LIGHTING SCHEDULE

LUM NO.	SERVICE NO.	CIRCUIT NO.	TYPE DISTRIBUTION WATTAGE	HEIGHT (FT)	MAST ARM LENGTH(FT)	MAST ARM TYPE	BASE TYPE	STATION, OFFSET
1	SCB 3166	A	LED-MC-III-190 ●	40	16	1	SLIP	A 12+95 32.0 RT
2	SCB 3166	A	LED-MC-III-190 ●	40	16	1	FIXED	A 14+38.9, 70.5 RT
3	SCB 3166	A	LED-MC-III-190 ●	40	16	1	FIXED	B 56+49.0, 33.8 LT
4	SCB 3166	A	LED-MC-III-190 ●	40	16	1	FIXED	A 15+76.5, 55.1 RT
5	SCB 3166	A	LED-MC-III-190 ●	40	16	1	FIXED	A 17+44.9, 42.0 LT
6	SCB 3166	A	LED-MC-III-190 ●	40	16	1	FIXED	A 15+86.3, 74.6 LT
7	SCB 3166	A	LED-MC-III-190 ●	40	16	1	FIXED	A 14+13.4, 75.9 LT

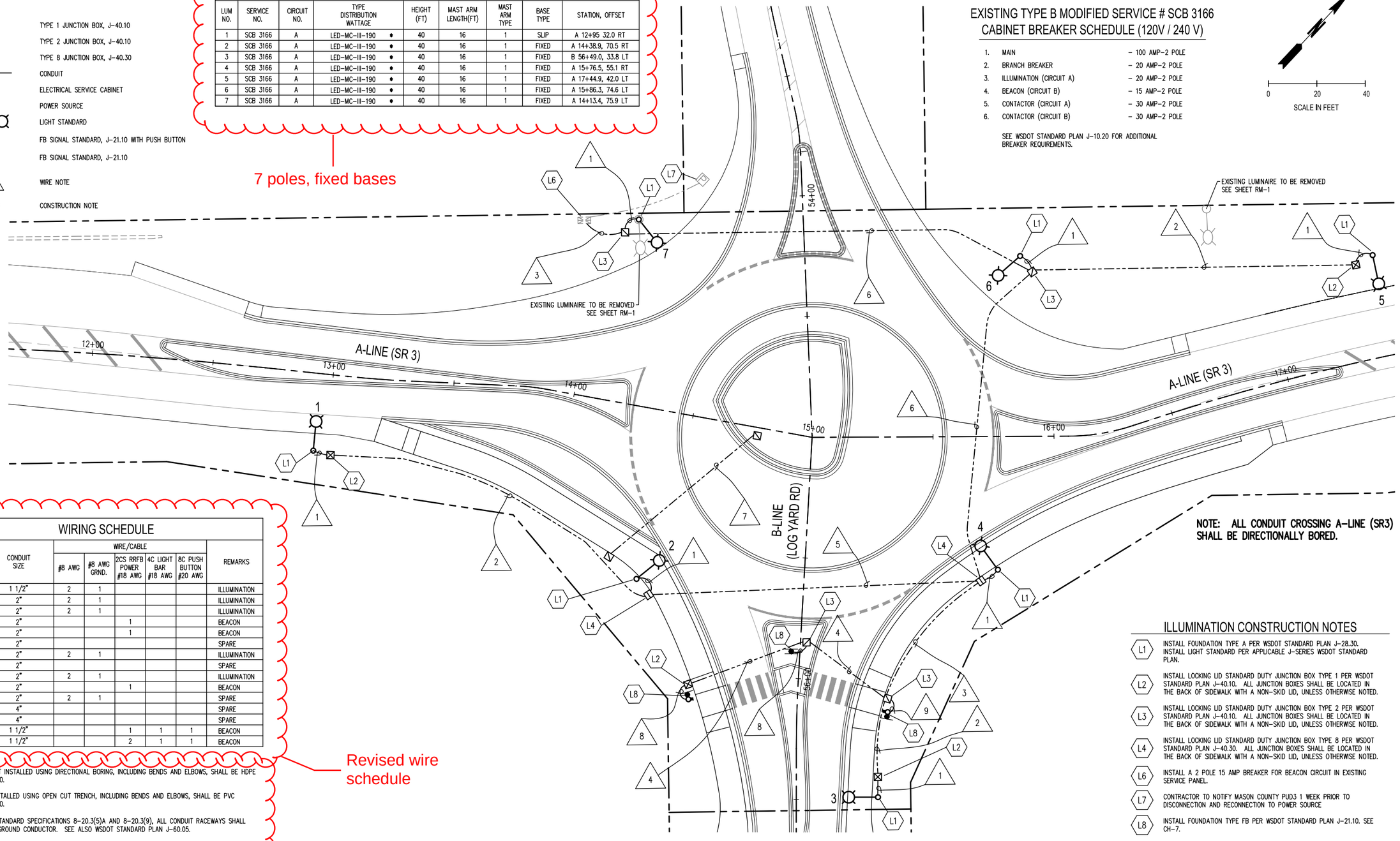
7 poles, fixed bases

EXISTING TYPE B MODIFIED SERVICE # SCB 3166 CABINET BREAKER SCHEDULE (120V / 240 V)

1.	MAIN	– 100 AMP–2 POLE
2.	BRANCH BREAKER	– 20 AMP–2 POLE
3.	ILLUMINATION (CIRCUIT A)	– 20 AMP–2 POLE
4.	BEACON (CIRCUIT B)	– 15 AMP–2 POLE
5.	CONTACTOR (CIRCUIT A)	– 30 AMP–2 POLE
6.	CONTACTOR (CIRCUIT B)	– 30 AMP–2 POLE

SEE WSDOT STANDARD PLAN J-10.20 FOR ADDITIONAL BREAKER REQUIREMENTS.

0 20 40
SCALE IN FEET



WIRING SCHEDULE

RUN NO. △	CONDUIT SIZE	WIRE/CABLE #8 AWG	#8 AWG GRND.	2CS RRFB POWER #18 AWG	4C LIGHT BAR #18 AWG	8C PUSH BUTTON #20 AWG	REMARKS
1	1 1/2"	2	1				ILLUMINATION
2	2"	2	1				ILLUMINATION
3	2"	2	1				ILLUMINATION
	2"			1			BEACON
4	2"			1			BEACON
	2"						SPARE
5	2"	2	1				ILLUMINATION
	2"						SPARE
6	2"	2	1				ILLUMINATION
	2"			1			BEACON
	2"	2	1				SPARE
7	4"						SPARE
	4"						SPARE
8	1 1/2"			1	1	1	BEACON
9	1 1/2"			2	1	1	BEACON

NOTES:

1. ALL CONDUIT INSTALLED USING DIRECTIONAL BORING, INCLUDING BENDS AND ELBOWS, SHALL BE HDPE SCHEDULE 80.
2. CONDUIT INSTALLED USING OPEN CUT TRENCH, INCLUDING BENDS AND ELBOWS, SHALL BE PVC SCHEDULE 80.
3. PER 2018 STANDARD SPECIFICATIONS 8-20.3(5)A AND 8-20.3(9), ALL CONDUIT RACEWAYS SHALL INCLUDE A GROUND CONDUCTOR. SEE ALSO WSDOT STANDARD PLAN J-60.05.
4. ALL SPARE CONDUIT SHALL BE OUTFITTED WITH A GROUND AND PULL STRING.

Revised wire schedule

ILLUMINATION CONSTRUCTION NOTES

- L1 INSTALL FOUNDATION TYPE A PER WSDOT STANDARD PLAN J-28.30. INSTALL LIGHT STANDARD PER APPLICABLE J-SERIES WSDOT STANDARD PLAN.
- L2 INSTALL LOCKING LID STANDARD DUTY JUNCTION BOX TYPE 1 PER WSDOT STANDARD PLAN J-40.10. ALL JUNCTION BOXES SHALL BE LOCATED IN THE BACK OF SIDEWALK WITH A NON-SKID LID, UNLESS OTHERWISE NOTED.
- L3 INSTALL LOCKING LID STANDARD DUTY JUNCTION BOX TYPE 2 PER WSDOT STANDARD PLAN J-40.10. ALL JUNCTION BOXES SHALL BE LOCATED IN THE BACK OF SIDEWALK WITH A NON-SKID LID, UNLESS OTHERWISE NOTED.
- L4 INSTALL LOCKING LID STANDARD DUTY JUNCTION BOX TYPE 8 PER WSDOT STANDARD PLAN J-40.30. ALL JUNCTION BOXES SHALL BE LOCATED IN THE BACK OF SIDEWALK WITH A NON-SKID LID, UNLESS OTHERWISE NOTED.
- L6 INSTALL A 2 POLE 15 AMP BREAKER FOR BEACON CIRCUIT IN EXISTING SERVICE PANEL.
- L7 CONTRACTOR TO NOTIFY MASON COUNTY PUD3 1 WEEK PRIOR TO DISCONNECTION AND RECONNECTION TO POWER SOURCE
- L8 INSTALL FOUNDATION TYPE FB PER WSDOT STANDARD PLAN J-21.10. SEE CH-7.

NOTE: ALL CONDUIT CROSSING A-LINE (SR3) SHALL BE DIRECTIONALLY BORED.

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: M. JOHNSON
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738,05
DRAWING FILE No.: 0738,05-IL-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 40425 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

ILLUMINATION PLAN

DRAWING No.: IL-1
SHEET No.: 44 OF 52

NOTES

1. JOINT UTILITY TRENCH TO BE PROVIDED BY CONTRACTOR.
2. ALL TRENCHED MASON COUNTY PUD 3 AND CENTURY LINK CONDUIT AND WIRING TO BE PROVIDED AND INSTALLED BY RESPECTIVE OWNER.
3. DIRECTIONAL BORE & CONDUIT FOR MASON PUD 3 TO BE PROVIDED BY CONTRACTOR.

LEGEND

- PROPOSED 3ø, FUSING CABINET (INSTALLED BY OTHERS)
- PROPOSED FIBER OPTIC INTERCONNECT VAULT (INSTALLED BY OTHERS)
- NEW UTILITY POLE (INSTALLED BY OTHERS)
- P — 3ø, 12.47 KV, UNDERGROUND POWER (INSTALLED BY OTHERS)
- C — FIBER OPTIC CONDUIT (INSTALLED BY OTHERS)
- JOINT UTILITY TRENCH (SEE DETAIL THIS SHEET)

0 30 60
SCALE IN FEET

MASON COUNTY PUD 3 WILL REPLACE FIBER VAULT WITH 2.25x5.25 CONCRETE VAULT. CONTRACTOR TO EXCAVATE

CONTRACTOR TO INSTALL 3 EACH RUNS OF 4" SCH 80 CONDUIT FOR ELECTRICAL PRIMARY 2 EACH RUNS OF 2" SCH 80 CONDUIT FOR FIBER OPTIC PUD 3 WILL PROVIDE AND PULL IN ALL CABLING

MASON COUNTY PUD 3 TO INSTALL CONDUIT AND PULL WIRES

CENTURY LINK TO INSTALL NEW HANDHOLE OUTSIDE OF CURB AND GUTTER LIMITS

CENTURY LINK TO INSTALL NEW 4-INCH CONDUIT BETWEEN EXISTING MANHOLE AND NEW HANDHOLE

CENTURY LINK TO REMOVE CABLE BETWEEN EXISTING MANHOLES AND ABANDON CONDUIT RUNS

CENTURY LINK TO PROVIDE TRENCHING, CONDUIT, AND UTILITY

DIRECTIONAL BORE UTILITY CROSSING ACROSS SR3

10+00 11+00 12+00 13+00 14+00 A-LINE (SR 3)

53+00 54+00 55+00 56+00 57+00 B-LINE (LOG YARD RD)

16+00 17+00 18+00 A-LINE (SR 3)

MATCH B-LINE 18+50 SEE THIS SHEET

NEW MASON COUNTY PUD 3 UTILITY POLE

MASON COUNTY PUD 3 ENCLOSURE VAULT

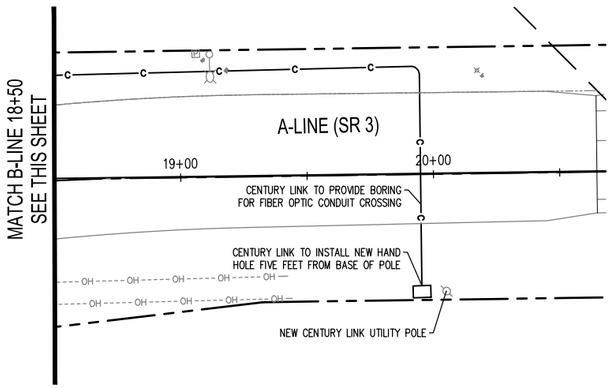
MASON COUNTY PUD 3 TO INSTALL CONDUIT AND PULL WIRES

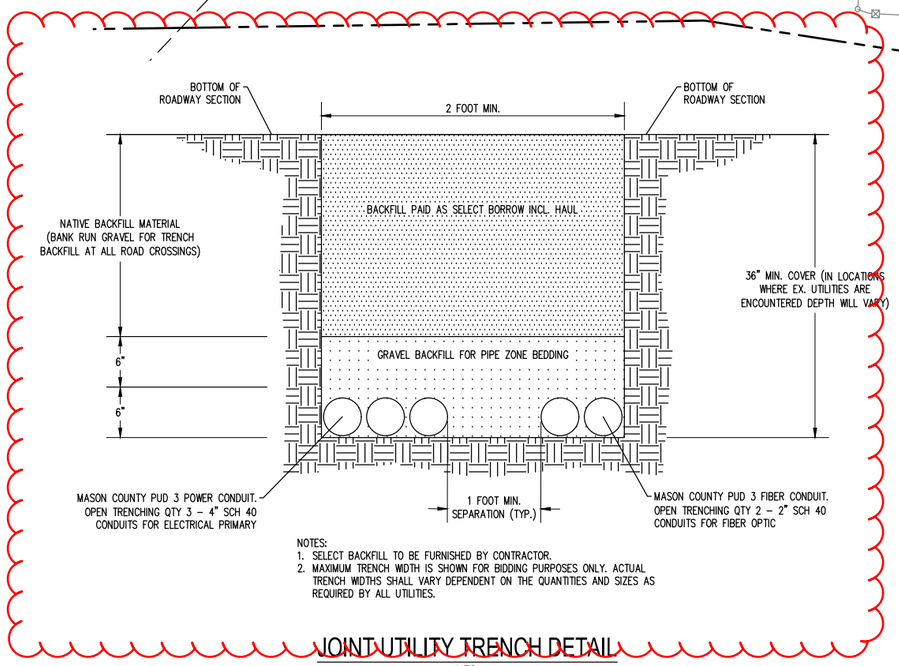
CENTURY LINK TO ABANDON MANHOLE AND REMOVE PEDESTAL

MASON COUNTY PUD 3 POWER VAULT

MASON COUNTY PUD 3 FIBER OPTIC VAULT

Revised





NOTES:
1. SELECT BACKFILL TO BE FURNISHED BY CONTRACTOR.
2. MAXIMUM TRENCH WIDTH IS SHOWN FOR BIDDING PURPOSES ONLY. ACTUAL TRENCH WIDTHS SHALL VARY DEPENDENT ON THE QUANTITIES AND SIZES AS REQUIRED BY ALL UTILITIES.

JOINT UTILITY TRENCH DETAIL

NTS

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: M. JOHNSON
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738,05
DRAWING FILE No.: 0738,05-IL-2-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 19621 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

UTILITY RELOCATION PLAN

DRAWING No.: UT-1
SHEET No.: 45 OF 52

Nov 06, 2019 3:35:47pm – User: konomelvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05-IL-2-T.DWG

T. 23 N., R. 01 W., S. 21, W.M.

NOTES - APPLICABLE TO ALL TRAFFIC CONTROL SHEETS

MOTORCYCLES USE EXTREME CAUTION SIGNS SHALL BE INSTALLED THROUGHOUT THE WORKZONE (W21-1701) AND FOR EACH SIGNIFICANT INTERSECTION OR OFF RAMP WHEN THE FOLLOWING ROADWAY CONDITIONS EXIST:

- GROOVED PAVEMENT (W8-2001)
- ABRUPT LANE EDGE (W21-801)
- NO SHOULDER (W8-1801)
- LOOSE GRAVEL (W8-7)

SPECIFIC SIGNS FOR EACH OF THE CONDITIONS NOTED SHALL ALSO BE INSTALLED AS REQUIRED.

WSDOT PROJECT INSPECTOR IS RESPONSIBLE FOR NOTIFYING THE TRAFFIC MANAGEMENT CENTER OF TRAFFIC CONTROL AND ANY COORDINATION WITH MAINTENANCE IF NEEDED.

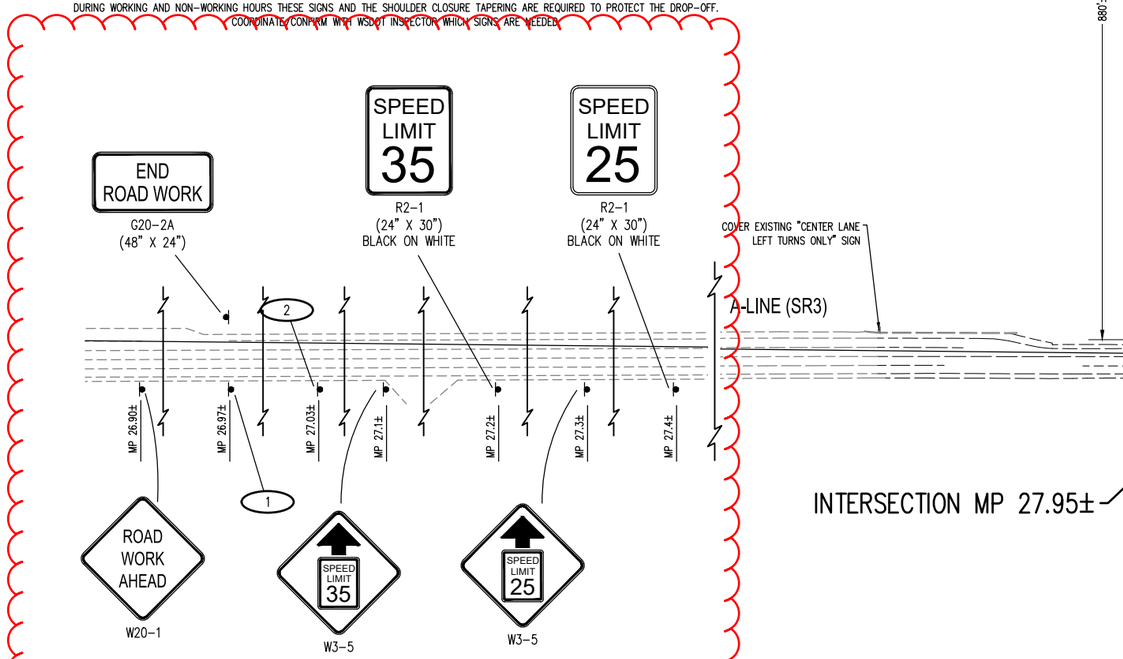
MAINTAIN PEDESTRIAN ACCESS AT ALL TIMES OR PROVIDE ALTERNATE ROUTE.

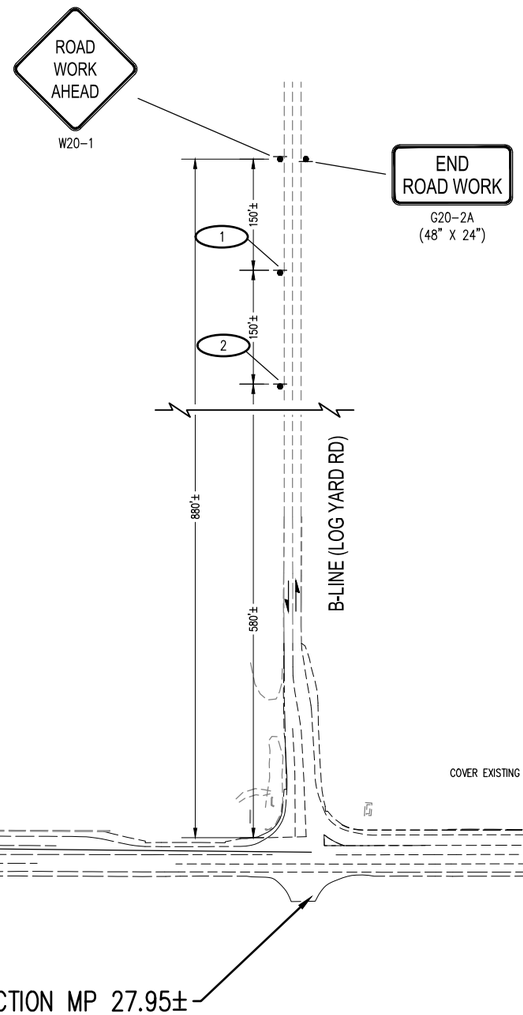
FLAGGERS SHALL STOP ALL TRAFFIC FOR PEDESTRIANS TO CROSS HIGHWAY.

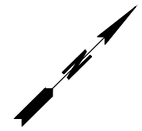
ALL CONFLICTING EXISTING SIGNS SHALL BE COVERED, AS DETERMINED BY THE ENGINEER OR WSDOT INSPECTOR.

SEE STD. PLAN K-80.10 FOR CLASS A CONSTRUCTION SIGN INSTALLATION.

DURING WORKING AND NON-WORKING HOURS THESE SIGNS AND THE SHOULDER CLOSURE TAPERING ARE REQUIRED TO PROTECT THE DROP-OFF.
COORDINATE/CONFIRM WITH WSDOT INSPECTOR WHICH SIGNS ARE NEEDED.



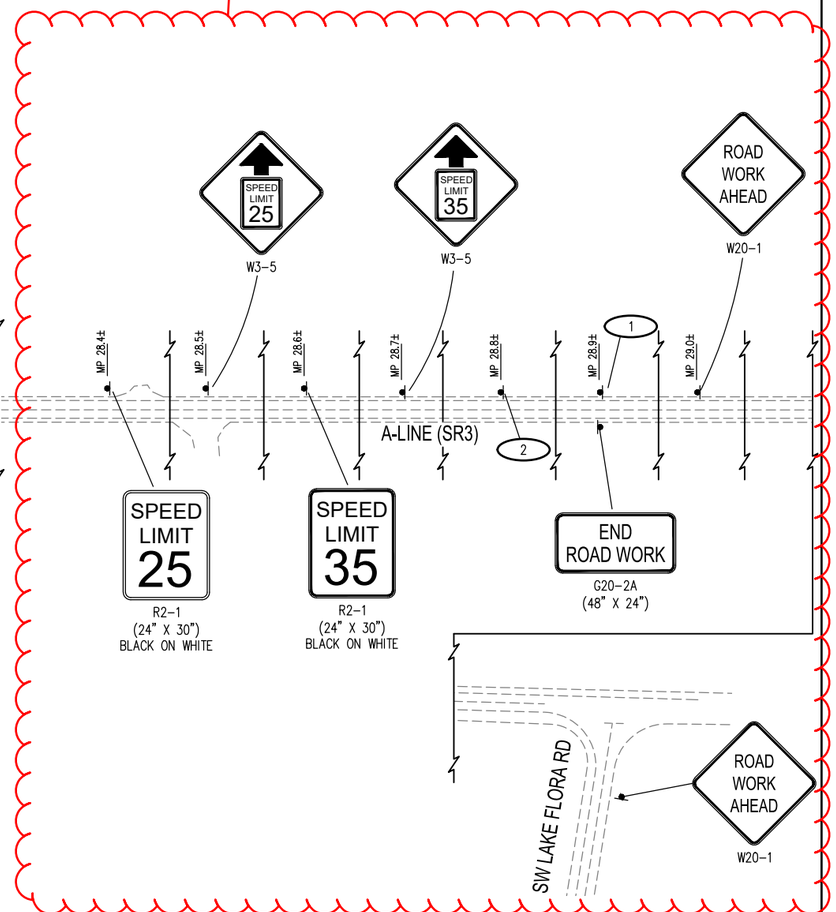




NOTES:

1. PLACE A W20-1 "ROAD WORK AHEAD" SIGN IN ADVANCE OF ALL INTERSECTION APPROACHES THAT FALL WITHIN TRAFFIC CONTROL SIGNING LIMITS.
2. ALL SIGNS SHALL BE 48" X 48" UNLESS OTHERWISE SHOWN. ALL SIGNS SHALL BE BLACK ON ORANGE UNLESS OTHERWISE SHOWN.

different sign spacing and sequence



different sign spacing and sequence

CLASS A SIGNING

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: M. JOHNSON
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-TC-01-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 49431 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

TRAFFIC CONTROL PLAN

DRAWING No.: TC-01
SHEET No.: 46 OF 52

T. 23 N., R. 01 W., S. 21, W.M.

LEGEND

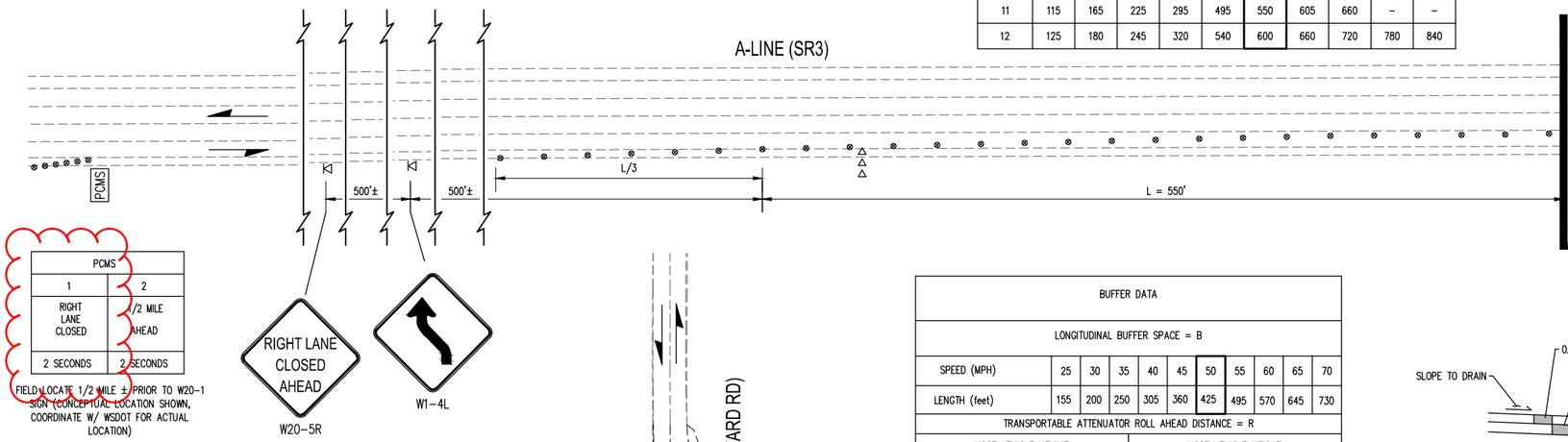
- CHANNELIZING DEVICES (TRAFFIC SAFETY DRUMS)
- WORK AREA
- TEMPORARY PAVEMENT
- CLASS B SIGN LOCATION – TEMPORARY MOUNT
- CLASS A SIGN LOCATION – POST MOUNT
- DIRECTIONAL ARROW
- PROTECTIVE VEHICLE WITH TRANSPORTABLE ATTENUATOR – REQUIRED (MAY BE A WORK VEHICLE)
- PCMS — PORTABLE CHANGEABLE MESSAGE SIGN
- ARROW PANEL

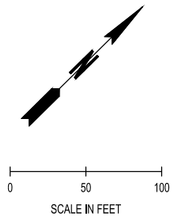
SIGN SPACING = X (FEET) (1)		
FREEWAYS & EXPRESSWAYS	55/70 MPH	1500'± (OR AS PER MUTCD)
RURAL HIGHWAYS	60/65 MPH	800'±
RURAL ROADS	45/55 MPH	500'±
RURAL ROADS, URBAN ARTERIAL	35/40 MPH	350'±
RURAL ROADS, URBAN ARTERIAL RESIDENTIAL & BUSINESS DISTRICTS	25/30 MPH	200'± (2)
URBAN STREETS	25 MPH OR LESS	100'± (2)
ALL SIGNS ARE 48"x48" BLACK ON ORANGE UNLESS OTHERWISE DESIGNATED.		

(1) ALL SPACING MAY BE ADJUSTED TO ACCOMMODATE INTERCHANGE RAMPS, AT-GRADE INTERSECTIONS, AND DRIVEWAYS.
(2) THIS SPACING MAY BE REDUCED IN URBAN AREAS TO FIT ROADWAY CONDITIONS.

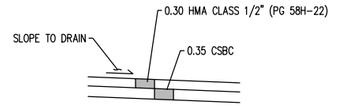
CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/70	40	80
45/50	30	60
35/40	30	60
25/30	20	40

MINIMUM TAPER LENGTH = L IN FEET											
LANE WIDTH (FEET)	POSTED SPEED (MPH)										
	25	30	35	40	45	50	55	60	65	70
10	105	150	205	270	450	500	550	–	–	–
11	115	165	225	295	495	550	605	660	–	–
12	125	180	245	320	540	600	660	720	780	840

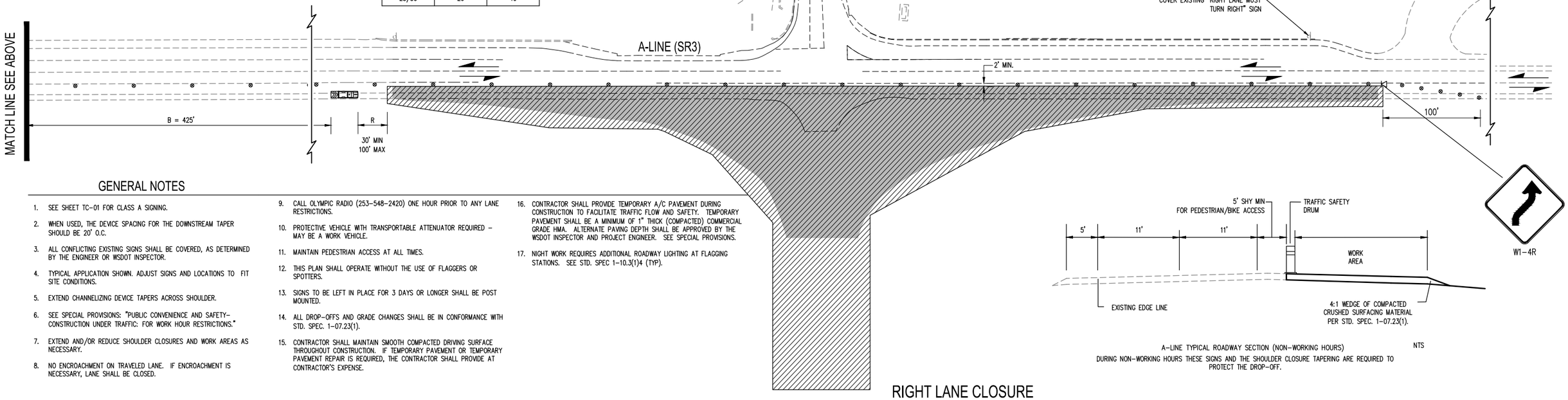




BUFFER DATA										
LONGITUDINAL BUFFER SPACE = B										
SPEED (MPH)	25	30	35	40	45	50	55	60	65	70
LENGTH (feet)	155	200	250	305	360	425	495	570	645	730
TRANSPORTABLE ATTENUATOR ROLL AHEAD DISTANCE = R										
MOST VEHICLE WEIGHT 9,900 TO 22,000 LBS.				MOST VEHICLE WEIGHT > 22,000 LBS.						
< 45 MPH	45–55 MPH		> 55 MPH	< 45 MPH	45–55 MPH		> 55 MPH			
100'	123'		172'	74'	100'		150'			
PROTECTIVE VEHICLE (WORK VEHICLE) = R										
NO SPECIFIED DISTANCE REQUIRED										



TEMPORARY PAVEMENT SECTION
N.T.S.



A-LINE TYPICAL ROADWAY SECTION (NON-WORKING HOURS) NTS
DURING NON-WORKING HOURS THESE SIGNS AND THE SHOULDER CLOSURE TAPERING ARE REQUIRED TO PROTECT THE DROP-OFF.

GENERAL NOTES

1. SEE SHEET TC-01 FOR CLASS A SIGNING.
2. WHEN USED, THE DEVICE SPACING FOR THE DOWNSTREAM TAPER SHOULD BE 20' O.C.
3. ALL CONFLICTING EXISTING SIGNS SHALL BE COVERED, AS DETERMINED BY THE ENGINEER OR WSDOT INSPECTOR.
4. TYPICAL APPLICATION SHOWN. ADJUST SIGNS AND LOCATIONS TO FIT SITE CONDITIONS.
5. EXTEND CHANNELIZING DEVICE TAPERS ACROSS SHOULDER.
6. SEE SPECIAL PROVISIONS: "PUBLIC CONVENIENCE AND SAFETY-CONSTRUCTION UNDER TRAFFIC: FOR WORK HOUR RESTRICTIONS."
7. EXTEND AND/OR REDUCE SHOULDER CLOSURES AND WORK AREAS AS NECESSARY.
8. NO ENCROACHMENT ON TRAVELED LANE. IF ENCROACHMENT IS NECESSARY, LANE SHALL BE CLOSED.
9. CALL OLYMPIC RADIO (253-548-2420) ONE HOUR PRIOR TO ANY LANE RESTRICTIONS.
10. PROTECTIVE VEHICLE WITH TRANSPORTABLE ATTENUATOR REQUIRED – MAY BE A WORK VEHICLE.
11. MAINTAIN PEDESTRIAN ACCESS AT ALL TIMES.
12. THIS PLAN SHALL OPERATE WITHOUT THE USE OF FLAGGERS OR SPOTTERS.
13. SIGNS TO BE LEFT IN PLACE FOR 3 DAYS OR LONGER SHALL BE POST MOUNTED.
14. ALL DROP-OFFS AND GRADE CHANGES SHALL BE IN CONFORMANCE WITH STD. SPEC. 1-07.23(1).
15. CONTRACTOR SHALL MAINTAIN SMOOTH COMPACTED DRIVING SURFACE THROUGHOUT CONSTRUCTION. IF TEMPORARY PAVEMENT OR TEMPORARY PAVEMENT REPAIR IS REQUIRED, THE CONTRACTOR SHALL PROVIDE AT CONTRACTOR'S EXPENSE.
16. CONTRACTOR SHALL PROVIDE TEMPORARY A/C PAVEMENT DURING CONSTRUCTION TO FACILITATE TRAFFIC FLOW AND SAFETY. TEMPORARY PAVEMENT SHALL BE A MINIMUM OF 1" THICK (COMPACTED) COMMERCIAL GRADE HMA. ALTERNATE PAVING DEPTH SHALL BE APPROVED BY THE WSDOT INSPECTOR AND PROJECT ENGINEER. SEE SPECIAL PROVISIONS.
17. NIGHT WORK REQUIRES ADDITIONAL ROADWAY LIGHTING AT FLAGGING STATIONS. SEE STD. SPEC 1-10.3(1)4 (TYP).

RIGHT LANE CLOSURE

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: M. JOHNSON
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-TC-02-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 40251 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

TRAFFIC CONTROL PLAN

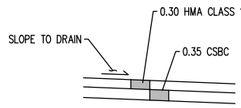
DRAWING No.: TC-02
SHEET No.: 47 OF 52

Nov 06, 2019 - 3:36:28pm - User kenc.melvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05-TC-02-T.DWG

T. 23 N., R. 01 W., S. 21, W.M.

LEGEND

- CHANNELIZING DEVICES (TRAFFIC SAFETY DRUMS)
- WORK AREA
- TEMPORARY PAVEMENT
- CLASS B SIGN LOCATION – TEMPORARY MOUNT
- CLASS A SIGN LOCATION – POST MOUNT
- DIRECTIONAL ARROW
- PROTECTIVE VEHICLE WITH TRANSPORTABLE ATTENUATOR – REQUIRED (MAY BE A WORK VEHICLE)
- ARROW PANEL



TEMPORARY PAVEMENT SECTION

N.T.S.

SIGN SPACING = X (FEET) (1)		
FREEWAYS & EXPRESSWAYS	55/70 MPH	1500'± (OR AS PER MUTCD)
RURAL HIGHWAYS	60/65 MPH	800'±
RURAL ROADS	45/55 MPH	500'±
RURAL ROADS, URBAN ARTERIAL	35/40 MPH	350'±
RURAL ROADS, URBAN ARTERIAL RESIDENTIAL & BUSINESS DISTRICTS	25/30 MPH	200'± (2)
URBAN STREETS	25 MPH OR LESS	100'± (2)
ALL SIGNS ARE 48"x48" BLACK ON ORANGE UNLESS OTHERWISE DESIGNATED.		

(1) ALL SPACING MAY BE ADJUSTED TO ACCOMMODATE INTERCHANGE RAMPS, AT-GRADE INTERSECTIONS, AND DRIVEWAYS.
(2) THIS SPACING MAY BE REDUCED IN URBAN AREAS TO FIT ROADWAY CONDITIONS.

CHANNELIZING DEVICE SPACING (FEET)		
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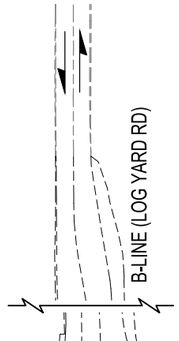
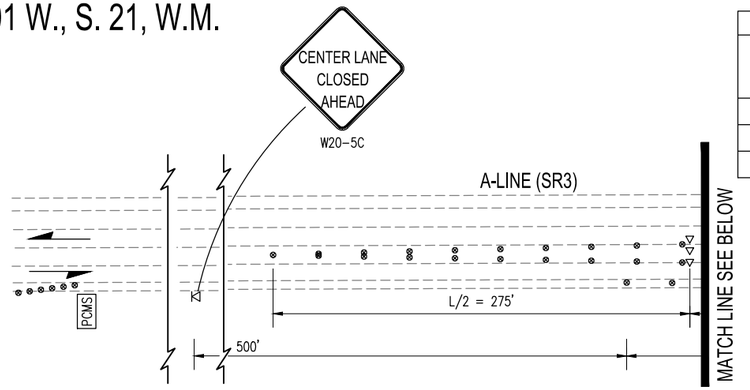
45/50	30	60
35/40	30	60
25/30	20	40

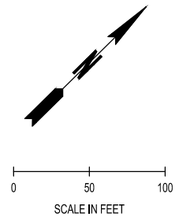




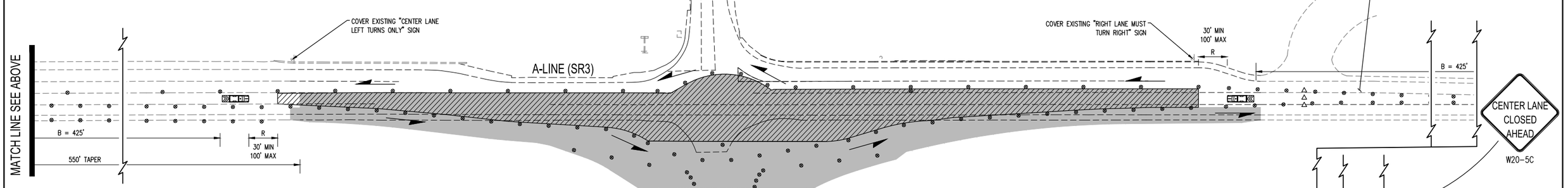
PCMS	
1	2
CENTER LANE CLOSED	NO LEFT TURNS
2 SECONDS	2 SECONDS

FIELD LOCATE 1/2 MILE ± PRIOR TO W20-1 SIGN (CONCEPTUAL LOCATION SHOWN, COORDINATE W/ WSDOT FOR ACTUAL LOCATION)

MINIMUM TAPER LENGTH = L IN FEET											
LANE WIDTH (FEET)	POSTED SPEED (MPH)										
	25	30	35	40	45	50	55	60	65	70
10	105	150	205	270	450	500	550	–	–	–
11	115	165	225	295	495	550	605	660	–	–
12	125	180	245	320	540	600	660	720	780	840

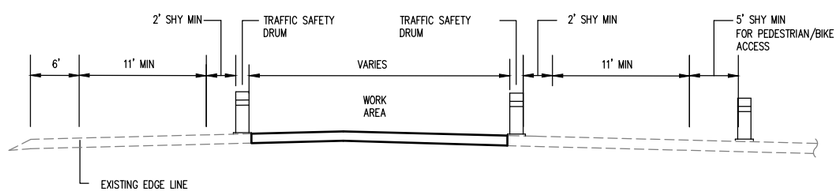


BUFFER DATA										
LONGITUDINAL BUFFER SPACE = B										
SPEED (MPH)	25	30	35	40	45	50	55	60	65	70
LENGTH (feet)	155	200	250	305	360	425	495	570	645	730
TRANSPORTABLE ATTENUATOR ROLL AHEAD DISTANCE = R										
MOST VEHICLE WEIGHT 9,900 TO 22,000 LBS.				MOST VEHICLE WEIGHT > 22,000 LBS.						
< 45 MPH	45–55 MPH		> 55 MPH	< 45 MPH		45–55 MPH		> 55 MPH		
100'	123'		172'	74'		100'		150'		
PROTECTIVE VEHICLE (WORK VEHICLE) = R										
NO SPECIFIED DISTANCE REQUIRED										



PCMS	
1	2
CENTER LANE CLOSED	NO LEFT TURNS
2 SECONDS	2 SECONDS

FIELD LOCATE 1/2 MILE ± PRIOR TO W20-1 SIGN (CONCEPTUAL LOCATION SHOWN, COORDINATE W/ WSDOT FOR ACTUAL LOCATION)



A-LINE TYPICAL ROADWAY SECTION (NON-WORKING HOURS) NTS

DURING NON-WORKING HOURS THESE SIGNS AND THE SHOULDER CLOSURE TAPERING ARE REQUIRED TO PROTECT THE DROP-OFF.

GENERAL NOTES

1. SEE SHEET TC-01 FOR CLASS A SIGNING.
2. WHEN USED, THE DEVICE SPACING FOR THE DOWNSTREAM TAPER SHOULD BE 20' O.C.
3. ALL CONFLICTING EXISTING SIGNS SHALL BE COVERED, AS DETERMINED BY THE ENGINEER OR WSDOT INSPECTOR.
4. TYPICAL APPLICATION SHOWN. ADJUST SIGNS AND LOCATIONS TO FIT SITE CONDITIONS.
5. EXTEND CHANNELIZING DEVICE TAPERS ACROSS SHOULDER.
6. SEE SPECIAL PROVISIONS: "PUBLIC CONVENIENCE AND SAFETY–CONSTRUCTION UNDER TRAFFIC: FOR WORK HOUR RESTRICTIONS."
7. EXTEND AND/OR REDUCE SHOULDER CLOSURES AND WORK AREAS AS NECESSARY.
8. NO ENCROACHMENT ON TRAVELED LANE. IF ENCROACHMENT IS NECESSARY, LANE SHALL BE CLOSED.
9. CALL OLYMPIC RADIO (253-548-2420) ONE HOUR PRIOR TO ANY LANE RESTRICTIONS.
10. PROTECTIVE VEHICLE WITH TRANSPORTABLE ATTENUATOR REQUIRED – MAY BE A WORK VEHICLE.
11. MAINTAIN PEDESTRIAN ACCESS AT ALL TIMES.
12. THIS PLAN SHALL OPERATE WITHOUT THE USE OF FLAGGERS OR SPOTTERS.
13. SIGNS TO BE LEFT IN PLACE FOR 3 DAYS OR LONGER SHALL BE POST MOUNTED.
14. ALL DROP-OFFS AND GRADE CHANGES SHALL BE IN CONFORMANCE WITH STD. SPEC. 1-07.23(1).
15. CONTRACTOR SHALL MAINTAIN SMOOTH COMPACTED DRIVING SURFACE THROUGHOUT CONSTRUCTION. IF TEMPORARY PAVEMENT OR TEMPORARY PAVEMENT REPAIR IS REQUIRED, THE CONTRACTOR SHALL PROVIDE AT CONTRACTOR'S EXPENSE.
16. CONTRACTOR SHALL PROVIDE TEMPORARY A/C PAVEMENT DURING CONSTRUCTION TO FACILITATE TRAFFIC FLOW AND SAFETY. TEMPORARY PAVEMENT SHALL BE A MINIMUM OF 1" THICK (COMPACTED) COMMERCIAL GRADE HMA. ALTERNATE PAVING DEPTH SHALL BE APPROVED BY THE WSDOT INSPECTOR AND PROJECT ENGINEER. SEE SPECIAL PROVISIONS.
17. NIGHT WORK REQUIRES ADDITIONAL ROADWAY LIGHTING AT FLAGGING STATIONS. SEE STD. SPEC 1-10.3(1)4 (TYP).

CENTER LANE CLOSURE

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: M. JOHNSON
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-TC-03-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 19631 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
SCJALLIANCE.COM

PROJECT NAME:

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

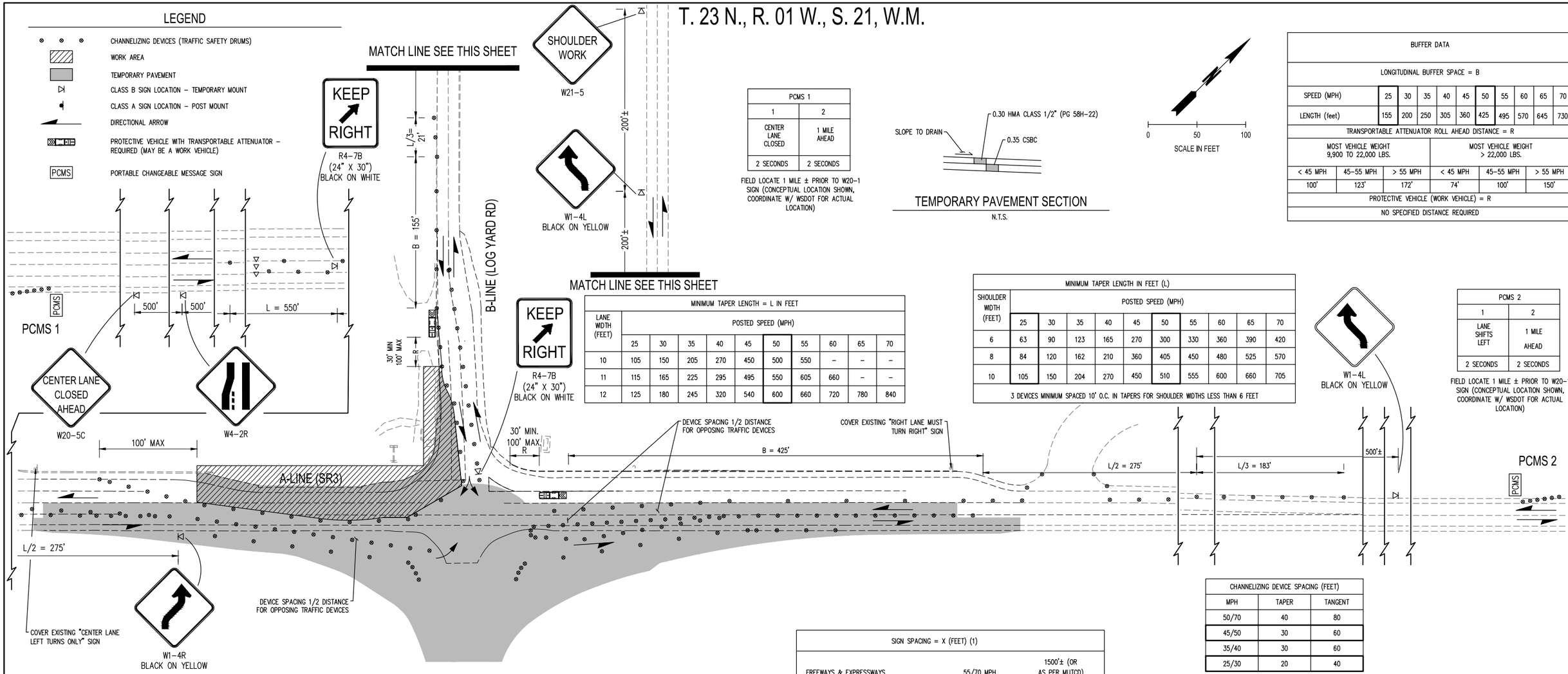
TRAFFIC CONTROL PLAN

DRAWING No.: TC-03
SHEET No.: 48 OF 52

T. 23 N., R. 01 W., S. 21, W.M.

LEGEND

- CHANNELIZING DEVICES (TRAFFIC SAFETY DRUMS)
- WORK AREA
- TEMPORARY PAVEMENT
- CLASS B SIGN LOCATION – TEMPORARY MOUNT
- CLASS A SIGN LOCATION – POST MOUNT
- DIRECTIONAL ARROW
- PROTECTIVE VEHICLE WITH TRANSPORTABLE ATTENUATOR – REQUIRED (MAY BE A WORK VEHICLE)
- PCMS – PORTABLE CHANGEABLE MESSAGE SIGN



PCMS 1	
1	2
CENTER LANE CLOSED	1 MILE AHEAD
2 SECONDS	2 SECONDS

FIELD LOCATE 1 MILE ± PRIOR TO W20–1 SIGN (CONCEPTUAL LOCATION SHOWN, COORDINATE W/ WSDOT FOR ACTUAL LOCATION)

TEMPORARY PAVEMENT SECTION

N.T.S.

BUFFER DATA										
LONGITUDINAL BUFFER SPACE = B										
SPEED (MPH)	25	30	35	40	45	50	55	60	65	70
LENGTH (feet)	155	200	250	305	360	425	495	570	645	730
TRANSPORTABLE ATTENUATOR ROLL AHEAD DISTANCE = R										
MOST VEHICLE WEIGHT 9,900 TO 22,000 LBS.				MOST VEHICLE WEIGHT > 22,000 LBS.						
< 45 MPH	45–55 MPH		> 55 MPH	< 45 MPH		45–55 MPH		> 55 MPH		
100'	123'		172'	74'		100'		150'		
PROTECTIVE VEHICLE (WORK VEHICLE) = R										
NO SPECIFIED DISTANCE REQUIRED										

MINIMUM TAPER LENGTH = L IN FEET										
LANE WIDTH (FEET)	POSTED SPEED (MPH)									
	25	30	35	40	45	50	55	60	65	70
10	105	150	205	270	450	500	550	–	–	–
11	115	165	225	295	495	550	605	660	–	–
12	125	180	245	320	540	600	660	720	780	840

MINIMUM TAPER LENGTH IN FEET (L)										
SHOULDER WIDTH (FEET)	POSTED SPEED (MPH)									
	25	30	35	40	45	50	55	60	65	70
6	63	90	123	165	270	300	330	360	390	420
8	84	120	162	210	360	405	450	480	525	570
10	105	150	204	270	450	510	555	600	660	705
3 DEVICES MINIMUM SPACED 10' O.C. IN TAPERS FOR SHOULDER WIDTHS LESS THAN 6 FEET										

PCMS 2	
1	2
LANE SHIFTS LEFT	1 MILE AHEAD
2 SECONDS	2 SECONDS

FIELD LOCATE 1 MILE ± PRIOR TO W20–1 SIGN (CONCEPTUAL LOCATION SHOWN, COORDINATE W/ WSDOT FOR ACTUAL LOCATION)

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/70	40	80
45/50	30	60
35/40	30	60
25/30	20	40

GENERAL NOTES

1. SEE SHEET TC–01 FOR CLASS A SIGNING.
2. WHEN USED, THE DEVICE SPACING FOR THE DOWNSTREAM TAPER SHOULD BE 20' O.C.
3. ALL CONFLICTING EXISTING SIGNS SHALL BE COVERED, AS DETERMINED BY THE ENGINEER OR WSDOT INSPECTOR.
4. TYPICAL APPLICATION SHOWN. ADJUST SIGNS AND LOCATIONS TO FIT SITE CONDITIONS.
5. EXTEND CHANNELIZING DEVICE TAPERS ACROSS SHOULDER.
6. SEE SPECIAL PROVISIONS: "PUBLIC CONVENIENCE AND SAFETY–CONSTRUCTION UNDER TRAFFIC: FOR WORK HOUR RESTRICTIONS."
7. EXTEND AND/OR REDUCE SHOULDER CLOSURES AND WORK AREAS AS NECESSARY.
8. NO ENCROACHMENT ON TRAVELED LANE. IF ENCROACHMENT IS NECESSARY, LANE SHALL BE CLOSED.
9. CALL OLYMPIC RADIO (253–548–2420) ONE HOUR PRIOR TO ANY LANE RESTRICTIONS.
10. PROTECTIVE VEHICLE WITH TRANSPORTABLE ATTENUATOR REQUIRED – MAY BE A WORK VEHICLE.
11. MAINTAIN PEDESTRIAN ACCESS AT ALL TIMES.
12. THIS PLAN SHALL OPERATE WITHOUT THE USE OF FLAGGERS OR SPOTTERS.
13. SIGNS TO BE LEFT IN PLACE FOR 3 DAYS OR LONGER SHALL BE POST MOUNTED.
14. ALL DROP–OFFS AND GRADE CHANGES SHALL BE IN CONFORMANCE WITH STD. SPEC. 1–07.23(1).
15. CONTRACTOR SHALL MAINTAIN SMOOTH COMPACTED DRIVING SURFACE THROUGHOUT CONSTRUCTION. IF TEMPORARY PAVEMENT OR TEMPORARY PAVEMENT REPAIR IS REQUIRED, THE CONTRACTOR SHALL PROVIDE AT CONTRACTOR'S EXPENSE.
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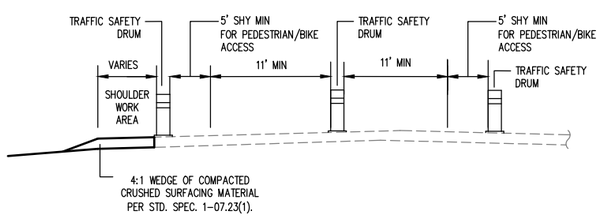
17. NIGHT WORK REQUIRES ADDITIONAL ROADWAY LIGHTING AT FLAGGING STATIONS. SEE STD. SPEC 1–10.3(1)4 (TYP).

SIGN SPACING = X (FEET) (1)		
FREEWAYS & EXPRESSWAYS	55/70 MPH	1500'± (OR AS PER MUTCD)
RURAL HIGHWAYS	60/65 MPH	800'±
RURAL ROADS	45/55 MPH	500'±
RURAL ROADS, URBAN ARTERIAL	35/40 MPH	350'±
RURAL ROADS, URBAN ARTERIAL RESIDENTIAL & BUSINESS DISTRICTS	25/30 MPH	200'± (2)
URBAN STREETS	25 MPH OR LESS	100'± (2)
ALL SIGNS ARE 48"x48" BLACK ON ORANGE UNLESS OTHERWISE DESIGNATED.		

(1) ALL SPACING MAY BE ADJUSTED TO ACCOMMODATE INTERCHANGE RAMPS, AT–GRADE INTERSECTIONS, AND DRIVEWAYS.
(2) THIS SPACING MAY BE REDUCED IN URBAN AREAS TO FIT ROADWAY CONDITIONS.



A–LINE TYPICAL ROADWAY SECTION (NON–WORKING HOURS) NTS

DURING NON–WORKING HOURS THESE SIGNS AND THE SHOULDER CLOSURE TAPERING ARE REQUIRED TO PROTECT THE DROP–OFF.

LANE SHIFT - THREE LANE ROADWAY

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: M. JOHNSON
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-TC-04-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 40429 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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SCJALLIANCE.COM

PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

TRAFFIC CONTROL PLAN

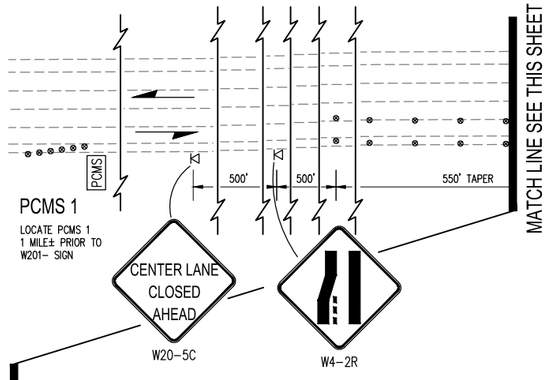
DRAWING No.: TC-04
SHEET No.: 49 OF 52

Nov 06, 2019 - 3:37:17pm - User: kons.melvin
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05-TC-04-T.DWG

T. 23 N., R. 01 W., S. 21, W.M.

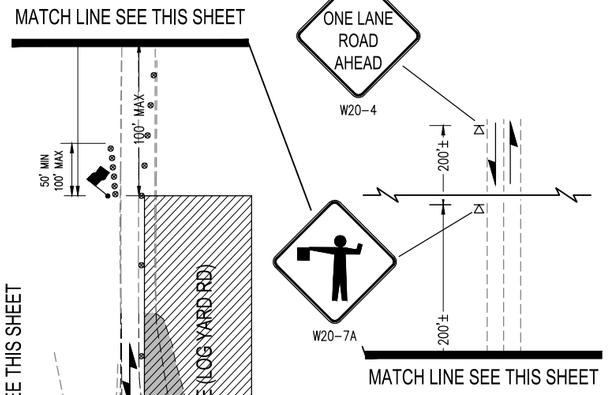
LEGEND

- CHANNELIZING DEVICES (TRAFFIC SAFETY DRUMS)
- WORK AREA
- CLASS B SIGN LOCATION – TEMPORARY MOUNT
- CLASS A SIGN LOCATION – POST MOUNT
- DIRECTIONAL ARROW
- PROTECTIVE VEHICLE WITH TRANSPORTABLE ATTENUATOR – REQUIRED (MAY BE A WORK VEHICLE)
- PCMS — PORTABLE CHANGEABLE MESSAGE SIGN
- FLAGGER WITH MINIMUM 6 CHANNELIZATION DEVICES WITHIN 50'–100' IN FRONT OF FLAGGER



PCMS 1

LOCATE PCMS 1 1 MILE± PRIOR TO W201– SIGN



PCMS 1	
1	2
CENTER LANE CLOSED	1 MILE AHEAD
2 SECONDS	2 SECONDS

FIELD LOCATE 1 MILE ± PRIOR TO W20–1 SIGN (CONCEPTUAL LOCATION SHOWN, COORDINATE W/ WSDOT FOR ACTUAL LOCATION)

0 50 100

SCALE IN FEET

BUFFER DATA										
LONGITUDINAL BUFFER SPACE = B										
SPEED (MPH)	25	30	35	40	45	50	55	60	65	70
LENGTH (feet)	155	200	250	305	360	425	495	570	645	730
TRANSPORTABLE ATTENUATOR ROLL AHEAD DISTANCE = R										
MOST VEHICLE WEIGHT 9,900 TO 22,000 LBS.				MOST VEHICLE WEIGHT > 22,000 LBS.						
< 45 MPH	45–55 MPH		> 55 MPH	< 45 MPH	45–55 MPH		> 55 MPH			
100'	123'		172'	74'	100'		150'			
PROTECTIVE VEHICLE (WORK VEHICLE) = R										
NO SPECIFIED DISTANCE REQUIRED										

SIGN SPACING = X (FEET) (1)		
FREEWAYS & EXPRESSWAYS	55/70 MPH	1500'± (OR AS PER MUTCD)
RURAL HIGHWAYS	60/65 MPH	800'±
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(1) ALL SPACING MAY BE ADJUSTED TO ACCOMMODATE INTERCHANGE RAMPS, AT-GRADE INTERSECTIONS, AND DRIVEWAYS.
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MINIMUM TAPER LENGTH = L IN FEET										
LANE WIDTH (FEET)	POSTED SPEED (MPH)									
	25	30	35	40	45	50	55	60	65	70
10	105	150	205	270	450	500	550	–	–	–
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MINIMUM TAPER LENGTH IN FEET (L)										
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8	84	120	162	210	360	405	450	480	525	570
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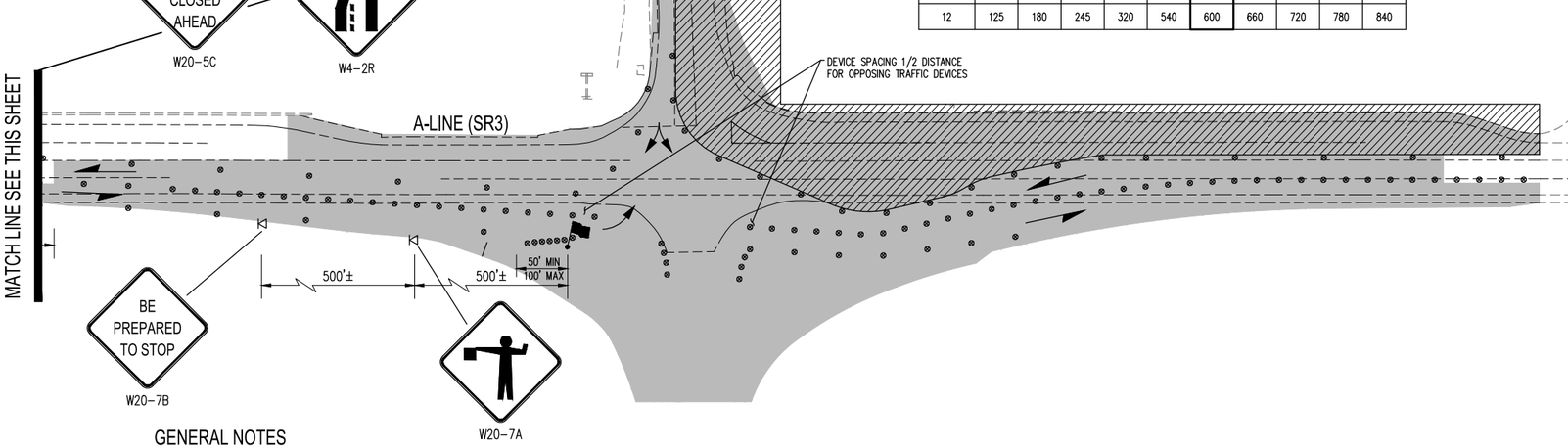
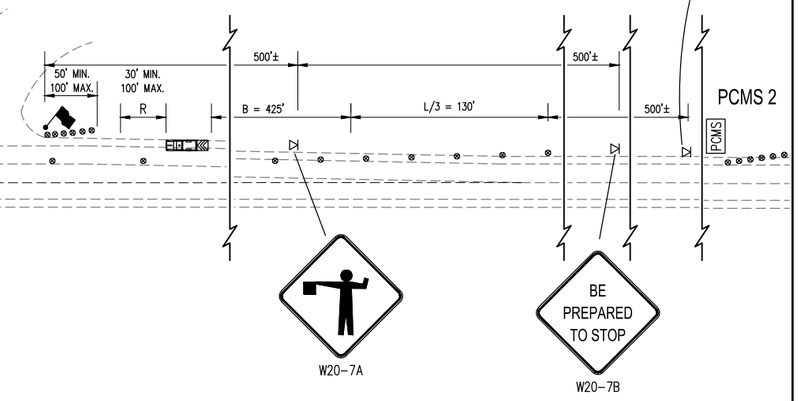
3 DEVICES MINIMUM SPACED 10' O.C. IN TAPERS FOR SHOULDER WIDTHS LESS THAN 6 FEET										

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/70	40	80
45/50	30	60
35/40	30	60
25/30	20	40





GENERAL NOTES

1. SEE SHEET TC–01 FOR CLASS A SIGNING.
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3. ALL CONFLICTING EXISTING SIGNS SHALL BE COVERED, AS DETERMINED BY THE ENGINEER OR WSDOT INSPECTOR.
4. TYPICAL APPLICATION SHOWN. ADJUST SIGNS AND LOCATIONS TO FIT SITE CONDITIONS.
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7. EXTEND AND/OR REDUCE SHOULDER CLOSURES AND WORK AREAS AS NECESSARY.
8. NO ENCROACHMENT ON TRAVELED LANE. IF ENCROACHMENT IS NECESSARY, LANE SHALL BE CLOSED.
9. CALL OLYMPIC RADIO (253–548–2420) ONE HOUR PRIOR TO ANY LANE RESTRICTIONS.
10. PROTECTIVE VEHICLE WITH TRANSPORTABLE ATTENUATOR REQUIRED – MAY BE A WORK VEHICLE.
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13. ALL DROP–OFFS AND GRADE CHANGES SHALL BE IN CONFORMANCE WITH STD. SPEC. 1–07.23(1).
14. CONTRACTOR SHALL MAINTAIN SMOOTH COMPACTED DRIVING SURFACE THROUGHOUT CONSTRUCTION. IF TEMPORARY PAVEMENT OR TEMPORARY PAVEMENT REPAIR IS REQUIRED, THE CONTRACTOR SHALL PROVIDE AT CONTRACTOR'S EXPENSE.
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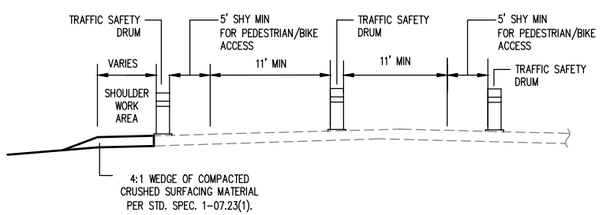

A–LINE TYPICAL ROADWAY SECTION (NON–WORKING HOURS) NTS

DURING NON–WORKING HOURS THESE SIGNS AND THE SHOULDER CLOSURE TAPERING ARE REQUIRED TO PROTECT THE DROP–OFF.

PCMS 2	
1	2
LANE SHIFTS LEFT	1 MILE AHEAD
2 SECONDS	2 SECONDS

FIELD LOCATE 1 MILE ± PRIOR TO W20–1 SIGN (CONCEPTUAL LOCATION SHOWN, COORDINATE W/ WSDOT FOR ACTUAL LOCATION)

LANE SHIFT

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: M. JOHNSON
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-TC-05-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 40420 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

SCJ ALLIANCE
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PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

TRAFFIC CONTROL PLAN

DRAWING No.: TC-05
SHEET No.: 50 OF 52

Nov 06, 2019 - 3:37:48pm - User: kmcmelvin
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T. 23 N., R. 01 W., S. 21, W.M.

LEGEND

- CHANNELIZING DEVICES (TRAFFIC SAFETY DRUMS)
- WORK AREA
- CLASS B SIGN LOCATION – TEMPORARY MOUNT
- CLASS A SIGN LOCATION – POST MOUNT
- DIRECTIONAL ARROW
- PCMS — PORTABLE CHANGEABLE MESSAGE SIGN

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/70	40	80
45/50	30	60
35/40	30	60
25/30	20	40

MINIMUM TAPER LENGTH = L IN FEET										
LANE WIDTH (FEET)	POSTED SPEED (MPH)									
	25	30	35	40	45	50	55	60	65	70
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100'	123'	172'		74'	100'	150'				
PROTECTIVE VEHICLE (WORK VEHICLE) = R										
NO SPECIFIED DISTANCE REQUIRED										

0 50 100
SCALE IN FEET

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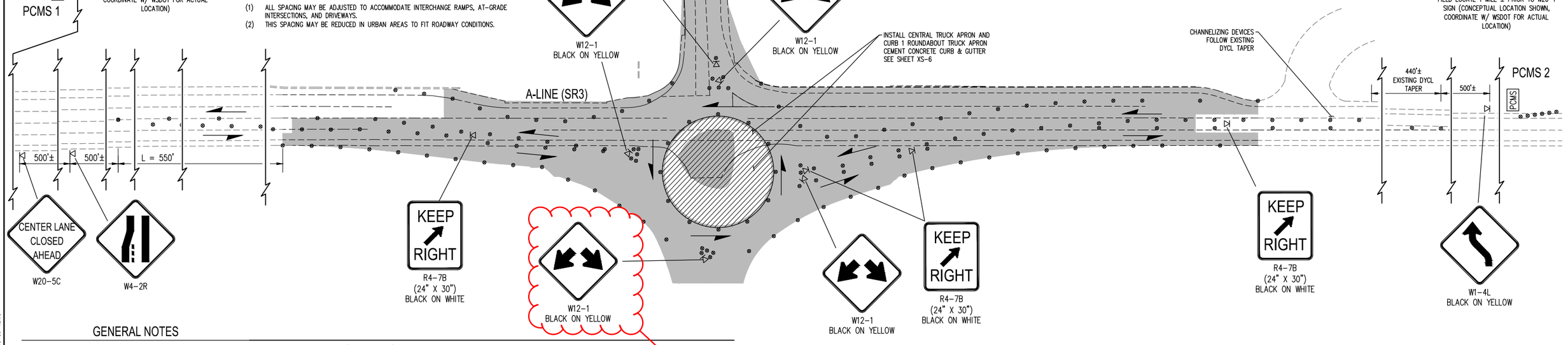
PCMS 1	
1	2
CENTER LANE CLOSED	1 MILE AHEAD
2 SECONDS	2 SECONDS

FIELD LOCATE 1 MILE ± PRIOR TO W20-1 SIGN (CONCEPTUAL LOCATION SHOWN, COORDINATE W/ WSDOT FOR ACTUAL LOCATION)

PCMS 1

PCMS 2	
1	2
LANE SHIFTS LEFT	1 MILE AHEAD
2 SECONDS	2 SECONDS

FIELD LOCATE 1 MILE ± PRIOR TO W20-1 SIGN (CONCEPTUAL LOCATION SHOWN, COORDINATE W/ WSDOT FOR ACTUAL LOCATION)



GENERAL NOTES

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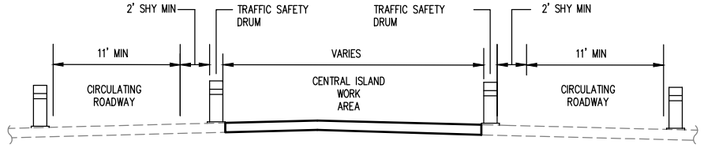
14. ALL DROP-OFFS AND GRADE CHANGES SHALL BE IN CONFORMANCE WITH STD. SPEC. 1-07.23(1).
15. CONTRACTOR SHALL MAINTAIN SMOOTH COMPACTED DRIVING SURFACE THROUGHOUT CONSTRUCTION. IF TEMPORARY PAVEMENT OR TEMPORARY PAVEMENT REPAIR IS REQUIRED, THE CONTRACTOR SHALL PROVIDE AT CONTRACTOR'S EXPENSE.
16. CONTRACTOR SHALL PROVIDE TEMPORARY A/C PAVEMENT DURING CONSTRUCTION TO FACILITATE TRAFFIC FLOW AND SAFETY. TEMPORARY PAVEMENT SHALL BE A MINIMUM OF 1" THICK (COMPACTED) COMMERCIAL GRADE HMA. ALTERNATE PAVING DEPTH SHALL BE APPROVED BY THE WSDOT INSPECTOR AND PROJECT ENGINEER. SEE SPECIAL PROVISIONS.



A-LINE TYPICAL ROADWAY SECTION (NON-WORKING HOURS) NTS
DURING NON-WORKING HOURS THESE SIGNS AND THE SHOULDER CLOSURE TAPERING ARE REQUIRED TO PROTECT THE DROP-OFF.

PEDESTRIANS AND BIKES CAN USE CONSTRUCTED SIDEWALK AND TRUCK APRONS IN THIS SCENARIO.

CENTRAL ISLAND INSTALLATION

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
DRAWN BY: M. JOHNSON
CHECKED BY: P. HOLM
ISSUE DATE: JUNE 2019
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-TC-06-T

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 49435 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
SCJALLIANCE.COM

PROJECT NAME:

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION
TRAFFIC CONTROL PLAN

DRAWING No.: TC-06
SHEET No.: 51 OF 52

T. 23 N., R. 01 W., S. 21, W.M.

LEGEND

- CHANNELIZING DEVICES (TRAFFIC SAFETY DRUMS)
- WORK AREA
- CLASS B SIGN LOCATION – TEMPORARY MOUNT
- CLASS A SIGN LOCATION – POST MOUNT
- DIRECTIONAL ARROW
- FLAGGER WITHIN 50'–100'
  MINIMUM 6 DEVICES IN FRONT OF FLAGGER

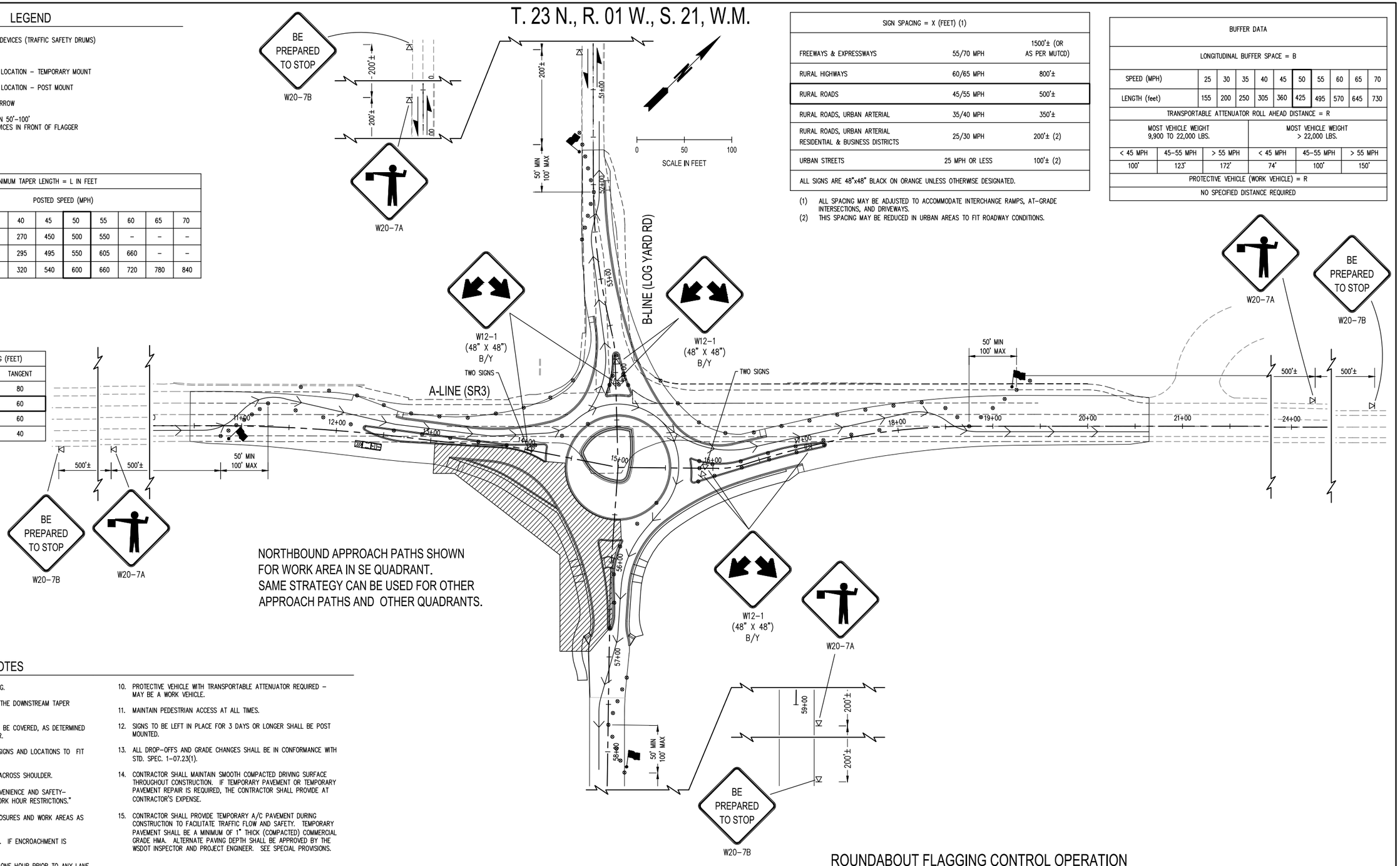
MINIMUM TAPER LENGTH = L IN FEET										
LANE WIDTH (FEET)	POSTED SPEED (MPH)									
	25	30	35	40	45	50	55	60	65	70
10	105	150	205	270	450	500	550	–	–	–
11	115	165	225	295	495	550	605	660	–	–
12	125	180	245	320	540	600	660	720	780	840

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/70	40	80
45/50	30	60
35/40	30	60
25/30	20	40

SIGN SPACING = X (FEET) (1)		
FREEWAYS & EXPRESSWAYS	55/70 MPH	1500'± (OR AS PER MUTCD)
RURAL HIGHWAYS	60/65 MPH	800'±
RURAL ROADS	45/55 MPH	500'±
RURAL ROADS, URBAN ARTERIAL	35/40 MPH	350'±
RURAL ROADS, URBAN ARTERIAL RESIDENTIAL & BUSINESS DISTRICTS	25/30 MPH	200'± (2)
URBAN STREETS	25 MPH OR LESS	100'± (2)
ALL SIGNS ARE 48"x48" BLACK ON ORANGE UNLESS OTHERWISE DESIGNATED.		

(1) ALL SPACING MAY BE ADJUSTED TO ACCOMMODATE INTERCHANGE RAMPS, AT-GRADE INTERSECTIONS, AND DRIVEWAYS.
(2) THIS SPACING MAY BE REDUCED IN URBAN AREAS TO FIT ROADWAY CONDITIONS.

BUFFER DATA										
LONGITUDINAL BUFFER SPACE = B										
SPEED (MPH)	25	30	35	40	45	50	55	60	65	70
LENGTH (feet)	155	200	250	305	360	425	495	570	645	730
TRANSPORTABLE ATTENUATOR ROLL AHEAD DISTANCE = R										
MOST VEHICLE WEIGHT 9,900 TO 22,000 LBS.				MOST VEHICLE WEIGHT > 22,000 LBS.						
< 45 MPH	45–55 MPH	> 55 MPH		< 45 MPH	45–55 MPH	> 55 MPH				
100'	123'	172'		74'	100'	150'				
PROTECTIVE VEHICLE (WORK VEHICLE) = R										
NO SPECIFIED DISTANCE REQUIRED										



NORTHBOUND APPROACH PATHS SHOWN FOR WORK AREA IN SE QUADRANT. SAME STRATEGY CAN BE USED FOR OTHER APPROACH PATHS AND OTHER QUADRANTS.

GENERAL NOTES

1. SEE SHEET TC–01 FOR CLASS A SIGNING.
2. WHEN USED, THE DEVICE SPACING FOR THE DOWNSTREAM TAPER SHOULD BE 20' O.C.
3. ALL CONFLICTING EXISTING SIGNS SHALL BE COVERED, AS DETERMINED BY THE ENGINEER OR WSDOT INSPECTOR.
4. TYPICAL APPLICATION SHOWN. ADJUST SIGNS AND LOCATIONS TO FIT SITE CONDITIONS.
5. EXTEND CHANNELIZING DEVICE TAPERS ACROSS SHOULDER.
6. SEE SPECIAL PROVISIONS: "PUBLIC CONVENIENCE AND SAFETY–CONSTRUCTION UNDER TRAFFIC: FOR WORK HOUR RESTRICTIONS."
7. EXTEND AND/OR REDUCE SHOULDER CLOSURES AND WORK AREAS AS NECESSARY.
8. NO ENCROACHMENT ON TRAVELED LANE. IF ENCROACHMENT IS NECESSARY, LANE SHALL BE CLOSED.
9. CALL OLYMPIC RADIO (253–548–2420) ONE HOUR PRIOR TO ANY LANE RESTRICTIONS.
10. PROTECTIVE VEHICLE WITH TRANSPORTABLE ATTENUATOR REQUIRED – MAY BE A WORK VEHICLE.
11. MAINTAIN PEDESTRIAN ACCESS AT ALL TIMES.
12. SIGNS TO BE LEFT IN PLACE FOR 3 DAYS OR LONGER SHALL BE POST MOUNTED.
13. ALL DROP–OFFS AND GRADE CHANGES SHALL BE IN CONFORMANCE WITH STD. SPEC. 1–07.23(1).
14. CONTRACTOR SHALL MAINTAIN SMOOTH COMPACTED DRIVING SURFACE THROUGHOUT CONSTRUCTION. IF TEMPORARY PAVEMENT OR TEMPORARY PAVEMENT REPAIR IS REQUIRED, THE CONTRACTOR SHALL PROVIDE AT CONTRACTOR'S EXPENSE.
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ROUNDABOUT FLAGGING CONTROL OPERATION

△	REVISIONS	DATE	BY
1	FPS #1	04/08/19	PH
2	FPS #2	07/29/19	PH
3	FPS #3	08/28/19	PH
4	FPS #4	11/06/19	PH

DESIGNED BY: K. MELVIN
ISSUE DATE: JUNE 2019
DRAWN BY: M. JOHNSON
JOB No.: 0738,05
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ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 40429 — REGISTERED PROFESSIONAL ENGINEER
11-06-19

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PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
SR-3 AND LOG YARD RD INTERSECTION

TRAFFIC CONTROL PLAN

DRAWING No.: TC-07
SHEET No.: 52 OF 52

PART 1 - GENERAL

The following is a list of drawings mentioned in the contract documents, and the same are here-by made part of the Contract.

Sheet Title	Sheet Description
CIVIL	
CV-1	COVER SHEET
AL-1	HORIZONTAL ALIGNMENT
EC-1	REMOVAL AND TESC PLAN
EC-2	REMOVAL AND TESC PLAN
SP-1	SITE PLAN AND HORIZONTAL CONTROL PLAN
SP-2	SITE PLAN DETAILS
SP-3	SITE PLAN DETAILS
SP-4	RAMP GRADING DETAILS
SP-5	RAMP GRADING DETAILS
SP-6	RAMP GRADING DETAILS (FOR REFERENCE ONLY)
SD-1	GRADING AND DRAINAGE PLAN
SD-2	GRADING AND DRAIANGE DETAILS
SD-3	DRAINAGE DETAILS
PP-1	PLAN, PROFILE, AND PAVING (FOR REFERENCE ONLY)
PM-1	PAVEMENT MARKING (FOR REFERENCE ONLY)
XS-1	TYPICAL SECTION
LS-1	LANDSCAPE PLAN
LS-2	LANDSCAPE DETAILS
LS-3	LANDSCAPE DETAILS & NOTES
IR-1	IRRIGATION PLAN
IR-2	IRRIGATION PLAN
IR-3	IRRIGATION DETAILS & NOTES
IL-1	LIGHTING AND SECURITY PLAN
IL-2	LIGHTING AND SECURITY DETAILS
WA-1	WATER SYSTEM PLAN
WA-2	WATER DETAILS
WA-3	WATER DETAILS
SS-1	ON-SITE SEPTIC SYSTEM SITE PLAN
SS-2	ON-SITE SEPTIC SYSTEM SITE PLAN
SS-3	ON-SITE SEPTIC SYSTEM DETAILS
ARCHITECTURAL	
G1.0	CODE INFORMATION & LIFE SAFETY PLANS
A1.0	REFERENCE FLOOR PLAN

A2.0	FLOOR PLAN
A2.1	PARTIAL ENLARGED PLANS
A3.0	ROOF PLAN
A4.0	EXTERIOR ELEVATIONS
A5.0	BUILDING SECTIONS
A5.1	WALL SECTIONS (1-3)
A5.2	WALL SECTIONS (4-7)
A5.3	WALL SECTIONS (8-10)
A6.0	REFLECTED CEILING PLAN
A7.0	DOOR & WINDOW TYPES, FINISH & DOOR SCHEDULES
A7.1	INTERIOR ELEVATIONS
AG0.0	WALL TYPES AND EQUPMENT MOUNTING HEIGHTS
AG1.0	DETAILS
AG2.0	DETAILS
AG3.0	DETAILS
AG4.0	DETAILS
AG4.1	DETAILS
AG5.0	DETAILS

ELECTRICAL

E0.1	ELECTRICAL NOTES & LEGEND
E1.0	POWER SITE PLAN
E2.1	LIGHTING PLANS
E2.2	LIGHTING SCHEDULED
E3.1	POWER & SIGNAL PLANS
E5.1	ELECTRICAL DISTRIBUTION
E5.2	EQUIPMENT SCHEDULE

MECHANICAL

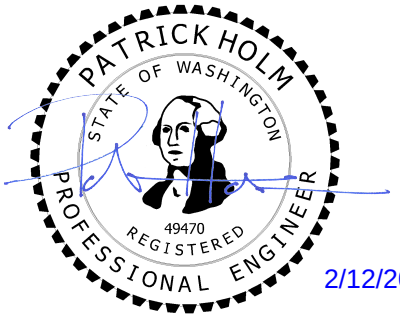
M0.1	MECHANICAL LEGEND AND NOTES
M0.2	MECHANICAL SCHEDULES
M0.3	MECHANICAL SCHEDULES
M0.4	MEHCANICAL SCHEDULES
M2.1	PLUMBING FOUNDATION PLAN
M3.1	PLUMBING FLOOR PLAN
M3.2	PLUMBING DETAILS
M4.1	HVAC FLOOR PLAN
M4.2	HVAC DETAILS
M4.3	HVAC DETAILS

STRUCTURAL

S0.1	GENERAL NOTES
S0.2	GENERAL NOTES
S0.3	GENERAL NOTES
S0.4	GENERAL NOTES
S1.0	FOUNDATION PLAN
S1.1	CANOPY FOUNDATION PLAN
S2.0	GRADE LEVEL FRAMING PLAN
S3.0	ROOF FRAMING PLAN
S3.1	CANOPY ROOF FRAMING PLAN
S4.0	FOUNDATION DETAILS
S4.1	FOUNDATION DETAILS
S5.0	WALL FRAMING DETAILS
S5.1	WALL FRAMING DETAILS
S5.2	WALL FRAMING DETAILS
S6.0	ROOF FRAMING DETAILS
S7.0	MISC. STEEL FRAMING
S8.0	CANOPY FRAMING DETAILS

END OF SECTION

MASON TRANSIT AUTHORITY
MTA – BELFAIR PARK AND RIDE PROJECT



2/12/2020

DIVISION 01
GENERAL REQUIREMENTS

SECTION 01 10 00

SUMMARY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Contract description.

B. Contractor's use of site and premises.

C. Work sequence.

D. Owner occupancy.

E. Specification Conventions.

1.2 CONTRACT DESCRIPTION

A. Construction of a Park and Ride near the intersection of Log Yard Road and State Route 3 in Belfair Construction of a Park and Ride near the intersection of Log Yard Road and State Route 3 in Belfair which will include pavement, transit building, bus canopy, sidewalk, ADA facilities, stormwater facilities, septic system, illumination, signing, striping, and other work, all in accordance with the attached Contract Plans, these Contract Provisions, and the Standard Specifications.

The transit building will include a new 3,000 square foot single story wood framed structure constructed on concrete slab, with new single slope single ply roofing construction. Exterior walls are a combination of wood siding and metal siding with anodized aluminum windows and doors. Interior are wood framed walls with gypsum and some ceramic tile with minimal interior finishes. Additional work includes hollow metal doors, frames and wood doors. Work includes full fire suppression system, mechanical, electrical, and plumbing systems.

The bus canopy will include a single story steel framed canopy with metal roofing. The canopy is open below the roof for the pass through of buses. Steel shall be painted. Work includes sheet metal gutters, downspouts and trim, electrical, and fire suppression system.

1. Permit documents for the Work of this Project have been submitted to authority having jurisdiction and review is in progress.

2. Future Work is not planned for this site.

B. Perform Work of Contract under stipulated sum contract with Owner in accordance with Conditions of Contract.

C. Work of this Contract includes, but not limited to:

1. Earth moving, cut and fill, and net import of soil to site.

2. Erosion control
3. Stormwater Management Systems
4. Concrete paving.
5. Asphalt paving.
6. Soil preparation.
7. Transit Building and associated appurtenances.
8. Water system.
9. Septic system.
10. Pavement markings and permanent signing.
11. Irrigation system.
12. Planting, seeding, and transplanting.
13. Installation of site electrical power and site lighting.
14. Surveying/Staking
15. Clean Up

1.3 CONTRACTOR'S USE OF SITE AND PREMISES

A. Access to Site: Limited to access drives and areas indicated on Drawings.

B. Construction Operations: Limited to areas noted on the Drawings.

C. Time Available for Performing Work: Work hours governed by Mason County Code.

D. Utility Outages and Shutdown: Notify the Owner 72-hours prior to outage and shutdown of utilities to obtain approval.

1.4 WORK SEQUENCE

A. Contractor shall propose work sequence to complete within Contract time as noted on the Bid Proposal Form.

1. Work within ordinary high-water mark is prohibited.
2. Execute tree and plant protection, and erosion control measures prior to start of work.
3. Mark all underground utilitiesprior to start of work.

1.5 OWNER OCCUPANCY

A. The Owner will not occupy the existing site throughout the duration of construction.

1.6 SPECIFICATION CONVENTIONS

A. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words “shall be” are included by inference where a colon (:) is used within sentences or phrases.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Schedule of values.

B. Applications for payment.

C. Change procedures.

1.2 SCHEDULE OF VALUES

A. Submit printed schedule. Contractor's standard form or electronic media printout will be considered. Schedule of Values shall be included with Owner's form of Application for Payment

B. Submit Schedule of Values within 10 days after date established in Notice to Proceed for Construction.

C. Format: Identify each line item with number and title of major specification Section.

D. Include amount of Contractor's overhead and profit.

E. Revise schedule to list approved Change Orders, with each Application For Payment.

1.3 APPLICATIONS FOR PAYMENT

A. Submit updated Schedule of Values on Contractor provided payment form as approved by Engineer and Owner with percentage of work complete per each Schedule identified.

B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.

C. Submit updated construction schedule with each Application for Payment.

D. Payment Period: Submit at intervals stipulated in the Agreement.

E. Submit with transmittal letter as specified for Submittals in Section 01 33 00 - Submittal Procedures.

F. Submit lien waivers.

G. Substantiating Data: When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:

1. Intent to pay Prevailing Wage Rates.
2. Partial release of liens from major subcontractors and vendors.
3. Construction progress schedules revised and current.

1.4 CHANGE PROCEDURES

A. As indicated in Owner-Contractor Agreement and General Conditions of the Contract.

B. Change Order Proposal and Field Authorization Forms: As provided by Architect/Engineer/Owner.

1.5 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. Contractor shall bear the cost of correcting destroyed or damaged Work, whether completed or partially completed, caused by Contractor's correction or removal of non-conforming Work at the discretion of Architect/Engineer/Owner.

C. Authority of Architect/Engineer or Owner's Construction Representative to assess defects and identify payment adjustments is final.

D. Non-Payment For Rejected Products: Payment will not be made for rejected products for any of the following:

1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.
3. Products not completely unloaded from transporting vehicle.
4. Products placed beyond lines and levels of required Work.
5. Products remaining on hand after completion of the Work.
6. Loading, hauling, and disposing of rejected products.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 25 00A

SUBSTITUTION REQUEST FORM

To:

For: Mason Transit Authority Belfair Park and Ride, Belfair, WA
We hereby submit for your consideration the following product instead of the specified item for the above project:

Section	**Paragraph**	**Specified Item**
_____	_____	_____

Proposed Substitution:_____

Attach complete dimensional information and technical data/01340, including laboratory tests, if applicable.

Include complete information on changes to Drawings and/or Specifications that proposed substitution will require for its proper installation.

Submit with request all necessary samples and substantiating data to prove equal quality, performance, and appearance to that which is specified. Clearly mark manufacturer's literature to indicate equality in performance. Differences in quality of materials and construction shall be indicated.

Fill in the blanks below:

A. Does the substitution affect dimensions shown on Drawings?
____Yes ____No If yes, clearly indicate changes.

_____

B. The Undersigned will pay for changes to the building design, including engineering and detailing costs caused by the requested substitution as required.

C. What effect does substitution have on other trades, other Contracts, and Contract completion data? (Be specific.)

_____

D. What effect does substitution have on applicable code requirements?

_____

_____

E. Differences between proposed substitution and specified item?

_____

_____

F. Manufacturer's guarantees of the proposed and specified items are:

_____Same _____Different (explain on attachment).

G. List of names and addresses of three similar projects on which product was used, date of installation, and Architect's name and address.

PROJECT	**ADDRESS(City)**	**DATE**	**ARCHITECT**	**PHONE #**
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

H. Cost Impact:

_____

I. The Undersigned certifies equal performance and assumption of liability for equal performance and the quality is equivalent and/or superior to the item specified.

Submitted by:

_____
Signature Title

_____
Firm

_____
Address/City/State/Zip Code

_____
Telephone Date

Signature must be by person having authority to legally bind his firm to the above terms. Failure to provide legally binding signature will result in retraction of any acceptance.

For Use by Architect:

_____Accepted _____Accepted As Noted

_____Not Accepted _____Received Too Late

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Supplementary Conditions, and Division 00 through Division 01 specifications shall apply to all sections of the Contract Documents, including specifications, drawings, addenda, or other changes of documents issued for bidding/construction.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration or provide PDF copy on Document Tracking Software utilized on the project, if used. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use form provided in Project Manual
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.

b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project,
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within **seven** days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within **15** days of receipt of request, or **seven** days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than **15** days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Supplementary Conditions, and Division 00 through Division 01 specifications shall apply to all sections of the Contract Documents, including specifications, drawings, addenda, or other changes of documents issued for bidding/construction.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on a document approved by the Owner.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: The Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by the Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
e. Quotation Form: Use forms acceptable to Architect and Owner.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to the Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Architect/Engineer/Owner.

1.5 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, The Architect will issue a Change Order for signatures of Owner and Contractor on a form approved by the Architect/Engineer/Owner.

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. **Construction** Change Directive: The Architect may issue a Construction Change Directive on a form approved by the Architect and Owner. Construction Change

Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Coordination and project conditions.

B. Preconstruction meeting.

C. Site mobilization meeting.

D. Progress meetings.

E. Pre-installation meetings.

F. Cutting and patching.

G. Special procedures.

1.2 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and Work of various sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.

C. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.

E. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion.

F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.3 PRECONSTRUCTION MEETING

A. Architect/Engineer/Owner will schedule meeting with Contractor after Notice of Award.

B. Attendance Required: Owner, Architect, Engineer, and Contractor.

C. Agenda: Refer to Sample Preconstruction Checklist included at the end of this Section.

D. Engineer will record minutes and distribute copies within four days after meeting to participants, with electronic copy to Owner, Architect, Engineer and Contractor. Contractor shall be responsible for distribution to those affected by decisions made.

1.4 PROGRESS MEETINGS

A. Architect/Engineer to schedule and administer meetings throughout progress of the Work at weekly intervals or as determined necessary by all parties.

B. Engineer will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required: Job superintendent, major subcontractors and suppliers, Owner, Architect/Engineer, as appropriate to agenda topics for each meeting.

D. Agenda:

1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Safety
5. Identification of problems impeding planned progress.
6. Review of submittals schedule and status of submittals.
7. Review of off-site fabrication and delivery schedules.
8. Maintenance of progress schedule.
9. Corrective measures to regain projected schedules.
10. Planned progress during succeeding work period.
11. Coordination of projected progress.
12. Maintenance of quality and work standards.
13. Effect of proposed changes on progress schedule and coordination.

14. Other business relating to Work.

E. Engineer will record minutes and distribute copies within four days after meeting to participants, with electronic copy to Owner, Architect, Engineer and Contractor. Contractor shall be responsible for distribution to those affected by decisions made.

1.5 PRE-INSTALLATION MEETINGS

A. When required in individual specification sections, convene pre-installation meetings at Project site prior to commencing work of specific section.

B. Require attendance of parties directly affecting, or affected by, Work of specific section.

C. Notify Architect/Engineer four days in advance of meeting date.

D. Prepare agenda and preside at meeting:

1. Review conditions of installation, preparation and installation procedures.

2. Review coordination with related work.

E. Meeting may coincide with Progress Meeting. Engineer will record minutes and distribute copies within two days after meeting to participants, with electronic copy to Owner, Architect, Engineer and Contractor. Contractor shall be responsible for distribution to those affected by decisions made.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION- Not Used

END OF SECTION

SCJ ALLIANCE
CONSULTING SERVICES

Preconstruction Checklist

Project Number:	738.05	*Date:*	
Project Title:	MTA – Belfair Park and Ride Project	*Location:*	Belfair

Mason Transit Authority	790 E Johns Prairie Rd.	Shelton/WA/98584
Name of Client Agency	*Address*	*City / State / Zip Code*
Mason Transit Authority	790 E Johns Prairie Rd.	Shelton/WA/98584
Name of Using Agency	*Address*	*City / State / Zip Code*
Mason Transit Authority	790 E Johns Prairie Rd.	Shelton/WA/98584
Name of Contracting Agency	*Address*	*City / State / Zip Code*
SCJ Alliance	8730 Tallon Lane NE, Suite 200	Lacey, WA 98516
A-RT	909 S. 336th Street, Suite 107	Federal Way, WA 98003
Name of Consultant	*Address*	*City / State / Zip Code*
Name of Contractor	*Address*	*City / State / Zip*
Mason Transit Authority Business Office, 790 E Johns Prairie Rd., Shelton/WA/98584		
Location of Conference		

1. Identification of Office Representatives

Danette Brannin	(360) 432-5750	dbrannin@masontransit.org
Client Agency Representative	*Phone Number*	*Email*
Using Agency Representative	*Phone Number*	*Email*
Danette Brannin	(360) 432-5750	dbrannin@masontransit.org
Contracting Agency Representative	*Phone Number*	*Email*
Patrick Holm	(360) 352-1465	Patrick.holm@scjalliance.com
Rhonda Gillogly	(253) 572-5511	rgillogly@a-rt.org
Consultant Representative	*Phone Number*	*Email*
Site Representative	*Phone Number*	*Email*
Testing Agency Representative	*Phone Number*	*Email*
Inspector Representative	*Phone Number*	*Email*
Other Contact	*Phone Number*	*Email*

SCJ ALLIANCE
CONSULTING SERVICES

2. **Communications**

   a. All communication will be directed to Danette Brannin (MTA) and Patrick Holm (SCJ).

3. **Completion of Time Contract**

   260 Working Days

4. **Other requirements of the Contract Documents which deserve special discussion by all parties:**

   a. Mason PUD 3
   b. Belfair Water District
      a. Existing Water Line Location
   c. Existing Access on East Log Yard Road

5. **Change Orders**

   Procedures and approvals which must be obtained prior to implementation of changes in the fields.

   a. Change orders may originate as a request of the agency, through the Consultant or as a change necessary due to omissions or latent conditions.
   b. If a change is necessary, the Consultant shall specify the extent of the change and obtain a cost proposal from the Contractor.

CONSTRUCTION MANAGEMENT AGENDA

6. **Construction Observation and Inspection**
   - Mason County
   - SCJ Alliance
   - A-RT
   - MTC

7. **Rights-of-Way, Easements and Access**

8. **Utilities**

   a. Mason PUD 3
   b. CenturyLink
   c. Belfair Water District

9. **Construction Progress Meetings**

   Set up times and intervals for construction progress meetings. First construction progress meeting will be on ___TBD_____.

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Supplementary Conditions, and Division 00 through Division 01 specifications shall apply to all sections of the Contract Documents, including specifications, drawings, addenda, or other changes of documents issued for bidding/construction.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:

1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Section 017000 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Section 017000 "Closeout" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within **7 working days** of starting construction operations, submit a list of key personnel assignments **and security clearance forms**, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office and by each temporary telephone. Keep list current at all times.

2. Each worker must pass a security clearance approval by Department of Correction Washington Correctional Center authorized individual.

3. Each approved worker must read and sign the Contractor Worker Agreement provided within the specification manual.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Pre-installation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.

d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
f. Indicate required installation sequences.
g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
2. File Preparation Format: **DWG** Version or PDF
3. File Submittal Format: Submit or post coordination drawing files using **Portable Data File (PDF) format**.

4. Architect will furnish Contractor digital data files of Drawings for use in preparing coordination digital data files, unless otherwise indicated by the Department of Corrections.

a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
b. Digital Data Software Program: Drawings are available in AutoCAD
c. Contractor shall execute a data licensing agreement in the form of form acceptable to Owner and Architect.
d. CAD files are to be used solely for use in preparing submittals or closeout materials for the project.

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.

4. Name of Owner.
5. Name of Contractor.
6. Name of Architect.
7. RFI number, numbered sequentially.
8. RFI subject.
9. Specification Section number and title and related paragraphs, as appropriate.
10. Drawing number and detail references, as appropriate.
11. Field dimensions and conditions, as appropriate.
12. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
13. Contractor's signature.
14. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect and Owner.

    1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow **seven** working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

    1. The following Contractor-generated RFIs will be returned without action:

        a. Requests for approval of submittals.
        b. Requests for approval of substitutions.
        c. Requests for approval of Contractor's means and methods.
        d. Requests for coordination information already indicated in the Contract Documents.
        e. Requests for adjustments in the Contract Time or the Contract Sum.
        f. Requests for interpretation of Architect's actions on submittals.
        g. Incomplete RFIs or inaccurately prepared RFIs.

    2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
    3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

        a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 working days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log **weekly, unless a document tracking software is utilized by the Owner/Architect.**

1. Project name.
2. Name and address of Contractor.
3. Name of Owner
4. Name and address of Architect.
5. RFI number including RFIs that were returned without action or withdrawn.
6. RFI description.
7. Date the RFI was submitted.
8. Date Architect's response was received.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within 5 working days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

A. General: The Architect will schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, and Architect, within 5 working days of the meeting.

B. Preconstruction Conference: The Owner and Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 10 working days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

a. Tentative construction schedule.
b. Phasing.
c. Critical work sequencing and long-lead items.
d. Designation of key personnel and their duties.
e. Lines of communications.
f. Procedures for processing field decisions and Change Orders.
g. Procedures for RFIs.
h. Procedures for testing and inspecting.
i. Procedures for processing Applications for Payment.
j. Distribution of the Contract Documents.
k. Submittal procedures.
l. Preparation of record documents.
m. Use of the premises
n. Work restrictions.
o. Working hours.
p. Owner's occupancy requirements.
q. Responsibility for temporary facilities and controls.
r. Procedures for moisture and mold control.
s. Procedures for disruptions and shutdowns.
t. Construction waste management and recycling.
u. Parking availability.
v. Office, work, and storage areas.
w. Equipment deliveries and priorities.
x. First aid.
y. Security.
z. Progress cleaning.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Pre-installation Conferences: Conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Owner and Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Possible conflicts.
i. Compatibility requirements.
j. Time schedules.

k. Weather limitations.
l. Manufacturer's written instructions.
m. Warranty requirements.
n. Compatibility of materials.
o. Acceptability of substrates.
p. Temporary facilities and controls.
q. Space and access limitations.
r. Regulations of authorities having jurisdiction.
s. Testing and inspecting requirements.
t. Installation procedures.
u. Coordination with other work.
v. Required performance results.
w. Protection of adjacent work.
x. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: The Architect will **Conduct** progress meetings at **weekly** intervals or as deemed necessary to adequately cover project development.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.

3) Resolution of BIM component conflicts.
4) Status of submittals.
5) Deliveries.
6) Off-site fabrication.
7) Access.
8) Site utilization.
9) Temporary facilities and controls.
10) Progress cleaning.
11) Quality and work standards.
12) Status of correction of deficient items.
13) Field observations.
14) Status of RFIs.
15) Status of proposal requests.
16) Pending changes.
17) Status of Change Orders.
18) Pending claims and disputes.
19) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

E. Coordination Meetings: **Conduct**] Project coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.

c. Review present and future needs of each contractor present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Work hours.
10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Change Orders.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Supplementary Conditions, and Division 00 through Division 01 specifications shall apply to all sections of the Contract Documents, including specifications, drawings, addenda, or other changes of documents issued for bidding/construction.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's construction schedule.
3. Construction schedule updating reports.
4. Daily construction reports.
5. Material location reports.
6. Site condition reports.
7. Special reports.

B. Related Requirements:
1. Section 013300 "Submittal Procedures" for submitting schedules and reports.
2. Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time belongs to Owner
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file if project document tracking software is utilized
3. Two paper copies.

B. Startup construction schedule.

1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from **the Notice to Proceed** until most recent Application for Payment.

F. Construction Schedule Updating Reports: Submit with Applications for Payment.

G. Daily Construction Reports: Submit at **weekly** intervals.

H. Material Location Reports: Submit at **weekly** intervals.

I. Site Condition Reports: Submit at time of discovery of differing conditions.

J. Special Reports: Submit at time of unusual event.

K. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing, work stages, area separations, Owner occupancy and security.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion and final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than **10** days, unless specifically allowed by Owner and Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 30 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than **14** days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than **30** days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.

3. Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordination with existing construction.

    b. Security clearances, includes check in and check out.
    c. Limitations of continued occupancies.
    d. Uninterruptible services.
    e. Use of premises restrictions.
    f. Provisions for future construction.
    g. Seasonal variations.
    h. Environmental control.

4. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

    a. Subcontract awards.
    b. Submittals.
    c. Purchases.
    d. Mockups.
    e. Fabrication.
    f. Sample testing.
    g. Deliveries.
    h. Installation.
    i. Tests and inspections.
    j. Adjusting.
    k. Curing.
    l. Building flush-out.
    m. Startup and placement into final use and operation.

5. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

    a. Structural completion.
    b. Temporary enclosure and space conditioning.
    c. Permanent space enclosure.
    d. Completion of mechanical installation.
    e. Completion of electrical installation.
    f. Substantial Completion.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Phasing, Substantial Completion, and final completion.

E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

1. See Section 012900 "Payment Procedures" for cost reporting and payment procedures.

F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

G. Recovery Schedule: When periodic update indicates the Work is **14** or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

1. Use Microsoft Project, Primava or other scheduling software

2.2 STARTUP CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven days of date established for the Notice to Proceed

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first **90** days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Startup Network Diagram: Submit diagram within **14** days of date established for **the Notice to Proceed** Outline significant construction activities for the first **90** days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than **60** days after date established for **the Notice to Proceed**.

a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.

2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

a. Preparation and processing of submittals.
b. Mobilization and demobilization.
c. Purchase of materials.
d. Delivery.
e. Fabrication.
f. Utility interruptions.
g. Installation.
h. Work by Owner that may affect or be affected by Contractor's activities.
i. Testing
j. Punch list and final completion.
k. Activities occurring following final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

2.4 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.

19. Substantial Completions authorized.

B. Material Location Reports: At **weekly** intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within **one** day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.

1. In-House Option: Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.

B. Contractor's Construction Schedule Updating: At **weekly** intervals, update schedule to reflect actual construction progress and activities. Issue schedule **one week** before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

C. Distribution: Distribute copies of approved schedule to Owner, Owner Representatives, Architect, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittal procedures.

B. Construction progress schedules.

C. Proposed products list.

D. Product data.

E. Shop drawings.

F. Samples.

G. Design data.

H. Test reports.

I. Certificates.

J. Manufacturer's instructions.

K. Manufacturer's field reports.

1.2 SUBMITTAL PROCEDURES

A. Transmit each submittal with Architect/Engineer-accepted form.

B. Submittals may be transmitted via email in PDF-format, including transmittal form.

C. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.

D. Identify Project, Contractor, subcontractor and supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.

E. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents.

F. Schedule submittals to expedite Project, and email in PDF format to Architect/Engineer at email address identified in preconstruction conference. Submittals sent by mail or hand-delivered shall be addressed to the A/E at SCJ Alliance, 8730 Tallon Lane NE, Suite 200, Lacey, WA 98516. Coordinate submission of related items.

G. For each submittal for review, allow 10 days excluding delivery time to and from Contractor.

H. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.

I. Allow space on submittals for Contractor and Architect/Engineer review stamps.

J. When revised for resubmission, identify changes made since previous submission.

K. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

L. Submittals not requested will not be recognized or processed.

1.3 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial schedules within 7 days after date established in Notice to Proceed. After review, resubmit required revised data within ten days.

B. Submit preliminary outline Schedules within 7 days after date established in Notice to Proceed for coordination with Owner's requirements. After review, submit detailed schedules within 15 days modified to accommodate revisions recommended by Architect/Engineer.

C. Submit revised Progress Schedules with each Application for Payment.

D. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.

E. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

F. Submit computer generated chart with separate line for each major portion of Work or operation, identifying first workday of each week.

G. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.

H. Indicate estimated percentage of completion for each item of Work at each submission.

I. Include schedule of submittal dates for shop drawings, product data, and samples, and critical dates reviewed submittals will be required from Architect/Engineer.

J. Revisions to Schedules:

1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.

2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.

3. Report to define problem areas, anticipated delays, and impact on Schedule will be item of discussion at each construction meeting. Report corrective action taken, or proposed, and its effect including effect of changes on schedules of separate contractors.

1.4 PROPOSED PRODUCTS LIST

A. Within 7 days after date of Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.5 PRODUCT DATA

A. Product Data: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Submit number of copies Contractor requires, plus three copies Architect/Engineer/Owner will retain.

C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

E. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.6 SHOP DRAWINGS

A. Shop Drawings: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. When required by individual specification sections, provide shop drawings signed and sealed by professional engineer responsible for designing components shown on shop drawings.

1. Include signed and sealed calculations to support design.

2. Submit drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.

3. Make revisions and provide additional information when required by authorities having jurisdiction.

D. Submit number of opaque reproductions Contractor requires, plus two copies Architect/Engineer will retain.

E. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.7 SAMPLES

A. Samples: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Samples for Selection as Specified in Product Sections:

1. Submit to Architect/Engineer for aesthetic, color, or finish selection.

2. Submit samples of finishes from full range of manufacturers' standard colors or in custom colors selected, textures, and patterns for Architect/Engineer selection, where indicated on drawings and in specifications.

C. Submit samples to illustrate functional and aesthetic characteristics of Products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

D. Include identification on each sample, with full Project information.

E. Submit number of samples specified in individual specification sections; Architect/Engineer will retain one sample.

F. Reviewed samples which may be used in the Work are indicated in individual specification sections.

G. Samples will not be used for testing purposes unless specifically stated in specification section.

H. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents purposes described in Section 01 70 00 - Execution and Closeout Requirements.

1.8 DESIGN DATA

A. Submit for Architect/Engineer's knowledge as contract administrator or for Owner.

B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.9 TEST REPORTS

A. Submit for Architect/Engineer's knowledge as contract administrator or for Owner.

B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.10 CERTIFICATES

A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Architect/Engineer, in quantities specified for Product Data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect/Engineer.

1.11 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Architect/Engineer for delivery to Owner in quantities specified for Product Data.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.12 MANUFACTURER'S FIELD REPORTS

A. Submit reports for Architect/Engineer's benefit as contract administrator or for Owner.

B. Submit report within 5 days of observation to Architect/Engineer for information.

C. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Quality control and control of installation.

B. Tolerances.

C. References.

D. Labeling.

E. Testing and inspection services.

F. Manufacturers' field services.

G. Examination.

H. Preparation.

1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step-in sequence.

C. When manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform Work by persons qualified to produce required and specified quality.

F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

1.4 REFERENCES

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date of Contract Documents, except where specific date is established by code.

C. Obtain copies of standards where required by product specification sections.

D. When specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

E. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of Architect/Engineer shall be altered from Contract Documents by mention or inference otherwise in reference documents.

1.5 LABELING

A. Attach label from agency approved by authority having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.

B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label.

1. Model number.

2. Serial number.

3. Performance characteristics.

1.6 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Architect/Engineer 30 days in advance of required observations.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

D. Refer to Section 01 33 00 - Submittal Procedures, MANUFACTURERS' FIELD REPORTS article.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Verify utility services are available, of correct characteristics, and in correct locations.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities:

1. Temporary electricity.
2. Temporary lighting for construction purposes.
3. Temporary heating, cooling and ventilation.
4. Telephone service.
5. Facsimile service.
6. Temporary water service.
7. Temporary sanitary facilities.

B. Construction Facilities:

1. Field offices and sheds.
2. Vehicular access.
3. Parking.
4. Progress cleaning and waste removal.
5. Project identification.
6. Traffic regulation.
7. Fire prevention facilities.

C. Temporary Controls:

1. Barriers.
2. Enclosures and fencing.
3. Security.
4. Water control.
5. Dust control.
6. Erosion and sediment control.

7. Noise control.
8. Pest control.
9. Pollution control.
10. Rodent control.

D. Removal of utilities, facilities, and controls.

1.2 TEMPORARY ELECTRICITY

A. Provide and pay for power service required from utility source as needed for construction operation.

B. Provide flexible power cords as required for portable construction tools and equipment.

1.3 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Provide and maintain 1 watt/sq ft lighting to exterior staging and storage areas after dark for security purposes.

B. Maintain lighting and provide routine repairs.

1.4 TEMPORARY HEATING, COOLING AND VENTILATION

A. Not applicable.

1.5 INTERNET SERVICE

A. Provide, maintain and pay for internet service to field office at time of project mobilization.

1.6 TEMPORARY WATER SERVICE

A. Provide and pay for suitable quality water service as needed to maintain specified conditions for construction operations.

B. Extend branch piping with outlets located so water is available by hoses with threaded connections.

1.7 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide facilities at time of project mobilization.

B. At end of construction, remove facilities used for construction operations.

1.8 FIELD OFFICES AND SHEDS – Contractor's Option

A. Office: Weather tight, with lighting, electrical outlets, heating, and ventilating equipment, and equipped with sturdy furniture and drawing display table.

B. Coordinate with College for location to conduct Project with Owner and Architect/Engineer meetings.

C. Locate offices and sheds as indicated in contractor-proposed staging plan.

D. Construction: Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations with steps and landings at entrance doors.

E. Environmental Control:

1. Heating, Cooling, and Ventilating for Offices: Automatic equipment to maintain comfort conditions.

2. Storage Spaces: Heating and ventilation as needed to maintain products in accordance with Contract Documents; lighting for maintenance and inspection of products.

F. Storage Areas And Sheds: Size to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and for inspection of products to requirements of Section 01 60 00 - Product Requirements.

G. Preparation: Fill and grade sites for temporary structures sloped for drainage away from buildings.

H. Maintenance and Cleaning:

1. Perform periodic cleaning and maintenance for office and storage areas.

2. Maintain approach walks free of mud, water, and snow.

I. Removal: At completion of Work remove buildings, foundations, utility services, and debris.

1.9 VEHICULAR ACCESS

A. Provide unimpeded access for emergency vehicles. Maintain 20 feet wide driveways with turning space between and around combustible materials.

B. Provide and maintain access to fire hydrants and control valves free of obstructions.

1.10 PROGRESS CLEANING AND WASTE REMOVAL

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.

B. Collect and remove waste materials, debris, and rubbish from site periodically and dispose off-site.

C. Materials suggested for recycling include:

1. Packing materials including paper, cardboard, foam plastic, and sheeting.

2. Recyclable plastics.

3. Glass, clear and colored types.

4. Metals.

5. Equipment oil.

D. See Section 01 7419 Construction Waste Management Disposal.

1.11 PROJECT IDENTIFICATION

A. Project Identification Sign:

1. No project signs are allowed without Owner permission except those required by law, unless approved by Owner.

B. Maintenance: Maintain signs and supports clean, repair deterioration and damage.

C. Removal: Remove signs, framing, supports, and foundations at completion of Project and restore area.

1.12 TRAFFIC REGULATION

A. Signs, Signals, And Devices:

1. Post Mounted and Wall Mounted Traffic Control and Informational Signs: As approved by authority having jurisdiction.

2. Traffic Control Signals: As approved by local jurisdictions.

3. Traffic Cones and Drums, Flares and Lights: As approved by authority having jurisdiction.

4. Flag person Equipment: As required by authority having jurisdiction.

B. Flag Persons: Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

C. Haul Routes:

1. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.

2. Confine construction traffic to designated haul routes.

D. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic. Removal:

1. Remove equipment and devices when no longer required.

2. Repair damage caused by installation.

3. Remove post settings.

1.13 FIRE PREVENTION FACILITIES

A. Establish fire watch for cutting and welding and other hazardous operations capable of starting fires. Maintain fire watch before, during, and after hazardous operations until threat of fire does not exist.

B. Portable Fire Extinguishers: NFPA 10; 10 pound capacity, 4A-60B: C UL rating.

1. Provide minimum one fire extinguisher in every construction trailer and storage shed.

1.14 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades required by authorities having jurisdiction for public rights-of-way.

C. Provide protection for plants designated to remain. Replace damaged plants.

D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.15 ENCLOSURES AND FENCING

A. Construction: Commercial grade chain link fence for storage and protection of materials and Work, or temporary weather tight enclosure.

B. Provide minimum 6 ft high temporary chain link fencing around property, and around construction limits indicated by temporary erosion control fencing.

C. Interior Enclosures:

1. Provide temporary partitions to separate work areas from Owner occupied areas, to prevent penetration of dust and moisture into Owner occupied areas, and to prevent damage to existing materials and equipment.

2. Construction: Framing and reinforced polyethylene or sheet materials with closed joints and sealed edges at intersections with existing surfaces.

1.16 SECURITY

A. Protect Work from theft, vandalism, and unauthorized entry.

B. Initiate program at project mobilization.

C. Maintain program throughout construction period until Owner acceptance and occupancy precludes need for Contractor security.

1.17 WATER CONTROL

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

1.18 DUST CONTROL

A. Execute Work by methods to minimize raising dust from construction operations.

B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

1.19 EROSION AND SEDIMENT CONTROL

A. Per Section 31 2500 – Erosion and Sedimentation Controls, and Drawings.

B. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.

C. Minimize surface area of bare soil exposed at one time.

D. Provide temporary measures including berms, dikes, and drains, and other devices to prevent water flow.

E. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.

F. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

1.20 NOISE CONTROL

A. Provide methods, means, and facilities to minimize noise from and noise produced by construction operations.

B. Comply with jurisdictional requirements of local noise ordinance.

1.21 POLLUTION CONTROL

A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

B. Comply with pollution and environmental control requirements of authorities having jurisdiction.

1.22 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

1.23 SAFETY & OCCUPATIONAL HEALTH RULES & REGULATIONS

Contractor in entering into a contract for this work agrees that he shall be solely responsible for conformance, by those in his employ and by his subcontractors and their employees and by other directly and indirectly connected with the work under this contract, with the requirements and regulations of the State of Washington Department of Labor and Industries, Division of Industrial Safety and Health Chapter 296-24 WAC "General Safety and Health Standards", and Chapter 296-52 WAC "Possession, Handling and Use of Explosives", and Chapter 296-55 WAC "Safety Standards for Construction Work" for use of all equipment, vehicles, construction processes and equipment, and other safety rules and regulations required therein including protection of workmen in excavations.

1.24 HAZARD COMMUNICATION PURPOSE

Contractor in entering into a contract for this Work agrees that he shall be solely responsible for conformance, by those in his employ and by his subcontractors and their employees and by other directly or indirectly connected with the work under his contract, with the requirements and regulations of the State of Washington WAC 296-62-054 through WAC 296-62-05427 for the purpose to ensure that the hazards of all chemicals produced or imported by chemical manufacturers or importers are evaluated, and that information concerning their hazard is transmitted to affected employers and employees. This occupational safety and health standard is intended to address comprehensively the issue of evaluating and communicating chemical hazards to employees. Statutory Authority: RCW 49.17.040 and 49.17.050. 84-22-012 (Order 84-22), 296-62-054, filed 10/30/84; 84-13-001 (Order 84-14), 296-62-054, filed 6/7/84.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products.

B. Product delivery requirements.

C. Product storage and handling requirements.

D. Product options.

E. Product substitution procedures.

F. Equipment electrical characteristics and components.

1.2 PRODUCTS

A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.

C. Furnish interchangeable components from same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect products in accordance with manufacturers' instructions.

B. Store with seals and labels intact and legible.

C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

D. For exterior storage of fabricated products, place on sloped supports above ground.

E. Provide [bonded] off-site storage and protection when site does not permit on-site storage or protection.

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.

H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article prior to bid.

1.6 PRODUCT SUBSTITUTION PROCEDURES

A. Instructions to Bidders specify time restrictions for submitting requests for Substitutions during bidding period to requirements specified in this section.

B. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. A request constitutes a representation that Bidder:

1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.

2. Will provide same warranty for Substitution as for specified product.

3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.

4. Waives claims for additional costs or time extension which may subsequently become apparent.

5. Will reimburse Owner and Architect/Engineer for review or redesign services associated with re-approval by authorities having jurisdiction.

E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.

F. Substitution Submittal Procedure:

1. Submit one copy of request for Substitution for consideration. Limit each request to one proposed Substitution. Request may be submitted electronically.

2. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.

3. Architect/Engineer will notify Contractor in writing of decision to accept or reject request.

PART 2 PRODUCTS

2.1 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Include lugs for terminal box.

B. Cord and Plug: Furnish minimum 6 foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 70 00

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Closeout procedures.

B. Final cleaning.

C. Starting of systems.

D. Demonstration and instructions.

E. Protecting installed construction.

F. Project record documents.

G. Operation and maintenance data.

H. Manual for materials and finishes.

I. Manual for equipment and systems.

J. Spare parts and maintenance products.

K. Product warranties and product bonds.

L. Maintenance service.

1.2 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect/Engineer's review.

B. Provide submittals to Architect/Engineer required by authorities having jurisdiction.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.3 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Clean debris from drainage systems.

C. Clean site; sweep paved areas, rake clean landscaped surfaces.

D. Clean pervious paved areas appropriate to surface type and requirements.

E. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.4 STARTING OF SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect/Engineer seven days prior to start-up of each item.

C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable manufacturer's representative or Contractors' personnel in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report in accordance with Section 01 33 00 - Submittal Procedures that equipment or system has been properly installed and is functioning correctly.

1.5 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.

B. Demonstrate Project equipment by qualified manufacturer's representative or Contractor's personnel who is knowledgeable about the Project.

C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

D. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at designated location.

E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

F. Required instruction time for each item of equipment and system is specified in individual sections.

1.6 TESTING, ADJUSTING AND BALANCING

A. Contractor and A/E will perform testing for adjustment and balancing of installed systems prior to punch list.

B. Notify A/E and Owner minimum of one week prior to date of testing.

1.7 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

C. Prohibit traffic from landscaped areas.

1.8 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed Shop Drawings, Product Data, and Samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress, not less than weekly.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

2. Field changes of dimension and detail.

3. Details not on original Contract drawings.

G. Submit documents to Architect/Engineer with claim for final Application for Payment.

1.9 OPERATION AND MAINTENANCE DATA

A. Submit data bound in 8-1/2 x 11 inch text pages, three-ring binders with durable plastic covers and the contents in electronic format on a USB drive.

B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.

C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

D. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

E. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:

1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.

2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:

a. Significant design criteria.

b. List of equipment.

c. Parts list for each component.

d. Operating instructions.

e. Maintenance instructions for equipment and systems.

f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

3. Part 3: Project documents and certificates, including the following:

    a. Shop drawings and product data.

    b. Air and water balance reports.

    c. Certificates.

d. Originals of warranties and bonds.

1.10 MANUAL FOR MATERIALS AND FINISHES

A. Submit two sets of final volumes in final form within 10 days after final inspection.

B. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Include information for re-ordering custom manufactured products.

C. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

D. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.

E. Additional Requirements: As specified in individual product specification sections.

F. Include listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.11 MANUAL FOR EQUIPMENT AND SYSTEMS

A. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.

B. Submit two sets of final volumes in final form within 10 days after final inspection.

C. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.

D. Provide electrical service characteristics, controls, and communications.

E. Include color coded wiring diagrams as installed.

F. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and special operating instructions.

G. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

H. Include manufacturer's printed operation and maintenance instructions.

I. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Include Contractor's coordination drawings as installed.

K. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

L. Additional Requirements: As specified in individual product specification sections.

M. Include listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

1.12 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Furnish spare parts, maintenance, and extra products in quantities specified in individual specification sections.

B. Deliver to Project site and place in location as directed by Owner; obtain receipt prior to final payment.

1.13 PRODUCT WARRANTIES AND PRODUCT BONDS

A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.

B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.

C. Verify documents are in proper form, contain full information, and are notarized.

D. Co-execute submittals when required.

E. Include Table of Contents and assemble in binder with durable plastic cover.

F. Submit prior to final Application for Payment.

G. Time Of Submittals:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.

2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.

3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

1.14 MAINTENANCE SERVICE

A. Furnish service and maintenance of components during one-year project warranty period.

B. Examine system components at frequency consistent with reliable operation. Clean, adjust, and/or lubricate as required.

C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by manufacturer of original component.

D. Do not assign or transfer maintenance service to agent or Subcontractor without prior written consent of Owner.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Supplementary Conditions, and Division 00 through Division 01 specifications shall apply to all sections of the Contract Documents, including specifications, drawings, addenda, or other changes of documents issued for bidding/construction.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous demolition and construction waste.
2. Recycling nonhazardous demolition and construction waste.
3. Disposing of nonhazardous demolition and construction waste.

B. Related Requirements:
1. Section 024119 "Selective Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements, and for disposition of hazardous waste.

1.3 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 50 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.

1. Demolition Waste:
   a. Concrete.
   b. Concrete reinforcing steel.
   c. Wood studs.
   d. Structural and miscellaneous steel.
   e. Roofing.
   f. Insulation.
   g. Equipment.
   h. Piping.
   i. Supports and hangers.
   j. Mechanical equipment.
   k. Refrigerants.
   l. Electrical conduit.
   m. Copper wiring.
   n. Electrical devices.
   o. Switchgear and panelboards.
   p. Transformers.

2. Construction Waste:
   a. Lumber.
   b. Metals.
   c. Roofing.
   d. Insulation.
   e. Piping.
   f. Electrical conduit.
   g. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:

      1) Paper.
      2) Cardboard.
      3) Boxes.
      4) Plastic sheet and film.
      5) Polystyrene packaging.
      6) Wood crates.
      7) Plastic pails.

1.5 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 7 days of date established for the Notice to Proceed

1.6 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use form approved by Architect and Owner, Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons
4. Quantity of waste recycled, both estimated and actual in tons.
5. Total quantity of waste recovered (salvaged plus recycled) in tons.
6. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements.

B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review

methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of waste management coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.8 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Dumpsters: Shall be of type that have secure cover and can be lockable. 2 sets of padlock keys shall be provided to WCC Construction Escorts.

C. Waste Identification: Indicate anticipated types and quantities of demolition and construction waste generated by the Work. Use form approved by Architect and Owner, Include estimated quantities and assumptions for estimates.

D. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use form approved by Architect and Owner, Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
   1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
   2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
   3. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

E. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use forms approved by Architect and Owner, Include the following:

   1. Total quantity of waste.
   2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.

3. Total cost of disposal (with no waste management).
4. Revenue from recycled materials.
5. Savings in hauling and tipping fees by donating materials.
6. Savings in hauling and tipping fees that are avoided.
7. Handling and transportation costs. Include cost of collection containers for each type of waste.
8. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Not Permitted on Project site.

C. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area off site.
5. Protect items from damage during transport and storage.

D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

E. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

F. Plumbing Fixtures: Separate by type and size.

G. Lighting Fixtures: Separate lamps by type and protect from breakage.

H. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:

1. Insert names and telephone numbers of local recycling receivers and processors of recyclable materials.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

    a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum **4-inch** size.
2. Crush concrete and screen to comply with requirements in Section 312000 "Earth Moving" for use as satisfactory soil for fill or subbase.

3. Clean and stack undamaged, whole masonry units on wood pallets.

B. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

C. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

D. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.

E. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

F. Conduit: Reduce conduit to straight lengths and store by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 01 77 13

PRELIMINARY CLOSEOUT REVIEW

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Contractor's punch list work.

B. Engineer's and Design Team punch list work.

1.02 CONTRACTOR PUNCH LISTS

A. Prior to any punchlist work starting by the Engineer or other members of the Design Team, the following items will be submitted to the Engineer:

1. When the project is sufficiently completed as judged by the Engineer to warrant punchlist inspection, the Contractor will issue typed letters on company letterheads to the Engineer documenting that the project is ready for a punchlist. The following items will be required:

a. Letter from the General Contractor documenting a 'complete' listing of all items of work not completed. *All punch list items to be tabulated on attached punch list form or similar accepted form.*

b. Letter from each of the major subcontractors, (Site, Landscape, and Electrical), documenting a 'complete' listing of all items of work not completed. *All punch list items to be tabulated on attached punch list form or similar accepted form.*

2. The Contractor's punch lists will be a tabulated list per area of items that are not complete, defective items and materials that do not conform to the Contract Documents. *All punch list items to be tabulated on attached punch list form, or similar accepted form.*

1.03 ENGINEER'S & DESIGN TEAM MEMBER'S PUNCH LISTS.

A. Upon receipt of the noted punch lists in items number 1.02.A1 and 1.02.A2 above, the Engineer and members of the Design Team will begin consultant punch list documentation. If the Engineer or other Design Team members find more than five (5) items beyond what the Contractor has documented on the Contractor's punch list, the Engineer and Design Team members will suspend all punch list work. Written notification will be forwarded to the Contractor that the Project is not ready for punch list work by the Architect and Design Team members.

B. After the Contractor amends punch list to the satisfaction of the A/E, A/E will begin punch list work and forward punch list documents to the Contractor.

C. Upon receipt of the A/E's punch lists, the Contractor shall complete the items listed and all subsequent items added in a timely manner. Contractor shall submit a Project Completion Notice to the Engineer when work is completed or special arrangements

have been made with the Owner and Engineer to complete items which have resulted in unavoidable delay.

D. Upon receipt of the Contractor's Project Completion Notice, Engineer and Design Team members will begin back check of punch list items. If the Engineer and Design Team members find five (5) or more items not complete, they will abandon back check work and forward written notification to the Contractor. The Contractor shall be required to complete the work and resubmit a Project Completion Notice.

E. All additional back check time incurred by the Engineer or other Design Team members beyond item 1.03.D above will be charged to the Contractor. No additional requests for payment by the Contractor will be processed by the Engineer until the punch list work is complete and the additional back check expenses have been paid to the Engineer and other members of the Design Team.

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Supplementary Conditions, and Division 00 through Division 01 specifications shall apply to all sections of the Contract Documents, including specifications, drawings, addenda, or other changes of documents issued for bidding/construction.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

B. Related Requirements:
1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect and Owner will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
b. Enable inserted reviewer comments on draft submittals.

2. **Three** paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return **two** copies.

C. Initial Manual Submittal: Submit draft copy of each manual at least **30** days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least **15** days before commencing demonstration and training. Architect and Owner will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within **15** days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner
4. Owner’s Project Number
5. Date of submittal.
6. Name and contact information for Contractor.
7. Name and contact information for Architect.
8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
9. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.

2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

   a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
   b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.

5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.

4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."

G. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Supplementary Conditions, and Division 00 through Division 01 specifications shall apply to all sections of the Contract Documents, including specifications, drawings, addenda, or other changes of documents issued for bidding/construction.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Requirements:
1. Section 017000 "Closeout Procedures" for general closeout procedures.
2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit **one** set(s) of marked-up record prints.
2. Number of Copies: Submit copies of record Drawings as follows:

a. Initial Submittal:

1) Submit **one** paper-copy set(s) of marked-up record prints.
2) Submit PDF electronic files of scanned record prints and **one** of file prints.
3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:

1) Submit two paper-copy set(s) of marked-up record prints.
2) Submit PDF electronic files of scanned record prints and one set(s) of prints.
3) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one copy of annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one annotated PDF electronic files and directories of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one annotated PDF electronic files and directories of each submittal.

E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.
d. Record and check the markup before enclosing concealed installations.
e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Revisions to routing of piping and conduits.
d. Revisions to electrical circuitry.
e. Actual equipment locations.
f. Locations of concealed internal utilities.
g. Changes made by Change Order or Construction Change Directive.
h. Changes made following Architect's written orders.
i. Details not on the original Contract Drawings.
j. Field records for variable and concealed conditions.
k. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
2. Format: **DWG**, Version operating system.
3. Format: Annotated PDF electronic file.
4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
5. Refer instances of uncertainty to Architect for resolution.
6. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.

a. See Section 013300 "Submittal Procedures" for requirements related to use of Architect's digital data files.
b. Architect will provide data file layer information. Record markups in separate layers.

C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name

each file with the sheet identification. Include identification in each digital data file.

4. Identification: As follows:

    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect.
    e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, and record Drawings where applicable.

B. Format: Submit record Product Data as annotated PDF electronic file

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 017839

SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Supplementary Conditions, and Division 00 through Division 01 specifications shall apply to all sections of the Contract Documents, including specifications, drawings, addenda, or other changes of documents issued for bidding/construction.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Qualification Data: For facilitator.

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

1. Transcript: Prepared and bound in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.

2. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
3. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals and in PDF electronic file format on compact disc.

1.5 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    c. Operating standards.
    d. Regulatory requirements.
    e. Equipment function.
    f. Operating characteristics.
    g. Limiting conditions.
    h. Performance curves.

2. Documentation: Review the following items in detail:

    a. Emergency manuals.
    b. Operations manuals.
    c. Maintenance manuals.
    d. Project record documents.
    e. Identification systems.
    f. Warranties and bonds.
    g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

    a. Instructions on meaning of warnings, trouble indications, and error messages.
    b. Instructions on stopping.
    c. Shutdown instructions for each type of emergency.
    d. Operating instructions for conditions outside of normal operating limits.
    e. Sequences for electric or electronic systems.
    f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

    a. Startup procedures.
    b. Equipment or system break-in procedures.

c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
2. Owner will furnish an instructor to describe Owner's operational philosophy.
3. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner**,** through Architect, with at least seven days' advance notice.

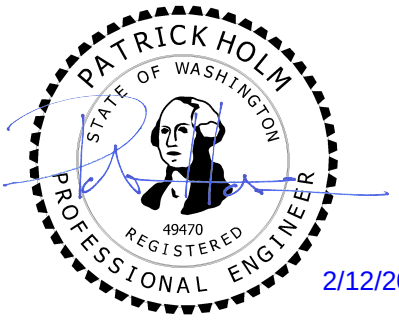
D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

F. Cleanup: Collect used and leftover educational materials and give to the Facility Manager. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 017900

MASON TRANSIT AUTHORITY
MTA – BELFAIR PARK AND RIDE PROJECT



2/12/2020

DIVISION 03
CONCRETE

SECTION 03 00 00

CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cast-in-Place concrete

B. Concrete accessories

C. Formwork, shoring, bracing, and anchorage

D. RELATED SECTIONS

E. 32 13 00 Concrete Paving

1.2 REFERENCES

A. American Concrete Institute (ACI)

1. 301 – Specifications for Structural Concrete
2. 315 – Details and Detailing of Concrete Reinforcement

B. American Society for Testing and Materials (ASTM)

1. A615 Deformed and Plain Billet-Steel for Concrete Reinforcement
2. C33 Specifications for Concrete Aggregates
3. C94 Specifications for Ready Mixed Concrete
4. C132 Test for Slump of Portland Cement Concrete
5. C150 Specification for Portland Cement
6. C156 Test Method for Water Retention by Concrete Curing Materials
7. C171 Specification for Sheet Materials for Curing Concrete
8. C260 Specifications for Air-Entraining Admixtures for Concrete
9. C309 Specification for Liquid Membrane Forming Compounds for Curing Compounds
10. C494 Specifications for Chemical Admixtures for Concrete
11. C595 Blending Hydraulic Cements (excluding slag cements)
12. D1751 Performed Expansion Joint Fillers for Concrete Paving and Structural Construction

C. U.S. Army Corps of Engineers

1. CRD-C-621-83 Specifications for Non-Shrink Grout

D. DOT / APWA – Specifications

1. WSDOT Standard Specifications

1.3 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301, unless indicated or specified otherwise.

B. Concrete work is subject to special testing and inspection.

C. Acquire cement and aggregate from the same source for all work.

D. Conform to ACI 305R when placing concrete during hot weather.

E. Conform to ACI 306R when placing concrete during cold weather.

F. Field samples mock-ups:

1. Provide mock-ups, as required by the Engineer, until approval is obtained.

2. Do not proceed with subsequent work until approval of the mock-up is obtained.

3. Approval of mock-up shall be the standard of workmanship and materials for the remainder of the work similar to the mock-up.

4. Maintain mock-up in approved condition, until directed otherwise.

5. Unless specified otherwise, remove mock-up at completion, when directed by the Engineer.

6. Unless specified or approved otherwise, schedule mock-ups a minimum of 5 working days between mock-up and actual installation of the work represented by the mock-up and actual installation of the work represented by the mock-up.

7. Notify the Engineer and Owner a minimum of 5 working days prior to mock-up.

1.4 SUBMITTALS

A. Letter of verification regarding manufacturer’s recommendation.

1. Curing agents and applied surfacing system compatibility.

2. Slab finish and applied surfacing, system capability.

B. Shop Drawings:

1. Reinforcing and Concrete Configuration

a. Detail reinforcing in accordance with ACI 315, or as shown on drawings. Indicate reinforcement sizes, spacings, locations and quantities of reinforcing, bending and cutting schedules, splicing and supporting and spacing devices.

b. Indicate embedded items.

c. Show concrete configurations

2. Slab Layouts: Dimension locations of control, expansion, and construction joints. Relate to stone banding surfacing.

C. Product Date: Submit for each accessory, admixture, and curing material proposed for the work.

D. Mix Designs: Prior to concrete work, submit mix designs and source supplier for approval and quality control monitoring.

1. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Unless specified otherwise, conform to ACI 301.

B. Sleeves or Clock-outs: Metal or plastic; fabricate to the shapes indicated.

C. “Sono Tube” or equal for post anchors.

2.2 REINFORCING STEEL

A. Reinforcing Steel: Types as indicated on the drawings.

B. Chairs, Bolsters, Bar Supports, and Spacers: Sized and shaped for strength and support of reinforcement during installation and placement of concrete.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150, normal – Type 1 Portland, gray color.

B. Normal Weight Fine and Coarse Aggregates: ASTM C33; severe weather exposure.

C. Water: Clean and not detrimental to concrete.

2.4 ADMIXTURES

A. Air-Entrainment: ASTM C260; Master Builders Inc. “Micro-Air” or “MMBVR” Euclid Chemical Co. “Air Mix” or approved.

B. Water Reducer Normal: ASTM C494, Type A; Master Builders, Inc. “Pozzolith N” Euclid Chemical Co., “Eucon WR 75” or approved.

C. High Range Water Reducer (Superplasticizer): ASTM C494 Type F or G and shall be of the second or third generation type. Shall be batch planted added, extend plasticity time, reduce water 20 to 30 percent. Master Builders Inc. “Rheobuild”, Euclid Chemical “Eucon 37”, or approved.

D. Accelerator: ASTM C494, Type C or E non corrosive, non-chloride; Master Builders “Pozzutech 20”, Euclid Chemical Co “Acclegard90” or approved.

E. Set Retarder: ASTM C494, Type B

2.5 ACCESSORIES

A. Bonding Agent: Polyvinyl Acetate.

B. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain or adversely affect concrete surfaces or court coating surface, and will not impact subsequent treatments of concrete surfaces when applied to forms or form liners.

C. Control Joints: ¼” thickness zinc plated or approved equal. As manufactured by Terrazo Stone and Marble. Depth to 1 ½” thickness of the slab.

D. Curing Materials:

1. Waterproof Sheet Material: Waterproof paper in accordance with ASTM C171; reinforced waterproof Kraft paper; white color at exterior applications; Burke Kraft Curing Paper Type I-SK-30, or approved.

2. Curing Compound: Must be thoroughly verified. ASTM C309; clear or translucent with fugitive dye; moisture loss not more than 0.03 gr./sq.cm. when tested in accordance with ASTM C156 and applied in a single coat at the manufacturer’s recommended rate. Euclid Chemical Co. “Kurz DR” or approved. Verify curing compounds are compatible with subsequently applied court surface coating and finishing systems.

2.6 CONCRETE MIX

A. Mix concrete in accordance with ASTM C94, and in accordance with the requirements indicated on the drawings.

B. Concrete shall meet the requirements of ACI 318-11 for Type F1 concrete. Maximum water/cement ratio 0.45; Min compressive strength 4,500 psi; Air content per ACI 318-11 Table 4.4.1.

C. Admixtures:

1. All exposed concrete is integral color mix.

2. All concrete shall contain the specified water reducing or high range water reducing admixture, except architectural concrete, and concrete with a required water/cement ratio of 0.45 or lower shall contain a high range water reducing admixture.

3. All concrete required to be air entrained shall contain air entraining admixture to produce 4% to 6% air.

4. All concrete placed in ambient temperatures from 40o F to 20o F, all slab concrete placed in ambient temperatures below 50o F shall contain an accelerator at the manufacturer's required dosage.

D. Provide 28 day compressive strength minimum 4,500 psi concrete unless indicated otherwise.

2.7 REINFORCEMENT FABRICATION

A. Fabricate as indicated on the drawings and in accordance with ACI 315.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to starting work, carefully inspect installed work of other trades and verify that such work is complete to the point where work of this Section may properly commence. Notify the Engineer in writing of conditions detrimental to the property and timely completion of work.

B. Do not begin installation until all unsatisfactory conditions are resolved. Beginning work constitutes acceptance of site conditions and responsibility for defective installation caused by prior observable conditions.

3.2 FORMWORK ERECTION

A. Verify lines, levels, and measurements before proceeding with formwork. Align form joints.

B. Use form coating on forms in accordance with the manufacturer's recommendations. Verify that form coatings will not affect the bond of subsequent concrete surface treatments.

C. Coordinate with work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

D. Tolerances: Comply with ACI 301, Table 4.3.1 – Tolerances for Formed Surfaces.

E. Where earth forms are used, hand trim sides and bottoms of earth forms. Remove loose dirt.

3.3 REINFORCEMENT

A. Place, support, and secure reinforcement against displacement.

B. Locate reinforcing splices not indicated on the drawings at points of minimum stress.

C. Provide laps and concrete cover as indicated in the drawings.

3.4 PLACING CONCRETE

A. In accordance with ACI 301.

B. Bonding Agent: Verify that agents will not affect subsequent concrete surface treatment. Mix thoroughly and apply strictly in accord with the manufacturer's instructions; do not use when ambient temperature is below 45o F. Place concrete in contact immediately while bonding agent is still tacky.

3.5 SLABS

A. Expansion Joints:

1. Place expansion joints where exterior slabs abut vertical walls.

2. Form expansion joints with joint filler. Recess joint filler ½" below finished concrete surface removable cap systems per manufacturer's recommendation to receive sealant specified.

3. Tool expansion joints to edges ¼" radius.

4. Discontinue reinforcing at the expansion joint.

B. Control Joints

1. Tolerance for horizontal control joints lines is ½".

2. Control joints shall be abutting end to end in a smooth straight continuous line.

3. Control joints shall penetrate the slab a minimum of 1 ½" the thickness of the slab.

4. Control joints shall be upright and plumb.

C. Curing:

1. Mixture cure all concrete for a minimum of 7 days, unless approved or specified otherwise.

2. Curing compound may be used if verified by the surfacing manufacturer's recommendations compatible with subsequent surfacing.

3. Apply all curing compounds in accordance with the manufacturer's recommendations and in compliance with surfacing manufacturer's recommendations.

D. Form Removal:

1. Remove all below grade forming materials (i.e.: header and sono tubes); reinforcement blocks to remain.

E. Tolerances:

1. The concrete surface shall be sloped as indicated on the drawings and finished so that the tolerance is 1/8” measured as the departure from the testing edge of a 10-foot straight edge held parallel to and in contact with the surface.

3.6 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete and control jointing concrete not conforming to required lines, details, dimensions, tolerances or specified requirements shall be removed and replaced at no additional cost to the Owner.

B. Replacement of defective concrete will be determined by the Engineer.

END OF SECTION

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SECTION 03 20 00
CONCRETE REINFORCING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Division 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Reinforcing steel for cast-in-place concrete.

B. Supports and accessories for steel reinforcement.

1.03 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete.

1.04 REFERENCE STANDARDS

A. ACI 301 - Specifications for Structural Concrete 2016.

B. ACI 318 - Building Code Requirements for Structural Concrete and Commentary 2014 (Errata 2018).

C. ACI SP-66 - ACI Detailing Manual 2004.

D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2018.

E. ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement 2016.

F. CRSI (DA4) - Manual of Standard Practice 2009.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.

C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.

D. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.06 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions listed on the Structural Drawings and with provision listed above, except where more stringent requirements are shown or specified.

1.07 REGULATORY REQUIREMENTS

A. Conform to International Building Code and Local Building Department requirements for testing, inspection, etc. during construction.

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi). Typical. Unless noted otherwise.

B. Reinforcing Steel: ASTM A706/A706M Grade 60, deformed low-alloy steel bars. Refer to structural drawings for additional information.

C. Reinforcement Accessories:

1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch unless noted otherwise on the structural drawings.
2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
3. Provide stainless steel components for placement within 1-1/2 inches of weathering surfaces.

2.02 **RE-BAR SPLICING:**

A. Refer to splicing notes listed on the structural drawings.

2.03 **FABRICATION**

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice unless noted otherwise on the structural drawings..

PART 3 EXECUTION

3.01 **PLACEMENT**

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

B. Do not displace or damage vapor barrier.

C. Accommodate placement of formed openings.

D. Maintain concrete cover around reinforcing as indicated on the structural drawings:

E. Comply with applicable code for concrete cover over reinforcement.

F. Bond and ground all reinforcement to requirements of Section 26 05 26.

3.02 **FIELD QUALITY CONTROL**

A. The Structural Engineer of Record shall be notified for review of reinforcing prior to placing concrete. Allow 5 business days before placing concrete unless noted otherwise on the structural engineers drawings.

3.03 **SCHEDULES**

A. Refer to Structural Drawings.

END OF SECTION

SECTION 03 30 00
CAST IN PLACE CONCRETE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Division 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding/construction.

B. Refer to the Structural Drawings for additional information.

1.02 REGULATORY REQUIREMENTS

A. Conform to the International Building Code and Local Building Department requirements for testing, inspection, etc. during construction.

1.03 TESTS

A. Testing and analysis of concrete will be performed under provisions of Section 01 45 00

B. Provide a copy of the concrete mix design submittal for each class of concrete to testing lab, Owner and Architect ten (10) days prior to commencement of work.

1.04 SUBGRADE APPROVAL

A. Subgrade Approval: Do not proceed with on-grade concrete placement over any subgrade condition until the Soils Engineer and testing lab have approved existing subgrade, structural backfill, and utility trench back fill.

B. Coordination: Contractor shall contact and schedule review of subgrade with Soils Engineer and testing laboratory ten (10) days (minimum) prior to any on-grade concrete placement.

1.05 SUMMARY

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 033543 "Polished Concrete Finishing" for concrete floors scheduled to receive a polished concrete finish.

1.06 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.07 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.

b. Independent testing agency responsible for concrete design mixtures.

c. Ready-mix concrete manufacturer.

d. Concrete Subcontractor.

e. Special concrete finish Subcontractor.

2. Review the following (where applicable):
    a. Special inspection and testing and inspecting agency procedures for field quality control.
    b. Construction joints, control joints, isolation joints, and joint-filler strips.
    c. Semirigid joint fillers.
    d. Vapor-retarder installation.
    e. Anchor rod and anchorage device installation tolerances.
    f. Cold and hot weather concreting procedures.
    g. Concrete finishes and finishing.
    h. Curing procedures.
    i. Forms and form-removal limitations.
    j. Shoring and reshoring procedures.
    k. Methods for achieving specified floor and slab flatness and levelness.
    l. Floor and slab flatness and levelness measurements.
    m. Concrete repair procedures.
    n. Concrete protection.
    o. Initial curing and field curing of field test cylinders (ASTM C31/C31M.)
    p. Protection of field cured field test cylinders.

1.08 **ACTION SUBMITTALS**

A. Product Data: For each of the following where applicable.
    1. Portland cement.
    2. Fly ash.
    3. Slag cement.
    4. Aggregates.
    5. Admixtures:
        a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
    6. Color pigments.
    7. Vapor retarders.
    8. Floor and slab treatments.
    9. Liquid floor treatments.
    10. Curing materials.
        a. Include documentation from color pigment manufacturer, indicating that proposed methods of curing are recommended by color pigment manufacturer.
    11. Joint fillers.
    12. Repair materials.
B. Design Mixtures: For each concrete mixture, include the following:
    1. Mixture identification.

2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Steel-fiber reinforcement content.
10. Synthetic micro-fiber content.
11. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
12. Include manufacturer's certification that permeability-reducing admixture is compatible with mix design.
13. Include certification that dosage rate for permeability-reducing admixture matches dosage rate used in performance compliance test.
14. Intended placement method.
15. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:
1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
a. Location of construction joints is subject to approval of the Owner and Architect.

D. Samples: For manufacturer's standard colors for color pigment and vapor retarder where applicable.

E. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:
1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

1.09 **INFORMATIONAL SUBMITTALS**

A. Qualification Data: For the following:
1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.
3. Testing agency: Include copies of applicable ACI certificates.

B. Material Certificates: For each of the following, signed by manufacturers:
1. Cementitious materials.
2. Admixtures.

3. Curing compounds.
4. Floor and slab treatments.
5. Bonding agents.
6. Adhesives.
7. Vapor retarders.
8. Semirigid joint filler.
9. Joint-filler strips.
10. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency where applicable:
1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Aggregates.
5. Admixtures:
a. Permeability-Reducing Admixture: Include independent test reports, indicating compliance with specified requirements, including dosage rate used in test.

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

E. Research Reports:
1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
2. For sheet vapor retarder/termite barrier, showing compliance with ICC AC380.

F. Preconstruction Test Reports: For each mix design.

G. Field quality-control reports.

H. Minutes of preinstallation conference.

1.10 **QUALITY ASSURANCE**

A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician with experience installing and finishing concrete, incorporating permeability-reducing admixtures.
1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.
1. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

D. Field Quality Control Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1. Personnel conducting field tests shall be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.

2.

1.11 **PRECONSTRUCTION TESTING**

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.

1. Include the following information in each test report:

a. Admixture dosage rates.

b. Slump.

c. Air content.

d. Seven-day compressive strength.

e. 28-day compressive strength.

f. Permeability.

1.12 **DELIVERY, STORAGE, AND HANDLING**

A. Comply with ASTM C94/C94M and ACI 301.

1.13 **FIELD CONDITIONS**

A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

2. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

3. Do not use frozen materials or materials containing ice or snow.

4. Do not place concrete in contact with surfaces less than 35 deg F other than reinforcing steel.

5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1 and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

1.14 **WARRANTY**

A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder/termite barrier material and accessories for sheet vapor retarder/ termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 1 PRODUCTS

2.01 **CONCRETE, GENERAL**

A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.02 **CONCRETE MATERIALS**

A. General

1. All concrete, unless specifically permitted by the Engineer, shall be batched and mixed at one the approved plants.
2. The control of concrete production shall be under the supervision of a recognized testing laboratory, selected and paid for by the Owner, which shall design the mixes and furnish inspection of batched aggregates at the mixing plant.
3. Refer to Structural drawings for addition information.

B. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
3. Obtain aggregate from single source.
4. Obtain each type of admixture from single source from single manufacturer.

C. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type II, gray.
2. Fly Ash: ASTM C618, Class C or F. Maximum loss of ignition shall be 1.0%
3. Slag Cement: Ground granulated blast – furnace (GGBF) shall conform to ASTM C989/C989M, Grade 100 or 120.

D. Aggregate: Coarse and fine aggregate shall conform to ASTM C33

E. Alternate Mix Designs: Variations of the mix design proportions may be accepted if substantiated in accordance with ACI 318, Chapter 19. Provide submittals a minimum of 14 business days prior to bid for determination of acceptability.

F. Air-Entraining Admixture: ASTM C260/C260M.

G. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride in steel-reinforced concrete.

H. Admixtures

1. Admixtures shall be by Master Builders, W.R. Grace, or pre-approved equal by Structural Engineer, Architect and Owner. All Manufacturer’s recommendations shall be followed.

2.

a. Water-Reducing Admixture: ASTM C494/C494M, Type A.
b. Retarding Admixture: ASTM C494/C494M, Type B.
c. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
d. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
e. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
f. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.

g. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494/C494M, Type C.

I. Water and Water Used to Make Ice: ASTM C94/C94M, clean and potable

J. Maximum Chloride Content: The maximum water soluble chloride content sall not exceed 0.15% by weight of cementitious material unless noted otherwise.

2.03 **RELATED MATERIALS**

A. Expansion- and Isolation-Joint-Filler Strips: [ASTM D1751, asphalt-saturated cellulosic fiber] [or] [ASTM D1752, cork or self-expanding cork].

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, [epoxy resin with a Type A shore durometer hardness of 80] [aromatic polyurea with a Type A shore durometer hardness range of 90 to 95] in accordance with ASTM D2240.

C. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements.

E. Floor Slab Protective Covering: Eight-feet- (2438-mm-) wide cellulose fabric.

2.04 **REPAIR MATERIALS**

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.

2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.

3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3 to 6 mm) or coarse sand, as recommended by underlayment manufacturer.

4. Compressive Strength: Not less than [4100 psi (29 MPa)] at 28 days when tested in accordance with ASTM C109/C109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.

2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.

3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.

4. Compressive Strength: Not less than [5000 psi (34.5 MPa)] at 28 days when tested in accordance with ASTM C109/C109M.

2.05 **CONCRETE MIXTURES, GENERAL**

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301 (ACI 301M).

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash or Other Pozzolans: 25 percent by mass.
2. Slag Cement: 50 percent by mass.
3. Silica Fume: 10 percent by mass.
4. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
5. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete,
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
5. Use permeability-reducing admixture in concrete mixtures where indicated.

2.06 **CONCRETE EXPOSED TO WEATHER**

A. Provide 5% total air content for all concrete exposed to weather. Total air content is the sum of entrained air provided by admixtures and naturally occurring entrapped air. Air content shall be tested prior to being placed in the pump hopper or bucket. It is not required to be tested at the discharge end of the pump hose. The tolerance on entrapped air shall be +2.0% and -1.5% with the average of all tests not less than the specified amount.

2.07 **TOTAL CEMENTITIOUS MATERIAL**

A. The sum of all cement plus flyash and slag. At the Contractor’s option, flyash or slag may be substituted for cement but, shall not exceed 25% by weight of total cementitious material. In no case shall the amount of flyash or slag be less than required by the concrete mix design table (see Structural Engineering Drawings). Footing mixes shall contain not less than 5 sacks of cementitious material per cubic yard, all other mixes shall contain not less than 5 ½ sacks of cementitious material per cubic yard unless noted otherwise.

2.08 **CONCRETE MIXTURES**

A. Refer to notes on the Structural Drawings

B. Mix Designs: The contractor shall design concrete mixes that meet or exceed the requirements of the concrete mix table. The mix designs shall facilitate anticipated placement methods, weather, rebar congestions, architectural finishes, construction sequencing, structural details, and all other factors required to provide a structurally sound, aesthetically acceptable finished product. Water reducing admixtures will likely be required to meet these requirements. Concrete mix designs shall clearly indicate the target slump. Slump tolerance shall be +/- 1 ½” inches.

C. Maximum water content 240 PCY

D. This mix shall contain 1 gallon per CY of “Eclipse” Shrinkage reducing add mixture by W.R. Grace or Architect/Engineer/ Owner approved equal.

PART 1 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.03 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
3. No aluminum items shall be embedded in any concrete
4. All embed plates shall be securely fastened in place.
5. All embedded steel items exposed to earth shall be galvanized.
6. All embedded steel items exposed to weather shall be painted unless noted as galvanized. See drawings and specifications for paint, and galvanizing requirements.

3.04 JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
2. Place joints perpendicular to main reinforcement.
    a. Continue reinforcement across construction joints unless otherwise indicated.
    b. Do not continue reinforcement through sides of strip placements of floors and slabs.
3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches) into concrete.
4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.

5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least of concrete thickness as follows:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Are not allowed

D. Doweled Joints:

1. Install dowel bars and support assemblies at joints where indicated on Drawings.
2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

E. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

3.05 **CONCRETE PLACEMENT**

A. Place concrete following all applicable ACI recommendations. Concrete shall be properly consolidated per ACI 309 using interior mechanical vibrators. Do not over vibrate. Concrete shall be poured monolithically between construction or expansion joints. If concrete is placed by the pump method. Horses shall be provided to support the hose. The hose shall not be allowed to ride on the reinforcing. Weather forecasts shall be monitored an ACI recommendations for hot and cold weather concreting shall be followed as required.

B. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

C. Notify Architect/Engineer and Owner and testing and inspection agencies 24 hours prior to commencement of concrete placement.

D. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Structural Engineer in writing, but not to exceed the amount indicated on the concrete delivery ticket.

E. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M), but not to exceed the amount indicated on the concrete delivery ticket.

F. Water shall not be added to the concrete surface during floating & Finishing operations. Pre-approved evaporation retarder specifically designed for floating &Finishing operations are acceptable.

G. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

1. If a section cannot be placed continuously, provide construction joints as indicated.

2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301
    a. Do not use vibrators to transport concrete inside forms.
    b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

H. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.
4. Screed slab surfaces with a straightedge and strike off to correct elevations.
5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

3.06 **FINISHING FLOORS AND SLABS**

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish:
1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.

C. Trowel Finish:
1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.

5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces [exposed to view] [or] [to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system] .
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155 (ASTM E1155M), for a randomly trafficked floor surface:
   a. Slabs on Ground:
      1) Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed [1/4 inch (6 mm)] [3/16 inch (4.8 mm)] [1/8 inch (3 mm)] [1/8 inch (3 mm) and)1/16 inch (1.6 mm) in 2 feet (610 mm)].
      2) Specified overall values of flatness, FF 25; and of levelness, FL 20; with minimum local values of flatness, FF 17; and of levelness, FL 15.
      3) Specified overall values of flatness, FF 35; and of levelness, FL 25; with minimum local values of flatness, FF 24; and of levelness, FL 17.
      4) Specified overall values of flatness, FF 45; and of levelness, FL 35; with minimum local values of flatness, FF 30; and of levelness, FL 24.
      5) Specified Overall Value (SOV): FF 50 and FL 25 with minimum local value (MLV): FF 40 and FL 17.
      6) Specified Overall Value (SOV): FF 25 and FL 20 with minimum local value (MLV): FF 17 and FL 15.
   b. Suspended Slabs:
      1) Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed [1/4 inch (6 mm)] [3/16 inch (4.8 mm)] [1/8 inch (3 mm)] [1/8 inch (3 mm) and)1/16 inch (1.6 mm) in 2 feet (610 mm)].

D. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces in accordance with manufacturer's written instructions and as follows:
   1. Uniformly apply dry-shake floor hardener at a rate of [100 lb/100 sq. ft. (49 kg/10 sq. m)] unless greater amount is recommended by manufacturer.
   2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating.
   3. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
   4. After final floating, apply a trowel finish.
   5. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

3.07 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:
   1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
   2. Mix, place, and cure concrete, as specified, to blend with in-place construction.

3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases a minim of 6 inches high unless otherwise indicated on Drawings, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
3. Minimum Compressive Strength: 4000 psi at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices.
    a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    b. Cast anchor-bolt insert into bases.
    c. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.08 **CONCRETE CURING**

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 (ACI 301M) and ACI 306.1 for cold weather protection during curing.
2. Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M) for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h (1 kg/sq. m x h), calculated in accordance with ACI 305.1,) before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
    a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
    b. Continuous Sprinkling: Maintain concrete surface continuously wet.

c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.

d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.

e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.

1) Recoat areas subject to heavy rainfall within three hours after initial application.

2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:

1. Begin curing immediately after finishing concrete.

2. Interior Concrete Floors:

a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

(a) Lap edges and ends of absorptive cover not less than 12-inches (300-mm).

(b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive.

(a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

(b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

(a) Water.

(b) Continuous water-fog spray.

b. Floors to Receive Polished Finish: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

(a) Lap edges and ends of absorptive cover not less than 12 inches (300 mm).

(b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

(a) Water.

(b) Continuous water-fog spray.

3.09 **TOLERANCES**

A. Conform to ACI 117 (ACI 117M).

3.10 **APPLICATION OF LIQUID FLOOR TREATMENTS**

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment in accordance with manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.

2. Do not apply to concrete that is less than [three] [seven] [14] [28] days' old.

3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing.

4. Rinse with water; remove excess material until surface is dry.

5. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller in accordance with manufacturer's written instructions.

3.11 **JOINT FILLING**

A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least [one] [six] month(s).

2. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints.

D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.12 **CONCRETE SURFACE REPAIRS**

A. Defective Concrete:

1. Repair and patch defective areas when approved by Architect.

2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete.

a. Limit cut depth to 3/4 inch (19 mm).

b. Make edges of cuts perpendicular to concrete surface.

c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.

d. Fill and compact with patching mortar before bonding agent has dried.

e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.

a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.

b. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.

a. Correct low and high areas.

b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

3. After concrete has cured at least 14 days, correct high areas by grinding.

4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.

a. Finish repaired areas to blend into adjacent concrete.

5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.

a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

b. Feather edges to match adjacent floor elevations.

6. Correct other low areas scheduled to remain exposed with repair topping.

a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations.

b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

7. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete.

a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around.

b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.

c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.

d. Place, compact, and finish to blend with adjacent finished concrete.

e. Cure in same manner as adjacent concrete.

8. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar.

a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.

b. Dampen cleaned concrete surfaces and apply bonding agent.

c. Place patching mortar before bonding agent has dried.

d. Compact patching mortar and finish to match adjacent concrete.

e. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.13 **FIELD QUALITY CONTROL**

A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.

B. Testing Agency: [Owner will engage] [Engage] a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.

2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.

3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:

1) Project name.

2) Name of testing agency.

3) Names and certification numbers of field and laboratory technicians performing inspections and testing.

4) Name of concrete manufacturer.

5) Date and time of inspection, sampling, and field testing.

6) Date and time of concrete placement.

7) Location in Work of concrete represented by samples.

8) Date and time sample was obtained.

9) Truck and batch ticket numbers.

10) Design compressive strength at 28 days.

11) Concrete mixture designation, proportions, and materials.

12) Field test results.

13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.

14) Type of fracture and compressive break strengths at seven days and 28 days.

C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

D. Inspections:

1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.
6. Batch Plant Inspections: On a random basis, as determined by Architect.

E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
   a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C143/C143M:
   a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   b. Perform additional tests when concrete consistency appears to change.
3. Slump Flow: ASTM C1611/C1611M:
   a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   b. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete; [ASTM C173/C173M volumetric method, for structural lightweight concrete].
   a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C1064/C1064M:
   a. One test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
6. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.
   a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

7. Compression Test Specimens: ASTM C31/C31M:
    a. Cast and laboratory cure two sets of [two] [three] [four] 6-inch (150 mm) by 12-inch (300 mm) or 4-inch (100 mm) by 8-inch (200 mm) cylinder specimens for each composite sample.
    b. Cast, initial cure, and field cure [two] sets of [two] [three] [four] standard cylinder specimens for each composite sample.
8. Compressive-Strength Tests: ASTM C39/C39M.
    a. Test one set of [two] [three] [four] laboratory-cured specimens at seven days and one set of two specimens at 28 days.
    b. Test one set of [two] [three] [four] field-cured specimens at seven days and one set of two specimens at 28 days.
    c. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa) if specified compressive strength is 5000 psi (34.5 MPa), or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi (34.5 MPa).
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests:
    a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
    b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
        1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 (ACI 301M), section 1.6.6.3.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 (ASTM E1155M) within 24 hours of completion of floor finishing and promptly report test results to Architect.

3.14 **PROTECTION**

A. Protect concrete surfaces as follows:
1. Protect from petroleum stains.

2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION

SECTION 03 35 11
CONCRETE FLOOR FINISHES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Divsion 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Surface treatments for concrete floors and slabs.

1.03 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with concrete floor placement and concrete floor curing.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Maintenance Data: Provide data on maintenance and renewal of applied finishes.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.07 FIELD CONDITIONS

A. Maintain light level equivalent to a minimum 200 W light source at 8 feet above the floor surface over each 20 foot square area of floor being finished.

B. Do not finish floors until interior heating system is operational.

C. Maintain ambient temperature of 50 degrees F minimum.

PART 2 PRODUCTS

2.01 CONCRETE FLOOR FINISH APPLICATIONS

A. Polished Finish:

1. Use at following locations: Throughout except for areas to receive carpet. Refer to drawings for locations..

2.02 POLISHED CONCRETE SYSTEM

A. Polished Concrete System: Materials, equipment, and procedures designed and furnished by a single manufacturer to produce dense polished concrete of the specified sheen.

1. Acceptable Systems:

a. Ameripolish, Inc; Ameripolish Polished Concrete System: www.ameripolish.com/#sle.

b. ARDEX Engineered Cements: www.ardexamericas.com/#sle.

c. PROSOCO, Inc; Consolideck Polished Concrete System: www.prosoco.com/consolideck/#sle.

d. W. R. Meadows, Inc; Induroshine and Bellatrix Concrete Enhancer: www.wrmeadows.com/#sle.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify that floor surfaces are acceptable to receive the work of this section.

B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.02 **GENERAL**

A. Apply materials in accordance with manufacturer's instructions.

3.03 **CONCRETE POLISHING**

A. Execute using materials, equipment, and procedures specified by manufacturer, using manufacturer approved installer.

1. Final Polished Sheen: Semigloss finish; other sheens are included as comparison to illustrate required sheen; final sheen is before addition of any sealer or coating, regardless of whether that is also specified or not.

2. Semi-Gloss Finish: Reflecting overhead and side images from 35 to 45 feet away.

B. Protect finished surface as required and as recommended by manufacturer of polishing system.

END OF SECTION

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Divsion 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Structural steel framing members.

B. Structural steel support members and struts.

C. Base plates, shear stud connectors.

D. Grouting under base plates.

1.03 REFERENCE STANDARDS

A. AISC (MAN) - Steel Construction Manual 2017.

B. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges 2016.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.

D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

E. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2014, with Editorial Revision (2017).

F. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2018.

G. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality 2014.

H. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts 2015.

I. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts (Metric) 2007 (Reapproved 2013).

J. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel 2018.

K. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2018a.

L. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions 2019.

M. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength 2018.

N. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2012.

O. AWS D1.1/D1.1M - Structural Welding Code - Steel 2015, with Errata (2016).

P. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel 2018.

Q. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections 2014, with Errata (2015).

1.04 **SUBMITTALS**

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments and fasteners.
2. Connections not detailed.
3. Indicate cambers and loads.
4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.

D. Mill Test Reports: Indicate structural strength, destructive test analysis and non-destructive test analysis.

E. Fabricator Test Reports: Comply with ASTM A1011/A1011M.

F. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.

G. Designer's Qualification Statement.

H. Fabricator's Qualification Statement.

I. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.05 **QUALITY ASSURANCE**

A. Fabricate structural steel members in accordance with AISC (MAN) "Steel Construction Manual."

B. Structural steel members designated as architecturally-exposed structural steel (AESS) to also comply with Section 05 12 13.

C. Maintain one copy of each document on site.

D. Fabricator: Company specializing in performing the work of this section with minimum 5 years of documented experience.

E. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.

F. Erector: Company specializing in performing the work of this section with minimum 5 years of documented experience.

G. Design connections not detailed on drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

PART 2 PRODUCTS

2.01 **MATERIALS**

A. Steel Angles and Plates: ASTM A36/A36M.

B. Steel Shapes, Plates and Bars: ASTM A529/A529M high-strength, carbon-manganese structural steel, Grade 50.

C. Steel Plates and Bars: ASTM A572/A572M, Grade 50 (345) high-strength, columbium-vanadium steel.

D. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade B.

E. Structural Bolts and Nuts: Carbon steel, ASTM A307, Grade A and galvanized in compliance with ASTM A153/A153M Class C.

F. Unheaded Anchor Rods: ASTM F1554, Grade 36, plain, with matching ASTM A563 or ASTM A563M nuts and ASTM F436/F436M Type 1 washers.

G. Headed Anchor Rods: ASTM A307 Grade C, plain.

H. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

I. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.

1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.

2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.

J. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

K. Refer to the structural drawings for additional information.

2.02 **FABRICATION**

A. Shop fabricate to greatest extent possible.

B. Continuously seal joined members by continuous welds where noted on the drawings. Grind exposed welds smooth.

C. Fabricate connections for bolt, nut, and washer connectors.

D. Develop required camber for members.

E. Refer to the structural drawings for additional information.

2.03 **FINISH**

A. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete or high strength bolted. Coordiante with Section 09 96 00 High Performance Coatings and Section 09 91 13 Exterior Painting.

2.04 **SOURCE QUALITY CONTROL**

A. Provide shop testing and analysis of structural steel.

B. High-Strength Bolts: Provide testing and verification of shop-bolted connections in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts", testing at least 10 percent of bolts at each connection or as noted on the structural drawings.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.02 **ERECTION**

A. Erect structural steel in compliance with AISC 303.

B. Allow for erection loads, and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.

C. Field weld components and shear studs indicated on shop drawings.

D. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts".

E. Do not field cut or alter structural members without approval of Architect and Structural Engineer.

F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

G. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

3.03 **TOLERANCES**

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative. Unless noted otherwise on the structural drawings.

B. Maximum Offset From True Alignment: 1/4 inch. Unless noted otherwise on the structural drawings.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Structural dimension lumber framing.

B. Non-structural dimension lumber framing.

C. Rough opening framing for doors, windows, and roof openings.

D. Sheathing.

E. Roofing nailers.

F. Preservative treated wood materials.

G. Miscellaneous framing and sheathing.

H. Communications and electrical room mounting boards.

I. Concealed wood blocking, nailers, and supports.

1.02 RELATED REQUIREMENTS

A. Section 07 62 00 - Sheet Metal Flashing and Trim: Sill flashings.

1.03 REFERENCE STANDARDS

A. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings 2015.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2019a.

D. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing 2003 (Reapproved 2017).

E. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing 2019a.

F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2016.

G. AWPA U1 - Use Category System: User Specification for Treated Wood 2018.

H. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. ICC-ES AC380 - Acceptance Criteria for Termite Physical Barrier Systems 2014, with Editorial Revision (2017).

J. PS 20 - American Softwood Lumber Standard 2020.

K. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17 2018.

L. WWPA G-5 - Western Lumber Grading Rules 2017.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide technical data on wood preservative materials and application instructions.

C. Structural Composite Lumber: Submit manufacturer's published structural data including span tables, marked to indicate which sizes and grades are being used; if structural

composite lumber is being substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.

D. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.05 **DELIVERY, STORAGE, AND HANDLING**

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

1.06 **WARRANTY**

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 **GENERAL REQUIREMENTS**

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

1. Species: Douglas Fir-Larch, unless otherwise indicated.

2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.

3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.02 **DIMENSION LUMBER FOR CONCEALED APPLICATIONS**

A. Grading Agency: West Coast Lumber Inspection Bureau; WCLIB (GR).

B. Grading Agency: Western Wood Products Association; WWPA G-5.

C. Sizes: Nominal sizes as indicated on drawings, S4S.

D. Moisture Content: S-dry or MC19.

E. Stud Framing (2 by 2 through 2 by 6):

1. Species: Douglas Fir-Larch.

2. Grade: No. 2.

F. Joist, Rafter and Small Beam Framing (2 by 6 through 4 by 16):

1. Species: Douglas Fir-Larch.

2. Grade: No. 1 and Better.

3. Species and Grades: As indicated on drawings for various locations.

G. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:

1. Lumber: S4S, No. 2 or Standard Grade.

2. Boards: Standard or No. 3.

2.03 **STRUCTURAL COMPOSITE LUMBER**

A. Structural Composite Lumber: Factory fabricated beams, headers, and columns, of sizes and types indicated on drawings; structural capacity as published by manufacturer.

2.04 **CONSTRUCTION PANELS**

A. Wood Sheathing (Structural): Sheathing on roof surfaces shall be plywood only. Sheathing on walls shall be Plywood T&G. Plywood shall be 5 Ply minimum where indeicated as

performance category 3/4" or thicker. wood sheathing shall be "Structural I" conforming to PSI-09 and / or PS2-10. All panels shall bear the stamp of an approved grading agency. Span rating shall be provided as follows:

1. Roof framing at 32" o.c. (48/24)
2. Roof framing at 24" o.c. (32/16)
3. All wood sheathed walls shall be blocked at all panel edges unless noted otherwise.

2.05 **ACCESSORIES**

A. Fasteners and Anchors:

1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.

B. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.

1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.

C. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.

D. Termite-Resistant Sill Flashing: Self-adhesive membrane; polyethylene film bonded to sealant.

1. Thickness: 40 mils (0.040 inch).
2. Termite Resistance: 100 percent when tested in accordance with ICC-ES AC380.
3. Water Vapor Permeance: 0.035 perm, maximum, when tested in accordance with ASTM E96/E96M.
4. Manufacturers:
   a. Polyguard Barrier Systems, Inc, a division of Polyguard Products, Inc; TERM Flashing Barrier: www.polyguardbarriers.com/#sle.
   b. or Architect / Owner prior approved equal.
   c. Substitutions: See Section 01 60 00 - Product Requirements.

E. Sill Flashing: As specified in Section 07 62 00.

F. Construction Adhesives: Adhesives complying with ASTM C557 or ASTM D3498.

1. Manufacturers:
   a. Franklin International, Inc; Titebond Fast Set Polyurethane Construction Adhesive: www.titebond.com/#sle.
   b. or Architect / Owner approved equal.

G. General Purpose Construction Adhesives:

1. Manufacturers:
   a. ADFAST Corporation; ADBOND EX 5690: www.adfastcorp.com/#sle.
   b. or Architect / Owner approved equal.

2.06 **FACTORY WOOD TREATMENT**

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Preservative Treatment:

1. Manufacturers:
    a. Lonza Group: www.wolmanizedwood.com/#sle.
    b. Koppers Performance Chemicals, Inc: www.koppersperformancechemicals.com/#sle.
    c. Viance, LLC; Preserve ACQ: www.treatedwood.com/#sle.
    d. or Architect / Owner approved equal.
    e. Substitutions: See Section 01 60 00 - Product Requirements.
2. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
    a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
    b. Treat lumber exposed to weather.
    c. Treat lumber in contact with roofing, flashing or waterproofing.
    d. Treat lumber in contact with masonry or concrete.
    e. Treat lumber less than 18 inches above grade.
    f. Treat lumber in other locations as indicated.
3. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
    a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
    b. Treat plywood in contact with roofing, flashing or waterproofing.
    c. Treat plywood in contact with masonry or concrete.
    d. Treat plywood less than 18 inches above grade.
    e. Treat plywood in other locations as indicated.
4. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA U1, Use Category UC4A, Commodity Specification A using waterborne preservative.
    a. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.

PART 3 EXECUTION

3.01 PREPARATION

A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches and seal.

B. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.

C. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 **FRAMING INSTALLATION**

A. Refer to structural drawings for additional information.

B. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.

C. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

D. Install structural members full length without splices unless otherwise specifically detailed.

E. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes, AWC (WFCM) Wood Frame Construction Manual and as noted on the structural drawings..

F. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.

G. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.04 **BLOCKING, NAILERS, AND SUPPORTS**

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

E. Provide the following specific non-structural framing and blocking:

1. Cabinets and shelf supports.
2. Wall brackets.
3. Handrails.
4. Grab bars.
5. Towel and bath accessories.
6. Wall-mounted door stops.
7. Chalkboards and marker boards.
8. Wall paneling and trim.
9. Joints of rigid wall coverings that occur between studs.

3.05 **ROOF-RELATED CARPENTRY**

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at all roof openings except where prefabricated curbs are specified and where specifically indicated otherwise. Form corners by alternating lapping side members.

3.06 INSTALLATION OF CONSTRUCTION PANELS

A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.

1. At long edges provide solid edge blocking where joints occur between roof framing members.
2. Nail panels to framing; staples are not permitted.

B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws or staples.

1. Use plywood at building exterior.

C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.

1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
3. Install adjacent boards without gaps.
4. Size: 48 by 96 inches, installed horizontally at ceiling height.
5. Size and Location: As indicated on drawings.

3.07 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.08 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Coordination of ABAA Tests and Inspections:

1. Provide testing and inspection required by ABAA QAP.
2. Notify in ABAA writing of schedule for air barrier work. Allow adequate time for testing and inspection.
3. Cooperate with ABAA testing agency.
4. Allow access to air barrier work areas and staging.
5. Do not cover air barrier work until tested, inspected, and accepted.

3.09 CLEANING

A. Waste Disposal: Comply with the requirements of Section 01 74 19 - Construction Waste Management and Disposal.

1. Comply with applicable regulations.
2. Do not burn scrap on project site.
3. Do not burn scraps that have been pressure treated.
4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

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SECTION 06 17 33
WOOD I-JOISTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Division 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Wood I-joists for roof framing.

B. Bridging, bracing, and anchorage.

C. Framing for openings.

D. Preservative treatment of wood.

1.03 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Installation requirements for miscellaneous framing.

B. Section 06 10 00 - Rough Carpentry: Material requirements for blocking, plates, and miscellaneous framing.

1.04 REFERENCE STANDARDS

A. ASTM D5055 - Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists 2019, with Editorial Revision (2020).

B. AWPA U1 - Use Category System: User Specification for Treated Wood 2018.

C. PS 2 - Performance Standard for Wood-Based Structural-Use Panels 2010.

1.05 DESIGN REQUIREMENTS

A. Refer to Structural Drawings

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's literature describing materials, dimensions, allowable spans and spacings, bearing and anchor details, bridging and bracing requirements, and installation instructions; identify independent inspection agency.

C. Shop Drawings: Indicate sizes and spacing of joists, bracing and bridging, bearing stiffeners, holes to be cut (if any), and framed openings between joists.

D. Certificate: Certification by joist manufacturer that products delivered are of the same design and construction as those evaluated by the independent inspection agency.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in manufacturer's original packaging with manufacturer's name and product identification intact and legible.

B. Protect products from damage due to weather and breakage.

C. Protect joists from warping or other distortion by stacking in upright position, braced to resist movement, with air circulation under coverings and around stacks.

D. Handle individual joists in the upright position.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood I-Joists:

1. Boise Cascade Company: www.bc.com/#sle.
2. Louisiana-Pacific Corporation: www.lpcorp.com/#sle.
3. Weyerhaeuser Company: www.weyerhaeuser.com/#sle.
4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

A. Wood I-Joists: Solid lumber top and bottom flanges and oriented strand board (OSB) webs bonded together with structural adhesive, with published span rating to meet project requirements.

1. Span Rating: Established and monitored in accordance with ASTM D5055 by independent inspection agency.
2. Oriented Strand Board: Comply with PS 2.
3. Adhesive: Tested for wet/exterior service in accordance with ASTM D2559.
4. Fabrication Tolerances:
    a. Flange Width: Plus/minus 1/32 inch.
    b. Flange Thickness: Minus 1/16 inch.
    c. Joist Depth: Plus 0, minus 1/8 inch.
5. Marking: Mark each piece with depth, joist spacing, and allowable span for joist spacing.
6. Provide bearing stiffeners if required by span rating or joist hanger manufacturer.

B. Wood-Based Components:

1. Wood fabricated from old growth timber is not permitted.

C. Joist Hangers: Refer to Structural Drawings.

D. Joist Bridging: Type, size and spacing recommended by joist manufacturer.

E. Fasteners: Electrogalvanized steel, type to suit application.

2.03 WOOD TREATMENT

A. Factory-Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that supports and openings are ready to receive joists.

B. Verify that field measurements are as indicated on shop drawings.

3.02 PREPARATION

A. Coordinate placement of bearing items.

3.03 ERECTION

A. Install joists in accordance with manufacturer's instructions.

B. Set structural members level and plumb, in correct position.

C. Make provisions for erection loads and for sufficient temporary bracing to maintain structure plumb and in true alignment until completion of erection and installation of permanent bracing.

D. Do not field cut or alter structural members without approval of Architect and Structural Engineer.

E. Install permanent bridging and bracing.

F. Install headers and supports to frame openings required.

G. Frame openings between joists with lumber in accordance with Section 06 10 00.

H. Coordinate installation of sheathing/decking with work of this section and Structural Drawings..

3.04 **TOLERANCES**

A. Framing Members: 1/2 inch maximum, from true position.

3.05 **SCHEDULES**

A. Refer to Structural Drawings for sizing and spacing.

END OF SECTION

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SECTION 06 41 00
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Divsion 01 specifications shall appply to all sections of the Contract Documents, including all specifications, drawings, addenda or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Specially fabricated cabinet units.

B. Countertops.

C. Hardware.

D. Preparation for installing utilities.

1.03 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.

B. Section 09 91 23 - Interior Painting: Field finishing of cabinet exterior.

C. Section 12 36 00 - Countertops.

1.04 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards 2014, with Errata (2018).

B. AWI (QCP) - Quality Certification Program Current Edition.

C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1 2016, with Errata (2018).

D. BHMA A156.9 - American National Standard for Cabinet Hardware 2015.

E. NEMA LD 3 - High-Pressure Decorative Laminates 2005.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.

1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.

2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

C. Product Data: Provide data for hardware accessories.

D. Product Data: Provide solid surfacing countertop manufacturer's technical litrature indicating physical properties and performance criteria for solid surfacing matrials and related components.

E. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet, countertop and shelf unit substrate and finish.

F. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards and locksets, demonstrating hardware design, quality, and finish.

G. Submit 2-2 inch by 2 inch samples of each type of solid surfacing materials.

H. Informational submittals for Solid Surface Countertops:

1. Submit Manufacturer's written installation instructions.
2. Maintenance Data: Manufacturer's recommended cleaning and maintenance procedures. Include in project closeout documents.

1.07 **QUALITY ASSURANCE**

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
2. Single Source Responsibility: Provide and install this work from single fabricator.

B. Quality Certification:

1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/#sle.
2. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
3. Provide designated labels on shop drawings as required by certification program.
4. Provide designated labels on installed products as required by certification program.
5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
6. Replace, repair, or rework all work for which certification is refused.

1.08 **DELIVERY, STORAGE, AND HANDLING**

A. Protect units from moisture damage.

B. Deliver, store, handle and protect solid surfacing materials in accordance with manufacturer's written instructions. Provide protective coverings of suitable material. Take special precautions at corners.

C. Do not deliver or install solid surfacing or casework until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at design levels during the remainder of the construction period.

1.09 **FIELD CONDITIONS**

A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

1.10 **SEQUENCING**

A. Sequence work to permit installation of adjacent affected construction and plumbing rough in.

B. Coordinate sizes and locations of plumbing cutouts, and other related work specified in other sections to ensure that all interior architectural woodwork can be suported and installed as indicated.

PART 2 PRODUCTS

2.01 **CABINETS**

A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Plastic Laminate Faced Cabinets: Custom grade.

C. Cabinets at Kitchen and Reception, includes shelves at Janitor:

1. Finish - Exposed Exterior Surfaces: Decorative laminate.
2. Finish - Exposed Interior Surfaces: Decorative laminate.
3. Finish - Semi-Exposed Surfaces: Decorative laminate
4. Finish - Concealed Surfaces: Manufacturer's option.
5. Door and Drawer Front Edge Profiles: Square edge with thin applied band.
6. Casework Construction Type: Type B - Face-frame or as shown on the drawings.
7. Cabinet Design Series: As indicated on drawings.
8. Adjustable Shelf Loading: 50 lbs. per sq. ft.

2.02 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

2.03 LAMINATE MATERIALS

A. Manufacturers:

1. As identified on the drawings
2. or Architect / Owner prior approved equal.

2.04 COUNTERTOPS

A. Provide solid surface countertops as identified on the drawings.

1. Fabricate and Install per manufacturer's recommendations.
2. Manufacturer's
   a. Formica
   b. or Architect / Owner prior approved.
3. Face profile as identified on the drawings.
4. Design Load: Deflection is limited to 1/360 and design items with sufficient strength for handling stresses.
5. Warranty: Provide manufacturer's 10 year limited warranty covering replacement of the material except for non-covered conditions as follows;
   a. Minor stains, scratches, water spots, and burns that may be corrected by techniques covered in the manufacturer's Use and Care Guide.
   b. Failure of solid surfacing joint materials
   c. Failure due to structural failure of base cabinets or solid surfacing substrate construction.
   d. Use for purposes other than indoor finish material.
6. Materials: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2
7. Colors and patterns: Match as indicated on drawings.
8. Fabrication:
   a. Assemble work at shop following manufacturer's printed fabrication instructions and deliver to job ready for installation. Manufacture in largest practical pieces for handling and shipping without seams.
   b. Fabricate countertops and backsplashes and side splashes where noted on the drawings to profiles and sizes indicated.

c. Manufacture solid surfacing in accordance with manufacturer's written instructions and specifications.

9. Field Measurements: Field verify dimensions prior to fabrication.

2.05 **ACCESSORIES**

A. Adhesive: Type recommended by fabricator to suit application.

B. Fasteners: Size and type to suit application.

C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.

D. Concealed Joint Fasteners: Threaded steel.

E. Grommets: Standard plastic grommets for cut-outs, in color black.

2.06 **HARDWARE**

A. Hardware: BHMA A156.9, types as recommended by manufacturer for quality grade specified.

B. Adjustable Shelf Supports: Standard side-mounted system using multiple holes for pin supports and coordinated self rests, polished chrome or satin chrome finish, for nominal 1 inch spacing adjustments.

C. Countertop Supports:

1. As recommended by manufactuer and to be in compliance with the drawings.

D. Drawer and Door Pulls: See below.

1. Product: 5" center to center, Transitional Metal Pull - 650, black stainless steel, manufactured by Richelieu.

2. or Architect / Owner approved equal.

E. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, in locations noted on the drawings. Lock finish shall be black..

F. Catches: Magnetic. As recommended by cabinet manufacturer for heavy duty use.

G. Drawer Slides:

1. Type: Full extension.

2. Static Load Capacity: Commercial grade.

3. Mounting: Side mounted.

4. Stops: Integral type.

5. Features: Provide self closing/stay closed type.

6. Manufacturers:

a. Accuride International, Inc; Heavy-Duty Drawer Slides: www.accuride.com/#sle.

b. Knape & Vogt Manufacturing Company; Heavy-Duty Drawer Slides: www.knapeandvogt.com/#sle.

H. Hinges: European style concealed self-closing type, steel with polished finish.

1. Manufacturers:

a. Grass America Inc; TEC Self-Close: www.grassusa.com/#sle.

I. Soft Close Adapter: Concealed, frame-mounted, screw-adjustable damper ; steel with polished finish.

1. Manufacturers:

a. Grass America Inc; Unisoft: www.grassusa.com/#sle.

2.07 **FABRICATION**

A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.

B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.

C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.

D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.

1. Cap exposed plastic laminate finish edges with material of same finish and pattern.

E. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 **INSTALLATION**

A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.

B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.

C. Use fixture attachments in concealed locations for wall mounted components.

D. Use concealed joint fasteners to align and secure adjoining cabinet units.

E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

3.03 **ADJUSTING**

A. Adjust moving or operating parts to function smoothly and correctly.

3.04 **CLEANING**

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

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SECTION 06 83 16
FIBERGLASS REINFORCED PANELING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Division 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Fiberglass reinforced plastic panels.

B. Trim.

1.03 REFERENCE STANDARDS

A. 9 CFR 416.2 - Regulatory Requirements Under the Federal Meat Inspection Act and the Poultry Products Inspection Act, Part 416-Sanitation current edition.

B. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics 2010 (Reapproved 2018).

C. ASTM D2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of Barcol Impressor 2013a.

D. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber 2016.

E. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels 2017.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2019b.

G. ISO 2812-1 - Paints and varnishes -- Determination of resistance to liquids -- Part 1: Immersion in liquids other than water 2017.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Samples: Submit two samples 6" by 6" inch in size illustrating material and surface design of panels.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fiberglass Reinforced Plastic Panels:

B. Manufacturer's:

1. As noted on Drawings

2. or Architect / Owner prior approved equal.

2.02 **PANEL SYSTEMS**

A. Wall Panels:

1. Panel Size: 4 by 8 feet.
2. Panel Thickness: 0.10 inch.
3. Surface Design: Refer to Drawings.
4. Color: Refer to Drawings.
5. Attachment Method: Adhesive only, sealant joints, no trim.

2.03 **MATERIALS**

A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.

1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
3. Scratch Resistance: Barcol hardness score greater than 35, when tested in accordance with ASTM D2583.
4. Impact Strength: Greater than 6 ft lb force per inch, when tested in accordance with ASTM D256.
5. Sanitation and Cleanability: Comply with 9 CFR 416.2.
6. Chemical Cleanability: Excellent chemical resistance to common cleaners and detergents when tested in accordance with ISO 2812-1.

B. Trim: Vinyl; color coordinating with panel.

C. Fasteners: Nylon rivets.

D. Adhesive: Type recommended by panel manufacturer.

E. Sealant: Type recommended by panel manufacturer; white.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify existing conditions and substrate flatness before starting work.

B. Verify that substrate conditions are ready to receive the work of this section.

3.02 **INSTALLATION - WALLS**

A. Install panels in accordance with manufacturer's instructions.

B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.

C. Pre-drill fastener holes in panels, 1/8 inch greater in diameter than fastener, spaced as indicated by panel manufacturer.

D. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.

E. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.

F. Install panels with manufacturer's recommended gap for panel field and corner joints.

G. Drive fasteners to provide snug fit, and do not over-tighten.

H. Place trim on panel before fastening edges, as required.

I. Fill channels in trim with sealant before attaching to panel.

J. Install trim with adhesive and screws or nails, as required.

K. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.

L. Remove excess sealant after paneling is installed and prior to curing.

END OF SECTION

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SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction and Special Conditions, including General Conditions and Supplementary Conditions, and Division 01 specifications, drawings, addenda, or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Board insulation at perimeter foundation wall and underside of floor slabs.

B. Batt insulation and vapor retarder in exterior wall construction.

C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

D. Roofing insulation specified in Section 07 54 23 TPO Roofing

1.03 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 03 30 00 - Cast-in-Place Concrete: Field-applied termiticide for concrete slabs and foundations.

C. Section 05 40 00 - Cold-Formed Metal Framing: Board insulation as wall sheathing.

D. Section 06 05 73 - Wood Treatment: Field-applied termiticide for wood.

E. Section 06 10 00 - Rough Carpentry: Supporting construction for batt insulation.

F. Section 075423 Thermolplstic Membrane Roofing: Insulation specified as part of roofing syste,.

1.04 REFERENCE STANDARDS

A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2019.

B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2019b.

D. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C 2019a.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria and product limitations.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.06 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Thermal Insulation Manufacturers:

1. DOW Chemical Co "Styrofoam".
2. Owens Corning "Foamular".
3. Architect / Owner prior approved equal

2.02 **APPLICATIONS**

A. Insulation Under Concrete Slabs: Extruded polystyrene (XPS) board.

B. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.

C. Insulation in Wood Framed Walls: Batt insulation with separate vapor retarder.

D. Insulation Over Roof Deck: Extruded polystyrene (XPS) board.

1. See Section 07 54 23 TPO Roofing

2.03 **FOAM BOARD INSULATION MATERIALS**

A. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578 with either natural skin or cut cell surfaces.

1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
4. Type and Thermal Resistance,: Type IV, 5.0 (0.88) per 1 inch thickness at 75 degrees F mean temperature. Comply with R-values listed on the drawings.
5. Board Sizes and Thickness: Provide per sizes indicated on drawings, with a minimum 1 1/2" thickness or as needed to meet R-Values listed on drawings.
6. Board Edges: Square.
7. Type and Water Absorption: Type IV, 0.3 percent by volume, maximum, by total immersion.
8. Manufacturers:
    a. Dow Chemical Company; STYROFOAM HIGHLOAD 40: www.dowbuildingsolutions.com/#sle.
    b. Kingspan Insulation LLC; GreenGuard XPS Type IV, 25 psi: www.kingspan.com/#sle.
    c. Owens Corning Corporation; FOAMULAR Extruded Polystyrene (XPS) Insulation: www.ocbuildingspec.com/#sle.
    d. Architect / Owner prior approved equal.

2.04 **BATT INSULATION MATERIALS**

A. Where batt insulation is indicated, provide and install unfaced glass fiber.

B. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit in widths required for snug fit freeof gaps and voids.

1. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
2. Thermal Resistance: R Value 21 at exterior walls
3. Thickness: For snug fit in between framing members.
4. Manufacturers:

a. CertainTeed Corporation: www.certainteed.com/#sle.

b. Johns Manville: www.jm.com/#sle.

c. Owens Corning Corporation; EcoTouch PINK FIBERGLAS Insulation: www.ocbuildingspec.com/#sle.

d. Architect / Owner prior approved equal.

2.05 **ACCESSORIES**

A. Vapor Barrier (polyethylene film) Clear polyethylene film 6 mil thick.

B. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive. 2" wide minumum.

1. Application: Sealing of interior circular penetrations, such as pipes or cables.

2. Width: Are required for application.

C. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

D. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.

E. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities or materials or substances that may impede adhesive bond where used.

C. Verify that insulation boards and adjacent materials are comptabile.

3.02 **BOARD INSTALLATION AT FOUNDATION PERIMETER**

A. Adhere a 6 inch wide strip of polyethylene sheet over construction, control and expansion joints with double beads of adhesive each side of joint or as recommended by manufacturer..

1. Tape seal joints.

2. Extend sheet full height of joint.

B. Apply adhesive to back of boards:

1. Three continuous beads per board length.

2. Full bed 1/8 inch thick.

3. and as recommended by manufacturer.

C. Install boards horizontally on foundation perimeter.

1. Place boards to maximize adhesive contact.

2. Install in running bond pattern.

3. Butt edges and ends tightly to adjacent boards and to protrusions.

D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 **BOARD INSTALLATION UNDER CONCRETE SLABS**

A. Place insulation under slabs on grade after base for slab has been compacted.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.04 **BATT INSTALLATION**

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. At wood framing, place vapor retarder on warm side of insulation by stapling at 6 inches on center. Lap and seal sheet retarder joints over member face.

F. Tape seal tears or cuts in vapor retarder.

G. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

3.05 **FIELD QUALITY CONTROL**

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

3.06 **PROTECTION**

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 25 00
WEATHER BARRIERS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementray Conditions, and Division 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Weather Barrier Membrane

B. Seam Tape

C. Flashing

D. Fasteners

1.03 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Water-resistive barrier under exterior cladding.

B. Section 07 21 00 - Thermal Insulation: Vapor retarder installed in conjunction with batt insulation.

C. Section 07 62 00 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.

D. Section 07 92 00 - Joint Sealants: Sealing building expansion joints.

1.04 REFERENCE STANDARDS

A. ASTM C920: Standard Specification for Elastomeric Sealants

B. ASTM C1193: Standard Guide for Use of Joint Sealants

C. ASTM D882: Test Method for Tensile Properties of Thin Plastic Sheeting

D. ASTM D1117: Standard Guide for Evaluating Non-woven Fabrics

E. ASTM E84: Test Method for Surface Buring Characteristics of Building Materials

F. ASTM E96: Test Method for Water Vapor Transmission of Materials

G. ASTM E 1677: Specification for Air Retarder Material or System for Framed Building Walls

H. ASTM E2178: Test Method for Air Permeance of Building Materials

I. ASTM E2357: Standard Test Method for Detrmining Air Leakage of Air Barrier Assemblies.

J. AATCC-American Association of Textile Chemists and Colorists; Test Method 127 Water Resistance: Hydrostatic Pressure Test.

K. TAPPI Test Method T-410: Grams of Paper and Paperboard (weight per Unit Area)

L. TAPPI Test Method T-460: Air Resistance (Gurley Hill Method)

M. ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers 2016.

N. ICC-ES AC148 - Acceptance Criteria for Flexible Flashing Materials 2017.

O. ICC-ES AC212 - Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers over Exterior Sheathing 2015.

P. ICC-ES AC380 - Acceptance Criteria for Termite Physical Barrier Systems 2014, with Editorial Revision (2017).

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on material characteristics.

C. Shop Drawings: Provide drawings of special joint conditions.

D. Manufacturer's Installation Instructions: Indicate preparation, installation methods and storage and handling criteria.\

E. Samples: Weather Barrier Membrane, minimum 8 1/2" x 11"

F. Quality Assurance Submittals;

1. Design Data, Test Reports; Provide manufacturer test reports indicating product compliance with indicated requirements.

2. Manufacturer's Field Service Reports: Provide site reports from manufacturer's authorized field service representative, indicating observation of weather barrier assembly installation.

G. Closeout Submittals:

1. Weather Barrier Warranty: Manufacturer's executed warranty form with authorized signatures and endorsements indicating date of Substantial Completion.

1.06 **QUALITY ASSURANCE**

A. Qualifications

1. Installer shall have experience with installation of commercial weather barrier assemblied under similar conditions.

2. Installation shall be in accordance with weather barrier manufacturer's written installation guidelines and recommendations.

3. Source Limitations: Provide commercial weather barrier and accesory materials produced by single manufactuer.

4. Installation includes all items tape, fasteners etc required by the manufactuer to have a complete assembly to meet warranty requirements.

1.07 **MOCK-UP**

A. Install mock-up using approved weather barrier assembly including fasteners, flashing tape and related accessoried per manufactuer's current printed instructions and recommendations.

B. Mock up

1. Size: 10 feet x 10 feet and around a window opening.

2. Mock up can be constructed on actual site conditions and may remain if approved by manufactuer's representative and Architect.

3. Mock-ups not approved must be fully removed and reinstalled per manufacturer's written instructions, and approved in writing by manufacturer's representative and Architect.

4. Contact manufacturer's designated representative and Architect prior to weather barrier assmebly installation to perform required mock-up visual inspection and analysis as required for warranty.

1.08 **PRE-INSTALLATION MEETINGS**

A. Hold a pre-installation conference two weeks prior to start of weather barrier installation. Attendees shall include Contractor, Architect, Installer, Owner, and Weather Barrier Manufacturr's Designated Representative.

B. Review all related project requirements and submittals, status of substrate work and preparation, areas of potential conflict and interface, availability of weather barrier assmebly materials and components. Installer's training requirements, equipment, facilities and scaffolding, and coordinate methods, procedures, and sequencing requirements for full and proper installation, integration and protection.

1.09 **FIELD CONDITIONS**

A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

1.10 **DELIVERY, STORAGE AND HANDLING**

A. Deliver weather barrier materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Store weather barrier materials as recommended by weather barrier manufacturer.

1.11 **SCHEDULING**

A. Review requirements requirements for sequencing of installation of weather barrier assmebly with installation of windows, doors, louvers, and flashings to provide a weather tight assembly.

B. Schedule installation of weather barrier materials and exterior cladding within nine months of weather barrier assembly installation.

1.12 **SPECIAL WARRANTY**

A. special weather barrier manufacturer's warranty for weather barrier for a period of ten (10) years from date of purchase.

B. Pre-Installation meetings and jobsite observations by weather barrier manufacturer for warranty are required.

C. Warranty Areas: Building Envelope

PART 2 PRODUCTS

2.01 **WEATHER BARRIER**

A. Manufacturer's

1. Basis of Design: DuPont: 4417 Lancaster Pike, Chestnut Run Plaza 728, Wilington, DE 19805: 1-800-44-TYVEK (8-9835): http://www.construction.tyvek.com

2. or Architect / Owner prior approved equal.

B. Materials

1. Spunbonded polyolefin, non-woven, non-perforated, weather barrier is based upon Dupont Tyvek Commercial Wrap and related assembly components.

2. Performance Characteristics:

a. Air Pentration: 0.001 cfm/ft^2 at 75 Pa, when tested in accordance with ASTM E2178, Type I per ASTM E1677. $\leq$ 0.04 cfm/ft^2 at 75 Pa, when tested in accordance with ASTM E2357.

b. Water Vapor Transmission: 28 perms, when tested in accordance with ASTM E96, Method B.

c. Water Penetration Resistance: 280 cm when tested in accordance with AATCC Test Method 127.

d. Basis Weight: 2.7 oz/yd^2, when tested in accordance with TAPPI Test Method T-410.

e. Air Resistance: Air infiltration at >1500 seconds, when tested in accordance with TAPPI Test Method T-460.

f. Tensile Strength: 38/35 lbs / in, when tested in accordance with ASTM D882, Method A.

g. Tear Resistance: 12 / 10 lbs, when tested in accordance with ASTM D1117.

h. Surface Burning Characteristics: Class A, when tested in accordance with ADTM E 84. Flame Spread: 10, Smoke Developed 10.

2.02 **ACCESSORIES**

A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.

B. Fasteners: As recommended by weather barrier manufacturer.

C. Sealants: Provide sealants that comply with ASTM C920, elastomeric polymer sealant to maintain watertight conditions.

1. Products:

a. DuPont Commercial Sealant

b. As recommended by the weather barrier manufacturer.

D. Adhesives:

1. Provide adhesive recommended by weather manufacturer.

E. Primers:

1. Provide flashing manufactuers recommended primer to assist in adhesion between substrate and flashing.

2. Products

a. 3M High Strength 90

b. Denso Butyl Spray

c. or as recommended by flashing manufacturer.

F. Flashing:

1. DuPont FlexWrap NF, as distributed by DuPont: Flexible membrane flashing materials for window openings and penetrations.

2. DuPont Thru-Wall Surface Adhered Membrane with Integrated Drip Edge: Thru-Wall flashing membrane materials for flashing at changes of direction or elevation, and at transitions between different assembly materials.

3. DuPont Straight flash or DuPont Straight Flash VF, as recommended by flashing manufacturer.

4. Preformed Inside and Outside Corners and End Dams as distributed by DuPont: Preformed three dinmensional shapes to complete the flashing system used in conjunction with DuPont Thru Wall Flashing.

5. All materials for weather system assembly shall be by the same manufacturer.

6. Provide comparable materials where other manufacturer product is utilized and prior approved by Architect/Owner.

G. Termite-Resistant Barrier Foundation Flashing: Peel and stick flashing membrane; polyethylene film bonded to sealant.

1. Thickness: 40 mil, 0.040 inch overall.

2. Roll Width: 12 inch.

3. Roll Length: 75 feet.
4. Termite Resistance: 100 percent when tested in accordance with ICC-ES AC380.
5. Manufacturers:
    a. Polyguard Barrier Systems, Inc, a division of Polyguard Products, Inc; TERM Flashing Barrier: www.polyguardbarriers.com/#sle.
    b. or Architect / Owner prior approved equal.
6. Install per manufacturer's written instruction and coordinate installation with weather barrier installation.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify that surfaces and conditions are ready to accept the work of this section and acceptable with weather barrier manufacturer's recommended tolerances prior to installation of weather barrier and accessories.

3.02 **PREPARATION**

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive adhesives in accordance with manufacturer's instructions.

3.03 **INSTALLATION**

A. Install materials in accordance with manufacturer's instructions.

B. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer's recommendations.

C. Start Weather Barrier prior to installation of doors and windows.

D. Start weather barrier installation at a building corner, leaving 6-12 inches of barrier extended beyond corner to overlap.

E. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level.

F. Sill plate / Sheating Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.

G. Window and Door Openings: Extend weather barrier completely over openings.

H. Overlap weather barrier 12 inches at corners, and 6 inches at seams.

I. Weather Barrier Attachment:
    1. Attach weather barrier to studs throuigh exterior sheathing. Secure using weather barrier manufacturer's recommended fasteners, space 12-18 inches vertically on center along stud line, and at each stud spacing but not more than 24" maximum horizontally.

J. Apply 4 inch by 7 inch piece of DuPont Straight Flash or weather barrier manufactuer approved alternate to weather barrier membrane prior to installation of cladding anchors.

3.04 **SEAMING**

A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.

B. Seal any tears or cuts as recommended by weather barrier manufacturer.

3.05 **OPENING PREPARATION**

A. Flush cut weather barrier at edge of sheathing around full perimeter of opening.

B. Cut a head flap at 45 degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.06 **FLASHING INSTALLATION**

A. Cut 9 inch wide flex wrap (material as recommended by manufactuer) a minimum of 12 inches longer than width of sill rough opening. Apply primer as required by manufacturer.

B. Cover horizontal sill by alinging flex wrap (material as recommended by manufacturer) edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into to corners by working in along the sill before adhering up the jambs.

C. Fan flex wrap (material as recommended by manufactrer) at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges where required by manufacturer.

D. Apply 9 inch wide strips of straight flashing (material as recommended by manufacturer) at jambs. Align flashing with interior edge of jamb framing. Start straight flashing (material as recommended by manufacturer) at head of opening and lap sill flashing down to sill sill.

E. Spray apply primer to top 6 inches of jambs and exposed sheathing.

F. Install flex wrap (material as recommended by manufacturer) at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.

G. Coordinate flashing with window installation.

H. On exterior, install backer rod in joint between window frame and flashed rough framing. Apply sealant at jambs and head, leaving sill unsealed. Apply sealants in accordance with sealant manufacturer's instructions and ASTM C 1193.

I. Posistion weather barrier head flap across head flashing. Adhere 4 inch wide straight flashing (material as recommended by manufacturer) over 45 degree seams.

J. Tape top of window in accordance with manufactuer's recommendations.

K. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply selant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.

L. Installation at doors is similar to items above.

3.07 **THRU-WALL FLASHING INSTALLATION**

A. Apply primer per amnufactuer's written instructions.

B. Install preformed corners and end dams bedded in sealant in appropriate locations along wall.

C. Starting at a corner, remove release sheet and apply membrane to primed surfaces in lengths of 8 to 10 feet.

D. Extend membrane through wall and leave 1/4" minimum exposed to form drip edge.

E. Roll flashing into place. Ensure continuous and direct contact with substrate.

F. Lap ends and overlap preformed corners 4 inches minimum. Seall all laps with sealant.

G. Trim exterior edge of membrane 1 inch and secure metal drip edge per manufacturer's written instructions.

H. Terminate membrane on vertical wall.

I. Apply sealant bead at each termination

3.08 **THRU WALL FLASHING / WEATHER BARRIER INTERFACE AT BASE OF WALL**

A. Overlap thru-wall flashing with weather barrier by 6 inches.

B. Mechanically fasten bottom of weather barrier through top of thru-wall flashing.

C. Seal vertical and horizontal seams with tape or sealing membrane.

3.09 **THRU-WALL FLASHING / WEATHER BARRIER INTERFACE AT SHELF ANGLE**

A. Seal weather barrier to bottom of shelf angle with sealing membrane.

B. Apply thru-wll flashing to top of shelf angle. Overlap thru-wall flashing with weather barrier by 6 inches.

C. Seal bottom of weather barrier thru-wall flashing with tape or sealing membrane.

3.10 **THRU-WALL FLASHING / WEATHER BARRIER INTERFACE AT WINDOW / DOOR HEAD.**

A. Cut flap in weather barrier at window / door head.

B. Prime exposed sheathing.

C. Install lintel as required. Verify end dams extend 4 inches minimum beyond opening.

D. Install end dams bedded in sealant.

E. Adhere 2 inches minimum thru-wll flashing to wall sheathing. Overlap lintel with thru-wall flashing and extend 1/4 inch minimum beyond outside edge of lintel to form drip edge.

F. Apply sealant along thru-wall flashings edges.

G. Fold weather barrier flap back into place and tape bottom edge to thru-wall flashing.

H. Tape diagonal cuts of weather barrier.

I. Secure weather barrier flap with fasteners.

3.11 **FIELD QUALITY CONTROL**

A. Notify manufacturer's designated representative to perform required periodic observations of weather barrier assembly installation.

3.12 **PROTECTION**

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

B. Do not leave paper- or felt-based barriers exposed to weather for longer than one week.

C. Protect weather barriers from damage.

END OF SECTION

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SECTION 07 46 16
ALUMINUM SIDING AND ROOFING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Division 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding/construction.

1.02 SUMMARY

A. Section includes aluminum siding, soffit and roofing.

B. Related Requirements:

1. Section 051200 Structural Steel Framing
2. Section 061000 "Rough Carpentry" for wood furring, grounds, nailers, and blocking.
3. Section 062013 "Exterior Finish Carpentry" for exterior wood siding

1.03 COORDINATION

A. Coordinate siding, soffit and roofing installation with flashings and other adjoining construction to ensure proper sequencing.

1.04 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1.05 ACTION SUBMITTALS

A. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, colors and finishes as noted on the drawings.

B. Samples for Verification: For each type, color, texture, and pattern required.

1. 12-inch- (300-mm-) long-by-actual-width Sample of siding.

1.06 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of aluminum siding and soffit.

B. Research/Evaluation Reports: For each type of aluminum siding required, from ICC-ES.

C. Sample Warranty: For special warranty.

D. Shop Drawings: Show panel layouts, trim installation and panel attachments for each condition and alum siding and soffit condition.

E. Provide completed site condition form for the specified finish to suit project condition.

1.07 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of product, including related accessories, to include in maintenance manuals.

1.08 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish full lengths of aluminum siding and soffit including related accessories, in a quantity equal to 2 percent of amount installed.

1.09 QUALITY ASSURANCE

A. INSTALLERS QUALIFICATIONS

1. Installation of panels and accessories by installers with a minimum of 5 years experience on panel projects of this nature.

B. MANUFACTURER'S QUALIFICATIONS

1. Manufacturer shall have a minimum of 10 years experience supplying metal roofing/siding to the region where the work is to be done.
2. Manufacturer shall provide proof of $2,000,000 liability insurance for their metal roof system and comply with current independent testing and certification as specified. See specific product literature for testing information.
3. Panel manufacturers without full supporting literature, Flashings & Details Guides, Guide Specifications and Technical Support shall not be considered equal to the specified product.

C. REGULATORY AGENCY REQUIREMENTS

1. Comply with UBC and local Building Code requirements if more restrictive than those specified herein.

1.10 **DELIVERY, STORAGE, AND HANDLING**

A. Deliver and store packaged materials in original containers with labels intact until time of use.

B. Store materials on elevated platforms, under cover, and in a dry location. With one end elevated for drainage.

C. Protect against damage and discoloration.

D. Handle panels with non-marring slings.

E. Do not bend panels.

F. Protect panels against standing water and condensation between adjacent surfaces.

G. If panels become wet, immediately separate sheets, wipe dry with clean cloth, and allow to air dry.

H. Remove any strippable film coating prior to installation and do not allow it to remain on the panels in extreme cold, heat or in direct sunlight.

1.11 **WARRANTY**

A. MANUFACTURER'S PRODUCT WARRANTY

1. Manufacturer's standard coating performance warranty, as available for specified installation and environmental conditions
2. Special Warranty: Manufacturer agrees to repair or replace products that fail in materials or workmanship within specified warranty period.
3. Failures include, but are not limited to, the following:
    a. Structural failures including cracking, fading, and deforming.
    b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Fading is defined as loss of color, after cleaning with product recommended by manufacturer, of more than 5 Hunter color-difference units as measured according to ASTM D2244.
5. Warranty Period: 25years from date of Substantial Completion.

B. CONTRACTOR'S WARRANTY

1. Warrant panels, flashings, sealants, fasteners and accessories against defective materials and/or workmanship, to remain watertight and weatherproof with normal

usage for two (2) years following Project Substantial Completion date.

PART 1 PRODUCTS

2.01 **MANUFACTURERS**

A. Source Limitations: Obtain products, including related accessories, from single source from single manufacturer.

2.02 **ALUMINUM SIDING AND ROOFING**

A. Aluminum Siding: Formed and coated product complying with AAMA 1402.

B. MANUFACTURERS

1. Basis of Design: (See drawings for aluminum siding style types, colors and locations)

a. AEP Span, A Division of ASC Profiles Inc, 2110 Enterprise Boulevard, West Sacramento, Calif 95691 800-733-4955, Fontana: 10905 Beech Avenue, Fontana, California 92337, Tacoma Location: 2141 Milwaukee Way, Tacoma, WA 98421

2. Architect / Owner prior approved equal.

2.03 **ALUMINUM SOFFIT**

A. Aluminum Soffit: Formed and coated product complying with AAMA 1402.

B. MANUFACTURERS

1. Basis of Design: (See drawings for aluminum siding style types, colors and locations)

a. AEP Span, A Division of ASC Profiles Inc, 2110 Enterprise Boulevard, West Sacramento, Calif 95691 800-733-4955, Fontana: 10905 Beech Avenue, Fontana, California 92337. Tacoma Location: 2141 Milwaukee Way, Tacoma, WA 98421

2. Architect / Owner prior approved equal.

2.04 **MATERIALS**

A. PANELS

1. Base Metal:

1) Material:

2) (1) Steel conforming to ASTM A792 Zincalume®/Galvalume®, minimum yield 50,000 psi, thickness 24 gauge (standard),

3) (2) [For primers thicker than 0.5 mil or if gauge is 20 or 18] Steel conforming to ASTM A653 (formerly ASTM A446), G-90 Galvanized, minimum yield 40,000 psi, thickness 24 gauge (standard),

4) Protective Coating:

5) (1) Conform to ASTM A792, AZ50 (Zincalume/Galvalume).

6) (2) [For primers thicker than 0.5 mil] Conform to ASTM A924 (formerly ASTM A525) G-90 Galvanized.

7) Exterior Finish:

8) DuraTech® 5000 (Polyvinylidine Fluoride), full 70% Kynar® 500/Hylar 5000® consisting of a baked-on 0.15-0.20 mil corrosion resistant primer and a baked-on 0.70-0.80 mil finish coat with a specular gloss of 10-30% when tested in accordance with ASTM D-523- 89 at 60°.

9) Interior Finish:

10) Primer Coat Material: Corrosion-resistant primer; primer coat dry film thickness: 0.15 mils; finish coat material: polyester paint, finish coat dry film thickness: 0.35 mils.

11) Color: Off-White to Light Gray

12) Color: (choose one)

13) Manufacturer’s standard selection as listed on the drawings.

14) Fabrication

15) Unless otherwise shown or noted on the drawings or specified herein, panels shall be full length. Fabricate flashings and accessories in longest practical lengths.

2.05 **ACCESSORIES**

A. Siding, Soffit and Roofing Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.

1. Provide accessories made from same material and matching color and texture of adjacent siding unless otherwise indicated.

B. Aluminum Accessories: Where aluminum accessories are indicated, provide accessories complying with AAMA 1402.

1. Texture: Smooth
2. Nominal Thickness: Manufacturer’s standard to match siding thickness
3. Finish: Manufacturer's standard to match siding finish.

C. Decorative Accessories: Provide the following aluminum decorative accessories as indicated:

1. Door and window casings
2. Entrance and window head pediments.
3. Louver casings..
4. Fasciae.
5. Moldings and trim.

D. Colors for Decorative Accessories: Match adjacent siding.

E. Flashing: Provide aluminum flashing complying with Section 076200 "Sheet Metal Flashing and Trim" at window and door heads and where indicated.

1. Finish for Aluminum Flashing: Same as aluminum siding

F. Fasteners:

1. As recommended and provided by siding manufacturer.

G. Insect Screening for Soffit Vents: PVC-coated, glass-fiber fabric at soffit.

PART 1 EXECUTION

3.01 **EXAMINATION**

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of aluminum siding and soffit and related accessories.

B. Inspect installed work of other trades and verify that such work is complete to a point where this work may continue.

C. Verify that installation may be made in accordance with approved shop drawings and manufacturer’s written instructions.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 **PREPARATION**

A. FIELD MEASUREMENTS

1. Verify prior to fabrication.
2. If field measurements differ from drawing dimensions, notify Architect/Engineer prior to fabrication
3. Clean substrates of projections and substances detrimental to application.

B. PROTECTION

1. Treat, or isolate with protective material, and contacting surfaces of dissimilar materials to prevent electrolytic corrosion.
2. Require workmen who will be walking on Roofing Panels to wear clean, soft-soled work shoes that will not pick up stones or other abrasive material, which could cause damage or discoloration.
3. Protect work of other trades against damage and discoloration.

C. SURFACE PREPARATION

1. Clean and dry surfaces prior to applying sealant.

3.03 **INSTALLATION**

A. General: Comply with manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

B. PANELS

1. Follow roof and wall panel manufacturer’s directions.
2. Install panel seams (choose one) vertically or horizontally.
3. Lap panels away from prevailing wind direction.
4. Do not stretch or compress panel side-laps.
5. Secure panels without warp or deflection.

C. SOFFITS

1. Follow roof panel manufacturer’s directions.
2. Do not stretch or compress panel side-laps.
3. Secure panels without warp or deflection.

D. ALLOWABLE ERECTION TOLERANCE

1. Maximum Alignment Variation: 1/4 inch in 40 feet.

E. FLASHING

1. Follow manufacturer’s directions and architect approved Shop Drawings.
2. Overlap roof panels at least 6 inches.
3. Install flashings to allow for thermal movement.
4. Remove strippable protective film, if used, immediately preceding flashing installation.

F. CUTTING AND FITTING

1. Neat, square and true. Torch cutting is prohibited where cut is exposed to final view.
2. Openings 6 inches and larger in any direction: Shop fabricate and reinforce to maintain original load capacity.
3. Where necessary to saw cut panels, debur and cut edges.

G. Install joint sealants as specified in Section 079200 "Joint Sealants" and to produce a weathertight installation.

H. Where aluminum siding contacts dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.

3.04 **ADJUSTING AND CLEANING**

A. At the completion of each day’s work and at work completion, sweep panels, flashings and gutters clean. Do not allow fasteners, cuttings, filings or scraps to accumulate.

B. Remove debris from project site upon work completion or sooner if directed.

C. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

D. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

E. PANEL DAMAGE AND FINISH SCRATCHES

1. Do not apply touch-up paint to damage areas that involve minor scratches.

2. Panels or flashings that have paint or substrate damage are subject to be removed and replaced at the discretion of the Architect and Owner, at no additional cost to Architect or Owner.

END OF SECTION

SECTION 07 46 23
WOOD SIDING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Divsion 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Horizontal exterior wood wall siding

B. Trim, flashings, accessories, and fastenings.

1.03 RELATED REQUIREMENTS

A. Section 07 62 00 - Sheet Metal Flashing and Trim: Product requirements for metal flashings and trim associated with wood siding for placement by this section.

B. Section 07 92 00 - Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.

C. Section 09 91 13 - Exterior Painting: Prime and finish painting.

1.04 REFERENCE STANDARDS

A. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17 2018.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating materials, component profiles, fastening methods, jointing details, sizes, surface texture and finishes.

C. Samples: Submit two samples 12 inch by 12 inch in size illustrating surface texture and stain colors with sealer showing each type of stain color for color matching in the fieldand for final color selection by Architect and Owner..

1.06 QUALITY ASSURANCE

A. Grade lumber in accordance with the following:

1. Western Red Cedar: WCLIB (GR).

PART 2 PRODUCTS

2.01 SIDING

A. 1x6 Tongue and Groove, smooth face Western Red Cedar siding. Installed horizontally and in locations indicated on drawings.

B. Finish

1. Contractor shall provide 2 samples for each finsih for review by Architect and Owner for selection.

a. Clear sealer to bring out natural "red tones" of wood.

b. Stained Cherry Color and sealed.

2.02 ACCESSORIES

A. Nails: Corrosion resistant type; non-staining, of size and strength to securely and rigidly retain the work ; prefinished to match siding finish.

B. Flashing: Galvanized steel as specified in Section 07 62 00.

1. Match sheet metal trim colors as noted on the drawings.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify that substrates are ready to receive work.

B. Verify that water-resistive barrier has been correctly and completely installed over substrate.

C. Do not begin until unacceptable conditions have been corrected.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 **PREPARATION**

A. Do not install materials until site pre-finishing is complete and dry.

3.03 **INSTALLATION**

A. Fasten siding in place, level and plumb.

1. Arrange for orderly nailing pattern at 12" oc..
2. Install siding for natural shed of water.
3. Position cut ends over bearing surfaces, and sand cut edges smooth and clean.

B.

C. Install metal flashings and trims at internal and external corners and at locations identified on the drawings. Coordinate work with Aluminum siding manufacturer and installer..

D. Sand work smooth and set exposed nails and screws.

3.04 **TOLERANCES**

A. Maximum Variation From Plumb and Level: 1/8" inch per 10 feet.

B. Maximum Offset From Joint Alignment: 1/16 inch.

END OF SECTION

SECTION 07 54 23
THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE ROOFING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Division 01 Specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Adhered system with thermoplastic polyolefin (TPO) roofing membrane.

B. Insulation, flat and tapered.

C. Vapor barrier.

D. Cover Board

E. Deck sheathing. Refer to Sections XX Sheathing and the Structural Drawings.

F. Flashings.

1.03 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood nailers and curbs.

B. Section 07 62 00 - Sheet Metal Flashing and Trim: .

C. Section 22 10 06 - Plumbing Piping Specialties: Roof drains.

1.04 REFERENCE STANDARDS

A. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board 2019.

B. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing 2019.

C. FM DS 1-28 - Wind Design 2016.

D. FM DS 1-29 - Roof Deck Securement and Above-Deck Roof Components; Factory Mutual System 2016.

E. NRCA (RM) - The NRCA Roofing Manual 2019.

F. NRCA (WM) - The NRCA Waterproofing Manual 2005.

G. UL (DIR) - Online Certifications Directory Current Edition.

H. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings Current Edition, Including All Revisions.

2.01 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D1079 and glossary in NRCA's " The NRCA Roofing Manual: Membrane Roofing Systems" apply to Work of this Section.

2.02 PREINSTALLATION MEETINGS

A. Preliminary Roofing Conference: Before starting roofing installation on wood sheathing decking, conduct a conference at the Project Site.

1. Meet with the Owner, Architect, roofing installer, roofing system manufacturer's representative and installers work that shall interface or affects roofing, including installers of any roof mounted equipment.

2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials. Installers personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review weather forecasts and schedule work accordingly to install materials in accordance with roofing manufacturer's installation requirements.
5. Review deck substrate requirements for conditions and finishes, including flatness and fastening.
6. Review structural loading limitations of roof deck during and after roofing installation.
7. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
8. Review governing regulations and requirements for insurance and certificats if applicable.
9. Review roof observation and repair procedures after roofing installation.

2.03 **SUBMITTALS**

A. See Section 130000 Administrative Requirements

B. Product Data: For each type of product

C. Shop Drawings: Include roof plans, sections, details and attachments to other work, including the following;

1. Layout and thickness of insulation
2. Vapor barrier installation
3. Flashing details and penetrations
4. Tapered insulation layout, thickness, and slopes at crickets.
5. Roof plan showing orientation of roof membrane, fastening specings, and patterns for mechanically fastened roofing system.
6. Insulation fasenting patterns for corner, perimeter, and field of roof locations.
7. Submit manufacturer's standard details, modified details to fit project conditions, and special details.
8. Submit letter, prior to roofing installation from manufacturer stating that all materials and details used by the installer meet the manufacturer's requirements to be warranted by the manufacturer for 20 years.

D. Samples for verification: For the following products;

1. Roof membrane and flashings in color identified in the specifcations.
2. Literature and sample of vapor barrier.

E. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

F. Qualification Data for installer and manufacturer.

G. Manufacturer Certficates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified on "Performance Requirements " Sections.
    a. Submit evidence of compliance with performance requirements.

2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

H. Product Test Reports: For roof membrane, vapor barrier and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.

I. Evaluation Reports: For compenents of roofing system, from ICC-ES

J. Field Quality Control Reports

K. Sample Warrantied: For manufacturer's special warranties.

L. Closeout Submittals:

1. Maintenance Data: For roofing system to include in maintenance manuals.

2.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty (20) years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section:

1. With minimum ten (10) years documented experience.

2. Approved by membrane manufacturer.

3. Extend manufacturer's labor and materials guarantee.

4. Extend manufacturer's No Dollar Limit guarantee.

C. All materials used in or in conjunction with the roofing system shall be manufacturered by or approved by the roofing material manufacturer.

D. Each Bidder shall be prepared to provide documentation for Class A assembly provided by their product.

2.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact bearing manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Protect products in weather protected environment, clear of ground and moisture.

C. Store liquid materials in their original undmaged containers in a clean, dry, protectived location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that connot be applied within it's stated shelf life.

D. Protect foam insulation from physical damagedirect exposure to sunlight and p.

E. Provide Safety Data Sheets (SDS) at the project site at all times during transportation, storage, and installation of materials.

F. Comply with requirements from Owner to prevent overloading or disturbance of the structure when loading materials onto the roof.

2.06 FIELD CONDITIONS

A. Do not apply roofing membrane during unsuitable weather. Refer to manufacturer's written instructions.

B. Do not apply roofing membrane when ambient temperature is below 40 degrees F.

C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

E. Proceed with work so new roofing materials are not subject to construction traffic as work progresses.

F. Do not allow grease, oil, fats, or other contaminants to come into direct contact with membrane.

2.07 **WARRANTY**

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Warranty: Include covergae of materials (entire system, including any fasteners) and instllation and damage resulting from failure to resist penetration of moisture, defective materials and workmanship.

C. Warranty: Roofing system shall be able to withstand peak wind gusts to 72mph.

D. Warranty Period: Minimum twenty (20) years after date of Final Acceptance. Warranty shall not exclude damage from improper application or environmental contaminants.

E. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind or other natural causes.

1. Warranty Term: 20 years.
2. For repair and replacement include costs of both material and labor in warranty.
3. Include accidental punctures according to the manufacturer's standard warranty terms.
4. Include hail damage according to the manufacturer's standard warranty terms.
5. Exceptions NOT Permitted:
    a. Damage due to roof traffic.
    b. Damage due to wind of speed greater than 56 mph but less than 90 mph.

2.08 **PRECAUTIONS**

A. Adhesives, primer, and sealants as indicated are extremely flammable and toxic. Use precautions indicated on containers, tubes, can and cartons.

B. Surfaces to be bonded shall be dry and clean. Suitable surfaces are usually considered to be smooth cover board approved by roofing membrane manufacturer, masonry, wood and metal plus well fastened insulation and cover board that is considered water resistantand accepted for adhered applications by roofing manufacturer.

C. After exposure to sunlight for 24 hours or longer, membranes may have achieved a "surface curing". Prior to hot air welding an application of primer is required to achieve a proper weld. The need for primer is determined by a test weld.

PART 2 PRODUCTS

3.01 **MANUFACTURER**

A. Basis of Design: Carlisle SynTec: www.carlisle-syntec.com/#sle

B. Architect / Owner prior approved equal.

C. Substitutions: See Section 01 60 00 - Product Requirements.

3.02 **ROOFING APPLICATIONS**

A. TPO Membrane Roofing: One ply membrane, fully adhered, over insulation.

B. Roofing Assembly Performance Requirements and Design Criteria:

1. Breaking Strength minimum, Grab method ASTM D751 with 225 lb result
2. Tear Strength minimum, Tongue Tear, STM D751 with a 55lb result

3. Brittleness, ASTMD2137, -40 degrees C Pass Result
4. Heat Aging, 32 days at 240 degrees F, ASTM D573 with 90% breaking strength and 90% elongation (reinforced) result.
5. Water absorption psi minimum (Method A) 158 degress F, 7 days, ASTM D471 with a plus 3% weight change result.
6. Ozone resistance 100 degrees F for 70 hours, ASTM DI 149 with a pass result.
7. Dimensional Stability, 24 hours at 54 degrees C, ASTM D1204 with a =/- 0.3% result.
8. Puncture resistance minimum, FTM IOIC, Method 20131 at 250lbs result.
    a. Drainage: No standing water within 48 hours after precipitation.

3.03 **ROOFING MEMBRANE AND ASSOCIATED MATERIALS**

A. Single Source Responsibility: Provide and install products from single source.

B. Membrane:
1. Material: Single ply Thermoplastic Polyolefin (TPO) complying with ASTM D6878/D6878M.
2. Reinforcing: Internal fabric.
3. Thickness: 60 mils (0.060 inch), minimum.
4. Sheet Width: Factory fabricated into largest sheets possible.
5. Color: Gray.
6. Product:
    a. Carlisle Sure-Weld.

C. Seaming Materials: Seaming, Adhesive and Sealants: Comply with VOC limits of Authorities Having Jurisdiction and as recommended by by roofing membrane manufacturer..

D. Vapor Barrier; Carlisle Syntec VapAir Seal 725TR compatible with roofing and insulation materials.40 Mil composite consisting of 35 mils of self adhering rubberized asphalt laminated to a 5 mil woven polypropylene film.
1. Adhesive.
    a. Use approved by manufacturer adhesives.
    b. Follow manufacturer's recommendation for installation of TPO roofing membrane timelines once Vapor Barrier is installed.
    c. Install per manufacturer's written instruction.

E. Flexible Flashing Material: Same material as membrane.

F. Base Flashing: Provide waterproof, fully adhered base flashing system at all penetrations, plane transitions, and terminations.

3.04 **DECK SHEATHING AND COVER BOARDS**

A. Deck Sheathing: As identified on the drawings.

B. Cover Board: Georgia Pacific Dens Deck (or Architect / Owner Prior Approved Equal) cover board, minimum 1/4" thick, ASTM C1177 as recommended and provided by the roofing membrane manufacturer in 4 ft. x 8 ft boards.

3.05 **INSULATION**

A. Polyisocyanurate (ISO) Board Insulation: ASTM C1289, Type II, Class 1 - Faced with glass fiber reinforced cellulosic felt facers on both major surfaces of the core foam.

1. Grade and Compressive Strength: Grade 2, 20 psi, minimum.
2. Product: As recommended by roofing membrane manufacturer.
    a. Roofing manufacturer shall supply insulation boards in accordance to meet R-38 rating in a 6" thickness and to meet Class A assembly.
    b. Contractor shall install wood blocking components as shown on the drawings for secure attachments and in sizes to match insulation thickness.
        1) Basis of Design:
            (a) Carlisle Insulbase Insulation ASTM C1289 Type II, Class I Grade 2 for thermal and taper.
        2) or Architect / Owner Prior Approved and in compliance with compatibility of roofing membrane materials approved for use.
3. Tapered Insulation Crickets:
    a. Tapered Insulation System: Factory tapered with a minimum slope 1/8" in/ ft unless otherwise noted. ASTM C1289 approved for use with a single ply adhered membrane roofing with a compression resistance of 20 psi.
    b. Install per roofing membrane manufacturer's recommendation.
    c. Provide roofing membrane manufacturer's written approval of system layout and fastening.

3.06 **ACCESSORIES**

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.

B. Prefabricated Flashing Accessories:
    1. Corners and Seams: Same material as membrane, in manufacturer's standard thicknesses.
    2. Penetrations: Same material as membrane, with manufacturer's standard cut-outs, rigid inserts, clamping rings, and flanges.
    3. Sealant Pockets: Same material as membrane, with manufacturer's standard accessories, in manufacturer's standard configuration.
    4. Pressure Sensitive Cover Strips: 6 inch wide, 45 mils (0.045 inch) thick, non-reinforced TPO membrane laminated to 35 mils (0.035 inch) thick cured synthetic rubber with pressure sensitive adhesive.
    5. Miscellaneous Flashing: Non-reinforced TPO membrane; 80 mils (0.080 inch) thick, in manufacturer's standard lengths and widths.

C. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches wide; self adhering.

D. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.

E. Membrane Adhesive: As recommended by membrane manufacturer.

F. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.

G. Sealants: As recommended by membrane manufacturer.

H. Cleaner: Manufacturer's standard, clear, solvent-based cleaner.

PART 3 EXECUTION

4.01 **EXAMINATION**

A. Examination by Contractor:

1. Verify that surfaces and site conditions are ready to receive work.
2. Verify deck is supported and secure.
3. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
4. Verify deck surfaces are dry and free of snow or ice.
5. Verify that roof openings, blocking, curbs, and penetrations through roof are solidly set, are in place.

B. Examination by Membrane Manufacturer:

1. General: The Contractor shall notify in writing that they have examined the roof surface area as noted above and it is ready for examination by the Roofing Membrane Manufacturer's representative.
2. The Roofing Membrane Manufacturer's technical advisor shall field inspect prepared roof surface prior to membrane application and compile a written report to the Architect / OWner and Contractor of acceptance or items needing repair or modification prior to roofing membrane application.
    a. The Contractor shall not proceed with application without prior written consent from membrane manufacturer's technical advisor accepting conditions. Written consent shall also be distributed to Architect / Owner.
3. Contractor shall verify that insulation and other systems have been installed complying with membrane manufacturer's recommended practices and shall receive written acceptance by membrane manufacturer.
4. Verify deck is clean and smooth and free from depressions, waves, or projections and properly sloped to drains.
5. Verify roof openings and penetrating elements through roof are solidly set, wood nailing strips are in place.
6. Verify roof deck is supported and secured.
7. Do not apply roofing materials to damp, frozen, dirty, dusty or to deck surfaces unacceptable to manufacturer.
8. Verify deck surfaces are dry and free from ice and snow. Confirm dry deck by mositure meter with 12% maximum.
9. Verify flatness and verify tight joints of wood deck.
10. Beginning installation means acceptance of all substrates.
11. Proceed with installation only after unsatisfactory conditions have been corrected.

4.02 **PREPARATION, GENERAL**

A. Clean substrate of dust, debris, mositure, and other substances deterimental to roofing system installation according to roofing system manufacturer's written instructions and recommendations. Remove sharp projections.

B. Do not begin work until other work that requires foot or equipment traffic on roof is complete.

C. Apply manufacturer's recommended vapor retarder or temporary roof before roof installation.

D. Prevent materials from entering and clogging roof drains and from spilling or migrating onto surfaces of other construction. Remove roof drains plugs when no work is taking place or when rain is forecast.

4.03 **WOOD DECK PREPARATION**

A. Verify flatness and tightness of joints of wood decking. Verify that all wood decking edges are fully supported. Fill knot holes with latex filler or completely cover with securely nailed sheet metal.

B. Confirm dry deck by moisture meter with 12 percent moisture maximum.

4.04 **INSTALLATION - GENERAL**

A. Perform work in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.

B. Do not apply roofing membrane during unsuitable weather.

C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.

D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

F. Coordinate the work with installation of associated counterflashings installed by other sections as the work of this section proceeds.

G. When substrate preparation is responsibility of another installer, notify Architect of unsatisfactory conditions before proceeding.

4.05 **INSTALLATION OF VAPOR BARRIER**

A. Verify surfaces are completely dry and surfaces are smooth and free of voids.

B. Perform adhesion tests in accordance with manufacturer's recommendations.

C. Artifical drying methods such as torches are not acceptable.

D. Install per manufacturer's written recommendations.

E. Provide seaming in accordance with manufacturer's written recommendations.

4.06 **INSTALLATION OF INSULATION.**

A. Prior to installation of insulation, ensure vapor barrier is clean and dry, continuous, and ready for application of insulation and has been accepted by manufacturer.

B. Attachment of Insulation:

1. Mechanically fasten insulation to deck in accordance with roofing manufacturer's instructions.

C. Lay subsequent layers of insulation with joints staggered minimum 6 inch from joints of preceding layer.

D. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.

E. Lay boards with edges in moderate contact without forcing, and gap between boards no greater than 1/4 inch. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

F. Cut insulation to fit neatly to perimeter blocking and protrusions in roof.

G. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.

H. At roof drains, use factory-tapered boards to slope down to roof drains over a distance of 18 inches.

I. Lay tapered boards to establish pitch to drains for positive drainage.

J. Do not apply more insulation than can be completely waterproofed in the same day.

4.07 **INSTALLATION OF COVER BOARDS**

A. Install cover boards over insualtion with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6" inches in each direction.

1. Trim cover baord neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks and crickets.

2. At internal roof drains, conform to slope of drain sump.

a. Trim cover board so that water flow is unrestricted.

3. Cut and fit cover board tight to nailers, projections and penetrations.

a. Set cover board in a uniform coverage of full spread insulation adhesive, firmly pressing and maintaining insulation in place.

4. Install slip sheet over cover board and beneath roof membrane if recommended by membrane manufacturer.

4.08 **INSTALLATION OF MEMBRANE**

A. Install roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.

B. Roll out membrane, free from wrinkles, bubbles or tears. Place sheet into place without stretching.

C. Shingle joints on sloped substrate in direction of drainage.

D. Fully Adhered Application: Apply adhesive at manufacturer's recommended rate. Fully embed membrane in adhesive except in areas directly over or within 3 inches of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.

E. Start installation of roofing membrane in the presence of roofing system manufacturer's technical personnel.

F. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

G. Overlap edges 4 1/2" and heat seal. Apply uniform bead of sealant to cut edges.

H. Install membrane adhesive in accordance with manufacturer's written recommendation.

I. Seal adjoining surfaces.

J. Continue membrane up veritical surfaces and below cap flashings unless noted or shown otherwise on the drawings.

K. Seal items penetrating membrane with counterflashing membrane material acceptable to manufacturer.

L. Install flashings as needed for watertight construction in accordance with the manufacturer's written recommendation. Seal watertight to membrane.

M. Do not expose materials vulnerable to water or sun damage in quantintities greater than can be weatherproofed during the same day.

N. Seam Welding:

1. Seam Welding: Overlap edges and ends and seal seams by heat welding, in accordnace with manufacturer's written recommendations.

2. Cover seams with manufacturer's recommended joint covers.

3. Probe seams once welds have thoroughly cooled. (Approximately 30 minutes.)
4. Repair deficient seams within the same day.
5. Seal cut edges of reinforced membrane after seam probe is complete.

O. Coordinate installation of roof drains and sumps and related flashings. Locate all field splices away from low areas and roof drains. Lap upslope sheet over downslope sheet.

P. Daily Seal: Install daily seal per manufacturers instructions at the end of each work day. Prevent infiltration of water at incomplete flashings, terminations, and at unfinished membrane edges.

4.09 **PROTECTION**

A. Protect finished installed items.

B. After installation, close off area to prevent unauthorized traffic.

4.10 **FIELD QUALITY CONTROL**

A. See Section 01 40 00 - Quality Requirements, for general requirements for field quality control and inspection.

B. Require site attendance of roofing and insulation material manufacturers daily during installation of the Work.

C. Flood Testing: Flood test each roof area for leaks, according to recommendations in ASTM D5957, after completing roofing and flashing, but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.

1. Perform tests before overlying construction is placed.
2. The roofing manufacturer, Architect and Owner shall be present for the test.
3. Floor to an average depth of 2 1/2" with a minimim depth of 1 inch and not exceeding a depth of 4 inches. Maintain 2 inches of clearance from top of base flashing.
4. Flood each area for 24 hours.
5. After flood testing, repair leaks, repeat flod tests and make furhter reapirs until roofing and flashing installation are watertight.
    a. Cost of restesting in the Contractor's responsibility.

D. Manufacturer's technical representative shall provide a final inspection report to the Architect and Owner. This inspection will verify acceptance of insallation by manufacturer for issuance of manufacturer's warranty. If any discrepancies are found to affect final acceptance by the manufacturer, then the Contractor shall make any repairs; changes required for final acceptance by the manufacturer; at his own expense without cost to the Owner or Architect.

E. Repair, remove or replace common components of the roofing system where inspections indicate that they do not comply with specifiifed requirements.

4.11 **CLEANING**

A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

B. Remove wrappings, empty containers, paper, and other debris from the roof daily. Dispose of debris in compliance with local, State, and Federal regulations.

C. Remove bituminous markings from finished surfaces.

D. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

E. Repair or replace defaced or damaged finishes caused by work of this section.

F. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time fo Substantial Completion and according to warranty requirements.

G. Remove stains cause by work of this section.

END OF SECTION

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SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Divison 01 specificqations shall apply to all sections of the Contract Documents, including all specifications, drawings,addenda or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, gutters, downspouts, exterior penetrations and other items indicated in Schedule.

B. Sealants for joints within sheet metal fabrications.

1.03 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood nailers for sheet metal work.

B. Section 07 71 23 - Manufactured Gutters and Downspouts.

C. Section 07 92 00 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.04 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2014 (2015 Errata).

B. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2017a.

C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.

D. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.

E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.

F. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free 2007 (Reapproved 2018).

G. CDA A4050 - Copper in Architecture - Handbook current edition.

H. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

C. Samples: Submit two samples 4 by 4 inch in size illustrating metal finish color.

1.07 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Maintain one copy of each document on site.

C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 10 years of documented experience.

1.08 **DELIVERY, STORAGE, AND HANDLING**

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 **SHEET MATERIALS**

A. Aluminum: ASTM B209 (ASTM B209M); 20 gage, (0.032 inch) thick; anodized finish of color as selected.

1. Color Anodized Finish: AAMA 611 AA-M12C22A42/44 Class I integrally or electrolytically colored anodic coating not less than 0.7 mils thick. Flashings where abuted to anodized aluminum storefront systems (windows and doors).

B. Pre-Finished Aluminum: ASTM B209 (ASTM B209M); 20 gage, (0.032 inch) thick; plain finish shop pre-coated with modified silicone coating.

1. Modified Silicone Polyester Coating: Pigmented Organic Coating System, AAMA 2603; baked enamel finish system.

2. Color: As selected by Architect from manufacturer's standard colors that match in accordance with colors noted on drawings.

2.02 **FABRICATION**

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch; miter and seam corners.

D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

F. Fabricate flashings to allow toe to extend 2 inches (or as indicated on the drawings) over roofing.. Return and brake edges.

2.03 **GUTTER AND DOWNSPOUT FABRICATION**

A. Field measure site conditions prior to fabricating work.

B. Fabricate with required connection pieces and end closures for gutters.

C. Gutters: SMACNA (ASMM) Rectangular profile.

D. Downspouts: Rectangular profile.

E. Gutters and Downspouts: Size indicated or as required to meet size for rainfall intensity determined by a storm occurance of 1 in in 10 years in accordance with SMACNA (ASMM) and as required by the Authorities Having Juridisdiction.

F. Accessories: Profiled to suit gutters and downspouts.

1. Anchorage Devices: In accordance with SMACNA (ASMM) requirements.

2. Gutter Supports: Straps. 18 Gauge.

3. Downspout Supports: Brackets, hangers and straps. .

G. Downspout Boots: Steel.

H. Downspout Extenders: Same material and finish as downspouts.

I. Seal metal joints.

2.04 **EXTERIOR PENETRATION FLASHING PANELS**

A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

2.05 **ACCESSORIES**

A. Fasteners: Galvanized steel, with soft neoprene washers.

B. Primer: Zinc chromate type.

C. Concealed Sealants: Non-curing butyl sealant.

D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.

E. Plastic Cement: ASTM D4586/D4586M, Type I.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 **PREPARATION**

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 **INSTALLATION**

A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..

B. Apply plastic cement compound between metal flashings and felt flashings.

C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

D. Seal metal joints watertight.

E. Secure gutters and downspouts in place with concealed fasteners.

F. Slope gutters 1/4 inch per 10 feet, minimum.

G. Connect downspouts to downspout boots, and grout connection watertight.

3.04 **FIELD QUALITY CONTROL**

A. See Section 01 40 00 - Quality Requirements, for field inspection requirements.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION

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SECTION 07 72 00
ROOF ACCESSORIES

PART 2 PRODUCTS

END OF SECTION

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SECTION 07 92 00
JOINT SEALANTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Division 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding/construction.

1.02 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Nonstaining silicone joint sealants.
3. Urethane joint sealants.
4. Mildew-resistant joint sealants.
5. Latex joint sealants.

B. Related Requirements:

1. Section 079100 "Preformed Joint Seals" for preformed compressible foam and precured joint seals.
2. Section 321373 "Concrete Paving Joint Sealants" for sealing joints in paved roads, parking lots, walkways, and curbing.

1.03 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1.04 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/4 inch wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency

C. Preconstruction Laboratory Test Schedule: Include the following information for each joint sealant and substrate material to be tested:

1. Joint-sealant location and designation.
2. Manufacturer and product name.

3. Type of substrate material.
4. Proposed test.
5. Number of samples required.

D. Sample Warranties: For special warranties.

1.06 **QUALITY ASSURANCE**

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

B. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: Qualified according to ASTM C1021 to conduct the testing indicated.

1.07 **FIELD CONDITIONS**

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer[or are below 40 deg F
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.08 **WARRANTY**

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: One year from date of Substantial Completion.

PART 1 PRODUCTS

2.01 **JOINT SEALANTS, GENERAL**

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.02 **NONSTAINING SILICONE JOINT SEALANTS**

A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C1248.

B. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.

1. Pecora 890 Silicone
2. Tremco Spectem 3
3. Dow Corning 790/791
4. Architect / Owner prior approved equal

2.03 **URETHANE JOINT SEALANTS**

A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

1. Pecora Dynatrol 1-XL
2. Sonneborn Sonolastic NP-1
3. Tremco Dymonic

2.04 **MILDEW-RESISTANT JOINT SEALANTS**

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

1. Sonneborn Omni Plus
2. Tremco Tremsil 200
3. Dow Corning 786
4.

2.05 **BUTYL JOINT SEALANTS**

A. Butyl-Rubber-Based Joint Sealants: ASTM C1311.

1. Tremco Tremflex 834
2. Architect / Owner prior approved equal

2.06 **LATEX JOINT SEALANTS**

A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

1. Pecora AC20+ Silicone
2. Sonneborn Sonolac
3. Tremco Tremflex 834

2.07 **JOINT-SEALANT BACKING**

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated], and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.08 **MISCELLANEOUS MATERIALS**

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and

formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 1 EXECUTION

3.01 **EXAMINATION**

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 **PREPARATION**

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

a. Concrete.

3. Remove laitance and form-release agents from concrete.

4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

a. Metal.

b. Glass.

c. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.03 **INSTALLATION OF JOINT SEALANTS**

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C1193 unless otherwise indicated.
    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.04 **CLEANING**

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.05 **PROTECTION**

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION

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SECTION 08 06 71
DOOR HARDWARE SCHEDULE

PART 2 PRODUCTS

1.01 **FINISHES**

A. Finishes: Complying with BHMA A156.18.

END OF SECTION

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SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions, and Division 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Hollow metal frames for wood doors.

C. Thermally insulated hollow metal doors with frames.

1.03 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware.

B. Section 08 80 00 - Glazing: Glass for doors and borrowed lites.

C. Section 09 91 13 - Exterior Painting: Field painting.

D. Section 09 91 23 - Interior Painting: Field painting.

1.04 ABBREVIATIONS AND ACRONYMS

A. ANSI: American National Standards Institute.

B. HMMA: Hollow Metal Manufacturers Association.

C. NAAMM: National Association of Architectural Metal Manufacturers.

D. SDI: Steel Door Institute.

1.05 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.

B. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames 2007 (R2011).

C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors 2011.

D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100) 2017.

E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames 2011.

F. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.

G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2019a.

H. NAAMM HMMA 860 - Guide Specifications for Hollow Metal Doors and Frames 2018.

I. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames 2014.

J. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames 2013.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

D. Samples: Submit two samples of metal, 2 inch by 2 inch in size showing factory finishes, colors, and surface texture.

E. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

F. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

G. Manufacturer's Qualification Statement.

H. Installer's Qualification Statement.

1.07 **QUALITY ASSURANCE**

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.

B. Maintain at project site copies of reference standards relating to installation of products specified.

1.08 **DELIVERY, STORAGE, AND HANDLING**

A. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

B. Protect doors and frames as recommended by manufactuer.

C. Remove horizontal stabilizing bars at time recommended by manufacturer.

PART 2 PRODUCTS

2.01 **MANUFACTURERS**

A. Hollow Metal Doors and Frames:

1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.
3. Fleming Door Products, an Assa Abloy Group company: www.assaabloydss.com/#sle.
4. Steelcraft, an Allegion brand: www.allegion.com/#sle.
5. or Architect / Owner prior approved equal.

2.02 **HOLLOW METAL DOORS**

A. Door Finish: Factory primed and field finished.

B. Exterior Doors: Thermally insulated.

1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    a. Level 1 - Standard-duty.
    b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
    c. Model 1 - Full Flush.
    d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.
2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.

3. Door Thickness: 1-3/4 inch, nominal.
4. Top Closures for Outswinging Doors: Flush with top of faces and edges.
5. Door Face Sheets: Flush.
6. Weatherstripping: Refer to Section 08 71 00.
7. Door Finish: Factory primed and field finished.

C. Interior Doors, Non-Fire-Rated:

1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
   a. Level 1 - Standard-duty.
   b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
   c. Model 1 - Full Flush.
   d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.
2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
3. Door Thickness: 1-3/4 inch, nominal.
4. Door Face Sheets: Flush.
5. Door Finish: Factory primed and field finished.

2.03 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Frame Finish: Factory primed and field finished.

C. Exterior Door Frames: Full profile/continuously welded type.

1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
3. Weatherstripping: Separate, see Section 08 71 00.

D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.

1. Terminated Stops: Provide at interior doors; closed end stop terminated 6 inch, maximum, above floor at 45 degree angle.
2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
3. Frame Finish: Factory primed and field finished.

E. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

F. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

2.04 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

B. Factory Finish: Complying with ANSI/SDI A250.3, manufacturer's standard coating.

1. Color: As indicated on drawings.

C. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

2.05 ACCESSORIES

A. Door Window Frames: Door window frames with glazing securely fastened within door opening.
   1. Size: As indicated on drawings.
   2. Frame Material: 18 gage, 0.0478 inch, galvanized steel.
   3. Metal Finish: Match door color. polyester powder coating.
   4. Glazing: 1/4 inch thick, tempered glass, in compliance with requirements of authorities having jurisdiction and as noted on the drawings.
   5. Glazing: 1/2" insulated laminated glazing at exterior doors, in compliance with requirements of authorities having juridiction and as noted on the drawings.
   6. Screws: Use tamper proof screws with removeable frame stops located on the interior or room side of the door face.

B. Glazing: As specified in Section 08 80 00, factory installed.

C. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.

D. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling where noted on the drawings for exterior applications; thinner pumpable grout is prohibited.

E. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

F. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Coordinate frame anchor placement with wall construction.

C. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

D. Install door hardware as specified in Section 08 71 00.

E. Comply with glazing installation requirements of Section 08 80 00.

F. Coordinate installation of electrical connections to electrical hardware items.

G. Touch up damaged factory finishes.

3.04 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.

B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 **ADJUSTING**

A. Adjust for smooth and balanced door movement.

B. Adjust sound control doors so that seals are fully engaged when door is closed.

3.06 **SCHEDULE**

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

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SECTION 08 11 16
ALUMINUM DOORS AND FRAMES

PART 2 PRODUCTS

1.01 **DOORS AND FRAMES**

A. Dimensions and Shapes: As indicated on drawings; dimensions indicated are nominal.

1. Provide the following clearances:

a. Hinge and Lock Stiles: 1/8 inch.

b. Between Meeting Stiles: 1/4 inch.

c. At Top Rail and Bottom Rail: 1/8 inch.

1.02 **COMPONENTS**

END OF SECTION

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SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Division 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Flush wood doors; flush and flush glazed configuration; non-rated.

1.03 RELATED REQUIREMENTS

A. Section 08 11 13 - Hollow Metal Doors and Frames.

B. Section 08 71 00 - Door Hardware.

C. Section 08 80 00 - Glazing.

D. Section 09 91 23 - Interior Painting: Field finishing of doors.

E. Section 09 93 00 - Staining and Transparent Finishing: Field finishing of doors.

1.04 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials Current Edition.

B. ANSI A135.4 - American National Standard for Basic Hardboard 2012.

C. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.

D. AWI (QCP) - Quality Certification Program Current Edition.

E. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards 2014, with Errata (2018).

F. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1 2016, with Errata (2018).

G. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.

1. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

D. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

E. Manufacturer's Installation Instructions: Indicate special installation instructions.

F. Manufacturer's Qualification Statement.

G. Installer's Qualification Statement.

H. Warranty, executed in Owner's name.

1.06 QUALITY ASSURANCE

A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.

1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.

C. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

D. Quality Certification:

1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/#sle.

2. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.

3. Provide designated labels on shop drawings as required by certification program.

4. Provide designated labels on installed products as required by certification program.

5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.07 **DELIVERY, STORAGE, AND HANDLING**

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.08 **WARRANTY**

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Interior Doors: Provide manufacturer's warranty for the life of the installation.

C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials and telegraphing core construction.

PART 2 PRODUCTS

2.01 **MANUFACTURERS**

A. Wood Veneer Faced Doors:

1. VT Industries

2. Construction Specialties, Inc; Acrovyn Flush Doors: www.c-sgroup.com/#sle.

3. Eggers Industries; [____]: www.eggersindustries.com/#sle.

4. or Architect / Owner prior approved.

2.02 **DOORS AND PANELS**

A. Doors: Refer to drawings for locations and additional requirements.

1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.

1. Provide solid core doors at each location, as noted on the drawings..
2. Wood veneer facing for field transparent finish as indicated on drawings.

2.03 **DOOR AND PANEL CORES**

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

2.04 **DOOR FACINGS**

A. Veneer Facing for Transparent Finish: White birch, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
   1. Vertical Edges: Same species as face veneer.
   2. "Running Match" each pair of doors and doors in close proximity to each other.

2.05 **DOOR CONSTRUCTION**

A. Fabricate doors in accordance with door quality standard specified.

B. Cores Constructed with stiles and rails:
   1. Provide solid blocks at lock edge for hardware reinforcement.
   2. Provide solid blocking for other throughbolted hardware.

C. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. USe removeable stops on room side with tamper resistant screws.

D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

F. Provide edge clearances in accordance with the quality standard specified.

2.06 **FACTORY FINISHING - WOOD VENEER DOORS**

A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent:
      a. System - 1, Lacquer, Nitrocellulose.
      b. Stain: As selected by Architect / Owner based on color selection sample to match.
      c. Sheen: Satin.

2.07 **ACCESSORIES**

A. Hollow Metal Door Frames: As specified in Section 08 11 13.

B. Glazed Openings:
   1. Heat-Strengthened and Fully Tempered Glass: ASTM C1048.

C. Door Window Frames: Door window frames with glazing securely fastened within door opening.
   1. Size: As indicated on drawings.
   2. Frame Material: 18 gage, 0.0478 inch, galvanized steel.
   3. Metal Finish: black polyester powder coating.
   4. Glazing: 1/4 inch thick, tempered glass, in compliance with requirements of authorities having jurisdiction.

D. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 **INSTALLATION**

A. Install doors in accordance with manufacturer's instructions and specified quality standard.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Use machine tools to cut or drill for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

E. Coordinate installation of glazing.

3.03 **TOLERANCES**

A. Comply with specified quality standard for fit and clearance tolerances.

B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.04 **ADJUSTING**

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

3.05 **SCHEDULE**

A. Refer to Door and Frame Schedule within the drawings .

END OF SECTION

SECTION 08 31 00
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions. including General Conditions and Supplementary Conditions, and Division 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Wall and ceiling mounted access units.

1.03 RELATED REQUIREMENTS

A. Section 09 91 13 - Exterior Painting: Field paint finish.

B. Section 09 91 23 - Interior Painting: Field paint finish.

C. Section Division 20: Mechanical components requiring access.

D. Section 23 33 00 - Air Duct Accessories: Access doors in ductwork.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

C. Manufacturer's Installation Instructions: Indicate installation requirements.

D. Manufacturer's Qualification Statement.

E. Project Record Documents: Record actual locations of each access unit.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

2.02 WALL AND CEILING MOUNTED ACCESS UNITS

A. Manufacturers:

1. Babcock-Davis: www.babcockdavis.com/#sle.
2. J.L. Industries
3. or Architect / Owner prior approved equal.

B. Wall and Ceiling Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.

1. Material: Steel.
2. Style: Exposed frame with door surface flush with frame surface.
3. Door Style: Single thickness with rolled or turned in edges.
4. Frames: 16 gage, 0.0598 inch, minimum thickness.
5. Door Panels to Receive Wall/Ceiling Finish: Surface recessed 5/8 inch back from wall face.

6. Steel Finish: Primed.
7. Primed and Factory Finish: Polyester powder coat; color to be selected by Architect and Owner. Doors shall be painted to in field to match adjacent finishes. Architect and Owner to select final color..
8. Door/Panel Size: 12" x 12" unless noted otherwise on the drawings. .
9. Hardware:
    a. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
    b. Latch/Lock: Cylinder lock-operated cam latch, two keys for each unit.
    c. Gasketing: Extruded neoprene, around perimeter of door panel.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify that rough openings are correctly sized and located.

B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 **PREPARATION**

A. Clean surfaces thoroughly prior to proceeding with this work.

B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.03 **INSTALLATION**

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings, and secure units rigidly in place.

C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION

SECTION 08 43 13
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 REFERENCE DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Condtions and Supplementary Conditions, and Division 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, adddenda, or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.

B. Aluminum doors and frames.

C. Weatherstripping.

1.03 RELATED REQUIREMENTS

A. Section 07 25 00 - Weather Barriers: Sealing framing to weather barrier installed on adjacent construction.

B. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.

C. Section 08 42 29 - Automatic Entrances.

D. Section 08 51 13 - Aluminum Windows:

E. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.

F. Section 08 80 00 - Glazing: Glass and glazing accessories.

G. Section 09 91 23 - Interior Painting: Field painting of interior surface of infill panels.

1.04 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site 2015.

B. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems 2015.

C. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems 2014.

D. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document) 2015.

E. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2014 (2015 Errata).

F. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections 2009.

G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2014.

H. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2013.

I. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors 2002 (Reapproved 2018).

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.06 **SUBMITTALS**

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.

D. Samples: Submit two samples 12 x 12 inches in size illustrating finished aluminum surface, glass, infill panels, glazing materials.

E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

F. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.

G. Manufacturer's Qualification Statement.

H. Installer's Qualification Statement.

I. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.07 **QUALITY ASSURANCE**

A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.

a. Insulating Glass Certification Council (IGCC).

B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.08 **DELIVERY, STORAGE, AND HANDLING**

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.09 **FIELD CONDITIONS**

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.10 **WARRANTY**

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 **MANUFACTURERS**

A. Other Acceptable - Aluminum-Framed Storefronts Manufacturers:

1. Kawneer North America: www.kawneer.com/#sle.
2. or Architect / Owner prior approved..
3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 **ALUMINUM-FRAMED STOREFRONT**

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.

1. Glazing Rabbet: For 1 inch insulating glazing.
2. Glazing Position: Centered (front to back).
3. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
4. Finish: Superior performing organic coatings.
    a. Factory finish all surfaces that will be exposed in completed assemblies.
    b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
5. Finish Color: Clear anodized.
6. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
7. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
8. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
9. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
10. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
11. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

2.03 **COMPONENTS**

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.

1. Framing members for interior applications need not be thermally broken.
2. Glazing Stops: Flush.

B. Glazing: As specified in Section 08 80 00.

C. Swing Doors: Glazed aluminum.

1. Thickness: 1-3/4 inches.
2. Top Rail: As shown on the drawings.
3. Vertical Stiles: As shown on the drawings.
4. Bottom Rail: 10 inches wide.
5. Glazing Stops: Square.
6. Finish: Same as storefront.

2.04 **MATERIALS**

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Structural Steel Sections: ANSI /ASTM A36; shapes to suit mullion sections.

C. Fasteners: Stainless steel.

D. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

E. Shop and Touch-Up Primer for Steel Components: Zinc oxide, alkyd, linseed oil primer appropriate for use over hand cleaned steel.

2.05 **FINISHES**

A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

2.06 **HARDWARE**

A. For each door, include weatherstripping, sill sweep strip and threshold.

B. Other Door Hardware: As specified in Section 08 71 00.

C. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.

D. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.

E. Threshold: Extruded aluminum, one piece per door opening, ribbed surface; provide on all exterior doors.

F. Hinges: Butt type, swing clear; top and bottom.

G. Push/Pull Set: Standard configuration push/pull handles.

H. Exit Devices: Panic type.

I. Door Closers: Concealed overhead.

J. Handle Latch: Lever Action Handle..

K. Locks: Dead latch with thumbturn inside ; keyed cylinder outside.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 **INSTALLATION**

A. Install wall system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Set thresholds in bed of sealant and secure.

J. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 **TOLERANCES**

A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 **FIELD QUALITY CONTROL**

A. Provide services of storefront manufacturer's field representative to observe for proper installation of system and submit report.

3.05 **ADJUSTING**

A. Adjust operating hardware for smooth operation.

3.06 **CLEANING**

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.

C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.07 **PROTECTION**

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

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SECTION 08 71 00
DOOR HARDWARE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Division 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Hardware for wood, aluminum and hollow metal doors.

B. Electrically operated and controlled hardware.

C. Other doors / gates indicated.

D. Keyed cylinders as indicated

E. Thresholds.

F. Weatherstripping and gasketing.

1.03 RELATED REQUIREMENTS

A. Section 06 20 00 - Finish Carpentry: Wood door frames.

B. Section 07 92 00 - Joint Sealants: Sealants for setting exterior door thresholds.

C. Section 08 06 71 - Door Hardware Schedule: Schedule of door hardware sets.

D. Section 08 11 13 - Hollow Metal Doors and Frames.

E. Section 08 14 16 - Flush Wood Doors.

F. Section 08 43 13 - Aluminum-Framed Storefronts: Door hardware, except as noted in section.

G. Section 28 10 00 - Access Control: Electronic access control devices.

1.04 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.

B. BHMA (CPD) - Certified Products Directory Current Edition.

C. BHMA A156.1 - American National Standard for Butts and Hinges 2016.

D. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches 2017.

E. BHMA A156.3 - American National Standard for Exit Devices 2014.

F. BHMA A156.4 - American National Standard for Door Controls - Closers 2013.

G. BHMA A156.6 - American National Standard for Architectural Door Trim 2015.

H. BHMA A156.7 - American National Standard for Template Hinge Dimensions 2016.

I. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders 2015.

J. BHMA A156.16 - American National Standard for Auxiliary Hardware 2018.

K. BHMA A156.17 - American National Standard for Self Closing Hinges & Pivots 2014.

L. BHMA A156.21 - American National Standard for Thresholds 2014.

M. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems Sponsor 2017.

N. BHMA A156.25 - American National Standard for Electrified Locking Devices 2018.

O. BHMA A156.28 - American National Standard for Recommended Practices for Mechanical Keying Systems 2018.

P. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames 2016.

Q. BHMA A156.115W - American National Standard for Hardware Preparation in Wood Doors with Wood or Steel Frames 2006.

R. DHI (H&S) - Sequence and Format for the Hardware Schedule 1996.

S. DHI (KSN) - Keying Systems and Nomenclature 1989.

T. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames 2004.

U. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors 1993; also in WDHS-1/WDHS-5 Series, 1996.

V. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.

W. ITS (DIR) - Directory of Listed Products current edition.

X. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

Y. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2019.

Z. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

AA. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2017.

BB. UL (DIR) - Online Certifications Directory Current Edition.

CC. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including All Revisions.

1.05 **INTENT OF HARDWARE GROUPS**

A. Should items of hardware not definitely specified be required for completion of the Work, furnish such items of type and quantity comparable to adjacent hardware adn appropriate for service required.

B. Where items of hardware are not definitely or correctly specified, are required for completion of the Work, a written statement of such omission, error, or other discrepancy to be submitted to the Architect, prior to date specified for receipt of bids for clarification by addendum; or furnish such items in the type and quality, and quantity established by this specification, and appropriate for the service intended.

1.06 **ADMINISTRATIVE REQUIREMENTS**

A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.

B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

C. Preinstallation Meeting: Convene a preinstallation meeting one week prior to commencing work of this section; attendance is required by affected installers and the following:

1. Architect.

2. Owner

3. Installer's Architectural Hardware Consultant (AHC).
4. Hardware Installer.
5. Owner's Security Consultant.

D. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.

E. Keying Requirements Meeting:

1. Schedule meeting at project site prior to Contractor occupancy.
2. Attendance Required:
    a. Contractor.
    b. Owner.
    c. Architect.
    d. Installer's Architectural Hardware Consultant (AHC).
    e. Hardware Installer.
    f. Owner's Security Consultant.
3. Agenda:
    a. Establish keying requirements.
    b. Verify locksets and locking hardware are functionally correct for project requirements.
    c. Verify that keying and programming complies with project requirements.
    d. Establish keying submittal schedule and update requirements.
4. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
    a. Access control requirements.
    b. Key control system requirements.
    c. Schematic diagram of preliminary key system.
    d. Flow of traffic and extent of security required.
5. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.
6. Deliver established keying requirements to manufacturers.

1.07 **SUBMITTALS**

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.

C. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.

1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
2. Comply with DHI (H&S) using door numbers and hardware set numbers as indicated in construction documents.
3. List groups and suffixes in proper sequence.

4. Provide complete description for each door listed.
5. Provide manufacturer's and product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
6. Include account of abbreviations and symbols used in schedule.
7. Size and finish of each item.
8. Mounting heights.
9. Explanation of abbreviations and symbols used withing schedule.

D. Shop Drawings - Electrified Door Hardware: Submit diagrams for power, signal, and control wiring for electrified door hardware that include details of interface with building safety and security systems. Provide elevations and diagrams for each electrified door opening as follows:
   1. Prepared by or under supervision of Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC).
   2. Elevations: Submit front and back elevations of each door opening showing electrified devices with connections installed and an operations narrative describing how opening operates from either side at any given time.
   3. Diagrams: Submit point-to-point wiring diagram that shows each device in door opening system with related colored wire connections to each device.

E. Templates
   1. Submit templates and "reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.

F. Samples for Verification:
   1. Submit minimum size of 2 by 4 inch for sheet samples, and minimum length of 4 inch for other products.
   2. Submit one (1) sample of hinge, latchset, lockset, closer and thresholds illustrating style, color, and finish.
   3. Return full-size samples to Contractor.
   4. Submit product description with samples.

G. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

H. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
   1. Submit manufacturer's parts lists and templates.

I. Keying Schedule:
   1. Submit three (3) copies of Keying Schedule in compliance with requirements established during Keying Requirements Meeting unless otherwise indicated.

J. Manufacturer's Qualification Statement.

K. Installer's Qualification Statement.

L. Supplier's Qualification Statement.

M. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

N. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.

O. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Lock Cylinders: Ten for each master keyed group.
3. Tools: One set of each special wrench or tool applicable for each different or special hardware component, whether supplied by hardware component manufacturer or not.

P. Closeout Submittals

1. Operating and Maintenance manuals:
   a. Complete information in care, maintenance, and adjustments and data on repair and replacement parts and information on preservation of finishes.
   b. Catalog pages for each product.
   c. Name, address, and phone number of local representative for each manufacturer.
   d. Parts list for each product.
2. Copy of final hardware schedule, edited to reflect "Installed".
3. Copy of Final Keying Schedule.
4. As Installed "Wiring Diagrams" for each piece of hardware connected to power, both low voltage and 110 volts.
5. One set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

1.08 **QUALITY ASSURANCE**

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience.

C. Distributor's Qualifications: Firm with 3 years experience in the distribution in the distribution of commercial hardware.

1. Distributor to employ full time Architectural Hardware Consultant (AHC) for the purpose of scheduling and coordinating hardware and establishing a keying schedule.
2. Hardware schedule shall be prepared and signed by AHC.

D. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) to assist in work of this section.

E. Except where specified in hardware schedule, furnish products of only one manufacturer for each type of hardware.

F. Review Project for extent of finish ahrdware required to complete the Work. Where there is a conflict between these Specifications and the existing hardware, notify the Architect in writing and furnish hardware in compliance with the Specification unless otherwise directed in writing by the Architect.

1.09 **DELIVERY, STORAGE, AND HANDLING**

A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

B. Deliver products in original unopened packaging with legible manufacturer's identification.

C. Package Hardware to prevent damage during transit and storage.

D. Mark hardware to coorespond with "reviewed hardware schedule"

E. Deliver hardware to door and frame manufacturer upon request.

F. Storage and Protection: Comply with manufacturer's recommendations.

1.10 **PROJECT CONDITIONS**

A. Coordiante hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security, and similar requirements indicated as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the contract documents.

B. Review shop drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

1.11 **WARRANTY**

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion.

1. Closers: Lifetime, minimum.
2. Exit Devices: Five, minimum.
3. Locksets and Cylinders: Seven, minimum.
4. Other Hardware: Two years, minimum.

PART 2 PRODUCTS

2.01 **DESIGN AND PERFORMANCE CRITERIA**

A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.

B. Provide individual items of single type, of same model, and by same manufacturer.

C. Provide door hardware products that comply with the following requirements:

1. Applicable provisions of federal, state and local codes.
2. Accessibility: ADA Standards and ICC A117.1.
3. Applicable provisions of NFPA 101.
4. Fire-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
5. Hardware on Fire-Rated Doors: Listed and classified by UL (DIR), ITS (DIR), testing firm acceptable to authorities having jurisdiction or [_____] as suitable for application indicated.
6. Listed and certified compliant with specified standards by BHMA (CPD).
7. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
8. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.
9. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.

D. Electrically Operated and/or Controlled Hardware: Provide necessary power supplies, power transfer hinges, relays, and interfaces as required for proper operation; provide wiring between hardware and control components and to building power connection in compliance with NFPA 70.

1. Refer to Section 28 10 00 for additional access control system requirements.

E. Lock Function: Provide lock and latch function numbers and descriptions of manufacturer's series. Refer to Section 08 0671 for listing of hardware sets.

F. Fasteners:

1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
    a. Aluminum fasteners are not permitted.
    b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
2. Provide machine screws for attachment to reinforced hollow metal and aluminum frames.
    a. Self-drilling (Tek) type screws are not permitted.
3. Fire-Rated Applications: Comply with NFPA 80.
    a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
    b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.
4. Concealed Fasteners: Do not use through or sex bolt type fasteners on door panel sides indicated as concealed fastener locations, unless otherwise indicated.

2.02 **HINGES**

A. Manufacturers:

1. Basis of Design: Stanley,dormakaba group. www.stanleyhardwarefor doors.com/#sle
2. Bommer Industries, Inc: www.bommer.com/#sle.

B. Hinges: Comply with BHMA A156.1, Grade 1.

1. Self Closing Hinges: Comply with BHMA A156.17.
2. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.
    a. Provide hinge width required to clear surrounding trim.
3. Provide hinges on every swinging door.
4. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
5. Bearings are to be fully hardened.
6. Bearing shell is to be consistent shape with barrel.
7. Minimum of 2 permanently lubricated non-detachable bearings on standard weight hinge and 4 permanently lubricated bearing on heavy weight hinges.
8. Equip with easily seated, non rising pins.
9. Non removeable pin screws shall be slotted stainless steel screws.
10. Hinges shall be full polished, front back and barrel.
11. Hinge pin is to be fully plated.
12. Bearing assembly is to be installed after plating.
13. Sufficient size to allow 180 degree swing of door.
14. Furnish five knuckles with flush ball bearings.
15. Provide ball-bearing hinges at each door with closer, unless noted otherwise.
16. Provide non-removable pins on exterior outswinging doors.

17. Provide power transfer hinges where electrified hardware is mounted in door leaf.
18. Provide following quantity of butt hinges for each door:
    a. Doors From 60 inches High up to 90 inches High: Three hinges.

2.03 **EXIT DEVICES**

A. Manufacturers:
   1. DORMA USA, Inc; 8000 Series: www.dorma.com/#sle.
   2. Precision, dormakaba Group: www.precisionhardware.com/#sle.

B. Exit Devices: Comply with BHMA A156.3, Grade 1.
   1. Lever design to match lockset trim.
   2. Provide cylinder with cylinder dogging or locking trim.
   3. Provide exit devices properly sized for door width and height.
   4. Provide strike as recommended by manufacturer for application indicated.
   5. Provide UL (DIR) listed exit device assemblies for fire-rated doors and panic device assemblies for non-fire-rated doors.

2.04 **LOCK CYLINDERS**

A. Manufacturers:
   1. Best, dormakaba Group: www.bestaccess.com/#sle.

B. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
   1. Provide cylinders from same manufacturer as locking device.
   2. Provide cams and/or tailpieces as required for locking devices.

2.05 **CYLINDRICAL LOCKS**

A. Manufacturers:
   1. Best, dormakaba Group: www.bestaccess.com/#sle.

B. Cylindrical Locks (Bored): Comply with BHMA A156.2, Grade 1, 4000 Series.
   1. Bored Hole: 2-1/8 inch diameter.
   2. Latchbolt Throw: 1/2 inch, minimum.
   3. Backset: 2-3/4 inch unless otherwise indicated.
   4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
      a. Finish: To match lock or latch.

2.06 **DOOR PULLS AND PUSH PLATES**

A. Manufacturers:
   1. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
   2. Trimco: www.trimcohardware.com/#sle.
   3. Burns

B. Door Pulls and Push Plates: Comply with BHMA A156.6.
   1. Pull Type: Straight, unless otherwise indicated.
   2. Push Plate Type: Flat, with square corners, unless otherwise indicated.
      a. Edges: Beveled, unless otherwise indicated.

3. Material: Aluminum, unless otherwise indicated.

2.07 **DOOR PULLS AND PUSH BARS**

A. Manufacturers:

1. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Trimco: www.trimcohardware.com/#sle.
3. Burns

B. Door Pulls and Push Bars: Comply with BHMA A156.6.

1. Bar Type: Bar set, unless otherwise indicated.
2. Material: Aluminum, unless otherwise indicated.

2.08 **CLOSERS**

A. Manufacturers; Surface Mounted:

1. DORMA USA, Inc; 8900 Series: www.dorma.com/#sle.
2. Stanley, dormakaba Group: www.stanleyhardwarefordoors.com/#sle.
3. Norton 7500 Series

B. Closers: Comply with BHMA A156.4, Grade 1.

1. Type: Surface mounted to door.
2. Provide door closer on each exterior door.
3. At outswinging exterior doors, mount closer on interior side of door.

2.09 **OVERHEAD STOPS AND HOLDERS**

A. Manufacturers:

1. Rixson or Sargent; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. DORMA USA, Inc; 900 Series: www.dorma.com/#sle.

B. Overhead Stops and Holders (Door Checks): Comply with BHMA A156.8, Grade 1.

1. Provide stop for every swinging door, unless otherwise indicated.

2.10 **PROTECTION PLATES**

A. Manufacturers:

1. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Trimco: www.trimcohardware.com/#sle.
3. Burns

B. Protection Plates: Comply with BHMA A156.6.

C. Metal Properties: Aluminum.

1. Metal, Standard Duty: Thickness 0.05 inch, minimum.

D. Edges: Beveled, on four sides unless otherwise indicated.

E. Fasteners: Countersunk screw fasteners.

2.11 **KICK PLATES**

A. Manufacturers:

1. Trimco: www.trimcohardware.com/#sle.

B. Kick Plates: Provide along bottom edge of push side of every door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.

1. Size: 12 inch high by 2 inch less door width (LDW) on push side of door.

2.12 **FLOOR STOPS**

A. Manufacturers:

1. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Trimco: www.trimcohardware.com/#sle.

B. Floor Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.

1. Type: Manual hold-open, with pencil floor stop.
2. Material: Aluminum housing with rubber insert.

2.13 **WALL STOPS**

A. Manufacturers:

1. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Trimco: www.trimcohardware.com/#sle.

B. Wall Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.

1. Type: Bumper, concave, wall stop.
2. Material: Aluminum housing with rubber insert.

2.14 **THRESHOLDS**

A. Manufacturers:

1. Pemko; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. National Guard Products, Inc: www.ngpinc.com/#sle.

B. Thresholds: Comply with BHMA A156.21.

1. Provide threshold at each exterior door, unless otherwise indicated.
2. Type: Flat surface.
3. Material: Aluminum.
4. Threshold Surface: Fluted horizontal grooves across full width.
5. Field cut threshold to profile of frame and width of door sill for tight fit.
6. Provide non-corroding fasteners at exterior locations.

2.15 **WEATHERSTRIPPING AND GASKETING**

A. Manufacturers:

1. Pemko; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. National Guard Products, Inc: www.ngpinc.com/#sle.
3. Reese Enterprises, Inc: www.reeseusa.com/#sle.

B. Weatherstripping and Gasketing: Comply with BHMA A156.22.

1. Head and Jamb Type: Adjustable.
2. Door Sweep Type: Encased in retainer.
3. Material: Aluminum, with brush weatherstripping.
4. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, unless otherwise indicated; .
5. Provide door bottom sweep on each exterior door, unless otherwise indicated.

2.16 **SILENCERS**

A. Manufacturers:

1. Ives, an Allegion brand: www.allegion.com/us/#sle.Ives, an Allegion brand: www.allegion.com/us/#sle.Ives, an Allegion brand: www.allegion.com/us/#sle.Ives, an Allegion brand: www.allegion.com/us/#sle.

2. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.

B. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.

1. Single Door: Provide three on strike jamb of frame.

2. Pair of Doors: Provide two on head of frame, one for each door at latch side.

3. Material: Rubber, gray color.

2.17 **WIRELESS ACCESS MANAGEMENT SYSTEMS**

A. Manufacturers:

1. Best, dormakaba Group: www.bestaccess.com/#sle.

B. Wireless Access Management Systems: Comply with guidelines of BHMA A156.25, and including necessary hardware for fully functional system.

1. Reader Formats: Provide magnetic stripe, proximity, dual validation or key Fob to activate access system functionality.

2. Door Locking Hardware: Provide applicable cylindrical locksets, panic hardware or mortise locksets in compliance with project access control requirements.

2.18 **KEY CONTROL SYSTEMS**

A. Manufacturers:

1. Best, dormakaba Group: www.bestaccess.com/#sle.

B. Key Control Systems: Comply with guidelines of BHMA A156.28.

1. Provide keying information in compliance with DHI (KSN) standards.

2. Keying: Grand master keyed.

3. Coordiante with Owner in regards to Keying to Owner's existing keying system.

4. Supply keys in following quantities:

a. 4 each Master keys.

b. 1 each Grand Master keys.

c. 6 each Construction Master keys.

d. 2 each Control keys if new system.

e. 2 each Change keys for each keyed core.

5. Key Management System: For each keyed lock on project, provide one set of consecutively numbered duplicate key tags with hanging hole and snap catch.

6. Deliver keys with identifying tags to Owner by security shipment direct from hardware supplier.

7. Permanent Keys and Cores: Stamped with applicable key marking for identification. Do not include actual key cuts within visual key control marks or codes. Stamp permanent keys "Do Not Duplicate."

2.19 **KEY PAD**

A. Key Pad: Indoor or outdoor use, 12-key digital keypad with silicone rubber keys, and compatible with access control systems using standard Wiegand output.
   1. Power: 12 VDC; 35mA Active and 7mA at Rest.
   2. Mounts on narrow mullion, 1-1/2 inch wide by 7 inch high by 1 inch deep.
   3. Operating Temperature: Minus 22 to 158 degrees F.
   4. Finish: Black.
   5. Coordinate Manufactuer with Owner's system.

2.20 **POWER SUPPLY**

A. Power Supply: Hard wired, with multiple zones providing eight (8) breakers for each output panel with individual control switches and LED's; UL (DIR) Class 2 listed.
   1. Power: 24 VAC, 10 Amp; with 120 VAC power supply.
   2. Operating Temperature: 32 to 110 degrees F.
   3. Provide with emergency release terminals that release devices upon activation of fire alarm system.

2.21 **FINISHES**

A. Finishes: Identified in Section 08 0671 - Door Hardware Schedule.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.

B. Verify that electric power is available to power operated devices and of correct characteristics.

3.02 **INSTALLATION**

A. Install hardware in accordance with manufacturer's instructions and applicable codes.

B. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.

C. Use templates provided by hardware item manufacturer.

D. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
   1. For Steel Doors and Frames: Install in compliance with DHI (LOCS) recommendations or as noted on the drawings.
   2. For Aluminum-Framed Storefront Doors and Frames: Refer to Section 08 43 13.
   3. For Wood Doors: Install in compliance with DHI WDHS.3 recommendations.
   4. Mounting heights in compliance with ADA Standards:
      a. Locksets: 40-5/16 inch.
      b. Push Plates/Pull Bars: 42 inch.
      c. Exit Devices: 40-5/16 inch.

E. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

3.03 **FIELD QUALITY CONTROL**

A. Perform field inspection and testing under provisions of Section 01 40 00 - Quality Requirements.

B. Provide an Architectural Hardware Consultant (AHC) to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.04 **ADJUSTING**

A. Adjust work under provisions of Section 01 70 00 - Execution and Closeout Requirements.

B. Adjust hardware for smooth operation.

C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

D. Adjust door opening force to be in complaince with ADA requirements.

3.05 **CLEANING**

A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.

B. Clean adjacent surfaces soiled by hardware installation.

C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.06 **PROTECTION**

A. Protect finished Work under provisions of Section 01 70 00 - Execution and Closeout Requirements.

B. Do not permit adjacent work to damage hardware or finish.

END OF SECTION

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SECTION 08 71 01
DOOR HARDWARE SCHEDULE

SCHEDULE OF FINISH HARDWARE:

OPTION LIST

CODE	DESCRIPTION
BF	BARRIER FREE
RM	FOR RIM DEVICE
VIN	VISUAL INDICATOR
B4E-HEAVY-KP	BEVELED 4 EDGES - KICK PLATES
1/4-20 SSMS/EA	STAINLESS MACHINE SCREWS/EXPANSION ANC.

FINISH LIST

CODE	DESCRIPTION
AL	ALUMINUM
626	SATIN CHROMIUM PLATED
630	SATIN STAINLESS STEEL
689	ALUMINUM PAINTED
GREY	GREY
US26D	CHROMIUM PLATED, DULL
US32D	STAINLESS STEEL, DULL

MANUFACTURER LIST

CODE	NAME
BE	BEST ACCESS SYSTEMS
DM	DORMA DOOR CONTROLS
NA	NATIONAL GUARD
PR	PRECISION

SH	**STANLEY COMMERCIAL HARDWARE**
ST	**STANLEY**
TR	**TRIMCO**

HARDWARE SETS

SET #1

DOORS: 100, 110, ALTERNATE DR. 120

CONTINUOUS HINGE 661HD UL 83" AL ST
EXIT DEVICE 2103 630 PR
ELECTRONIC EXIT DEVICE TRIM EXQ-7EV14DV STD RM 626 BE
DOOR CLOSER QDC115 689 SH
CONCEALED OH STOP 910 SERIES 626 DM
SADDLE THRESHOLD 426 1/4-20 SSMS/EA FULL WIDTH DOOR AL NA

NOTE: WEATHERSTRIP AND DOOR BOTTOM BY DOOR SUPPLIER. ALTERNATE FOR PROX CARD READER EXQ-7EV14PH STD RM

SET #2

DOORS: 101

HINGES FBB179 4 1/2 X 4 1/2 US26D ST
EXIT DEVICE 2114 X 4914D 630 PR
HOLD OPEN CLOSER QDC116 BF 689 SH
WALL BUMPER 1270CV 626 TR
GASKETING 5050 B HEAD & JAMBS NA

SET #3

DOORS: 101A

HINGES FBB199 4 1/2 X 4 1/2 NRP US32D ST
EXIT DEVICE 2103 630 PR
ELECTRONIC EXIT DEVICE TRIM EXQ-7EV14DV STD RM 626 BE

DOOR CLOSER QDC115 689 SH

CONCEALED OH STOP 910 SERIES 626 DM

DOOR SWEEP C627 A NA

GASKETING 127 NA HEAD & JAMBS NA

SADDLE THRESHOLD 426 1/4-20 SSMS/EA FULL WIDTH DOOR AL NA

NOTE: ALTERNATE FOR ELECTRONIC TRIM TOBE PROX CARD EXQ-7EV14PH STD RM

SET #4

DOORS: 103

HINGES FBB199 4 1/2 X 4 1/2 NRP US32D ST

EXIT DEVICE 2103 630 PR

ELECTRONIC EXIT DEVICE TRIM EXQ-7EV14PH STD RM 626 BE

DOOR CLOSER QDC115 689 SH

CONCEALED OH STOP 910 SERIES 626 DM

DOOR SWEEP C627 A NA

GASKETING 127 NA HEAD & JAMBS NA

SADDLE THRESHOLD 426 1/4-20 SSMS/EA FULL WIDTH DOOR AL NA

SET #5

DOORS: 103A

HINGES FBB179 4 1/2 X 4 1/2 US26D ST

LOCKSET 9K3-7R14D STD 626 BE

DOOR CLOSER QDC211 BF 689 SH

SURFACE OH STOP 700 SERIES 626 DM

KICK PLATE K0050 10" X 2" LDW B4E 630 TR

DOOR SILENCERS 1229A GREY TR

SET #6

DOORS: 104

HINGES FBB179 4 1/2 X 4 1/2 US26D ST

LOCKSET 9K3-7AB14D STD 626 BE

WALL BUMPER 1270CV 626 TR

DOOR SILENCERS 1229A GREY TR

SET #7

DOORS: 105

HINGES FBB179 4 1/2 X 4 1/2 US26D ST
LOCKSET 9K3-7R14D STD 626 BE
DOOR CLOSER QDC211 BF 689 SH
KICK PLATE K0050 10" X 2" LDW B4E 630 TR
WALL BUMPER 1270CV 626 TR
GASKETING 5050 B HEAD & JAMBS NA

SET #8

DOORS: 105A

HINGES FBB179 4 1/2 X 4 1/2 US26D ST
PASSAGE SET 9K3-0N14D 626 BE
WALL BUMPER 1270CV 626 TR
DOOR SILENCERS 1229A GREY TR

SET #9

DOORS: 106, 107, 108

HINGES FBB179 4 1/2 X 4 1/2 US26D ST
PRIVACY SET 45H-0L14H VIN 626 BE
DOOR CLOSER QDC211 BF 689 SH
KICK PLATE K0050 10" X 2" LDW B4E 630 TR
WALL BUMPER 1270CV 626 TR
GASKETING 5050 B HEAD & JAMBS NA

SET #10

DOORS: 109, 115

HINGES FBB179 4 1/2 X 4 1/2 US26D ST
LOCKSET 9K3-7R14D STD 626 BE

WALL BUMPER 1270CV 626 TR

DOOR SILENCERS 1229A GREY TR

SET #11

DOORS: 111

HINGES FBB179 4 1/2 X 4 1/2 US26D ST

LOCKSET 9K3-7D14D STD 626 BE

DOOR CLOSER QDC212 BF 689 SH

KICK PLATE K0050 10" X 2" LDW B4E 630 TR

WALL BUMPER 1270CV 626 TR

GASKETING 5050 B HEAD & JAMBS NA

SET #12

DOORS: 112

HINGES FBB191 4 1/2 X 4 1/2 NRP US32D ST

LOCKSET 9K3-7D14D STD 626 BE

DOOR CLOSER QDC115 689 SH

CONCEALED OH STOP 910 SERIES 626 DM

DOOR SWEEP C627 A NA

GASKETING 127 NA HEAD & JAMBS NA

SADDLE THRESHOLD 426 1/4-20 SSMS/EA FULL WIDTH DOOR AL NA

SET #13

DOORS: 114

HINGES FBB179 4 1/2 X 4 1/2 US26D ST

FLUSH BOLT 3917-12 626 TR

LOCKSET 9K3-7R14D STD 626 BE

SURFACE OH STOP 700 SERIES 626 DM

ASTRAGAL 139 A 84" NA

DOOR SILENCERS 1229A GREY TR

NOTE: FLUSH BOLT TOP ONLY

SET #MISC

DOORS: HSMISC

PORTAL GATEWAY WQX-PG-C-B BE

ACCESS MANAGEMENT SOFTWARE WQS-SWAT BE

END OF SECTION

SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Condtions, and Division 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Insulating glass units.

B. Glazing compounds and accessories.

1.03 RELATED REQUIREMENTS

A. Section 07 25 00 - Weather Barriers.

B. Section 07 92 00 - Joint Sealants: Sealants for other than glazing purposes.

C. Section 08 43 13 - Aluminum-Framed Storefronts: Glazing furnished as part of storefront assembly.

1.04 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials Current Edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test 2015.

C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.

D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers 2005 (Reapproved 2015).

E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.

F. ASTM C1036 - Standard Specification for Flat Glass 2016.

G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.

H. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.

I. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass 2015.

J. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings 2016.

K. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation 2010.

L. GANA (GM) - GANA Glazing Manual 2008.

M. GANA (SM) - GANA Sealant Manual 2008.

N. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

O. NFRC 100 - Procedure for Determining Fenestration Product U-factors 2017.

P. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence 2014, with Errata (2017).

Q. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems 2017.

1.05 **ADMINISTRATIVE REQUIREMENTS**

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

1.06 **SUBMITTALS**

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data on Insulating Glass Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

D. Samples: Submit two samples 6 inches by 6 inches in size of glass units.

E. Samples: Submit 6 inch long bead of glazing sealant, color as selected.

F. Certificate: Certify that products of this section meet or exceed specified requirements.

G. Manufacturer's Qualification Statement.

H. Installer's Qualification Statement.

I. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 60 00 - Product Requirements, for additional provisions.

2. Extra Insulating Glass Units: One of each glass size and each glass type.

1.07 **QUALITY ASSURANCE**

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.

a. Insulating Glass Certification Council (IGCC).

b. Safety Glazing Certification Council (SGCC).

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

1.08 **FIELD CONDITIONS**

A. Do not install glazing when ambient temperature is less than 40 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.09 **WARRANTY**

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Insulating Glass Units: Provide a 20 year year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

PART 2 PRODUCTS

2.01 **MANUFACTURERS**

A. Glass Fabricators:

1. GGI - General Glass International: www.generalglass.com/#sle.
2. JE Berkowitz, LP: www.jeberkowitz.com/#sle.
3. Standard Bent Glass Corp: www.standardbent.com/#sle.
4. Trulite Glass & Aluminum Solutions, LLC: www.trulite.com/#sle.
5. Viracon, Inc: www.viracon.com/#sle.
6. or Architect / Owner prior approved equal.

B. Float Glass Manufacturers:

1. Cardinal Glass Industries: www.cardinalcorp.com/#sle.
2. Guardian Glass, LLC: www.guardianglass.com/#sle.
3. Pilkington North America Inc: www.pilkington.com/na/#sle.
4. or Architect / Owner prior approved equal.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.

1. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
2. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
3. Glass thicknesses listed are minimum.

B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.

1. In conjunction with vapor retarder and joint sealer materials described in other sections.

C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:

1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
3. Solar Optical Properties: Comply with NFRC 300 test method.

2.03 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.

1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
2. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.

2.04 INSULATING GLASS UNITS

A. Manufacturers:

1. Any of the manufacturers specified for float glass.

2. Fabricator certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.

B. Insulating Glass Units: Types as indicated.

1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
3. Metal Edge Spacers: Aluminum, bent and soldered corners.
4. Spacer Color: Black.
5. Edge Seal:
    a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide or polyurethane sealant as secondary seal applied around perimeter.
    b. Color: Black.
6. Purge interpane space with dry air, hermetically sealed.

C. Exterior and interior window / sidelite units, and alum. entrance doors. Insulating Glass Units: Vision glass, double glazed.

1. Applications: Any glazing in an aluminum window or door.
2. Space between lites filled with air.
3. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
    a. Tint: Gray at exterior applications and clear on interior applications.
    b. Coating: Self-cleaning type, on #1 surface.
    c. Coating: Low-E (passive type), on #2 surface.
4. Inboard Lite: Annealed float glass, 1/4 inch thick, minimum.
    a. Tint: Clear.
5. Total Thickness: 1" at windows and 1/2" as storefront doors
6. Thermal Transmittance (U-Value), Summer - Center of Glass: as recommended by manufacturer for condition, nominal.
7. Visible Light Transmittance (VLT): as recommended by manufacturer for condition percent, nominal.
8. Solar Heat Gain Coefficient (SHGC): as recommended by manufacturer for condition, nominal.

2.05 **GLAZING COMPOUNDS**

A. Type GC-5 - Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; black color or as recommended by manufacturer and approved by the Architect and Owner.

2.06 **ACCESSORIES**

A. Setting Blocks: Neoprene, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long by one half the height of the glazing stop by thickness to suit

application, self adhesive on one face.

C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.

1. Width: As required for application.
2. Thickness: As required for application.
3. Spacer Rod Diameter: As required for application.
4. Manufacturers:
    a. Pecora Corporation: www.pecora.com/#sle.
    b. Tremco Global Sealants: www.tremcosealants.com/#sle.

D. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent, designed for compression of 25 percent to effect an air barrier and vapor retarder seal; size as recommeded by manufacturer.

E. Glazing Splines: Resilient Neoprene extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

F. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that the minimum required face and edge clearances are being provided.

C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

D. Verify that sealing between joints of glass framing members has been completed effectively.

E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

D. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

E. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.04 **INSTALLATION - DRY GLAZING METHOD (TAPE AND TAPE)**

A. Application - Interior Glazed: Set glazing infills from the interior of the building.

B. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

D. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.

E. Place glazing tape on free perimeter of glazing in same manner described above.

F. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

G. Carefully trim protruding tape with knife.

3.05 **INSTALLATION - WET GLAZING METHOD (SEALANT AND SEALANT)**

A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.

B. Place setting blocks at 1/4 points and install glazing pane or unit.

C. Install removable stops with glazing centered in space by inserting spacer shims both sides at 24 inch intervals, 1/4 inch below sight line.

D. Fill gaps between glazing and stops with sealant to depth of bite on glazing, but not more than 3/8 inch below sight line to ensure full contact with glazing and continue the air and vapor seal. Sealant type as recommended by manufacturer.

E. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.06 **FIELD QUALITY CONTROL**

A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.

B. Monitor and report installation procedures and unacceptable conditions.

3.07 **CLEANING**

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove non-permanent labels immediately after glazing installation is complete.

C. Clean glass and adjacent surfaces after sealants are fully cured.

D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.08 **PROTECTION**

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

SECTION 09 29 00
GYPSUM BOARD

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Division 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Metal stud wall framing.

B. Metal channel ceiling framing.

C. Gypsum wallboard.

D. Joint treatment and accessories.

E. Textured finish system.

1.03 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Building framing and sheathing.

B. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.

C. Section 07 21 00 - Thermal Insulation: Acoustic insulation.

D. Section 07 92 00 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

E. Section 09 30 00 - Tiling: Tile backing board.

1.04 REFERENCE STANDARDS

A. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units 2018.

B. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units 1999 (Reaffirmed 2016).

C. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board 2017.

D. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing 2003 (Reapproved 2017).

E. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members 2018.

F. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products 2018.

G. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board 2019b.

H. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs 2018.

I. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base 2019.

J. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel 2018.

K. ASTM C1396/C1396M - Standard Specification for Gypsum Board 2017.

L. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber 2016.

M. GA-216 - Application and Finishing of Gypsum Panel Products 2016.

N. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.05 **SUBMITTALS**

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on gypsum board, accessories and joint finishing system.

C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.06 **QUALITY ASSURANCE**

A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum Five (5) years of experience.

B. Copies of Documents at Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.07 **REGULATORY REQUIREMENTS**

A. Conform to applicable codes for fire rated assemblies, where they occur.

PART 2 PRODUCTS

2.01 **GYPSUM BOARD MATERIALS**

A. Provide completed assemblies complying with ASTM C840 and GA-216.

2.02 **METAL FRAMING MATERIALS**

A. Manufacturers - Metal Framing, Connectors, and Accessories:

1. ClarkDietrich: www.clarkdietrich.com/#sle.
2. SCAFCO Corporation: www.scafco.com/#sle.
3. or Architect / Owner prior approved equal.

B. Non-structural Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.

1. Studs: "C" shaped with knurled or emobossed faces.
2. Runners: U shaped, sized to match studs.
3. Ceiling Channels: C-shaped.
4. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch.
5. Resilient Furring Channels: Single or double leg configuration; 1/2 inch channel depth.
    a. Products:
        1) Same manufacturer as other framing materials.

C. Grid Suspension Systems: Steel grid system of main tees and support bars connected to structure using hanging wire.

1. Products:
    a. USG Corporation; Drywall Suspension System: www.usg.com/#sle.
    b. or Architect / Owner prior approved equal.

2.03 **BOARD MATERIALS**

A. Manufacturers - Gypsum-Based Board:
   1. American Gypsum Company: www.americangypsum.com/#sle.
   2. CertainTeed Corporation: www.certainteed.com/#sle.
   3. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
   4. National Gypsum Company: www.nationalgypsum.com/#sle.
   5. USG Corporation: www.usg.com/#sle.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; use ends square, tapered or beveled cut in locations best suited for cut as recommended by manufacturer..
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. Thickness:

C. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
   1. Application: Vertical surfaces behind thinset tile, except in wet areas.
   2. Type X Thickness: 5/8 inch.
   3. Edges: Tapered.

2.04 GYPSUM WALLBOARD ACCESSORIES

A. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
   1. Types: As detailed or required for finished appearance.

B. Beads, Joint Accessories and Other Trim: ASTM C1047, rigid plastic, galvanized steel or rolled zinc, unless noted otherwise.
   1. Corner Beads: Low profile, for 90 degree outside corners.
      a. Products:
         1) CertainTeed Corporation; No-Coat Drywall Corner: www.certainteed.com/#sle.
         2) ClarkDietrich; Strait-Flex Big-Stick: www.clarkdietrich.com/#sle.
         3) Phillips Manufacturing Co; Everlast Corner Bead: www.phillipsmfg.com/#sle.
   2. L-Trim with Tear-Away Strip: Sized to fit 5/8" inch thick gypsum wallboard.
      a. Products:
         1) Phillips Manufacturing Co; gripSTIK L-Tear: www.phillipsmfg.com/#sle.

C. Moisture Guard Trim: ASTM C1047, rigid plastic, 48 inch length, applied to bottom edge of gypsum board.
   1. Height: 1-3/4 inch.
   2. Products:
      a. Waterguard USA; Waterguard: www.waterguard-usa.com/#sle.

D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.

E. Finishing Compound: Surface coat and primer, takes the place of skim coating.
   1. Products:

a. CertainTeed Corporation; Quick Prep Plus Interior Prep Coat: www.certainteed.com/#sle.

F. Textured Finish Materials: Latex-based compound; plain.

1. Products:

a. CertainTeed Corporation; Extreme Texture Coat/Acrylic Texture with M2Tech: www.certainteed.com/#sle.

b. Sherwin-Williams; Tuff Surface Premium Texture Finish: www.sherwin-williams.com/#sle.

G. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 **FRAMING INSTALLATION**

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.

1. Level ceiling system to a tolerance of 1/1200.

2. Laterally brace entire suspension system.

C. Studs: Space studs as indicated.

1. Extend partition framing to structure where indicated and to ceiling in other locations.

2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.

3. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

E. Blocking: Install wood blocking for support of:

1. Framed openings.

2. Wall mounted cabinets.

3. Plumbing fixtures.

4. Toilet accessories.

5. Wall mounted door hardware.

6. Fire cabinets as shown on drawings

7. Metal signage

8. Bracing for metal lockers

3.03 **BOARD INSTALLATION**

A. Comply with ASTM C840, GA-216 and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Non-Rated: Install gypsum board perpendicular to framing, with ends and edges occurring over firm bearing.

C. Cementitious Backing Board: Install over wood framing members where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

D. Installation on Wood Framing: For rated assemblies, comply with requirements of listing authority. For non-rated assemblies, install as follows:

1. Single-Layer Applications: Screw attachment.

3.04 **INSTALLATION OF TRIM AND ACCESSORIES**

A. Control Joints: Place control joints consistent with lines of building spaces and as directed.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

D. Decorative Trim: Install at locations shown on drawings and in accordance with manufacturer's instructions.

E. Moisture Guard Trim: Install on bottom edge of gypsum board according to manufacturer's instructions and in locations indicated on drawings.

3.05 **JOINT TREATMENT**

A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:

1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.

2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.

3. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.

B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

1. Feather coats of joint compound so that camber is maximum 1/32 inch.

2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile.

C. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.06 **TEXTURE FINISH**

A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions and to match approved sample.

END OF SECTION

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SECTION 09 30 00
TILING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Divison 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Tile for wall applications.

B. Cementitious backer board as tile substrate.

C. Ceramic accessories.

D. Ceramic trim.

1.03 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.

B. Section 09 29 00 - Gypsum Board : Tile backer board.

1.04 REFERENCE STANDARDS

A. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium) 2019.

B. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar 2017.

C. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar 2017.

D. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement 1999 (Reaffirmed 2016).

E. ANSI A108.2 - American National Standard General Requirements: Materials, Environmental and Workmanship 2019.

F. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive 2009 (Revised).

G. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar 1999 (Reaffirmed 2010).

H. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy 1999 (Reaffirmed 2010).

I. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout 1999 (Reaffirmed 2010).

J. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout 1999 (Reaffirmed 2010).

K. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework 2017.

L. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units 2018.

M. ANSI A108.12 - American National Standard for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar 1999 (Reaffirmed 2010).

N. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone 2005 (Reaffirmed 2016).

O. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar 2017.

P. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar 2012 (Revised).

Q. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation 2010 (Reaffirmed 2016).

R. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units 1999 (Reaffirmed 2016).

S. ANSI A137.1 - American National Standard Specifications for Ceramic Tile 2012.

T. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation 2019.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, ceramic accessories and setting details.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Installer's Qualification Statement:

1. Submit documentation of National Tile Contractors Association (NTCA) or Tile Contractors' Association of America (TCAA) accreditation.

2. Submit documentation of completion of apprenticeship and certification programs.

F. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 60 00 - Product Requirements, for additional provisions.

2. Extra Tile: 1 percent of each size, color, and surface finish combination, but not less than 5 of each type.

1.07 QUALITY ASSURANCE

A. Maintain one copy of and ANSI A108/A118/A136 and TCNA (HB) on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.

C. Installer Qualifications:

1. Company specializing in performing tile installation, with minimum of five years of documented experience.
2. Installer Certification:
    a. Ceramic Tile Education Foundation (CTEF): Certified Tile Installer (CTI).
    b. Apprenticeship Program: Installer has achieved Journeyworker status through an apprenticeship from the International Union of Bricklayers and Allied Craftworkers (IUBAC) or a U.S. Department of Labor (DOL)-recognized program.

1.08 **MOCK-UP**

A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.

B. Construct tile mock-up where indicated on drawings, incorporating all components specified for the location.
    1. Minimum size of mock-up is indicated on drawings.
    2. Approved mock-up may remain as part of the Work.
    3. Demolish mock-up when directed by Architect, and remove debris from the site.

1.09 **DELIVERY, STORAGE, AND HANDLING**

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.10 **FIELD CONDITIONS**

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

PART 2 PRODUCTS

2.01 **TILE**

A. Manufacturers: All products by the same manufacturer.
    1. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 **TRIM AND ACCESSORIES**

A. Ceramic Accessories: Glazed finish, as noted on the drawings; same manufacturer as tile.

B. Ceramic Trim: Matching bullnose ceramic shapes in and as noted on the drawings..
    1. Applications:
        a. Open Edges: Bullnose.
        b. Inside Corners: Jointed.
    2. Manufacturers: Same as for tile.

2.03 **SETTING MATERIALS**

A. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.
    1. Applications: Use this type of bond coat where indicated and where no other type of bond coat is indicated.
    2. Products:
        a. ARDEX Engineered Cements; ARDEX N 23 MICROTEC: www.ardexamericas.com/#sle.
        b. Custom Building Products; ProLite Premium Rapid Setting Large Format Tile Mortar, with Multi-Surface Bonding Primer: www.custombuildingproducts.com/#sle.

c. Merkrete, by Parex USA, Inc; Merkrete 735 Premium Flex: www.merkrete.com/#sle.

d. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 **GROUTS**

A. Standard Grout: ANSI A118.6 standard cement grout.

1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.

2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.

3. Color(s): As selected by Architect from manufacturer's full line.

4. Products:

a. Custom Building Products; Polyblend Non-Sanded Grout: www.custombuildingproducts.com/#sle.

b. LATICRETE International, Inc; LATICRETE 1500 Sanded Grout: www.laticrete.com/#sle.

c. Merkrete, by Parex USA, Inc; Merkrete Duracolor Non-Sanded Grout: www.merkrete.com/#sle.

2.05 **MAINTENANCE MATERIALS**

A. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.

1. Applications: Between tile and plumbing fixtures.

2. Color(s): As selected by Architect from manufacturer's full line.

3. Products:

a. ARDEX Engineered Cements; ARDEX SX: www.ardexamericas.com/#sle.

b. Custom Building Products; Commercial 100% Silicone Caulk: www.custombuildingproducts.com/#sle.

c. LATICRETE International, Inc; LATICRETE LATASIL: www.laticrete.com/#sle.

B. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.

1. Composition: Water-based colorless silicone.

2. Color(s): As selected by Architect from manufacturer's full line.

3. Products:

a. Merkrete, by Parex USA, Inc; Merkrete Grout Sealer: www.merkrete.com/#sle.

b. Architect / Owner prior approved equal.

2.06 **ACCESSORY MATERIALS**

A. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 5/8" inch thick; 2 inch wide coated glass fiber tape for joints and corners.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

3.02 **PREPARATION**

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

3.03 **INSTALLATION - GENERAL**

A. Install tile and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.19 , manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Install ceramic accessories rigidly in prepared openings.

G. Install non-ceramic trim in accordance with manufacturer's instructions.

H. Sound tile after setting. Replace hollow sounding units.

I. Keep control and expansion joints free of mortar, grout, and adhesive.

J. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

K. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

L. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 **INSTALLATION - WALL TILE**

A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at toilet rooms.

3.05 **CLEANING**

A. Clean tile and grout surfaces.

END OF SECTION

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SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Divison 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.03 RELATED REQUIREMENTS

A. Section 26 51 00 - Interior Lighting: Light fixtures in ceiling system.

B. Section 28 46 00 - Fire Detection and Alarm: Fire alarm components in ceiling system.

1.04 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2019a.

C. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method 2017.

D. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings 2017.

E. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels 2013.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2019b.

G. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions 2017.

H. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests 2016.

I. ASTM E1264 - Standard Classification for Acoustical Ceiling Products 2019.

J. ASTM E1414/E1414M - Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum 2016.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate grid layout and related dimensioning.

C. Product Data: Provide data on suspension system components and acoustical units.

D. Samples: Submit two samples 6 by 6 inch in size illustrating material and finish of acoustical units.

E. Samples: Submit two samples each, 12 inches long, of suspension system main runner, cross runner and perimeter molding.

F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

G. Manufacturer's Qualification Statement.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 60 00 - Product Requirements, for additional provisions.

2. Extra Acoustical Units: 50 sq ft of each type and size.

1.07 **QUALITY ASSURANCE**

A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five (5) years documented experience.

B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five (5) years documented experience.

1.08 **FIELD CONDITIONS**

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 **MANUFACTURERS**

A. Acoustic Tiles/Panels:

1. CertainTeed Corporation: www.certainteed.com/#sle.

2. or Architect / Owner prior approved equal

B. Suspension Systems:

1. Same as for acoustical units.

2.02 **PERFORMANCE REQUIREMENTS**

A. Seismic Performance: Ceiling systems designed to withstand the effects of earthquake motions determined according to ASCE 7 for Seismic Design Category D, E, or F and complying with the following:

1. Local authorities having jurisdiction.

2.03 **ACOUSTICAL UNITS**

A. Acoustical Panels, Type See Drawings: Painted mineral fiber, with the following characteristics:

1. Classification: ASTM E1264 Type III.

2. Size: As indicated on the drawings.

3. Thickness: 5/8 inches.

4. Panel Edge: Reveal for 15/16" grid

5. Color: White.

6. NRC: .50

7. CAC: 35

8. Light Reflectance: .88

9. Suspension System: CertainTeed 15/16" EZ classic stab system Exposed grid.

2.04 **SUSPENSION SYSTEM(S)**

A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips and splices as required.

1. Materials:

a. Steel Grid: ASTM A653/A653M, G30 coating, unless otherwise indicated.

B. Exposed Suspension System: Hot-dipped galvanized steel grid with aluminum cap.

1. Structural Classification: Heavy-duty, when tested in accordance with ASTM C635/C635M.

2. Profile: Tee; 15/16 inch face width.

3. Finish: Baked enamel.

4. Color: White.

2.05 **ACCESSORIES**

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Hanger Wire: 12-gage 0.08 inch galvanized steel wire.

C. Hold-Down Clips: Manufacturer's standard clips to suit application, as needed.

D. Seismic Clips: Manufacturer's standard clips for seismic conditions and to suit application.

E. Perimeter Moldings: Same metal and finish as grid.

1. Size: As required for installation conditions and specified Seismic Design Category.

2. Angle Molding: L-shaped, for mounting at same elevation as face of grid.

F. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 **PREPARATION**

A. Install after major above-ceiling work is complete.

B. Coordinate the location of hangers with other work.

3.03 **INSTALLATION - SUSPENSION SYSTEM**

A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size unless otherwise shown on the drawings..

D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.

1. Use longest practical lengths.

E. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

F. Seismic Suspension System, Seismic Design Categories D, E, F: Hang suspension system with grid ends attached to the perimeter molding on two adjacent walls; on opposite walls, maintain a 3/4 inch clearance between grid ends and wall.

G. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

I. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

J. Do not eccentrically load system or induce rotation of runners.

3.04 **INSTALLATION - ACOUSTICAL UNITS**

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

E. Cutting Acoustical Units:

1. Cut to fit irregular grid and perimeter edge trim.
2. Make field cut edges of same profile as factory edges.

3.05 **TOLERANCES**

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09 68 13
TILE CARPETING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Division 01 specifications shall apply to al sections of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding / construction.

1.02 REFERENCE STANDARDS

A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials 2016.

B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring 2019.

C. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride 2016a.

D. CRI 104 - Standard for Installation of Commercial Carpet 2015.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

C. Shop Drawings: Indicate layout of joints.

D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.

E. Submit four, 24 inch long samples of edge strip.

F. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

G. Manufacturer's Qualification Statement.

1. Company specializing in manufacturing specified carpet with a minimum of three (3) years documented experience.

H. Installer's Qualification Statement.

1. Company specializing in installing carpet with a minimum of three (3) years documented experience approved by the manufacturer.

I. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 60 00 - Product Requirements, for additional provisions.

2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.04 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 3 days prior to installation to achieve temperature stability/

B. Maintain minimum 70 degrees F ambient temperature for three (3) days prior to, during and twenty four (24) hours after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Tile Carpeting:

1. Interface, Inc; (as noted on the drawings): www.interface.com/#sle.
2. or Architect / Owner prior approved..
3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

A. Tile Carpeting, Type Textured Loop: Tufted, manufactured in one color dye lot.

1. Pile Height: 0.15 inches
2. Tile Size: 19.69 X 19.69 inch, nominal.
3. Total Thickness: 0.31 inches.
4. Color: As noted on the drawings.
5. Pattern: As noted on the drawings.
6. Backing: GlasBac Tile (Standard Backing)
7. Indoor Air Quality: Green Label Plus Certified.
8. Pile Weight: 24 oz. /sq. yard.

2.03 ACCESSORIES

A. Subfloor Filler: type recommended by flooring material manufacturer.

B. Edge Strips: Carpet to concrete flooring. Rubber type, color as selected by Architect. Refer to drawings for additional information on color, type and manufacturer..

C. Adhesives:

1. Compatible with materials being adhered; maximum VOC content of 50 g/L; CRI (GLP) certified; in lieu of labeled product, independent test report showing compliance is acceptable.

D. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.

B. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).

1. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

B. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.

C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

D. Vacuum clean substrate.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install carpet tile in accordance with manufacturer's instructions.

C. Blend carpet from different cartons to ensure minimal variation in color match and prior to cutting.

D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.

F. Fully adhere carpet tile to substrate.

G. Trim carpet tile neatly at walls and around interruptions.

H. Complete installation of edge strips, concealing exposed edges.

I. Where wall bases are scheduled. cut carpet tight to walls. Fit carpet tight to vertical interruptions, leaving no gaps.

3.04 **CLEANING**

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

END OF SECTION

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SECTION 09 91 13
EXTERIOR PAINTING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Division 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:

D. Do Not Paint or Finish the Following Items:

1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
2. Items indicated to receive other finishes.
3. Items indicated to remain unfinished.
4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
5. Non-metallic roofing and flashing.
6. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, zinc, and lead.
7. Marble, granite, slate, and other natural stones.
8. Floors, unless specifically indicated.
9. Ceramic and other types of tiles.
10. Glass.
11. Concealed pipes, ducts, and conduits.
12. Items identified to be finished with a high performance paint coating
13. Exterior metal signage and letters.

1.03 RELATED REQUIREMENTS

A. Section 09 91 23 - Interior Painting.

B. Section 09 96 00 - High-Performance Coatings.

1.04 REFERENCE STANDARDS

A. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.

B. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).

C. SSPC-SP 6 - Commercial Blast Cleaning 2007.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
2. MPI product number (e.g. MPI #47).
3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
4. Manufacturer's installation instructions.
5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
1. Where sheen is specified, submit samples in only that sheen.
2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.
3. Allow 30 days for approval process, after receipt of complete samples by Architect.
4. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as masonry, have been approved.

D. Samples: Submit two paper chip samples, 4x4 inch in size illustrating range of colors and textures available for each surface finishing product scheduled.

E. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

F. Manufacturer's Instructions: Indicate special surface preparation procedures.

G. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces and color samples of each color and finish used.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
3. Label each container with color in addition to the manufacturer's label.

1.06 **QUALITY ASSURANCE**

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 5 years experience and approved by manufacturer.

1.07 **DELIVERY, STORAGE, AND HANDLING**

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 **FIELD CONDITIONS**

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

B. Paints:

1. Sherwin-Williams Company: www.sherwin-williams.com/#sle.

C. Primer Sealers: Same manufacturer as top coats.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.

1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.

2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

3. Supply each paint material in quantity required to complete entire project's work from a single production run.

4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Flammability: Comply with applicable code for surface burning characteristics.

C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

D. Colors: As indicated on drawings.

2.03 PAINT SYSTEMS - EXTERIOR

A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including primed metal.

1. Two top coats and one coat primer.

2. Top Coat(s): Exterior Latex; MPI #10, 11, 15, 119, or 214.

a. Products:

1) Sherwin-Williams Resilience, Gloss.

2.04 PRIMERS

A. Primers: As recpmmended by paint manufacturer.

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

E. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 **PREPARATION**

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or repair existing paints or finishes that exhibit surface defects.

D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Ferrous Metal:

1. Solvent clean according to SSPC-SP 1.
2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

3.03 **APPLICATION**

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

E. Apply each coat to uniform appearance.

F. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply additional coats until complete hide is achieved.

G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 **CLEANING**

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 **PROTECTION**

A. Protect finishes until final completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

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SECTION 09 91 23
INTERIOR PAINTING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditons and Divsion 01 specifications shall apply to all section of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.

1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.

D. Do Not Paint or Finish the Following Items:

1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
2. Items indicated to receive other finishes.
3. Items indicated to remain unfinished.
4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, and lead items.
6. Marble, granite, slate, and other natural stones.
7. Floors, unless specifically indicated.
8. Ceramic and other tiles.
9. Glass.
10. Acoustical materials, unless specifically indicated.
11. Concealed pipes, ducts, and conduits.

1.03 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 09 91 13 - Exterior Painting.

C. Section 09 96 00 - High-Performance Coatings.

1.04 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications 2016.

C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials 2016.

D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.

E. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).

F. SSPC-SP 6 - Commercial Blast Cleaning 2007.

1.05 **SUBMITTALS**

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
2. MPI product number (e.g. MPI #47).
3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
4. Manufacturer's installation instructions.
5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.

1. Where sheen is specified, submit samples in only that sheen.
2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.
3. Allow 30 days for approval process, after receipt of complete samples by Architect.
4. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as masonry, have been approved.

D. Samples: Submit two paper chip samples, 4x4 inch in size illustrating range of colors and textures available for each surface finishing product scheduled.

E. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

F. Manufacturer's Instructions: Indicate special surface preparation procedures.

G. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces and color samples of each color and finish used.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
3. Label each container with color in addition to the manufacturer's label.

1.06 **QUALITY ASSURANCE**

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 5 years years experience and approved by manufacturer.

1.07 **DELIVERY, STORAGE, AND HANDLING**

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 **FIELD CONDITIONS**

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply materials when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.

D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 **MANUFACTURERS**

A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

B. Paints:

1. Sherwin-Williams Company: www.sherwin-williams.com/#sle.

2.02 **PAINTS AND FINISHES - GENERAL**

A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.

1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.

2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

3. Supply each paint material in quantity required to complete entire project's work from a single production run.

4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Flammability: Comply with applicable code for surface burning characteristics.

C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

D. Colors: As indicated on drawings.

1. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.

2. Extend colors to surface edges; colors may change at any edge as directed by Architect.

2.03 **PAINT SYSTEMS - INTERIOR**

A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, wood, uncoated steel, shop primed steel and unless noted otherwise..

1. Two top coats and one coat primer.
2. Top Coat(s): High Performance Architectural Interior Latex; MPI #138, 139, 140, or 141.
    a. Products:
        1) Sherwin-Williams Pre-Catalyzed Waterbased Epoxy, Semi-Gloss. (MPI #141)

B. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals:
1. Medium duty applications include doors and door frames.
2. Two top coats and one coat primer.
3. Top Coat(s): Interior Epoxy-Modified Latex; MPI #115 or 215.
    a. Products:
        1) Sherwin-Williams Waterbased Catalyzed Epoxy, Semi-Gloss.
4. Primer: As recommended by top coat manufacturer for specific substrate.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

E. Test shop-applied primer for compatibility with subsequent cover materials.

F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
1. Gypsum Wallboard: 12 percent.
2. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 **PREPARATION**

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or repair existing paints or finishes that exhibit surface defects.

D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

G. Ferrous Metal:
1. Solvent clean according to SSPC-SP 1.
2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

H. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

I. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with clear sealer.

3.03 **APPLICATION**

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

F. Sand wood and metal surfaces lightly between coats to achieve required finish.

G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 **CLEANING**

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 **PROTECTION**

END OF SECTION

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SECTION 09 96 00
HIGH-PERFORMANCE COATINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special COnditions, including General Conditions and Supplementary Conditions, and Division 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings and addenda, or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. High performance coatings.

B. Surface preparation.

1.03 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 09 91 13 - Exterior Painting.

1.04 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.

B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating 2005 (Reapproved 2017).

C. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association Current Edition.

D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.

E. SCAQMD 1113 - Architectural Coatings 1977 (Amended 2016).

F. SSPC V1 (PM1) - Good Painting Practice: Painting Manual, Volume 1 2016.

G. SSPC V2 (PM2) - Systems and Specifications: Steel Structures Painting Manual, Volume 2 2015.

H. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).

I. SSPC-SP 2 - Hand Tool Cleaning 2018.

J. SSPC-SP 3 - Power Tool Cleaning 2018.

K. SSPC-SP 6 - Commercial Blast Cleaning 2007.

L. SSPC-SP 11 - Power Tool Cleaning to Bare Metal 2012, with Editorial Revision (2013).

M. SSPC-SP 13 - Surface Preparation of Concrete 1997 (Reaffirmed 2003).

1.05 DEFINITIONS

A. Definitions of Painting Terms: ASTM D 16, unless otherwise noted.

B. Dry Film Thickness (DFT): Thickness of a coat of paint fully cured state measured in mils (1/1000 inch)

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide complete list of all products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
2. MPI product number (e.g. MPI #47) where applicable.
3. Cross-reference to specified coating system(s) product is to be used in; include description of each system.
4. Manufacturer's installation instructions.

C. Samples: Submit two samples 8 by 8 inch in size illustrating colors available for selection based on colors listed on drawings.

D. Manufacturer's Certificate: Certify that high-performance coatings comply with VOC limits specified.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

G. Maintenance Data: Include cleaning procedures and repair and patching techniques.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Coating Materials: 1 gallon of each type and color.
2. Label each container with manufacturer's name, product number, color number, and room names and numbers where used.

1.07 **QUALITY ASSURANCE**

A. Maintain one copy of each referenced document that applies to application on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

C. Applicator Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience.

D. Applicator's Personnel: Employ persons trained for application of specified coatings.

E. Applicator's Quality Assurance: Submit a list of a minum of 5 comleted projects of similar size and complexity to this work. Include for each project the following;

1. Projet name and location
2. Name of Owner
3. Name of General Contractor
4. Name of Architect
5. Name of coating manufacturer
6. Approximate area of coatings applied
7. Date of completion.

F. Warranty: Submit manufacturer's standard warranty

G. Pre-Application of Coatings Meeting: Convene a pre-application of coatings meeting 2 weeks before start of application of coating systems. Require attendance of parties directly affecting work of this section, including Contractor, Architect, Owner, Applicator, and manufacturer's representative. Review the following;

1. Environmental requirements
2. Protection of surfaces note scheduled to be coated.
3. Surface preparation.

4. Application.
5. Repair
6. Field Quality Control.
7. Cleaning.
8. Protection of coating systems.
9. One-Year Inspection.
10. Coordination with other work.

1.08 **DELIVERY, STORAGE, AND HANDLING**

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of coating, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Coating Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

D. Storage:

1. Store materials in a clean dry area and within temperatire range in accordance with manufacturer's instructions.
2. Keep containers sealed until ready to use.
3. Do not use materials beyond manufacturer's shelf life limits.

1.09 **FIELD CONDITIONS**

A. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the coating product manufacturer.

C. Do not install materials when temperature is below 55 degrees F or above 90 degrees F.

D. Maintain this temperature range, 24 hours before, during, and 72 hours after installation of coating.

E. Restrict traffic from area where coating is being applied or is curing.

1.10 **ENVIRONMENTAL REQUIREMENTS**

A. Weather:

1. Air and Surface Temperatures: Prepare surface and apply cure coatings within air and surface temperature range in accordance with manufacturer's instructions.
2. Surface Temperatre: Minimum of 5 degrees above dew point.
3. Relative Humidity; Prepare surfaces and apply cure coatings within relative humidity range in accordance with manufacturer's instructions.
4. Precipitation: Do not prepare surfaces or apply coatings in rain, snow, fog, or mist.
5. Wind: Do not spray coatings if wind velocity is above manufacturer's limit.

B. Dust and Contaminants:

1. Schedule coating work to avoid excessive dust and airborne contaminants.
2. Protect work areas from excessive dust and airborne contaminants during coating application and curing.

1.11 **WARRANTY**

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for bond to substrate and degradation of chemical resistance.

PART 2 PRODUCTS

2.01 **MANUFACTURERS**

A. Only materials (primers, coatings, etc.) listed in the latest edition of the MPI Approved Product List (APL) are acceptable for use on this project.

B. Provide high performance coating products from the same manufacturer to the greatest extent possible.

1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.

2. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.

C. High-Performance Coatings:

1. Basis of Design: Tnemec Company, Inc: www.tnemec.com/#sle.

2. or Architect / Owner prior approved equal

2.02 **TOP COAT MATERIALS**

A. Coatings - General: Provide complete multi-coat systems formulated and recommended by manufacturer for the applications indicated, in the thicknesses indicated; number of coats specified does not include primer or filler coat.

B. Coating System for Exterior Steel-Severe Exposure.

1. Aggressive Corrosion, Coastal or UV Exposure, Physical Abuse.

a. System Type:Fluorourehtane

b. Surface Preparation: SSPC-SP 6/NACE3

c. Shop Field Primer: Series 90-97 Tneme-Zinc. DFT 2.5 to 3.5 mils

d. Field Intermediate Coat: Series 27FC, Typoxy. DFT 4.0-6.0 mils

e. Field Finish Coat: Sereis 1072 Fluoronar DFT 2.0 to 3.0 mils.

f. Total DFT: 9.0 to 12.5 mils

g. Finish Color: Match colors identified on the drawings.

C. Shellac: Pure, white type.

2.03 **ACCESSORY MATERIALS**

A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of coated surfaces.

B. Accessories required for application of specified coating in acordance with manufacturer's instructions, including thinners.

C. Products of coating manufacturer.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify existing conditions before starting work.

B. Do not begin application of coatings until substrates have been properly prepared.

C. Verify that substrate surfaces are ready to receive work as instructed by the coating manufacturer. Obtain and follow manufacturer's instructions for examination and testing of substrates.

D. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

F. Test shop-applied primer for compatibility with subsequent cover materials.

G. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Cementitious Substrates: Do not begin application until substrate has cured 28 days minimum and measured moisture content is not greater than 12 percent.

H. Proceed with coating application only after unacceptable conditions have been corrected.

1. Commencing coating application constitutes Contractor's acceptance of substrates and conditions.

3.02 **PREPARATION**

A. Clean surfaces of loose foreign matter.

B. Remove substances that would bleed through finished coatings. If unremovable, seal surface with shellac.

C. Remove finish hardware, fixture covers, and accessories and store. Reinstall after work is completed.

D. Concrete:

1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

2. Clean surfaces with pressurized water. Use pressure range of 1,500 to 4,000 psi at 6 to 12 inches. Allow to dry.

3. Clean concrete according to ASTM D4258. Allow to dry.

4. Prepare surface as recommended by coating manufacturer and according to SSPC-SP 13.

E. Ferrous Metal:

1. Solvent clean according to SSPC-SP 1.

2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning", and protect from corrosion until coated.

4. In addition, for surfaces to be finished with Coating Type High Performance, remove tight rust, and shop primer, if any to bare metal using power tools according to SSPC-SP 11 "Power Tool Cleaning to Bare Metal", and protect from corrosion until coated.

F. Protect adjacent surfaces and materials not receiving coating from spatter and overspray; mask if necessary to provide adequate protection. Repair damage.

3.03 **PRIMING**

A. Apply primer to all surfaces, unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.

B. Concrete: Prior to priming, patch with masonry filler to produce smooth surface.

3.04 **COATING APPLICATION**

A. Apply coatings in accordance with manufacturer's written instructions, to thicknesses specified and recommendations in "MPI Architectural Painting and Specification Manual".

B. Apply in uniform thickness coats, without runs, drips, pinholes, brush marks, or variations in color, texture, or finish. Finish edges, crevices, corners, and other changes in dimension with full coating thickness.

C. Keep containers closed when not in use to avoid contamination.

D. Use application equipment, tools, pressure settings and techniques in accordance with manufacturer's instructions.

E. Uniformly apply coatings at spreading rate required to achieve DFT.

F. Apply coatings to be free of film characteristics or defects that would adversly affect performance or appearance of coating systems.

G. Stripe paint with brush critical locations on steel such as welds, corners and edges using specified primer.

3.05 **REPAIR**

A. Materials and Surfaces Not Scheduled To Be Coated: Repair or replace damaged materials and surfaces not scheduled to be coated.

B. Damaged Coatings: Touch up or repair damaged coatings. Touch up of minor damage shall be acceptable where result is not visibly different from adjacent and as acceptable to the Architect and Owner. Recoat entire surface where touch up result is visibly different, either in sheen, texture, or color.

C. Coating Defects: Repair in accorance with manufacturer's instructions coatings that exhibit film characteristices or defects that would adeversly affect performance or appearance of coating systems.

3.06 **FIELD QUALITY CONTROL**

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection.

B. Manufactuerer's Representative shall provide technical assistance and guidnace for surface preparations and application of coating systems.

C. The manufacturer shall have a representative on site to review coatings are as specified, surface application is as specified, verify DFT of each coating system is as specified using wet film and dry film gauges. Includes review of coating defects that would adversly affect the performance of the coating system.

D. The manufacturer's representative shall provide a written report to the Architect, Owner and Contractor describing inspections made and actions taken to correct nonconforming work report any non conforming work not corrected..

E. The manufacturer's representative shall perform a additional reviews and reports to review coorective work associated with the item above until accepted by the Owner and Architect.

3.07 **CLEANING**

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

B. Clean surfaces immediately of overspray, splatter, and excess material.

C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

D. Remove temporary coverings and protection of surrounding areas and surfaces.

3.08 **PROTECTION**

A. Protect surfaces of coating systems from damage during construction.

END OF SECTION

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SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions. including General Conditions and Supplementary Conditions and Divison 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Commercial toilet accessories.

B. Utility room accessories.

1.03 RELATED REQUIREMENTS

A. Section 061000 Rough Carpentry: Concealed supports for accessories, including in wall framing and plates.

B. Section 09 30 00 - Tiling: Ceramic washroom accessories.

C. Section 22 40 00 - Plumbing Fixtures: Under-lavatory pipe and supply covers.

1.04 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.

B. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service 2015a (Reapproved 2019).

C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.

D. ASTM C1036 - Standard Specification for Flat Glass 2016.

E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports and reinforcement of toilet partitions to receive anchor attachments.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Commercial Toilet, Shower, and Bath Accessories:

1. Provide accessories in accordance with items listed within the drawings.
2. or Architect / Owner prior approved equal.
3. Substitutions: Section 01 60 00 - Product Requirements.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

1. Grind welded joints smooth.

2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.

B. Keys: Provide 5 keys for each accessory to Owner; master key lockable accessories.

C. Stainless Steel Sheet: ASTM A666, Type 304.

D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.

E. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.

F. Adhesive: Two component epoxy type, waterproof.

G. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

H. Provide gaskets in depth needed to install accessories plumb, level and square where items over lap ceramic tile. Seal voids with clear silicone sealant (paintable)

2.03 **FINISHES**

A. Stainless Steel: Satin finish, unless otherwise noted.

2.04 **COMMERCIAL TOILET ACCESSORIES**

A. See drawings for list of accessories.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. Verify that field measurements are as indicated on drawings.

D. See Section 061000 Rough Carpentry for installation of blocking, reinforcing plates and concealed anchors in walls and ceilings.

3.02 **PREPARATION**

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.03 **INSTALLATION**

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Provide devices to level out accessories where they overlap ceramic tile to wall conditions.

D. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.04 **PROTECTION**

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Construction Contracts and Special Conditions, including General Conditions and Supplementary Conditions, and Divison 01 specifications shall apply to all sections of the Contract Documents, including all specifications, drawings, addenda, or other changes of documents issued for bidding / construction.

1.02 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

C. Accessories.

1.03 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.

B. Section 09 91 23 - Interior Painting: Field paint finish.

1.04 REFERENCE STANDARDS

A. FM (AG) - FM Approval Guide current edition.

B. NFPA 10 - Standard for Portable Fire Extinguishers 2017, with Errata (2018).

C. UL (DIR) - Online Certifications Directory Current Edition.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide extinguisher operational features.

C. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.

D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.06 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Extinguishers:

1. Kidde, a unit of United Technologies Corp: www.kidde.com/#sle.
2. Nystrom, Inc: www.nystrom.com/#sle.
3. Potter-Roemer: www.potterroemer.com/#sle.
4. Pyro-Chem, a Tyco Business: www.pyrochem.com/#sle.
5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Fire Extinguisher Cabinets and Accessories:

1. Kidde, a unit of United Technologies Corp: www.kidde.com/#sle.

2. Larsen's Manufacturing Co: www.larsensmfg.com/#sle.
    a. Fire Extinguisher Basis of Desgin: Larsen's MP5, 2A-10BC with U.L. Rating.
    b. Fire Cabinter Basis of Desgin: Model No 2409-SR (Semi-Recessed). Do not Break glass Door style with lock and recessed handle, stainless steel construction with tempered glass. Provide mounting brackets as recommended by Manufacturer for fire extinguisher so that top of extinguisher is clearly visible with door closed. Provide vertical decal lettering.
3. Nystrom, Inc: www.nystrom.com/#sle.
4. or Architect / Owner approved equal
5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 **FIRE EXTINGUISHERS**

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
    1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.

B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
    1. Class: A:B:C type.
    2. Size: 10 pound.
    3. Finish: Baked polyester powder coat, red color.
    4. Provide Maintenance / inspection record keeping tag on each extinguisher meeting requirments of N.F.P.A. 10 and local ahuthorities having jurisidction. Extinguishers shall be properly charged with charging / inspection date noted on tag.

2.03 **ACCESSORIES**

A. Lettering:{ }“FIRE EXTINGUISHER” decal, or vinyl self-adhering, pre-spaced black lettering in accordance with authorities having jurisdiction (AHJ).

B. Provide 5 Master Keys

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.02 **INSTALLATION**

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level in wall openings, as indicated on the drawings.

C. Secure rigidly in place.

D. Place extinguishers and accessories in cabinets.

E. Position cabinet signage at as indicated on drawings.

END OF SECTION

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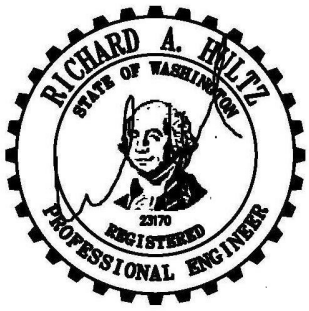

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. Operation and Maintenance Manual

1.03 SUBMITTALS

A. General: Comply with Section 200500 and Division 01.

B. Preliminary O&M: Submit preliminary review O&M manual for review.

C. Final O&M: Submit Final O&M manuals per Division 01.

PART 2 - PRODUCTS

2.01 GENERAL

A. General Contents: A maintenance manual shall be compiled containing maintenance and operating information and maintenance schedules for all project mechanical systems.

2.02 SUBMITTAL DATA AND TECHNICAL O&M DATA

A. Submittal Data: Provide manufacturer’s technical product data, with manufacturer's model number, description of the equipment, equipment capacities, equipment options, electrical power voltage/phase, special features, and accessories. Label equipment and fixtures data with same designation as used on contract documents. This information may consist of the same information as the submittal data (clearly identified and marked to suit each item). This information shall be provided for all items requiring maintenance and for items that may require replacement over a 30 year period or be revised due to an Owner building improvement (includes valves, fire sprinkler heads, etc.) (includes plumbing fixtures, valves, plumbing specialties, equipment, etc. (includes valves, equipment, air outlets/inlets, dampers, etc.).

B. Technical O&M Data: Provide for each equipment or item requiring maintenance. Label O&M data to clearly indicate which equipment on the project it applies to (use same designation as used in the Contract Documents). Data to include:

1. Manufacturer’s operating and maintenance manuals and instructions.

2. Itemized list of maintenance activities and their scheduled frequency.

3. Maintenance instructions for each maintenance activity.

4. Manufacturer’s parts list.

5. Manufacturer's recommended lubricants.

6. Size, quantity and type of filters required (as applicable).

7. Size, quantity and type each belts unit requires (as applicable).

8. Size, quantity and type of fuses (as applicable).

C. Sources: Provide names, addresses, and phone numbers for local manufacturer's representative, service companies, and parts sources for mechanical system components. List shall include all mech including: system riser components, valves, sprinkler heads, and equipment plumbing fixtures, valves, and equipment HVAC system valves, filters, belts, and equipment control valves, actuators, dampers controllers, relays, and sensors.

D. Start-Up Reports: Include copies of all equipment and system start-up reports.

E. Balancing Report: Include a full copy of the balancing report under a dividing tab for the specification section (or building system) where this work is specified. Where balancing is provided by others, obtain from the balancer a copy of the report to insert in the O&M's.

2.03 MAINTENANCE SCHEDULES

A. General: Provide Maintenance schedules with an itemized list of maintenance activities and their scheduled frequency (i.e., weekly, monthly, semi-annually, etc.) for item requiring maintenance.

B. Special Maintenance: List any critical maintenance items or areas requiring special attention.

C. Start-Up/Shut-Down: Provide normal start-up, operating, and shut-down procedures; emergency shut-down procedures; and (where applicable) seasonal shut-down procedures.

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Division 21 - Fire Suppression.

C. Division 22 - Plumbing Systems.

D. Division 23 - Heating, Ventilation, and Air Conditioning (HVAC) Systems.

1.02 WORK INCLUDED

A. General Mechanical System Requirements

B. Mechanical System Motors

C. Identification and Labeling

1.03 DEFINITIONS

A. Abbreviations and Terms: Where not defined elsewhere in the Contract Documents, shall be as defined in RS Means Illustrated Construction Dictionary, Fourth Addition and in the ASHRAE Handbook of Fundamentals, latest edition.

B. "As required" means "as necessary to form a safe, neat, and complete working installation (or product), fulfilling all the requirements of the specifications and drawings and in compliance with all codes."

C. "Concealed" means "hidden from view" as determined when areas are in their final finished condition, from the point of view of a person located in the finished area. Items located in areas above suspended ceilings, in plumbing chases, and in similar areas are considered "concealed." Items located in cabinet spaces (e.g. below sinks) are not considered concealed.

D. "Coordinate" means "to accomplish the work with all others that are involved in the work by: directly discussing the work with them, arranging and participating in special meetings with them to discuss and plan the work being done by each, obtaining and completing any necessary forms and documentation required for the work to proceed, reaching agreement on how parts of the work performed by each trade will be installed relative to each other both in physical location and in time sequence, exchanging all necessary information so as to allow the work to be accomplished with a united effort in accordance with the project requirements".

E. "Finished Areas" means "areas receiving a finish coat of paint on one or more wall surface."

F. “Mechanical”, where applied to the scope of work, includes all project fire suppression systems, plumbing systems, HVAC systems, and controls for these systems and all work covered by specification Divisions 20, 21, 22, 23, and 25. Such work is shown on multiple drawings and is not limited to a particular set of sheets, or sheets prefaced with a particular letter.

G. The term "related documents" (as used at the beginning of each specification section), and the Specification Divisions and Sections listed with it, is only an indication of some of the specification sections which the work of that section may be strongly related to. Since all items of work relate to one another and require full coordination, all specification sections, as listed in the Table of Contents, shall be considered as being "related documents", and shall be considered (by this reference) in the same manner as if they had all been listed under the term "related documents" in each specification section.

H. "Work included" (as used at the beginning of each specification section), and the items listed with it, is only an indication of some of the items specified in that Section and is in no way limiting the work of that Section. See complete drawings and specifications for all required work.

I. "Verify" means "Contractor shall obtain, by methods independent of the project Architect/Engineer and Owner, the information noted and the information needed to properly perform the work".

J. “Substitution”: As applied to equipment means “equipment that is different than the ‘Basis of Design’ equipment scheduled on the drawings (or otherwise indicated in the contract documents)”.

1.04 GENERAL REQUIREMENTS

A. Scope: Furnish all labor, materials, tools, equipment, and services for all mechanical work. This section applies to all Division 20, 21, 22, 23, 25 specifications and to all project mechanical work. All mechanical equipment and devices furnished or installed under other Divisions of this specification (or by the Owner) which require connection to any mechanical system shall be connected under this division of the Specifications.

B. General: All work shall comply with Division 00, General Conditions, Supplementary Conditions, Division 01, and all other provisions of the Contract Documents.

C. Code:

1. Compliance: All work shall be done in accordance with all applicable codes and ordinances. Throughout the Project Documents, items are shown or specified in excess of code requirements; in all such cases, the work shall be done so that code requirements are exceeded as indicated.

2. Documentation: Maintain documentation of all permits and code inspections for the mechanical work; submit documentation showing systems have satisfactorily passed all AHJ inspections and requirements.

3. Code Knowledge: Contractor and workers assigned to this project shall be familiar and knowledgeable of all applicable codes and ordinances. Code requirements are typically not repeated in the Contract Documents. By submitting a bid, the Contractor is acknowledging that the Contractor and workers to be utilized on this project have such knowledge.

4. Proof of Code Compliance: Prior to final completion, satisfactory evidence shall be furnished to show that all work has been installed in accordance with all codes and that all inspections required have been successfully passed. Satisfactory evidence includes signed inspections by the local code authority, test lab results, qualified and witnessed field tests, and related acceptance certificates by local

code authorities, and field notes by the Contractor as to when all inspections and tests occurred.

D. Complete Systems: Furnish and install all materials, appurtenances, devices, and miscellaneous items not specifically mentioned herein or noted on the drawings, but which are necessary to make a complete working installation of all mechanical systems. Not all accessories or devices are shown or specified that are necessary to form complete and functional systems.

E. Review and Coordination:

1. General: To eliminate all possible errors and interferences, thoroughly examine all the Drawings and Specifications before work is started, and consult and coordinate with each of the various trades regarding the work. Such coordination shall begin prior to any work starting, and continue throughout the project.

2. Suppliers: Suppliers of products shall review the documents to confirm that their products are suitable for the application and that all manufacturers requirements and recommendations have been satisfactorily addressed in the Contract Documents. Where not addressed the supplier shall notify the Engineer prior to bidding to resolve any issue or include in their bid an adequate amount to resolve the issue.

F. Conflicts and Discrepancies: Notify the Architect/Engineer of any discrepancies or conflicts before proceeding with any work or the purchasing of any materials for the area(s) of conflict until requesting and obtaining written instructions from the Architect/Engineer on how to proceed. Where conflicts occur, the most expensive and stringent requirement (as judged by the Architect/Engineer) shall prevail. Any work done after discovery of such discrepancies or conflicts and prior to obtaining the Architect/Engineer's instructions on how to proceed shall be done at the Contractor's expense.

G. Drawings and Specifications: Drawings and specifications are complementary and what is called for in either is binding as if called for in both. The drawings are diagrammatic and show the general arrangement of the construction and therefore do not show all offsets, fittings and accessories which are required to form a complete and operating installation. Mechanical work is shown on multiple drawings and is not limited to a particular set of sheets, or sheets prefaced with a particular letter.

H. Offsets/Fittings:

1. Piping Systems: Include in bid all necessary fittings and offset to completely connect up all systems, maintain clear access paths to equipment, and comply with all project requirements. Offsets are required to route piping around building structural elements, roof slopes, mechanical systems, electrical systems, and numerous other items. Due to the schematic nature of the plans such offsets are typically not shown. Contractor is responsible to determine the quantity of offsets and fittings required, and the labor involved. No added payment or “extras” will be granted for the Contractor’s failure to correctly estimate the number of offsets and fittings and labor required. Contractor is advised that equipment and fixture connections may require more than 20 elbows per plumbing fixture and coil per pipe line.

2. Duct Systems: Include in bid all necessary fittings, offsets, and transitions to completely connect all systems, maintain clear access paths, and comply with all

project requirements. Offsets are required to route piping around building structural elements, roof slopes, mechanical systems, electrical systems, and numerous other items. Due to the schematic nature of the plans such offsets are typically not shown. Contractor is responsible to determine the quantity of offsets and fittings required, and the labor involved. No added payments or “extras” will be granted for the Contractor’s failure to correctly estimate number of offsets, fittings, transitions and labor required. Contractor is advised that transitions are required at connections to all equipment, to all air inlets/outlets, crossing of beam lines, at crossing with piping, and similar locations.

3. Added Offsets: In addition to offsets and fittings required per the above paragraphs, include in bid costs 2 added elbows for each 30 feet of pipe and duct run. Such offsets shall be of same size and material of connecting runs. Offsets shall be bid as 90-degree elbows. The Owner reserves the right to obtain credit for any elbows required by this paragraph but not actually used. Added offsets shall be calculated based on project total accumulated duct (or pipe) lengths, with lengths rounded up to the nearest 30' in order to calculate offsets. (For example, if project had 5 feet of 24 x 8 duct in one location, and 8 feet of 24 x 8 duct in another location, total accumulated length of 24 x 8 would be 13 feet, round up to 30 feet, with calculated offsets to be provided as 2).

I. Design: The level of design presented in the documents represents the extent of the design being furnished to the Contractor; any additional design needed shall be provided by the Contractor. All design by the Contractor shall be performed by individuals skilled and experienced in such work, and where required by local code (or elsewhere in the documents) shall be performed by engineers licensed in the State where the project is located. Include in bid the costs of all such project design; including engineering, drafting, coordination, and all related activities and work. Such designs services are required for many building systems; including but not limited to ductwork at equipment, piping at fixtures and equipment, hanger/support systems, temporary duct/piping systems, mechanical offsets/adjustments to suit other system, and for methods/means of accomplishing the work.

J. Special Tools: Furnish to the Owner one complete set of any and all special tools such as odd size wrenches, keys, etc. (allen wrenches are considered odd), which are necessary to gain access to, service, or adjust any piece of equipment installed under this contract. Each tool shall be marked or tagged to identify its use. Submit a written record listing the special tools provided, date, and signed by the Owner's representative receiving the tools.

K. Standards and References: Shall be latest edition unless a specific edition, year, or version is cited, or is enforced by the AHJ.

L. Warranties:

1. General: Products and workmanship shall be warranted to be free from all defects, capable of providing satisfactory system operation, and conforming to the requirements of the Contract Documents. Include in the project bid all costs associated with project warranties to ensure that the warranty extends for the required period; possible project delays and failure by others to complete their work may cause the start of the warranty period to be delayed. The Contractor shall be responsible for increasing the warranty dates by corresponding amounts to provide the required warranty periods.

2. Basic Project Warranty: As described in Division 00 and 01. See individual specification sections for specific warranty requirements. Start date and duration

are as indicated in Division 00 and 01. Where not indicated otherwise in Division 00 or 01, the basic project warranty shall start at project substantial completion and be for one year.

3. Special Warranties: See individual specification sections for special warranty requirements and extended warranty periods beyond the basic project warranty.

1.05 SUBSTITUTIONS

A. General: See Division 00 and 01 for information and requirements regarding substitutions. Manufacturers not scheduled on the plans or listed as “Acceptable Manufacturers” require prior approval and shall submit a substitution request form (see Division 01 for requirements and limitations). See Paragraph 2.01 this specification section regarding “Acceptable Manufacturers”.

B. Redesign:

1. The Contract Documents show design configurations based on particular manufacturers. Use of other manufacturers' products (i.e. substitutions) from what is shown (or specified) may require redesign of mechanical, plumbing, controls, fire protection, electrical, structural, and general building construction to accommodate the substitution.

2. Review the installation requirements for substitutions and provide redesign of all affected construction. The redesign shall be equal or superior in all respects to the Architect/Engineer's design (as judged by the Architect/Engineer), including such aspects as equipment access, ease of maintenance, utility connection locations, unit electrical requirements, noise considerations, unit performance, and similar concerns.

3. Redesign shall be done by the Contractor and shall meet the requirements and have the approval of the Architect/Engineer prior to beginning work. Apply for and obtain all permits and regulatory approvals.

C. Construction Modifications: Provide all required construction modifications to accommodate the substituted products; this includes all mechanical, plumbing, controls, fire protection, electrical, structural, and general building construction. Construction modification shall comply with code, specifications, and be equal to designed construction.

D. Costs: Cost of redesign, construction costs, and all additional costs incurred to accommodate substituted equipment shall be borne by the Contractor.

E. Submittals: In addition to other required submittals, submit shop drawings showing the redesign for substituted equipment; submittal shall include installation plans and sections, connecting services (i.e. ducts, piping, electrical) locations and routing, required service clearances, and related installation details. Submit data required by other disciplines to allow review of the impact of the substitution (i.e. weights, electrical).

1.06 QUALITY ASSURANCE

A. Experience: All work shall be performed by individuals experienced and knowledgeable in the work they are performing, and experienced with the same type of systems and building type as this project. By virtue of submitting a bid, the Contractor is acknowledging that workers to be utilized on this project have such experience and

knowledge. Upon request of the Engineer, submit resumes showing the work history, training, and types of projects worked on, for individuals assigned to this project.

B. Code: Utilize workers experienced and knowledgeable with codes pertaining to their work; verify code compliance through-out the project.

C. ASME: All pressure vessels, pressure vessel safety devices, and pressure vessel appurtenances shall comply with the standards of, and bear the stamp of ASME.

D. Quality Assurance Checks: Prior to ordering products and making submittals, confirm the following for each:

1. General: Product is suitable for the intended purpose and complies with the Contract Documents.

2. Manufacturer: Product's manufacturer is listed as an acceptable manufacturer in the Contract Document’s or a substitution request (where allowed) has been submitted and the manufacturer has been listed as acceptable.

3. Electrical (for products requiring electrical power):

   a. Product is for use with the voltage/phase as indicated on the electrical plans (or for the electrical circuit the item will be connected to).

   b. Product's ampacity requirements (MCA) do not exceed that indicated on the electrical plans (or for the electrical circuit the item will be connected to).

4. Weight: Product's weight is no greater than that indicated.

5. Space Verification: Product will fit in the space available, and along the path available to install the item, will have adequate service clearances, and will not impede on any clearances required for other items in the space the item will be located.

6. Installation: A suitable method for installing the product has been selected which meets the project schedule and other requirements.

7. Lead Time: The product's fabrication, shipping, and delivery period meets the project schedule requirements.

8. Substituted Equipment: Where equipment is not the basis of design confirm all requirements for substituted equipment have been met and shop drawings of construction revisions have been (or are being) prepared.

9. Controls: Item is compatible with the controls it will be connected to and has been coordinated with the firm providing the project control work.

10. Listing: Item is Listed when required to be as such. And if the item is to be installed as part of a Listed system or assembly, it is compliant with the Listing of the overall system or assembly.

1.07 SUBMITTALS - GENERAL

A. Variations: Only variations that are specifically identified as described herein will be considered. Provide with the submittal (in addition to other information required): description of the proposed variation, entity who is proposing the variation, why the variation is being proposed, any cost changes associated with the variation, and any other pertinent data to allow for review. Failure to submit information on the variation as described will result in the submittal review being conducted without considering the variation.

B. Quality Assurance: By submitting an item for review, the Contractor is claiming that all "Quality Assurance Checks" (see paragraph 1.06 this specification Section) have been performed and satisfactorily passed and no further comment from the submittal reviewer is required for the "Quality Assurance Checks".

C. Product Submittals - Information Required:

1. Manufacturer's catalog information, containing product description, model number, and illustrations. Mark clearly to identify pertinent information and exact model and configuration being submitted.

2. List of accessories and options provided with product.

3. Product dimensions and clearances required.

4. Product weight.

5. Submittal identified with product name and symbol (as shown on the drawings or written in the specifications) and specification Section and paragraph reference.

6. Performance capacity and characteristics showing compliance with the Contract Documents.

7. Manufacturer's and local manufacturer's representative names, addresses, and phone numbers.

8. For equipment requiring piping or duct connections:

   a. Type of connections required.

   b. Size and locations of connections.

9. For electrically operated equipment:

   a. Number and locations of electrical service connections required.

   b. Voltage required.

   c. Fuse or circuit breaker protection requirements.

   d. Motor starter requirements; if motor starter is furnished with the equipment, submit product information on motor starter.

10. For equipment requiring control connections:

    a. Type of control signals required.

b. Control communication protocol.

c. Information on control devices furnished with equipment.

d. Location of control connections.

11. Manufacturer's installation instructions.

12. See each specification Section for additional submittal requirements.

D. Shop Drawing Submittals: Provide for the following systems:

1. Fire Suppression Systems.

2. HVAC control systems.

3. For any parts of any system which are to be installed differently than as shown on the drawings.

4. Construction revisions to accommodate Substituted Equipment.

5. Other areas/work as noted in the Contract Documents.

6. For those systems requiring shop drawings, reference system's specification Section for additional requirements.

1.08 RECORD DOCUMENTS

A. Field Record Drawings: Maintain a set of full size contract plans at the project site upon which all changes from the as-bid plans are noted. Plans shall be maintained clean, dry and legible; with information recorded concurrent with construction progress. These plans shall also include actual locations (with dimensions) of all underground and concealed mechanical systems. Connection points to outside utilities shall be located by field measurements and so noted on these record drawings. All addenda, change order, field orders, design clarifications, request for information, and all other clarifications and revisions to the plans shall also be made a part of these record drawings. Plans shall be available for weekly review by the Architect/Engineer. Label drawing “As-Builts” with date, name of Contractor, and name of individual overseeing the work.

B. Final Field Record Drawings Submittal: Deliver to the Architect/Engineer the original Field Record drawings and one full size copy.

1.09 PRODUCT HANDLING, PROTECTION AND MAINTENANCE

A. Protection:

1. Protect all products from contamination, becoming unclean, and from damage of any kind and whatever cause; when being handled, in storage, and while installed, until final project acceptance.

2. Completely cover fixtures, motors, control panels, equipment, and similar items to protect from becoming unclean and damage of any kind.

3. Protect premises and work of other trades from damage due to Mechanical work.

B. Openings: Cap all openings in pipe, ductwork and equipment to protect against entry of foreign matter until all work that could cause unclean conditions or damage is complete (including work that has dust or fumes associated with it). Caps shall be of sufficient strength and seal integrity to prevent entry of water or fumes for the most extreme conditions they may be exposed to (i.e. high velocity water spray, high winds, concrete splash, etc.)

C. Storage: Provide properly conditioned and sheltered storage facilities for products to prevent damage of any kind and to maintain new condition. Provide adequate venting arrangements to avoid condensation damage.

D. Operation and Maintenance:

1. General: Inspect products periodically to confirm conditions and maintenance needs. Keep records of inspections and (upon request) forward to the Architect/Engineer prior to project final acceptance. Operation and Maintenance shall be in accordance with manufacturer's written procedures and recognized best maintenance practices. Keep records of maintenance and (upon request) forward to the Architect/Engineer prior to project final acceptance.

2. Stored Products: Provide maintenance (i.e. equipment rotation, lubrication, flush, cleaning, etc.) and inspection on products while stored to maintain new condition.

3. Installed Products: Provide maintenance and inspection of products and operate mechanical systems until substantial completion or specified Owner Instruction has been provided (whichever is later). Maintenance shall include all labor and materials and all manufacturers' recommended maintenance (i.e. strainer cleaning, filter changes, bearing lubrication, belt tensioning, etc.). In addition to scheduled maintenance, review all equipment periodically to allow detection of improper operation or any special maintenance needs; review shall be consistent with best practices for the product but in no case less than a site visit every two weeks. Document all maintenance activities.

E. Damaged Products: Damaged products shall be replaced with new. Where damage is limited to paint (or similar finish), the product may remain if the finish is restored to a new condition (as judged by the Architect/Engineer).

1.10 JOB CONDITIONS

A. Special Requirements:

1. Maintain emergency and service entrance usable to pedestrian and vehicle traffic at all times. Where trenches are cut, provide adequate bridging for traffic.

2. Coordinate startup and shutdown of all mechanical systems and utilities with related trades and the Owner's representative.

3. Coordinate all construction activities with the Owner's Representative and cooperate fully so as to minimize conflicts and to facilitate Owner usage of the premises during construction.

4. Provide temporary services to occupied areas to accommodate Owner's use during construction. All temporary work shall comply with same specifications as for new work and be of same quality.

B. Downtime Restrictions:

1. Contractor shall notify the Owner at least 72 hours in advance of any intended shut-down of any building services or systems and obtain Owner approval prior to proceeding.

2. Electrical power to the building shall not be interrupted at any one time for more than 15 minutes.

C. Schedule of Work: Arrange work to comply with schedule of construction, and so as not to violate any downtime restrictions, and to accommodate the Owner's scheduled use of the premises during construction.

1.11 ENGINEER REVIEWS AND WITNESSING

A. General: See Division 00 and 01 for scheduling, notification, and additional requirements.

B. Access: Provide ladders, any special tools and safety equipment to allow Engineer's access to areas and equipment. Remove and reinstall ceiling tiles, access panels, and similar items where requested to allow for reviews.

C. Review of Systems with Equipment:

1. Prior to Engineer’s review, system’s equipment shall have received specified start-up and be substantiated by a written report.

2. Prior to Engineer’s review, systems shall have been operating properly for at least five consecutive days prior to the scheduled review date.

3. Personnel shall be present to operate the system’s equipment and controls, and to vary system settings as directed by the Engineer to allow for a review of operation over a range of settings.

D. Re-Review Fees: The project budget allows for one review by the Engineer for specified reviews. See Division 00 and 01 for compensation to the Engineer for required re-reviews.

1.12 REFERENCES

A. ASME A13.1: Scheme for the Identification of Piping Systems.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. General: Any reference in the Specifications or on the Drawings to any article, device, product, material, fixture, form or type of construction by manufacturer, name, make, model number, or catalog number shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. The manufacturers listed as Acceptable Manufacturers may bid the project for the items indicated without submitting a substitution request; however that does not relieve the products from having to comply with the Contract Documents.

B. Substitutions: Products by manufacturers listed as “Acceptable Manufacturers” (other than those listed as the “Basis of Design”) are considered substitutions and shall comply with the requirements for substitutions. See Paragraph titled “Substitutions” in Part 1 of this specification section.

C. Considerations: In reviewing a manufacturer for acceptance, factors considered (as compared to the specified item) include: engineering data showing item's capacity, performance, proper local representation of manufacturer, likelihood of manufacturer's future local support of product, service availability, previous installations, previous use by Owner/Engineer/Architect, product quality, availability/quality of maintenance and operation data, electrical requirements, capacity/performance, acoustics, physical dimensions, weight, items geometry and access requirements, utility needs, and similar concerns.

D. Limitations of the Term “Acceptable Manufacturer”: The listing of a manufacturer as an Acceptable Manufacturer does not necessarily mean that the products of that manufacturer are equal to those specified. The listing is only an indication of those manufacturers which have represented themselves as being capable of manufacturing, or have in the past manufactured, items equal to those specified. The burden to review products to confirm equivalency with the specified products is on the Contractor. The Architect/Engineer shall be the final judge as to whether an item is equal to that specified.

E. Quality: Products provided by Acceptable Manufacturers shall be equal to or superior to the specified manufacturer's item in function, appearance, and quality, and shall fulfill all requirements of the Contract Documents. The Architect/Engineer shall be the judge as to whether an item meets these requirements or not.

F. Manufacturer: To be considered as being made by a particular manufacturer, the product must be made directly by the manufacturer and have the manufacturer’s name (or nameplate with name) affixed to the product (or on the product container where direct labeling is not possible). Example: manufacture “A” is listed as an acceptable manufacture; manufacturer “B” is not listed as an acceptable manufacturer; manufacturer “A” owns “B”; products from “B” do not qualify as being made by an acceptable manufacturer by virtue of ownership.

2.02 PRODUCTS - GENERAL

A. Standard Products: Products shall be standard products of a manufacturer regularly engaged in the manufacture of such products. The standard products shall have been in satisfactory commercial or industrial use for two years prior to bid opening. The two year use shall include applications of equipment and materials under similar circumstances and of similar size. The two year's experience must be satisfactorily completed by a product which has been sold or is offered for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures. Except that equipment changes made solely to satisfy code requirements, to improve unit efficiency, or to comply with unique project requirements are not required to have two year prior operation.

B. Latest Design: Products shall be the latest design and version available from the manufacturer, including software. Discontinued products shall not be used.

C. Service Support: Qualified permanent service organizations for support of the equipment shall be located reasonably convenient to the equipment installation and able to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

D. Manufacturer's Nameplate: Equipment shall have a manufacturer's nameplate bearing the manufacturer's name, address, model number, serial number, and additional information as required by code. Nameplate shall be securely affixed in a conspicuous place. The nameplate of the distributing agent will not be acceptable. Nameplate shall be of durable construction, easily read, with lettering minimum size 12 font.

E. Compatibility: All components and materials used shall be compatible to the conditions and materials the items will be exposed to. All items exposed to the weather shall be galvanized, or be of stainless steel or similar corrosion resistant material.

F. Sizes: Sizes indicated for products manufactured to standardized sizes (e.g. pipe, pipe fittings, valves, material gauges, etc.) are minimums. During bidding confirm that the sizes are available and meet project requirements. Where indicated sizes are not available provide the next larger available size; confirm this larger size will suit the construction and meet Contract Document requirements prior to ordering. Such size revisions are subject to Engineer's review; indicate size revisions on the product submittal and why the size is being revised.

G. Non-Specified Items: Materials shown on the drawings but not specified shall be provided as shown and as required to suit the application illustrated and intended and shall be of commercial quality, consistent with the quality of similar type items provided on the project. Not all items shown on the drawings necessarily have a corresponding specification; such items shall be provided per this paragraph and so as to provide complete, finished, fully functioning mechanical systems.

H. Weights: Do not exceed the weights shown unless added structural supports are provided. Such supports shall meet the requirements of the project Structural Engineer. The Contractor shall bear all costs for all redesign and added supports to accommodate heavier equipment. The Contractor shall reimburse the Engineer for all time associated with all review and analyses regarding the use of equipment heavier than that indicated.

I. Temperature/Pressure Rating: All materials and components furnished shall be suitable for the temperature and pressures they will be exposed to. Contractor shall consider possible operating modes to ensure proper material ratings.

J. Standardization: All products of the same type shall be by the same manufacturer and have the same characteristics and features to allow for Owner's standardization.

K. Model Numbers: Any reference to a manufacturer's "model number" is a reference to a manufacturer's series number or type of product, and is not a complete "model number" in having all the necessary numbers/letters to convey all of the features, accessories, and options that are required. These series numbers are only meant to convey a type of product that may meet the project requirements. Where conflicts or discrepancies occur regarding a listed manufacturer's series or "model" number and specified capacities or features, the more stringent and expensive shall prevail.

2.03 ELECTRICAL

A. General: All electrical devices, wiring, products, and work shall comply with the Division 26 specifications and code. See drawings for building occupancy type, types of construction, and areas which may require special wiring methods or other electrical work.

B. Equipment: All equipment requiring power shall be factory wired to an equipment mounted junction box (or an accessible compartment with power terminals or electrical device) arranged to allow for connection of electrical power.

C. Overcurrent protection: Circuit breakers, circuit breaker disconnects, fuses, and other current limiting devices indicated to be provided, shall be rated to suit the maximum overcurrent rating of the item served, and have other ratings, as required by code. Circuit breakers for HVAC and refrigeration unit equipment shall be UL listed by HACR type.

D. Short Circuit Current Rating (SCCR): All equipment (or components) requiring the use of electrical power shall have a SCCR value to comply with code. The minimum rating shall be 65,000 Amps RMS Symmetrical unless a lower value is indicated on the plans or allowed by code. Where the Contractor wishes to utilize equipment having a lower rating, the Contractor shall be responsible to provide calculations substantiating that a lower SCCR is acceptable (and complies with code), or make revisions to the electrical system to accommodate the proposed equipment (or components).

E. Product Certification (Listing): Products which require connection to electrical power shall be certified (i.e. listed) by a Nationally Recognized Testing Laboratory (NRTL) and be labeled (in a conspicuous place) with such certification (or certification mark). Certification shall comply with code, OSHA Standards, and Authority Having Jurisdiction (AHJ) requirements. NRTL's shall be recognized as such by OSHA and the AHJ. Certification shall be for the complete assembly (approval of individual components is not acceptable). Field evaluations to obtain certification shall be performed by accredited product testing laboratories acceptable to the AHJ and Engineer, be performed in accordance with code, NFPA 791, recognized practices, and be labeled to identify the certification.

2.04 MOTORS

A. General: Where a piece of equipment specified includes an electric motor, the motor shall be factory installed and mounted. Motor starters and motor electrical disconnect switches shall be provided by the Contractor doing the work of the Section where the item was specified, unless specifically shown to be provided by Division 26 (or another Division). Wiring from the motor to motor starters and to electrical disconnects shall be by the Contractor doing the work of the Section where the item was specified, unless specifically shown to be provided by Division 26.

B. Acceptable Manufacturers: General Electric, TECO-Westinghouse, Reliance, Gould, Century, Baldor, U.S. Motors, Marathon, and acceptable manufacturers for the equipment (see individual specification sections).

C. Type: Motor type shall comply with code and applicable standard requirements and be configured to suit the application. Motors located indoors shall be open frame, drip-proof type, unless indicated otherwise. Motors located outdoors exposed to weather shall have corrosion resistant finish and shall be totally enclosed fan cooled (TEFC) or totally enclosed non-ventilated (TENV) type, unless indicated otherwise.

D. Listing: All motors shall be UL listed.

E. Efficiency: Motor efficiencies shall comply with code. Fractional horsepower motors shall be the electronically commuted (EC) type with speed control where noted and where non-EC motors are not available which comply with code efficiency requirements. Motor power factor shall comply with code, local utility requirements, and as indicated. Provide added power factor correction devices as necessary to comply.

F. Sizing: Motors shall not be smaller than indicated and of adequate size to start and drive the respective equipment when handling the quantities specified without exceeding the nameplate full load current at the conditions indicated and for the expected operating conditions. If it becomes evident that a motor furnished is too small to meet these requirements as a result of the Contractor using substituted equipment or having revised the system arrangement, the Contractor shall replace it with a motor of adequate size at no additional cost to the Owner. Contractor shall also arrange with the Electrical Contractor to increase the size of the wiring, motor starter and other accessories as required to serve the larger motor at no additional cost to the Owner.

G. Service Factor: Minimum 1.15.

H. EC Motors (ECM):

1. General: Electronically commutated type with integral inverter to convert AC power (of voltage/phase indicated) to DC power, and solid state circuitry to vary output power and speed of motor. Motor shall have permanently lubricated bearings with an L10 life of 100,000 hours at expected operating conditions. Motor shall have rotor position and rotation detection as required for operation.

2. Speed Range: Motor speed shall be controllable down to 25% of full speed.

3. Manual Speed Control: Provide with manual speed adjustment dial for motor speed control. Dial shall be motor mounted unless indicated otherwise, operable by a screwdriver or by hand. Motor mounted controls shall be factory wired. Remote mount dials shall be hand operable (i.e. no tools required), shall be for mounting on a standard 2 x 4 electrical junction box, and be able to be located up to 100 feet remote from the motor. Motor control wiring for remote mount dials shall be factory wired from the motor to an equipment mounted junction box (with field supplied wiring from this J-box to the remote dial).

4. EMCS Control: Motor speed shall be adjustable via a remote 0-10V input signal (unless noted otherwise) from the building EMCS. Control wiring shall be factory wired from the motor to an equipment mounted junction box. EMCS control is not required where not indicated to be provided or where not utilized as part of the control sequence.

5. Control Power: Provide with integral transformer, factory wired, as needed to power motor controls. Locate transformer at motor or equipment.

2.05 IDENTIFICATION AND LABELS

A. General: All piping, valves, and mechanical equipment shall be labeled. Labels in concealed accessible spaces shall be reviewed and verified by Architect/Engineer prior to being concealed.

B. Piping:

1. Type: Self-sticking colored identification markers, lettered to identify the pipe contents, and banded at each end with arrow tape indicating the direction of flow. Markers shall be similar and equal to Brady "System 1" and Seton "Opti-Code" markers. Spray painted stencil labeling is not acceptable. Some labels may be special order.

2. Identification Colors: Comply with ASME A13.1, and as follows:

Conveyed Material/System	Background	Letters
Fire Suppression	Red	White
Potable Water	Green	White
Refrigeration	Black	White
Waste/Vent	Gray	White

3. Lettering: Lettering shall identify the material conveyed in each pipe and shall match the designation used on the plans, but without abbreviations. Systems which have supply and return piping shall have piping labeled as such (i.e. heating water return, heating water supply, etc.). Systems that have different pressures shall be labeled to indicate such (i.e. Steam-Low Pressure, Steam-Medium Pressure, Natural Gas-Low Pressure, Natural Gas-Medium Pressure, etc.).

4. Size: Size of letters and color field shall comply with ASME A13.1, repeated here for convenience:

Outside Diameter of Pipe or Covering	Length of Color Field	Size of Letters
3/4 to 1-1/4 Inches	8 Inches	1/2 Inches
1-1/2 to 2 Inches	8 Inches	3/4 Inches
2-1/2 to 6 Inches	12 Inches	1-1/4 Inches
8 to 10 Inches	24 Inches	2-1/2 Inches
Over 10 Inches	32 Inches	3-1/2 Inches

5. Applications: Install on all exposed piping adjacent to each shut-off valve, at branches to indicate changes of direction, where pipes pass through walls and floors, on 20 foot centers or at least one in each room on each pipe. Markers shall be installed on all concealed accessible piping (i.e., piping above suspended ceilings, behind access doors, in accessible chases, etc.) near the point of access. For piping above suspended ceilings, markers shall be installed the same as if the piping was exposed (i.e., same as if the suspended ceiling was not in place). Markers shall be installed so as to be easily read by a person standing on the floor. Provide additional flow arrows at each pipe connection at valves having more than 2 ports (i.e. 3-way control valves).

6. Other Requirements: See other specification Sections for additional requirements.

C. Valves:

1. Labels: Laminated plastic or phenolic material, at least 1/16-inch thick, with black surface layer and white (unless other color indicated) sub-layer for letter engraving to expose sub-layer. Labels shall not be less than 3" x 1" in size. Label shall be pre-drilled at one end for attachment to valve. Attach to valve with No. 6 polished nickel-steel jack chain of sufficient length to allow label to hang free.

2. Lettering: Engrave label with valve size, name of system served (cold water, heating water supply, chilled water supply, etc.) and purpose of valve. Lettering size 3/16-inch, except where needed to be smaller to fit label size.

3. Application: Labels shall be installed on all valves except valves at hydronic system coils and equipment where the valve purpose is readily obvious.

D. Equipment:

1. Labels: Laminated plastic (or phenolic) material, 1/16-inch thick, with black surface layer and white (unless other color indicated) sub-layer, with engraving through to expose white sub-layer. Minimum 2-inch high (unless indicated otherwise or required due to equipment size) with length to contain required lettering. Label shall be pre-drilled and be mechanically fastened to the equipment. Prior to making labels, submit a list of all proposed labels.

2. Lettering: All caps, engraved on label, with equipment designation (same designation as used on Contract Drawings; e.g. HVAC-101, EF-22, CP-1A). Air handling equipment (i.e. VAV terminal units, fans, etc.) labels shall include the room names and numbers or area of building served (use final installed room designations). Where systems serve portions of the building (i.e. wings or floors), include on label the area served. Lettering shall be in multiple rows, with equipment label on top row. Equipment lettering to be 5/8-inch high; area served lettering to be 3/8-inch high (except that smaller lettering may be used if necessary to fit label size).

3. Application: All scheduled mechanical equipment shall be labeled. The label shall be located on a side of the equipment so as to be easily read, with the marking visible to a person standing at the access level near the equipment (assuming any necessary access to a concealed unit has been made).

E. Electrical Devices:

1. Labels: Minimum 1/4-inch high (unless indicated otherwise) lettering, all caps, engraved on laminated plastic or phenolic material, at least 1/16-inch thick. Laminated plastic (or phenolic) shall have black surface layer and white (unless other color indicated) sub-layer, with engraving through to expose white sub-layer. Label shall be pre-drilled and be mechanically fastened to the item; where mechanical fastening is not possible use 3M VHB double sided specialty tape No. 4945. Prior to making labels, submit a list of all proposed labels.

2. Lettering: Label shall identify the item served (using the same designation as indicated on the Contract Drawings), the source of power (by panel and circuit breaker), and comply with code.

3. Application: Variable frequency drives, motor starters, disconnects, contactors, relays and similar items which control power to equipment and system components shall be labeled. The label shall be located so as to be easily read. See Section 230933 for labeling of low voltage control components.

F. Concealed Items:

1. General: Equipment, valves, dampers and similar items concealed above accessible ceilings shall have the ceiling marked below the item to identify the item and its location.

2. Marking System: The marking system shall consist of an engraved phenolic label, minimum 1/16-inch thick and 3/4-inch high with 1/2-inch high lettering. Label shall be black with white lettering. Apply labels to ceiling grid system using 3M double sided tape (3M VHB #4945).

3. Labeling: Shall identify equipment using the same designation indicated on the plans; valves shall be identified by size and system (e.g. EF-1, VAV-101, VALVE 4" CW). Prior to making labels, submit a list of all proposed labels.

PART 3 - EXECUTION

3.01 GENERAL

A. Workmanship: Furnish and install products to provide complete and functioning systems with a neat and finished appearance. If, in the judgment of the Architect/Engineer, any portion of the work has not been installed in accordance with the Contract Documents and in a neat workmanlike manner, or has been left in a rough, unfinished manner, the Contractor shall be required to revise the work so that it complies with the Contract Documents, at no increase in cost to the Owner.

B. Coordination: Coordinate the work with all trades that may be affected by the work to avoid conflicts and to allow for an organized and efficient installation of all systems.

C. Examination and Preparation: Examine installation conditions and verify they are proper and ready for the work to proceed. Verify compatibility of materials in contact with other materials, and suitability for conditions they will be exposed to. Do not proceed with the work until unsatisfactory conditions have been corrected. Prepare area to accept the work and prepare products for the installation.

D. Field Conditions: Check field conditions and verify all measurements and relationships indicated on the drawings before proceeding with any work. In verifying existing conditions, the Contractor shall verify by direct physical inspection, complete tracing out of systems, by applying test pressures, by excavation and inspection, use of pipeline cameras, and other suitable absolute certain methods to confirm the actual physical conditions that exist.

E. Openings and Cutting and Patching in New Construction:

1. Openings - General: The General Contractor shall provide all required spaces and provisions in structures of new construction for the installation of work of all other contractors or subcontractors.

2. Coordination: The Contractors doing work subject to Division 20 shall furnish to the General Contractor (in a timely manner) all needed dimensions and locations of openings to allow for these openings to be provided as the construction adjacent to the opening is being done.

3. Cutting and Patching: Cutting and patching of structures in place made necessary to admit work, repair defective work, or by neglect of contractors and subcontractors to properly anticipate their requirements, shall be done by the General Contractor at the expense of the contractors or subcontractors responsible. Work shall be done in a fashion to duplicate the results that would have been obtained had the work been properly sequenced.

4. Patching Materials: Patching shall be with materials of like kind and quality of the adjoining surface by skilled labor experienced in that particular trade.

F. Cleaning: Clean all products (whether exposed to view or not) of all construction debris, and other materials; grease and oil spots shall be removed with appropriate cleaning

agents and surfaces carefully wiped clean. Where cleaning cannot restore items to new conditions, the item shall be replaced with new.

G. Site Work: All trenching, backfilling, compacting, and similar groundwork for utilities shall comply with specification, code, manufacturer, best construction practices, and WSDOT Standard Specifications for Road, Bridge, and Municipal Construction. Provide minimum 6-inch deep sand bedding, minimum 6-inch thick surrounding sand backfill, and 6-inch deep compacted backfill at buried items, unless noted otherwise or required otherwise. Washed 3/8-inch minus pea gravel may be used where allowed by product manufacturer and code. Subsequent backfill shall be in 6-inch lifts, and be compacted to 95% maximum density. Backfill material (above initial 6-inch sand) shall be free of organic material, and rocks larger than 3-inches in any direction.

3.02 INSTALLATION

A. General: Work shall be in accordance with manufacturer's written installation instructions, code, applicable standards, and best construction practices.

B. Space Verification: Prior to ordering materials verify that adequate space exists to accept the products, and along the installation path. Such verification shall be by direct field measurement of the actual space available and use of manufacturer’s final submittal dimensions. Where the project involves new construction and long lead items and a time schedule not allowing for such direct field measurements, confirm in writing with all trades associated with building the space that adequate room is available. Review maintenance and service access space required and confirm requirements will be met. No submittals shall be made until such space verification work has been performed, and confirmed that adequate space is available. By virtue of making a submittal that Contractor affirms he has completed this verification.

C. Installation Locations: Unless dimensioned locations for items are shown, select the precise location of the item in accordance with the Contract Documents, coordinated with other trades and item connection locations, and subject to the Architect/Engineer's review. No allowances will be granted for failure to obtain the Architect/Engineer's review, failure to coordinate the work, and failure to comply with Contract Document requirements.

D. Replacement and Maintenance: Install mechanical equipment to permit easy access for normal maintenance, and so that parts requiring periodic replacement or maintenance (e.g. coils, heat exchanger bundles, sheaves, filters, bearings, etc.) can be removed. Relocate items which interfere with access or revise item installation location, orientation, or means of access.

E. Building Access Doors: Provide access doors where indicated and where needed to provide access to valves, drains, duct access doors, and similar items requiring service or access that would otherwise be inaccessible. Consult architectural drawings and coordinate location and installation of access doors with trades which are affected by the installation. Access doors are typically not shown on the drawings. The Contractor shall review all construction details and types and locations of items requiring access to determine quantity and sizes of access doors required.

F. Manually Operated Components: Valves, damper operators, on/off switches, keypads, controls, and other devices which are manually adjustable or operated shall be located so as to be easily accessible by a person standing on the floor. Any such items which are not in the open shall be made accessible through access doors in the building construction. See individual specification sections for additional requirements.

G. Monitoring Components: Gauges, thermometers, instrumentation, and other components which display visual information (i.e. operating conditions, alarms, etc.), shall be located and oriented so as to be easily read by a person standing on the floor. Provide necessary brackets, hangers, remote read devices and accessories as needed. Equipment control panels and graphic displays furnished with equipment (or integral to equipment) shall be located to be easily accessible by a person standing on the floor adjacent to the equipment, and be located between 4-feet and 6-feet above the finished floor.

H. Accessible Installation: If circumstances at a particular location make the accessible installation of an item difficult or inconvenient, the situation shall be discussed with the Architect/Engineer before installing the item in a location that will result in poor access.

I. Rotating Parts: Belts, pulleys, couplings, projecting setscrews, keys and other rotating parts which may pose a danger to personnel shall be fully enclosed or guarded in accordance with Code, and so as not to present a safety hazard.

J. Equipment Pads: All ground and slab mounted mechanical equipment shall be installed on a minimum 4-inch thick concrete pad, (unless indicated otherwise). Where the largest dimension for any pad exceeds 6 feet provide a 6 x 6 - 10 gauge welded wire fabric reinforcement in the pad (unless noted otherwise). Concrete shall be same as used for building footings (unless noted otherwise). Concrete shall be same as used for building footings (unless noted otherwise).

K. Dissimilar Metals: Provide separations between all dissimilar metals. Where not specified in another way, use 10 mil plastic tape wrapped at point of contact or plastic centering inserts.

L. Electrical Offsets: Provide offsets around all electrical panels (and similar electrical equipment) to maintain space clear above and below electrical panels to structure, and clearance of 3.5 feet directly in front of panel, except where indicated otherwise or required by code to be more. Such required offsets are typically not shown on the plans but are to be provided per this paragraph. Include in bid offsets for all systems near electrical panels.

M. Piping Through Framing: Piping through framing shall be installed in the approximate center of the member. Where located such that nails or screws are likely to damage the pipe, a steel plate at least 1/16-inch thick shall be installed to provide protection. At metal framing, wrap piping to prevent contact of dissimilar metals. At metal and wood framing, provide plastic pipe insulators at piping penetrations through framing nearest each equipment connection and on at least 32-inch centers.

N. Safety Protection: All ductwork, piping and related items installed by this Contractor that present a safety hazard (i.e., items installed at/near head height, items projecting into maintenance access paths, etc.) shall be covered (at hazardous area) with 3/4" thick elastomeric insulation and reflective red/white self-sticking safety tape. All sharp corners on supports and other installed items shall be ground smooth.

O. Equipment Access: Access to equipment is of utmost importance. Contractor shall apply extra attention to the location of pipe and duct routings and in coordinating all work so that equipment access and a clear maintenance pathway to equipment is maintained. Poor maintenance access will not be accepted. Contractor shall note that in essentially all areas piping and ducts need to run with slopes parallel to the roof (or floor above), in necessitating elbows/fittings/transitions at crosses of ducts/pipes and at all connections to mains and branches; and requiring added fittings to maintain a clear walking path.

P. Pressure Tests: Maintain documentation of all pressure (and leakage) tests performed on systems and submit with project closeout documents. Records shall contain (as a minimum): date of test, system name, description portion of system being tested, method of test, initial and final test pressures (or of measured leakage rates, as applicable), indication of test pass or fail, name and signature of individual performing (or documenting) the test, initials of independent witness of test.

3.03 PAINTING

A. General: Painting shall comply with Division 09 specifications regarding painting. Colors, in all cases, shall be as selected by the Architect/Engineer. Color samples shall be submitted to the Architect/Engineer for approval prior to painting.

B. The following painting shall be provided under Division 20:

1. All exposed metallic surfaces (includes piping, ducts, hangers, conduits, etc.) provided by this Contractor (except equipment with factory finish or items specifically excluded) shall receive one coat of rust inhibiting primer and two (2) coats of selected finish paint.

2. All exposed insulated surfaces provided by this Contractor (except where specifically excluded) shall receive one coat of primer and two coats of selected finish paint.

3. The inside of all ductwork (including visible dampers, roof vents, insulation pins, and any visible metal) behind grilles, registers, diffusers, and louvers shall be painted flat black.

C. Items to be painted under Division 09:

1. Exposed duct work in finished areas.

2. Exterior mechanical equipment.

3. Exposed piping in finished areas.

3.04 PENETRATION PROTECTION

A. Exterior and Watertight Penetrations: Where any work pierces the building exterior (or construction intended to be watertight) the penetration shall be made watertight and weatherproof. Provide all necessary products (e.g. caulking, flashing, screens, gaskets, backing materials, siding, roofing, trim, etc.). Where not detailed or indicated how to install submit shop drawings of the proposed methods. Flashing arrangements shall be per SMACNA Architectural Sheet Metal Manual unless noted otherwise. Caulking alone is not an acceptable means of sealing penetrations.

B. Equipment: Equipment or products located outdoors shall be watertight (except for provisions designed to intentionally accept water and having drain provisions) and shall be designed and intended by the manufacturer to be used outdoors at the project location. Where any work pierces the unit casing exposed to the outdoors the penetration shall be made watertight and weatherproof; provide all necessary products (e.g. caulking, flashing, gaskets, backing materials, etc.).

C. Animal Protection: Mechanical system openings, overhangs, shrouds, coverings, gaps below units, and other elements where animals could enter or occupy shall be protected

with screens to prevent animal entry or occupation. Screening shall be installed in a neat professional manner, square to the adjacent construction, and be securely attached with removable fasteners.

3.05 START-UP

A. General: Provide inspections, start-up and operational checks of all mechanical systems and equipment. Maintain documentation of all start-up work and submit with project closeout documents. See individual specification Sections for additional requirements.

B. Personnel: Inspection and start-up services shall be done by individuals trained in the operation, and knowledgeable with, the systems being started-up. Equipment start-up shall be by the manufacturer's authorized service representative where indicated (see individual specification Sections).

C. Scheduling and Agenda: Submit a proposed detailed start-up schedule with proposed dates and times at least 30 days prior to the earliest proposed system start-up. Revise dates and times as mutually agreed upon with trades involved, and witnesses, before submitting a final start-up schedule.

D. Witnessing: Start-up may be witnessed by the Engineer and Owner's representative (at their option). Notify the Engineer and Owner 7 days prior to the proposed start-up time.

3.06 OWNER INSTRUCTION

A. General: Provide instruction to the Owner on the operation and maintenance of all installed mechanical systems.

B. Personnel: Instruction on the operation and maintenance of products shall be by individuals trained and experienced in the installation, operation and maintenance of these products. Instruction shall be by the product manufacturer's authorized service representative where indicated (see individual specification Sections).

C. Scheduling and Agenda: Submit a proposed instruction schedule (with proposed dates and times) and an instruction agenda at least 30 days prior to the earliest proposed instruction period. Coordinate Owner and Architect/Engineer review and arrange mutually agreed upon instruction schedule and the instruction agenda, and submit a final instruction schedule and agenda. Organize instruction by sub-systems corresponding to the project specifications (or similar logical grouping).

D. Instruction: Demonstrate and explain normal start-up, normal shut-down, normal operation, normal settings, adjustments, signs of abnormal operation, emergency shut-down, safety concerns, and related information. Demonstrate and explain system maintenance requirements with references to the O&M Manual. Show how maintenance is performed, including how items are accessed, maintenance procedures, tools and parts required, and related information. Review typical repairs and explain how performed.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. Pressure Gauges

B. Strainers

C. Unions

D. Flexible Connectors

E. Access Doors

1.03 SUBMITTALS

A. General: Comply with Section 200500.

B. Product Data: Submit product information data for all items to be used.

1.04 REFERENCES

A. ASME B16.18: Cast Copper Alloy Solder Joint Pressure Fittings.

B. ASME B16.39: Malleable Iron Threaded Pipe Unions: Classes 150, 250, and 300.

C. ASME B40.3 - Bimetallic Activated Thermometers.

D. ASME B40.100 - Pressure Gauges and Gauge Attachments.

E. IMC: International Mechanical Code.

F. UPC: Uniform Plumbing Code.

1.05 GENERAL REQUIREMENTS

A. Domestic (Potable) Water Systems: All items in contact with potable water shall be lead free in accordance with ANSI/NSF 61. Plastic piping system components shall comply with ANSI/NSF 14.

B. System Requirements: Products shall comply with additional requirements cited for the specific systems the products are being installed in; see specific system specification sections.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 200500, Paragraph 2.01, Acceptable Manufacturers.

B. Pressure Gauges: Trerice, Weiss, Winters.

C. Strainers: Watts, Keckley, Mueller, Sarco, Taco, Paco, Bell & Gossett, Armstrong, Wilkins.

D. Unions: Anvil, Nibco, Watts, Epco, Victaulic, Ward, Jefferson Union.

E. Dielectric Connecters: Victaulic Precision Plumbing Products, Elster Perfection.

F. Flexible Connectors: Universal, Mason, Dormont, OPW, Unisource, Twin City Hose.

G. Access Doors: J.R. Smith, Zurn, Josam, Acudor, Elmdoor, Kees, J.C. Industries.

H. Escutcheons: Selected by Contractor.

2.02 PRESSURE GAUGES

A. General: 4-1/2" round dial, stem mounting, black impact resistant phenolic (or fiberglass reinforced polypropylene) flangeless case, white face with black numerals, phosphor bronze bourdon tube rated to minimum 250 psi, brass socket, acrylic window, and 1/4" npt (or ½" npt) bottom connection. Shut off cock not allowed (use ball valve). Rated for use with the system pressures and temperatures to be exposed to, but be rated for no less than 250° F. Accuracy shall be 0.5% per ASME B40, 100 Grade 2A.

B. Liquid Fill: Gauges used on pumps and where vibration or pulsation are present shall be liquid filled and be provided with a snubber. Liquid fill shall be suitable for ambient temperatures from 0 to 150° F, and for system temperatures to be encountered.

C. Pressure Gauge Ranges: 0 to 1.5 times systems normal operating pressure (at point of measurement), with numeral figures on 5 psig for gauges reading to 100 psi, and 10 psig on gauges reading to higher values. Except: systems which operate at a vacuum, provide range from 30 to 0 inches mercury vacuum; where measuring differential pressure provide range 1.5 times normal measured pressure.

2.03 STRAINERS

A. Water Systems:

1. Copper Piping Systems 2-1/2” and Smaller: Bronze body, “Y” type, screwed or solder type end connections, 125 lb class (rated 125 psi steam working pressure at 350 deg F minimum) and 400 psi (WOG) rated working pressures at 210 deg F, stainless steel 20 mesh wire screen, and gasketed retainer cap. Reinforce wire mesh with perforated stainless steel sheet for sizes 2" and 2-1/2". Ratio of net free area of screen to pipe free area greater than 3.5. Provide with blowdown valve, ball type, with 3/4" NPT male end connection. Valve manufacturer shall be listed as an “Acceptable Manufacturer” in the hydronic piping system specification section.

2. Steel Piping Systems: Ductile iron, cast iron, or carbon steel construction, “Y” type, 250 lb class (rated 250 psi steam working pressure at 450°F minimum), with stainless steel screen. Screen shall be 20 mesh for strainers up to 2" in size, and have 3/32" perforations on larger sizes. Sizes 2-1/2 inch and less shall have threaded end connections; larger sizes shall have flanged end connections.

Provide with bolted and gasketed strainer cap on flanged strainers; provide threaded gasketed retainer cap on threaded strainers. Provide with blowdown valve, ball type, with 3/4" NPT male end connection. Valve manufacturer shall be listed as an “Acceptable Manufacturer” in the hydronic piping system specification section.

2.04 UNIONS

A. Dielectric Unions: Shall not be used. Provide “dielectric connector” with standard union where union is required at connection point of dissimilar materials.

B. Unions on Copper Pipe:

1. General: Pressure and temperature ratings to match (or exceed) piping system being installed in; minimum Class 125.

2. 2-Inch Pipe and Smaller: Wrought copper solder joint copper to copper union, complying with ASTM B16.18.

3. 2-1/2-Inch Pipe and Larger: Brass flange unions.

C. Unions on Steel Pipe:

1. General: Pressure and temperature ratings to match (or exceed) piping system being installed in; minimum Class 150.

2. Threaded: Malleable iron union, threaded connections, with ground joints, complying with ASME B16.39. Provide with brass-to-iron seat (except provide iron-to-iron seat where the conveyed material is detrimental to brass).

3. Welded and Flanged: Flange unions; see individual system specification sections.

D. Dielectric Connector: Schedule 40 steel pipe nipple, zinc electroplated, with internal thermoplastic lining which is NSF/FDA listed and meeting all code requirements for potable water applications. Suitable for continuous use up to 225 deg F and 300 psi. "Clearflow" dielectric waterway (or approved). For systems operating at temperatures greater than 225 deg F provide flanged connections with insulating gaskets.

2.05 FLEXIBLE CONNECTORS

A. Piping Flexible Connectors: Corrugated hose type with outer braided wire sheath covering. Corrugations shall be close pitch annular type. Minimum working pressure of 250 psig, minimum length of 12 inches (or 12 times the connector's nominal diameter, whichever is more), and screwed or flanged end connections. Metal for hose shall be bronze or stainless steel; braided sheath shall be stainless steel, any type of ASTM 300 series.

2.06 ACCESS DOORS

A. Hinged lockable steel access door, for mounting on face of wall, with minimum 16 gauge frame and 16 gauge door, concealed hinge, cam and cylinder lock, and anchor straps or anchor frame with mounting holes. Provide Type 304 stainless steel construction with No. 4 finish where used in restrooms, locker rooms, kitchens, and similar "wet" areas. Provide steel construction with prime coated finish in other areas. Door shall have

rounded corners, and concealed pivoting rod hinge. Size shall be 12" x 12" (unless indicated otherwise) but shall be large enough to allow necessary access to item being served and sized to allow removal of the item (where access door is the only means of removal without disturbing fixed construction).

B. Fire Rating: Door shall maintain fire rating of element installed in; reference drawings for required rating.

C. Access doors shall all be keyed alike. Provide two (2) keys for each door.

2.07 ESCUTCHEONS

A. Type: Circular metal collar to seal pipe penetrations at building elements (i.e. walls, floors, cabinets, and ceilings); one piece type except that split hinge type may be used for applications on existing piping.

B. Construction: Constructed of chrome plated brass or polished stainless steel, sized to tightly fit pipe exterior surface (or pipe insulation where insulated) and to fully cover the building element penetration.

C. Projection: Shallow face type with maximum projection from wall not to exceed 1.2 times inner diameter of escutcheon.

D. Special Applications: For sprinkler heads and similar special applications see items' specification Section.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Pressure Gauges: Install pressure gauges at inlet and outlets of all pumps; at each side of pressure reducing valves; and as indicated. Provide with ball-type isolation valves.

B. Strainers: Install strainers ahead of each control valve, and as indicated. Provide valve in blow-off connection on strainers, valve shall be same size as blow-off tapping.

C. Unions: Install unions in pipe connections to control valves, coils, regulators, reducers, all equipment, and where it may be necessary to disconnect the equipment or piping for repairs or maintenance; and as indicated. Where flanged connections occur at equipment additional unions are not required unless indicated otherwise. Dielectric unions shall not be used.

D. Dielectric Connectors: Install connectors between all connections of copper and steel piping (or equipment), and other dissimilar metals. Where flanged connections occur use insulating type flanges. Dielectric unions shall no be used.

E. Access Doors: Provide access doors where indicated on the drawings and where needed to provide access to trap primers, water hammer arresters, cleanouts, valves, coils, controls, mechanical spaces, and similar items requiring service or access that would otherwise be inaccessible. Consult architectural drawings and coordinate location and installation of access doors with trades which are affected by the installation. Access doors are typically not shown in the plans. Review ceiling and wall types and locations of items requiring access to determine quantity and sizes of access doors required.

F. Escutcheons: Provide at all pipe penetrations through building elements, except where penetration is concealed (unless specifically noted otherwise). Items located in accessible cabinet spaces (e.g. below sinks) are not considered concealed.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. Pipe Hangers and Supports

B. Duct Hangers and Supports

C. Mechanical Equipment Anchors and Supports

1.03 QUALITY ASSURANCE

A. Pipe Hanger Standards: Manufacturers Standardization Society (MSS) Standards SP-58, SP-89, SP-69, and SP-90.

B. General: All methods, materials and workmanship shall comply with Code; including IBC, IMC, UPC, NFPA Standards, and ASME standards.

1.04 SUBMITTALS

A. General: Submittals shall comply with Section 200500.

B. Product Data: Submit product data for all hangers, supports, and anchors. Data to include finish, load rating, dimensions, and applicable agency listings. Indicate application for all items by system type, size, and other criteria as appropriate to project.

C. Shop Drawings:

1. General: Shop drawings shall clearly indicate dimensions, anchor and support type, anchor and support size, anchor and support spacing, finish, configuration, and systems/equipment to be applied to.

2. Attachments: Submit shop drawings for proposed attachment methods to building structure where the method of attachment has not been shown on the drawings, or where attachment methods other than those shown on the drawings are desired to be used.

3. Fabricated Supports: Submit shop drawings for all fabricated supports.

4. Finished Areas: Submit shop drawings for all supports that will be exposed in finished areas.

1.05 GENERAL REQUIREMENTS

A. Seismic: Provide adequate hangers, supports, anchors, and bracing to serve as seismic restraints. Seismic anchoring and bracing methods shall comply with SMACNA SRM, Mason SRG, and code. Seismic restraints system shall be able to withstand seismic forces as required by code but no less than two times the weight of the supported (or

anchored) item (including contents) in an upward direction and a force equal to the weight of the item (including contents) in a horizontal direction, without placing excess stress on the item or allowing excess movement of the item (i.e. movement that would cause damage to the item or adjacent items or cause support failure). Forces on equipment shall be applied to the center of gravity of the equipment.

B. Design and Manufacture: All pipe hangers and supports shall be designed and manufactured in accordance with MSS-SP 58.

1.06 REFERENCES

A. ADC: Air Duct Council - Flexible Duct Performance and Installation Standard, 5th Edition.

B. ASHRAE-F: American Society of Heating, Refrigeration, and Air Conditioning Engineers, Handbook of Fundamentals.

C. ASME B31.1: Power Piping.

D. ASME B31.9: Building Services Piping.

E. ASTM A36: Standard Specification for Carbon Structural Steel.

F. ASTM A108: Standard Specification for Steel Bar, Carbon and Alloy, Cold - Finished.

G. ASTM A123: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

H. ASTM A153: Standard specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

I. ASTM A653: Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.

J. ASTM A907: Standard Specification for Steel, Wire, Epoxy - Coated.

K. ASTM A924: Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot Dip Process.

L. IBC: International Building Code.

M. IMC: International Mechanical Code.

N. Federal Spec QQ-W-461H: Wire, Steel, Carbon (Round, Bare, and Coated).

O. Mason SRG: Mason Industries Seismic Restraint Guidelines for Suspended Piping, Ductwork, Electrical Systems and Floor Mounted Equipment, 6th Edition.

P. MSS SP-58: Pipe and Hangers and Supports - Materials, Design and Manufacture.

Q. MSS SP-69: Pipe and Hangers and Supports - Selection and Application.

R. MSS SP-89: Pipe Hangers and Supports - Fabrication and Installation Practices.

S. MSS SP-90: Guidelines on Terminology for Pipe Hangers and Supports.

T. SMACNA-DCS: HVAC Duct Construction Standards Metal and Flexible, 3rd Edition.

U. SMACNA SRM: Seismic Restraint Manual Guidelines for Mechanical Systems, 2nd Edition.

V. UPC: Uniform Plumbing Code.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 200500, Paragraph 2.01, Acceptable Manufacturers.

B. Hangers and Supports: Grinnell, B-Line Systems, Unistrut, Erico, PHD, Basic-PSA, Pate, Caddy, Unisource, Metraflex, American Insulation Sales, Thermal Pipe Shields.

C. Anchors: Rawplug, Phillips, Hilti, Michigan, Simpson, Fastenal, Grinnell, B-Line Systems, Unistrut, PHD, Basic-PSA, Metraflex.

2.02 GENERAL

A. Finish:

1. Indoor Applications: Electro-plated zinc in accordance with ASTM B 633, or hot-dip galvanized after fabrication in accordance with ASTM A 123; except that hanger straps may be formed from pre-galvanized steel.

2. Outdoor Applications: Hot-dip galvanized after fabrication in accordance with ASTM A 123, ASTM A 153, or ASTM A 653 (as applicable to item).

B. Identification: Steel pipe hangers and supports shall be stamped with the manufacturer's name, part number, and size.

C. Hanger Rods: Threaded hot rolled steel. Hanger rods shall be sized so that the total load imposed (including pipe or duct, insulation, hangers, and fluid) does not exceed the following:

Nominal Rod Diameter	Maximum Load
1/4 Inch	240 Pounds
5/16 Inch	440 Pounds

D. Hanger Straps: Galvanized steel, minimum 1" x 22 gauge (except where required by Code to be heavier or noted otherwise), of lock-forming grade conforming to ASTM A924, G90 (minimum) galvanized coating conforming to ASTM A 653. Minimum yield strength of 30,000 psi. Straps shall be sized so that the total load imposed does not exceed the following:

Strap Size	Maximum Load
1" x 22 Gauge	230 Pounds
1" x 20 Gauge	290 Pounds

E. Beam Attachments: Constructed of malleable iron or steel, MSS standard types designed for clamping to building structural support beam. "C" clamp type shall have cup point set

screws with locknuts and retaining straps. Center loaded type beam clamps shall have horizontally adjustable clamping bolt (or rod with nuts).

F. General Anchors (Screws, Nuts, Bolts, Fasteners):

1. General: Constructed of materials suitable for the conditions exposed to and materials being joined, with minimum 50 year service life. Stainless steel construction where exposed to corrosive conditions. Configuration, size and grade to suit application, accommodate expected forces, and provide anchoring to structural element (or allow for proper fastening of items). Minimum safety factor of 2.5 (or as required by code, whichever is greater). Comply with ASTM A307, SAE J429, SAE J78, or ASTM A 563; bolts and nuts shall have unified inch screw threads (course, UNC).

2. Test Reports: Provide independent test report indicating fastener strength (pullout and shear) as installed in the materials and applications of this project.

3. Finish: In finished areas, the portion of fastener exposed to view shall match the exposed finish of item being fastened.

G. Manufactured Strut Systems:

1. Channels: Minimum 12 gauge, 1-5/8 x 1-5/8" (unless noted otherwise), with slots/holes to suit application.

2. Accessories: Channel nuts press formed, machined and hardened with gripping slot, fabricated from steel conforming to ASTM A 108 or ASTM A 36. Fittings fabricated from steel in accordance with ASTM A 907.

3. End Caps: Vinyl cap, capable of withstanding high temperatures without degradation, manufactured specifically for use with manufactured strut. Unistrut Series P2859 or P2860 (or approved).

H. Steel: Structural steel per ASTM A 36.

I. Wood: Only allowed to be used where building structural elements are of wood construction same type, grade used for building structural members. Where located outdoors shall be the pressure treated type; with all cut portions of wood painted with wood preservative.

J. Field Galvanizing Compound: Brush or spray applied galvanizing treatment; consisting of a premixed ready to apply liquid organic zinc compound, with 95% metallic zinc content by weight in dry film. ZRC worldwide “ZRC Cold Galvanizing Compound”.

2.03 PIPE HANGERS AND SUPPORTS

A. Copper Pipe: All hangers used directly on copper pipe shall be copper plated or have a factory applied 1/16-inch thick (minimum) plastic coating on all contact surfaces.

B. Cushion Clamps: Pipe clamps with a vibration dampening insert between the pipe and clamp, with a nylon inserted lock-nut on clamp. Insert shall be constructed of a thermoplastic elastomer, designed to tightly fit and match pipe size and clamp used with; suitable for system temperatures.

C. Type: Shall be MSS type selected in accordance with MSS-69; except that MSS type 24, 26, and 34 shall not be used.

D. Trapeze Hangers: Shall be constructed of carbon steel angles, manufactured strut channels, or other structural shapes with flat surface (or installed saddle) for pipe support. Provide steel washer where hanger rod nuts bear on trapeze hanger. Pipe anchors shall be two piece clamp type designed for use with trapeze style (i.e. inserted into strut channel opening) or one piece type designed for welded or bolted attachment to trapeze; shaped to match pipe size (or pipe size plus insulation thickness on insulated systems). Pipe guides shall comply with paragraph titled “Alignment Guides”; or be steel angles with vertical leg height equal to pipe diameter (or pipe diameter plus insulation thickness on insulated systems); or be two piece clamp type pipe anchors sized and installed to serve as a guide.

E. Insulated Pipe Supports:

1. Insulation material at pipe support shall consist of expanded perlite, calcium silicate or high density phenolic. Where located outdoors or used on chilled water piping, insulation material, shall be water resistant. Insert shall have a flame resistant jacket of nylon reinforced kraft paper bonded to aluminum foil cover on insulation, with galvanized steel shield. Insulation material shall have no more than 5% deformation at 100 psi and a thermal conductivity no more than 0.32 Btu/hr-sf-deg F-inch (rated at 75 deg F). Insulation shall be suitable for temperatures and conditions it will be exposed to without degradation over a 30 year life.

2. All insulation and materials shall have a fire hazard rating not to exceed 25 for flame spread and 50 for smoke development, as tested by ASTM E84.

3. Insert shall be same thickness as adjoining pipe insulation, sized to match pipe diameter used on.

4. Minimum insulation and shield lengths, and minimum shield gauge:

Nominal Pipe Diameter In Inches	Insulation Length In Inches	Shield Length In Inches	Minimum** Shield Gauge
1/2 to 1	*	4	20
1-1/4 to 2	6	4	20

* Insert not required; shield at insulation is acceptable.
** Provide with 360° shield where pipe is clamped (or has a 360° anchor).

2.04 DUCT HANGERS AND SUPPORTS

A. Hangers: As shown in SMACNA-DCS except that wire shall not be used and all materials used shall comply with these specifications.

B. Hanger Attachments to Structure: As shown in SMACNA-DCS to suit building construction and as allowed on structural drawings. Provide washers at all fasteners through hanger straps (regardless of SMACNA-DCS allowances). Where C-clamps are provided, retainer clips shall be used. Friction beam clamps shall not be used.

C. Hanger Attachments to Ducts: As shown in SMACNA-DCS except that wire shall not be used as any form of support or attachment for ducts.

D. Flexible Duct Strap: Woven polypropylene hanging strap, minimum tensile strength of 400 lbs, minimum 1.75-inches wide, designed and intended for flexible duct support.

E. HVAC Support Wire: Steel, minimum 12 gauge, soft-annealed wire, complying with Federal Specification QQ-W-461H, and IBC for support of ceilings and accessories installed in ceilings.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

A. General: Provide all necessary bolts, nuts, washers, fasteners, turnbuckles, hanger rods, rod connectors, stanchions, wall/roof/floor backing and attachments, bridging between structural members, and any other miscellaneous accessories required for the support and anchoring of all pipes, ducts, and mechanical equipment. All supports, whether from floor, walls, or hung from structure, are Contractor's responsibility. Anchors and supports shall be adequate to accommodate forces equipment will be exposed to. Any field cut pieces of galvanized materials shall be hot-dip galvanized after cutting; or be solvent and wire brushed clean and receive field applied galvanizing treatment. This field applied galvanizing (only allowed with prior permission for minor localized cuts) shall use multiple coats to provide as near equal protection as possible to factory (or hot-dip) applied coatings.

B. Backing: Install steel or wood backing in walls (anchored to studs) and in ceiling (anchored to joists or trusses), as required to provide support for items.

C. Installation: Install all inserts, anchors, and supports in accordance with manufacturer's instructions, code requirements, and best professional practices. The most restrictive criteria governs.

D. Welded Assembly Finish: All welded steel support assemblies shall have a power wire brush and primer paint finish where installed indoors and be have factory applied hot-dip galvanized finish where installed outdoors (or subject to moisture); unless another finish is specified.

E. Attachments: Attach to anchoring element (i.e. building structure, concrete pads, etc.) as shown on drawings (reference structural drawings). Where not detailed on the drawings, the Contractor shall design and submit shop drawings of proposed attachment methods to the Engineer for review.

F. Application:

1. Where not detailed on the drawings (or otherwise indicated), the selection and design of supports is the Contractor’s responsibility, in compliance with code and Contract Document requirements; subject to submittal review and acceptance by the Engineer.

2. HVAC Support wire and flexible duct strap shall only be used for support of ceiling air inlets and outlets, or at flexible duct supports.

G. Manufactured Strut (“Unistrut”): Provide end caps on all strut ends at the following locations:

1. Where exposed to view in finished areas.

2. Where near maintenance access paths.

3. Where personnel injury could occur if the ends were not covered.

3.02 INSTALLATION OF PIPE HANGERS AND SUPPORTS

A. General: Aboveground pipe shall be anchored to the structure to prevent sagging, to keep pipe in alignment, and to resist the forces the pipe will be exposed to; piping shall be supported independent of equipment so that no loads bear on the equipment.

B. Adjustment: All pipe supports shall be provided with a means of adjustment for the aligning and leveling of the pipe after installation.

C. Applications: Selection, sizing, and installation of pipe supports and accessories shall be in accordance with the manufacturers recommendations, standards MSS SP-89 and MSS SP-69, UPC, and IMC. Refrigerant piping and similar piping subject to vibration (i.e. high pressure tubing) shall be installed with cushion clamps.

D. Support Spacing: Provide piping support spacing according to the most restrictive of the following: UPC, IMC, ASME B31.1, B31.9, local codes, manufacturers recommendations or Contract Documents specific requirements. Provide supports at each change in direction of piping and at each side of concentrated loads (such as in-line pumps, valves greater than size 5", and similar items). On hubless cast iron piping provide supports at each branch connection; and hubless cast iron piping greater than size 2" shall have supports on both side of piping couplings.

E. Trapeze Hangers: Four or more pipes running parallel may be supported on trapeze hangers provided the slopes of such pipes allow use of common trapeze. Suspend trapeze hanger from the building structure using hanger rods; attach to the building structure using concrete inserts, beam clamps, or other approved methods. Where trapeze width exceeds 30 inches, and where building attachment restrictions require more anchor points, provide three (or more) hanger rod supports. Provide pipe anchors to secure piping to trapeze on minimum 20 foot spacing; size and install pipe anchor to allow longitudinal movement of pipe (unless noted otherwise) with minimal vertical and transverse movement; where pipe is subject to expansion/contraction provide anchoring and alignment guides per paragraph titled “Thermal Expansion/Contraction”.

F. Pre-Insulated Pipe Supports: Protect all insulated pipe at point of support with pre-insulated pipe supports. Such supports shall be in place at time of installing pipe.

3.03 INSTALLATION OF DUCT HANGERS AND SUPPORTS

A. General: Provide anchors and supports for all ductwork. Supports and hangers shall comply with SMACNA-DCS, except that hanger spacing and hanger maximum loads shall be governed by whichever is more restrictive between these specifications or SMACNA-DCS.

B. Hanger Spacing -- Rectangular Duct:

Duct Area	Maximum Spacing
Up to 4 Square Feet	8 Feet

C. Hanger Spacing -- Round Duct:

Duct Area	Maximum Spacing

Up to 24 Inch Diameter 8 Feet

D. Hanger Spacing - Flexible Duct: 4 feet, and at changes of direction as needed to maintain duct elevation and smooth airflow.

E. Flexible Duct: Support with methods shown in ADC. Metal strap in contact with the flexible duct shall have minimum 1.5-inch width.

F. Fittings: Provide supports at each change in direction of duct for ducts with 4 square foot area or more, or for ducts larger than 24 inch diameter. Locate hangers at inside and outside corners of elbows--or at each end of fitting on each side.

G. Concentrated Loads: Provide additional supports at each side concentrated loads such as modulating dampers (24" x 24" and larger), duct heaters (18" x 18" and larger), sound attenuators (all sizes), and similar items.

H. End of Duct: At end of duct run, hangar shall be located no more than 1/2 the allowed hangar spacing from the end of the run.

3.04 CEILING SERVICES

A. Less than 20 Pounds: Ceiling mounted services, air inlets/outlets, and accessories weighing less than 20 pounds shall be positively attached to the ceiling suspension main runners (or ceiling support members) or to cross runners with the same carrying capacity as the main runners (or support members).

B. 20 to 56 Pounds: Ceiling mounted services, air inlets/outlets, and accessories weighing 20 pounds but not more than 56 pounds, in addition to the above, shall have two No. 12 gauge wire hangers (or minimum 1” x 22 gauge hangar straps) connected from the terminal or service to the ceiling system hangers or to the structure above. These added hangers may be slack.

C. Greater Than 56 Pounds: Ceiling mounted services, air inlets/outlets, and accessories weighing more than 56 pounds shall be supported directly from the building structure by approved hangers.

3.05 MECHANICAL EQUIPMENT ANCHORS AND SUPPORTS

A. General: Provide anchoring and supports for all mechanical equipment. All equipment shall be anchored to (or supported from) the building structure. In lieu of anchoring to the building, anchor outdoor equipment to the concrete pad serving the equipment.

B. Suspended Equipment: Support as indicated on the plans. Where not indicated use the methods shown (or consistent with) Mason SRG and SMACNA-DCS; submit shop drawings of the proposed methods to the Engineer for review.

C. Vibration Isolation: Equipment shall be supported and anchored in such a way so that no equipment vibration is transmitted to the building structure.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. Pipe Sleeves

B. Duct Sleeves

C. Duct Closure Collars

D. Firestop Seals

E. Non-Firestop Seals

1.03 DEFINITIONS

A. Firestop System: Specific firestop materials or combination of materials installed in a specific way in openings in a specific rated assembly to restore (or maintain) the fire rating and smoke passage resistance properties of the assembly.

B. Firestop Seal: Same as “Firestop System”.

C. Rated Assembly: Wall, floor, roof, ceiling, roof/ceiling or other construction which is required (by code or the Contract Documents) to have a fire-resistance rating, be a smoke barrier, or to limit the passage of smoke.

1.04 SUBMITTALS

A. General: Shall comply with Section 200500.

B. Product Data: Provide product data on all material to be use. Provide MSDS for all sealants, caulks and similar materials.

C. Shop Drawings – General: Shop drawings of proposed sealing/flashing assembly for roof and exterior wall penetrations.

D. Shop Drawings – Firestop: Provide firestop system shop drawings showing:

1. Listing agency’s detailed drawing showing opening, penetrating items, and firestop materials. Drawing shall be identified with listing agency’s name and number or designation, fire rating achieved, and date of listing for each firestop system.

2. Identify where each firestop system is to be used on the project.

3. Manufacturer’s installation instructions.

4. For proposed systems that do not conform strictly to the listing, submit listing agency's drawing marked to show modifications and stamped approval by the firestop system manufacturer's fire protection engineer.

5. Other data as required by the AHJ.

1.05 REFERENCES

A. ASTM A 36: Standard Specification for Carbon Structural Steel.

B. ASTM C534: Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.

C. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.

D. ASTM E 814: Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

E. UL 1479: Standard for Fire Tests of Through-Penetration Firestops.

F. UL 723: Surface Burning Characteristics of Building Materials.

G. SMACNA-DCS: SMACNA HVAC Duct Construction Standards, Third Edition.

H. SMACNA-ARCH: SMACNA Architectural Sheet Metal Manual, Seventh Edition.

I. USGBC LEED: US Green Building Council LEED Reference Guide for Green Building Construction.

1.06 GENERAL REQUIREMENTS

A. Corrosion Protection: All sleeves exposed to water, moisture, chemicals, or subject to corrosion shall be constructed of corrosion resistant materials suitable for the exposure. Steel sleeves shall be hot dip galvanized after assembly. Provide additional coatings as noted or as required to resist corrosion.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 200500, Paragraph 2.01, Acceptable Manufacturers.

B. Firestop Seal Materials: 3M, Dow Corning.

C. Non-Firestop Seal Materials: 3M, GE, Dow Corning, Tremco, Pecora, Sonneborn, Pipeline Seal & Insulator.

2.02 PIPE SLEEVES

A. Diameter:

1. Belowground: Inside diameter of belowground pipe sleeves shall be at least 2 inch larger than the outside diameter of the pipe or pipe covering (for covered piping systems), so as to allow free movement of piping.

2. Aboveground: Inside diameter of aboveground pipe sleeves shall be at least 1-inch larger than the outside diameter of the pipe or pipe covering (for covered piping systems), so as to allow free movement of piping.

B. Length: Horizontal sleeves through finished areas (where sleeve is exposed to view) shall be sized to be flush with finished surfaces; other horizontal sleeves may terminate flush to 2-inches past the element being penetrated. Vertical sleeves shall be sized to extend one inch above the final floor elevation.

C. Flexible Type: Flexible cellular elastomeric insulation, complying with ASTM C 534, Type 1, minimum 1/2-inch thick. Water vapor permeance shall not exceed 0.08 perms. Operating Temperature Limits -20 degrees F to 180 degrees F. Provide in sheet or pre-fabricated pipe size; provide multiple wraps as required.

2.03 DUCT SLEEVES

A. Size: Inside dimension of duct sleeves shall be at least 1-inch larger than the outside dimension of the duct or duct covering (for covered duct systems). For duct system conveying air or gases operating above 200 deg F provide sleeve dimension minimum 2-inch larger than duct or duct covering (for covered duct systems). Provide larger sleeves where a larger space around duct exterior is required by code, by duct or flue system manufacturer, to provide required thermal clearances, where specifically noted, where unusual conditions are present and where required to accommodate large movement.

B. Length: Horizontal sleeves through finished areas (where sleeve is exposed to view) shall be sized to be flush with finished surfaces; other horizontal sleeves may terminate flush to 2-inches past the element being penetrated. Vertical sleeves shall be sized to extend one inch above the finished floor.

C. Non-structural:

1. Aboveground Type: 24 gauge spiral seam galvanized steel duct or 20 gauge longitudinal seam galvanized steel duct for round openings. Fabricated of 18 gauge galvanized sheet metal for other openings; configured to suit duct.

D. Flexible Type: Flexible cellular elastomeric insulation, complying with ASTM C 534, Type 1. Water vapor permeance shall not exceed 0.08 perms. Operating Temperature Limits -20 degrees F to 180 degrees F. provide in sheet or pre-fabricated pipe size.

2.04 DUCT CLOSURE COLLARS

A. General: Closure collars shall provide closure of opening between duct and opening in element penetrated and shall abut tight up to and overlap duct and shall consist of rolled angle material (for round ducts) and welded framed angles (for rectangular and round ducts).

B. Size: Closure collars shall be sized to match duct and opening applied to and shall have minimum 2-inch overlap on duct side and 2-inch overlap at opening/penetrated element side but shall completely cover opening in element penetrated with minimum 1-inch overlap to undisturbed element (i.e. wall, floor, etc.).

C. Material: Closure collars shall be fabricated of 20 gauge galvanized steel for ducts 15 inches diameter and less and shall be fabricated of 18 gauge galvanized steel duct for all larger ducts and all square and rectangular ducts.

2.05 FIRESTOP SEALS

A. General: Commercially manufactured through-penetration and membrane-penetration firestop systems to prevent the passage of fire, smoke and gases, and to restore the original fire-resistance rating of the barrier penetrated.

B. Listing: Firestopping shall be listed by UL in “Fire Resistance Directory” (category to match the application), or be qualified by another independent agency acceptable to the AHJ.

C. Rating: Firestop system and devices shall be tested in accordance with ASTM E 814 or UL 1479, with “F” and “T" ratings as required to maintain the fire-resistance rating of the barrier penetrated, and as required by code.

D. Fire Hazard: Materials shall have a flame spread of 25 or less, and a smoke development rating of 50 or less; when tested in accordance with ASTM E 84 or UL 723.

E. Cabling Applications: Firestop systems used with loose electrical cabling shall be the type that allows for removal of the cable or installation of new cables without damage to the firestop system, or the need to replace or repair firestop materials.

F. Insulation: Firestop system shall be applicable to insulated systems to allow the insulation to run continuous through the firestop system (unless noted otherwise).

2.06 NON-FIRESTOP SEALS

A. Indoor Sealants:

1. Smoke or Sound Sealant Applications: For use where a firestop seal is not required, but smoke or sound seal is required. Single component, elastomeric or acrylic latex type sealant with STC ratings per ASTM E90. Sealants shall be of the following types, or approved equal:

a. 3M “Smoke and Sound Sealant SS100”.

b. Tremco “Tremstop”.

2. Other Areas - Dry (Not Normally Exposed to Water/Moisture): Single component, latex sealant complying with requirements of ASTM C834. Sealants shall be of the following types, or approved equal:

a. Tremco Corporation “Tremflex 834”.

b. Pecora Corporation “AC-20 Arylic Latex”.

c. Sonneborn Building Products “Sonolac”.

B. Outdoor Sealants:

1. General: Single component, non-sag, low modulus, silicone elastomeric sealant conforming to requirements of ASTM C920, Type S, Grade NS, Class 100/50. Sealant shall be of the following types, or approved equal.

a. Dow Corning “790 Silicone Building Sealant”.

b. Pecora Corporation “890 Silicone”.

c. Tremco “Spectrem 1”.

2. Adjacent to Aluminum: Single component, non-sag, medium modulus, silicone elastomeric sealant conforming to requirements of ASTM C920, Type S, Grade NS, Class 50. Sealant shall be primer-less type for use in joints adjacent to fluoropolymer coatings. Sealants shall be of the following types, or approved equal:

a. Dow Corning “795 Silicone Building Sealant”.

b. GE Silicones, Momentive, SCS2000 and SCS7000.

c. Pecora “895 Silicone”.

d. Tremco “Spectrem 2”.

C. Expanding Foam Sealant:

1. General: Single component, polyurethane insulating sealant with flame spread index of 25 or less and smoke development rating of 50 or less. Shall expand and fully cure within 24 hours to a semi-rigid, closed cell, water and air resistant foam. Sealant shall be of the following types, or approved equal.

a. DAP “Kwik Foam”.

b. Fomo Products ”Handi-Foam”.

c. Todol Products “EZ Flo Gun Foam”.

D. Link Seal: Seals shall consist of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening. The seal assembly shall expand when mechanically tightened to provide an absolute water-tight seal between the pipe and wall opening. Sizing shall be per manufacturer's recommendations. Seal shall be Pipeline Seal and Insulator, "Link-Seal" (or approved).

E. Specialty: Packed fiberglass or wool insulation; with silicone sealant rated for use with temperatures and other conditions encountered.

F. Grout: ASTM C 1107, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout. Nonshrink; recommended for interior and exterior applications. Design mix shall provide 5000-psi, 28-day compressive strength. Premixed and factory packaged.

PART 3 - EXECUTION

3.01 PIPE SLEEVES

A. General: Provide sleeves for all piping passing through walls, floors, partitions, roofs, foundations, footings, grade beams, and similar elements. Except that sleeves are not required at core drilled penetrations through solid concrete or where formed openings equivalent to a core drilled opening are provided. Sleeves shall be the following type (horizontal/vertical refer to position of sleeve):

1. Horizontal, Belowground: Non-structural, belowground, non-waterstop type; except that penetrations of footings shall be structural type.

2. Horizontal, Aboveground: Non-structural type.

3. Vertical, Slab on Grade: Structural type; except at piping serving individual fixtures or individual heating units in finished areas, the flexible type may be used. Where not installed to be concealed (as in a plumbing chase) install height of flexible type so it is concealed by the floor finish, cabinet base, or an escutcheon.

B. Installation: Set sleeves plumb or level (or sloped as required for sloped pipes) in proper position, tightly fitted into the work. Set sleeves properly in element for specified projection past adjacent surfaces (see sleeve product specification); cut ends of sleeve as necessary.

C. Insulation: Insulation shall run continuous through sleeves (unless noted otherwise).

3.02 DUCT SLEEVES

A. General: Provide sleeves for all ducts passing through walls, floors, partitions, roofs, foundations, footings, grade beams, and similar elements, except that sleeves are not required at core drilled penetrations through solid concrete or where formed openings equivalent to a core drill and provided and where no floor drain serves the room where the penetration occurs. Sleeves shall be the following type aboveground:

1. Horizontal, Aboveground:

a. Other Walls: Non-structural type. No sleeve required unless needed as part of the seal system or specifically noted to be provided (i.e. for acoustic, thermal, seal retention, or other purposes). Provide clearances around pipe same as sleeve would provide (see specified sleeve size).

B. Installation: Set sleeves plumb or level (or sloped as required for sloped duct) in proper position, tightly fitted into the work. Set sleeves properly in element for specified projection past adjacent surface (see sleeve product specification); cut ends of sleeve as necessary.

C. Insulation: Insulation shall run continuous through sleeves (unless noted otherwise).

3.03 DUCT CLOSURE COLLARS

A. General: Closure collars shall be provided for all exposed ducts on each exposed penetration where the duct passes through any floors, walls, ceilings, roofs, partitions, and similar elements. Closure collars shall additionally be provided where so noted on the drawings and at all duct penetrations into mechanical rooms, boiler rooms, and rooms housing mechanical equipment (on both sides of the penetration).

B. Installation: Collar shall be installed tight against surfaces and shall fit snugly around the duct or duct covering. Sharp edges of the collar around insulated duct shall be ground smooth to preclude tearing or puncturing the insulation covering or vapor barrier of insulated ducts. Collars shall be anchored to element penetrated, with fasteners appropriate to material fastening to, on maximum 6 inch centers.

3.04 FIRESTOP SEALS

A. General: At each through-penetration and membrane-penetration in rated assemblies, where required to limit the passage of smoke, and as required by code or in the Contract Documents, provide a firestop system. Firestop system shall be installed in accordance with the manufacturer's instructions and listing.

B System Selection: Contractor is responsible to select the firestop systems to be utilized, corresponding to the construction of the assembly penetrated, and types of penetrations. Contractor shall submit proposed firestop systems to be utilized, shall also review such systems with the AHJ and obtain AHJ approval.

C. Preparation: Prepare surfaces as recommended by firestop material manufacturer. Examine and confirm that conditions are acceptable to proceed with the installation. Provide maskings and temporary coverings to prevent contamination or defacement of adjacent surfaces.

D. Installation Review:

1. Notify Architect/Engineer when firestopping work is complete and ready for review. Provide minimum 7 days notice to allow scheduling of review. An independent testing agency may be utilized to perform an inspection.

2. Notify AHJ when firestopping work is complete and ready for inspection. Provide sufficient advance notice to allow scheduling of the inspection without adversely impacting project schedule.

3. Do not cover or conceal firestopping until all inspections have been satisfactorily completed.

3.05 NON-FIRESTOP SEALS

A. General: Provide seals around all ducts, conduit, and piping passing through sleeves, walls, floors, roofs, foundations, footings, partitions, and similar elements. Seals shall be watertight where the penetration may be exposed to water or moisture. Provide type of sealant to suit the application. Provide smoke and sound type at all penetrations of rooms which contain mechanical equipment on both side of element penetrated to a depth of 5/8-inch (unless noted otherwise).

B. At Sleeves:

1. Between Sleeve and Penetrated Element: Fill openings around outside of pipe sleeve with same material as surrounding construction, or with material of equivalent fire and smoke rating and properties that allow a tight seal between the sleeve and the surrounding construction. Seal full depth of sleeve for vertical penetrations.

2. Between Pipe and Inside of Sleeve: Provide sealant between outside of pipe or pipe covering (for covered piping systems) and inside of sleeve. Seal depth shall be minimum 1-inch each side. Provide Link Seal type for belowground penetrations, vault wall penetrations, and slab-on-grade penetrations (not required where flexible type sleeves are used).

C. No Sleeves: Provide "Link-Seal" type for belowground penetrations, vault wall penetrations, and slab-on-grade penetrations. Provide sealant at other areas, type to suit the application. Fully seal between outside of pipe or pipe covering (for covered piping systems) and surrounding construction. Seal depth shall be minimum 1-inch each side.

D. Plumbing Fixtures: Provide sealant between fixture and abutting building surfaces. Seal so no water or overspray from fixture can enter building construction. See Section 224000.

E. Preparation: Remove loose materials and foreign matter impairing adhesion of seal. Perform preparation in accordance with recognized standards and sealant manufacturers recommendations. Protect elements surrounding area of work from damage or disfiguration due.

F. Installation: Install sealants immediately after joint preparation. Install sealants free of air pockets, foreign embedded matter, ridges, and sags. Tool exposed joint surface concave and with a neat finished appearance.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. Air Balancing

B. Plumbing System Water Balancing

C. Report

1.03 SUBMITTALS

A. General: Comply with Section 200500.

B. Company: Submit name of Company proposed to do the balancing and sample balancing forms. Where the Company has not been pre-qualified, and substitutions are allowed after bidding (see Division 00 and 01), submit information regarding firm qualifications.

C. Personnel: Submit list of personnel that will be assigned to the project and their qualifications, and list of past projects.

D. Reports: Preliminary and final balancing reports.

1.04 REFERENCES

A. AABC-NS: Associated Air Balance Council, National Standards for Field Measurements and Instrumentation.

B. ASHRAE: Handbook of Fundamentals.

C. ACGIH-IV: American Conference of Governmental Industrial Hygienists, Industrial Ventilation, A Manual of Recommended Practice.

D. NEEB-PS: National Environmental Balancing Bureau Procedural Standard for Testing, Adjusting and Balancing Environmental Systems.

1.05 GENERAL REQUIREMENTS

A. General: Balancing shall be done by a company which specializes in this type of work and is totally independent and separate from the Company which has installed the systems to be balanced.

B. Balancers Qualifications:

1. General: Work of this Section shall be performed by balancing firms meeting the following and having prior approval from the Engineer:

a. Professional Affiliation: Firm shall be an Associated Air Balance Council (AABC) member balancer or National Environmental Balancing Bureau (NEBB) certified balancer.

b. Experience: Firm shall have satisfactorily completed the balancing work for at least 5 similar projects in the last 3 years. Similar is defined to mean: within 10% of the same quantity of units and air inlets/outlets, involve same type of systems, be the same type of facility (i.e. school, hospital, etc.). The lead field balancer (i.e. the individual who will be on site directing and participating in the balancing efforts) shall have at least 5 years of experience performing balancing work on similar projects.

c. References: Have five references for similar projects which have been completed in the last three years that will give a good or better performance rating. References shall be engineers, architects, or building owners. As part of the qualification process at least three of these references will be contacted and a rating obtained for the following: timeliness of work (i.e. able to complete work on schedule), cooperative nature of balancer's staff (i.e. ability to work well as a team with other project trades and professionals), overall quality of balancing work, quality of balancing report. Each item will be rated on a scale of 1 to 5 (5 being excellent), with the result averaged, score must be of 4 or better.

2. Pre-Qualified Balancers: As a convenience to the Contractor, the following balancing firms have been pre-qualified. This is not in any way intended to limit competition or prevent other firms from submitting qualifications, but is intended as an aid to Contractors by identifying firms that have been confirmed as meeting the qualification requirements.

a. Neudorfer Engineers

b. Hardin and Sons

c. Airtest Company

d. MacDonald Miller Facility Solutions

e. National Indoor Air Care

f. Test Comm

g. Advanced Mechanical Services

h. Testing and Commissioning (TAC) Services

i. AccuABC

3. Qualification Process: Firms not pre-qualified who desire to perform the balancing work shall submit a substitution request form in accordance with Contract Document requirements (reference Division 00 and 01). In addition to the information required on the substitution request form, submit: Company information, resumes of staff to be assigned, lists of projects, and references (with name of project, staff assigned to project, and contact name and phone number).

C. Balancing Issues: Notify the Engineer in writing of all problems or discrepancies between actual conditions and what design documents show as work proceeds.

D. Engineer's Authority: The Balancer shall be directly responsible to the Engineer and shall perform this work and make system adjustments as directed by the Engineer.

E. Lead Balancer: The Balancer shall assign an individual as “lead balancer” to work in the field to directly supervise the balancing work and field technicians. This lead field balancer shall have at least 5 years of experience performing balancing work on similar projects.

F. Added Site Visit: The Balancer shall include in his bid three extra site visits and associated time to access system readiness for balancing and resolution of balancing issues. Include added site visit and 8 hours of field balancing time, plus report amendment time to provide added balancing as directed by the Engineer. Such work may occur during the project’s construction period or during the warranty period.

PART 2 - PRODUCTS

2.01 GENERAL INSTRUMENTATION

A. General: Balancing equipment shall comply with Associated Air Balance Council recommendations for field measurement instrumentation.

B. Calibration: All measuring instruments shall be accurately calibrated and maintained in good working order. Calibration dates and certifications shall be available at Engineer's request.

C. Instruments: Shall be capable of:

1. Air velocity instruments, direct reading in feet per minute with 2% accuracy.

2. Static pressure instruments, direct reading in inches water gauge with 2% accuracy.

3. Tachometers, direct reading in revolutions per minute with 1/2% accuracy; or revolution counter accurate with 2 counts per 1,000.

4. Thermometers, direct reading in degrees Fahrenheit with 1/10 of a degree accuracy.

5. Pressure gauges, direct reading in feet of water or psig with 1/2% accuracy.

6. Water flow instruments, direct reading in feet of water or psig with 1/2% accuracy suitable for readout of balancing valve provided.

D. Potable Water: Instruments used in contact with potable water shall be cleaned and disinfected before use with a chlorine solution.

PART 3 - EXECUTION

3.01 GENERAL

A. Workmanship: All measurements and adjustments shall be in accordance with AABC-NS, NEEB-PS, and ACGIH-IV and recognized best balancing procedures. Measurements and adjustments of equipment shall be executed in a manner consistent with the manufacturer's recommendations.

B. Flow Rates:

1. General: All air and water systems shall be completely balanced and adjusted to provide the flow rates indicated (within tolerances indicated in this specification Section), and to produce an even heating and cooling effect and control response.

2. Balancer Determined: Where flow rates have not been indicated the balancer shall determine such flow rates using acceptable practices in accordance with AABC-NS, NEEB-PS, and ASHRAE standards and submit the proposed flow rates to the Engineer for review.

3. Confirmation: Prior to beginning balancing confirm any flow rate changes since design with the submittals and flow rates indicated therein, and with the Engineer to confirm changes made since design. Assume that new flow rates will be issued.

C. Controls: Consult and coordinate with the Control Contractor for the adjustment and setting of all control devices to allow for the balancing work, and for proper system operation and proper flow rates. Set all controls and valves as required to maintain design flow rates and temperatures as shown on the drawings. Make measurements and provide data to the Control Contractor to allow for proper control of items.

D. Comfort Adjustments: Make final adjustments for flow rates in order to optimize each space's comfort, including such considerations as temperature, drafts, noise, pressurization, and air changes. Where variances are made from design values, state reasons in report (e.g., "too noisy", "too drafty," etc.). All such variances are subject to approval by the Architect/Engineer.

E. Deficiency Reports: Submit deficiency reports where the work does not allow balancing to occur or balancing issues develop. Indicate date, system and equipment involved, location, description of deficiency, and related information to allow for diagnosing the problem. Provide suggestions for resolution where possible.

3.02 AIR BALANCING

A. Pre-check of System: Prior to beginning balancing, perform, as a minimum, the following:

1. Verify that clean filters have been installed, that system is free from debris, and that all inlets/outlets are not obstructed.

2. Check all fans and equipment to verify that proper start-up and system preparation has been done by the installing contractor.

3. Check all door/window and similar building opening status to insure building is ready and proper pressurization can be obtained.

4. Open all dampers to full flow position, check positions and operation of all motorized dampers to allow full system flows.

5. Review controls and sequences of operation.

B. Tolerances: All air flow rates (supply, return, and exhaust) shall be adjusted to within plus 5 percent and minus 5 percent of the values shown in the contract documents, except that relative space-to-space pressure relationships shall always be maintained (e.g., restrooms shall be negative relative to other areas, general offices shall be positive, etc.).

C. Draft and Noise Adjustments: All diffusers, grilles, and registers shall be adjusted to minimize drafts and to eliminate objectionable noise.

D. Filters: Air balancing shall be done with new, clean air filters installed. Adjust air deliveries so that design quantities will be obtained when filters are half dirty. This condition shall be simulated by covering a portion of the filter area.

E. Fan Speeds: Adjust fan speeds as required to produce design flow rates.

F. Marking: Upon completion of flow readings and adjustments permanently mark the balanced position of all balancing valves by stamping the indicator plate of the valve.

G. Duct Traverse: Rectangular duct traverses shall measure the center of equal areas in the air flow stream, with centers not more than 6 inches apart. Round duct traverses shall measure at least 20 locations, with locations being the centers of equal annular area. Reference ACGIH Industrial Ventilation Manual.

H. One Open Run: Balance each branch run so that there is at least one wide open run; balance branches relative to one another so that at least one branch damper is wide open (except that where unique conditions exist, and the Engineer gives prior approval, one open damper on runs or branches is not required).

I. Data: Data to be measured/recorded and provided in report for all air handling systems and equipment:

1. Floor plans clearly showing and identifying all diffusers, grilles, OA louvers, ducts and all other items where air flow rates were measured.

2. Identify manufacturer, model number, size, and type of all air inlets/outlets.

3. Initial, trial, and final air flow measurements for all diffusers, grilles, OA louvers, ducts, and all other items where air flow rates were measured.

4. Design air flow rates and percentage final air flow rates are of design values.

5. Final damper (or other balance device) final position (as a percentage of full open).

6. The connected voltage and corresponding nameplate full load amps, and the initial and final amperages of all fan motors.

7. Initial and final RPMs of all fans.

8. Static pressures on inlet and outlet of all fans.

9. Fan initial and final CFMs.

10. Outdoor air CFMs (record minimum and maximum values).

11. Entering and leaving air temperatures across coils with coils operating at 100% capacity.

12. Static pressure drop across each filter bank and coil.

13. Final position of any speed controls (as percent of full).

14. In addition to data noted elsewhere, provide the following for all equipment which are part of balanced systems:

    a. Equipment name and number (as used on drawings).

    b. Service.

    c. Equipment manufacturer and model number.

    d. Filters sizes and quantities (where applicable).

    e. Motor manufacturer and complete nameplate data.

    f. Design operating conditions.

    g. Actual operating conditions (flows, pressure drops, rpm, etc.).

3.03 WATER BALANCING - PLUMBING

A. Pre-check of System: Prior to beginning balancing, perform, as a minimum, the following:

1. Verify that all strainers have been cleaned.

2. Examine fluid in system to verify system condition; balancing is to occur before system disinfection but with system in adequate clean condition.

3. Check for proper rotation and operation of all pumps.

4. Verify that expansion tanks are not air bound and properly charged and that system is full of fluid.

5. Remove air from the circulating system by opening all fixture valves to full flow position allowing system to flow.

6. Check equipment for proper start-up and system operation.

7. Review controls and sequences of operation.

B. Domestic Hot Water Systems: Balance domestic hot water system to provide even flow distribution to allow hot water to reach all fixtures. Use only clean instruments on system and perform balance prior to sterilizing of system. Where flow rates are not indicated, proportion pump water flow rate based on the linear footage of system served.

C. Marking: Upon completion of flow readings and adjustments permanently mark all settings of balancing valves.

D. Data to be measured/recorded and provided in report:

1. Floor plans or schematics showing and identifying all valves, coils, pumps and other items where temperatures, pressure drops, or water flow rates were measured.

2. Identify manufacturer, model number, size and type for all balancing devices.

3. Initial, trial, and final water flow measurements (pressure drops, temperatures, and GPMs) for all items where measurements were made.

4. Design water flow rates, and percentage final water flows are of design values.

5. The connected voltage and corresponding nameplate full load amps, and the initial and final amperages of all pump motors.

6. Pump operating suction and discharge pressures and final total developed head.

7. Pump initial and final GPMs.

8. Final position of all valves (percent open or setting position on valve).

9. Final position of any speed controls (as percent of full).

10. In addition to data noted elsewhere, provide the following for all equipment which are part of balanced systems:

a. Equipment name and number (as used on drawings).

b. Service.

c. Equipment manufacturers and model number.

d. Equipment capacities.

e. Motor manufacturer and complete nameplate data.

f. Design operating conditions.

g. Actual operating conditions (flows, pressure drops, etc.).

3.04 BALANCING REPORT

A. General: A balancing report shall be submitted as specified herein, documenting all balancing procedures and measurements.

B. Report Organization: The report shall be divided into logical sections consistent with the building or system layout (i.e. by floors, building wings, air handling units, or other convenient way). Tabulate data separately for each system. Describe balancing method used for each system.

C. Preliminary Report: Two preliminary review copies of the balancing report shall be submitted to the Architect/Engineer when the balancing work is 90% complete (or as near 90% complete as possible due to uncompleted work of other trades). In addition to containing all the information required of the final report, the preliminary report shall

contain a list of all the work required of other trades in order to allow the balancing work to be completed. The Architect/Engineer will review the preliminary report and inform the Contractor of any additional items or revisions required for the final report. Preliminary reports may be omitted where the Architect/Engineer grants approval.

D. Final Report: Shall be included in the Operation and Maintenance Manual. Submit reports to Contractor for inclusion in Manuals (or, when manuals have been already sent to Engineer, send report to Engineer who will insert report into Manual). Provide number of reports as required to match quantity of O&M Manuals, but in no case less than five.

E. Format: 8-1/2" x 11" size, neat, clean copies, drawings accordion folded. Report shall be typed, shall have a title page, table of contents, and divider sheets with identification tabs between sections. Information shall be placed in a three hole notebook, with the front cover labeled with the name of the Job, Owner, Architect/Engineer, Balancing Contractor, and Report Date.

F. Electronic Copy: Provide copy of reports in *.pdf format; submit final report with closeout documents per Divisions 00 and 01.

G. General Balancing Information Required:

1. At the beginning of the report, include a summary of problems encountered, deviations from design, remaining problems, recommendations, and comments.

2. List of instruments used in making the measurements and instrument calibration data.

3. Names of personnel performing measurements.

4. Explanation of procedures used in making measurements and balancing each system.

5. List of all correction factors used for all diffusers, grilles, valves, venturi meters, and any other correction factors used.

6. Areas where difficulties were encountered in obtaining design flow rates, or where unstable operating conditions may exist.

7. Note any parts of the system where objectionable drafts or noises may be present and efforts made to eliminate same and why they may still be present.

8. Note where variances from design values occur; explain why.

9. All specified measurements, balancing data, any additional recorded data, and observations.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. Sprinkler System Design

B. Piping

C. Sprinkler Heads

D. Valves

E. Fire Department Connections

F. Accessories

G. Owner Instruction

1.03 QUALITY ASSURANCE

A. General: Comply with 200500 requirements.

B. Listing: All materials and equipment shall be UL listed and FM approved for the application.

C. Latest Design: Products shall be of the manufacturer's latest design.

D. Code and AHJ Compliance: Products and installation shall comply with code and Authority Having Jurisdiction (AHJ) requirements. Contractor is responsible to review and be familiar with code and local AHJ requirements. Products submitted are represented by the Contractor as complying with code and AHJ requirements.

E. Exceed Code: The Contract Documents indicate items in excess of code requirements; in all such cases the work shall be done so that code requirements are exceeded as indicated. Such work may include coverage of areas not strictly required by code, painting, concealing of piping, access provisions for system inspections, oversized mains to accommodate future expansion, etc.

1.04 SUBMITTALS

A. General: Comply with Section 200500.

B. Shop Drawings:

1. Submit shop drawings of entire sprinkler system to Architect/Engineer for review; label these as "Preliminary – Not for AHJ Review". After incorporating or satisfactorily resolving Architect/Engineer review comments, submit shop drawings to AHJ for approval; label these as "AHJ Review Set"; at same time

submit informational copy to the Architect/Engineer.

2. Shop drawings shall show head locations on reflected ceiling plans; use shop drawings from ceiling installer for ceiling layout; where these drawings are not available use information in the Contract Documents to develop a reflected ceiling plans.

C. Product Data: Submit information on all products to be used; include evidence of product UL listing and FM approval. Submit proposed labeling and signage.

D. Calculations: Submit all system calculations showing compliance with NFPA and AHJ requirements.

E. Review Impacts: Architect/Engineer's review may involve changes to Contractor's design in order to comply with the Contract Documents including aesthetic issues. These changes may be substantial enough to affect drawings and calculations submitted to the AHJ and requiring a resubmittal. Contractor shall assume at least one re-submittal to the AHJ will be required and shall pay all required AHJ re-submittal and AHJ re-review fees.

1.05 GENERAL REQUIREMENTS

A. Experience: All fire sprinkler design shall be performed by a Contractor thoroughly familiar with and knowledgeable of NFPA 13, NFPA 24, local AHJ requirements, and fire sprinkler system design and installation. By virtue of submitting a bid, the Contractor is acknowledging that he does in fact have such knowledge; and all work provided will fully comply with all the requirements of these specifications. The fire sprinkler Contractor shall be qualified, as required by the AHJ to design and install all parts of the fire sprinkler system. All portions of underground fire sprinkler piping shall be installed by a licensed fire sprinkler contractor, or by a level U certified plumbing contractor, as issued by the State's Fire Marshal's office.

B. Professional Stamp: All fire sprinkler design drawings and calculations shall be prepared by and stamped by a licensed fire sprinkler professional as required by the AHJ.

C. Design: System shall be Contractor designed and approval by both the Fire Marshal and Architect/Engineer. System design shall comply with Contract Documents regarding particular system configuration as may be specified or noted (i.e. routing of mains, head locations, etc.).

D. System Description: Dry pipe fire sprinkler system serving building and adjacent areas subject to freezing. All spaces shall be sprinklered as required by the AHJ.

E. Special Design Areas: Various portions of the building's fire sprinkler system require special design effort and coordination; including but not limited to: multiple design layouts, multiple calculations for these layouts, multiple meetings with code officials, multiple meetings with various contractors, multiple meetings with members of the design team, added coordination among trades, coordination with the AHJ, and coordination with the design team. The Contractor shall include in his bid costs for such special design and installation work.

1.06 REFERENCES

A. AWWA C104: Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water.

B. AWWA C111: Rubber - Gasket Joints for Ductile Iron Pipe with Ductile Iron or Gray Iron

Threaded Flanges.

C. AWWA C151: Ductile Iron Pipe, Centrifugally Cast for Water.

D. FM-AG: FM Global Approval Guide.

E. NFPA 13: Standard for the Installation of Sprinkler Systems.

F. NFPA 24: Installation of Private Fire Service Mains and their Appurtenances.

G. UL-FPD: Underwriters Laboratories Fire Protection Equipment Directory.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. General: All products shall comply with Section 200500, Paragraph 2.01, Acceptable Manufacturers.

B. Pipe and Fittings: Domestic manufacturer's only.

C. Valves: Crane, Grinnell, Potter-Roemer, Viking, Gem, Victaulic, Nibco, Stockham.

D. Sprinkler System Components: Reliable, Viking, Potter-Roemer, Gem, Star, Victaulic.

E. Air Compressor: Jenny, General Air Products, Air Power Products.

2.02 PIPE AND PIPE FITTINGS

A. Aboveground Piping and Fittings: Piping shall be steel or copper; in accordance with NFPA 13. Fittings shall be suitable for 175 psi working pressure, and shall be cast iron or malleable iron screwed, grooved, welded, or soldered; in accordance with NFPA 13. Piping and fittings ran outside and exposed to the outdoors shall be galvanized type. Flexible braided steel piping serving individual heads may be used where acceptable to the AHJ, and such piping is FM approved and UL listed for the application.

2.03 VALVES

A. Isolation Valves: Bronze construction, minimum 175 psi water working pressure, UL listed and FM approved, per NFPA 13, with configuration and accessories to suit application.

B. Check Valves: Iron or bronze body swing check valve, minimum 175 psi working pressure, UL listed and FM approved, per NFPA 13.

C. Accessories:

1. Wall Indicator Post: Wall mounted hand wheel, with position indicator, locking means, extension rod (length to suit application), and bright red factory enamel paint finish.

2. Indicator Posts: Cast iron construction, with operating wrench, locking means, identification plates indicating valve open/shut, adjustable sleeve, sections to suit varying buried depths, tapped for supervisory device, extension rod, base to

match valve used with, and bright red factory enamel paint finish.

3. Automatic Ball Drip Valve: Straight or angle cast brass ball drip, 1/2 inch.

D. Detector Backflow and Meter: Double check type backflow preventer with weighted clapper for bypassing small flows through meter, AHJ approved type UL listed and FM approved, with tapped bosses for meter connection, galvanized iron body, and complete with meter trim (including isolation valves, union, bypass backflow preventer, and connecting pipe/fittings). Meter shall be a magnetic turbine type meeting AWWA Class 1 standards, AHJ requirements, with register reading up to 10,000,000 gallons and having 1/2-inch connections.

E. Backflow Preventer: Double check type: AHJ approved type, UL listed and FM approved, OS&Y isolation valves, with replaceable clapper rubbers, four corporation stops for testing, air vents on each check valve, and having galvanized iron check valve bodies and covers. Use compact type as necessary to suit space available as shown on plans.

2.04 ALARM VALVES

A. Alarm valve shall be UL listed and FM approved for use as an alarm valve in fire sprinkler system, size as selected by Contractor.

B. Alarm valve shall be complete with accelerator, pressure gauges, main drain valve, pressure alarm switch, alarm test valving, priming connections, drain lines/drain cup, connections for water motor alarm, check and isolation valves for air line connection, air line relief valve and all other accessories to provide a complete alarm valve assembly as required to function in accordance with NFPA standards, and as required by the AHJ.

2.05 ALARM BELLS

A. Electric Type: Electric motor driven alarm rated for outdoor installation, with alloy steel gong shell (color as selected by Architect/Engineer and acceptable to AHJ), stainless steel plunger striking tip, and 8-inch diameter. Voltage/electrical characteristics to match power, devices, and fire alarm system connected to.

B. Labeling: Alarm bells shall be labeled or provided with sign mounted adjacent to bell, as required by the AHJ. Sign shall be aluminum lithographed, with red letters on white background.

2.06 SPRINKLER HEADS

A. Dry Type:

1. General: Provide where system may be exposed to freezing temperatures with finish, length and temperature rating to suit application. Quick response type.

2. Finished Areas: Polished chrome finish type with flush type chrome plated escutcheon where installed through ceilings, soffits, and similar elements.

3. Unfinished Areas: Natural bronze finish with flush or deep type brass finish escutcheon where installed through a floor, ceiling, or similar element.

B. Sprinkler Guards: Hard-wire cage sprinkler guard, designed to protect sprinkler from mechanical damage, with chrome plated finish. Where used on exposed heads, guards shall be type that clamp to pipe; where used on recessed heads, guards shall be surface

anchor type having substantial attachments to material surrounding the head (soffit plywood, etc.); provide 2x backing as needed. Provide custom fabricated guards/attachments as required.

C. Sprinkler heads shall be upright, pendant or sidewall type as required to suit application.

D. Extended Coverage Heads: Provide as necessary to allow complete coverage of all areas.

2.07 FIRE DEPARTMENT CONNECTIONS

A. Configuration: Wall or free-standing configuration as indicated (or required to suit the application). Wall type shall be flush mounted.

B. Size and Connections: As required by AHJ.

C. Construction: Cast brass construction with brass clappers, brass swivel couplings, and brass clapper pins. Clapper design shall allow for one or both inlets to be pressurized during operation. Provide each inlet with threaded brass cap, with pin lugs and chain attachment to FDC. Wall type shall have wall plate.

D. Labeling: Words "AUTO SPKR" and “FIRE DEPARTMENT CONNECTION” (or as required by the AHJ). Provided added labeling to indicate areas/system served where the service is not readily obvious; and as required by the AHJ.

E. Finish: Wall type shall have polished brass finish on all outdoor exposed components; free-standing type shall have rough brass finish.

2.08 ACCESSORIES

A. Waterflow Alarm - Flow Type Indicator: Shall be UL listed, with polyethylene paddle water flow detector, cast metal body, adjustable time delay retard mechanism to allow indicator to absorb fluctuations of water flow due to pressure surges to prevent false alarms. Electrical characteristics shall match alarm bell and available voltage.

B. Sightflow Connections: Cast iron construction, with clear acrylic windows, steel covers, and Buna-N O-rings.

C. Valve Switches: Switch for indicating operation of valve; type and configuration to suit valve used on. Switch shall have single pole, double throw type contacts, with cast aluminum housing and non-ferrous parts for corrosion resistance. Shall be weatherproof type where installed outdoors.

D. Sway Bracing/Restraints: Contractor fabricated of riser clamps, Schedule 40 pipe and pipe fittings, all welded construction, size and configuration to suit application.

E. Specialties: Access doors, gauges, and related piping specialties; see Section 200519.

F. Hangers/Supports: See Section 200529.

G. Sleeves Seals: See Section 200530.

H. Air Compressor:

1. Sizing: By Contractor, in compliance with NFPA and AHJ requirements.

2. Type: Electric motor-driven, air cooled, single-stage, tank mounted type. Tank shall be ASME labeled with support legs for base mounting. Unit shall be complete with wiring, motor starter, pressure switch and devices for automatically controlling compressor operation. Unit shall have rubber-in-shear vibration isolators, relief valve, pressure gauge, outlet isolation valve, outlet union, and accessories for proper connections and operation.

3. Power: Unit shall be for use with 120 volt/1 phase electricity (unless noted otherwise), with a single point power connection. Provide unit with electric power disconnect; complying with NEC and code requirements.

4. Noise: Compressor noise shall not exceed Noise Criteria (NC) 35 in any octave band. Provide acoustic enclosure, remote piped air intake with a muffler, and other accessories to reduce noise as required to meet this NC level.

I. Air Maintenance Assembly: Shall be type for use with dedicated sprinkler system air compressor. Assembly shall include air line strainer, air pressure switch for compressor control, bypass globe valve, isolation valves, unions, and all related components to properly connect the air compressor to the dry pipe system, in compliance with NFPA and local code requirements.

J. Labeling:

1. General: See Section 200500 for labeling of piping, valves, equipment, concealed items, and similar items.

2. Design Basis: Provide label identifying hydraulic basis of design and other design parameters, fabricated of material as required by the AHJ, with lettering type and information as required by the AHJ.

3. Other: Provide additional labels as required by AHJ, fabricated of material as required by the AHJ, with lettering type and information as required by the AHJ.

K. Signage:

1. Room Doors: Metal or self-adhesive vinyl sign with white lettering on a red background; lettering minimum of 2-inches high. Where exposed to weather sign and accessories shall be UV and corrosion resistant. Label wording as directed by the AHJ (e.g. “SPRINKLER VALVE ROOM”, “FIRE SPRINKLER RISER ROOM”, etc.). Verify AHJ labeling requirements prior to ordering.

2. FDC: Metal construction, with lettering type, information, and construction as required by the AHJ. Provide with accessories for mounting; fasteners and items exposed to weather shall be UV and corrosion resistant.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Installation of all equipment shall be performed by a Contractor specializing in this work and subject to Owner and Fire Marshal approval. Install all items in accordance with code, manufacturers’ recommendations, and best construction practices.

B. Water Supply: The fire sprinkler system shall be connected to the site water supply as

indicated on the drawings. All underground site work related to the fire sprinkler system shall be reviewed by the Contractor doing the work of this Section, to verify that the installed piping conforms to acceptable professional practices and governing code. The Contractor doing the work of this section by virtue of connecting to this site piping is certifying that this site piping has been reviewed and is acceptable for connection to.

C. Water Main Flushing: Flush outside fire water mains prior to connecting to inside system to prevent any contamination. Such flushing by Division 21 is in addition to any flushing performed by other trades. Failure to flush will result in system rejection. Reference NFPA 24 for requirements; coordinate with site contractor.

D. Pipe Routing:

1. Select pipe routing that maintains full personnel access to building equipment and systems, without requiring stepping over or bending down to cross sprinkler piping. Follow specific pipe routing requirements of the Contract Documents as indicated. Piping shall run parallel to building structure in a neat, workmanlike manner.

2. All piping shall be run concealed in ceiling space, attic space, pipe shafts, soffits, etc. where possible. Piping may only be exposed with Engineers approval and shall be painted as directed by the Architect/Engineer. Where piping must run exposed, it shall be ran in as unobtrusive fashion as possible, in lines parallel to major building features, as high as possible, and as directed by the Architect/Engineer.

3. Provide all necessary drilling of beams, trusses, etc; reference Section 200500 for cutting requirements; structural Engineers approval is required prior to any such cutting or drilling.

E. Escutcheons: Provide chrome plated escutcheon plates at exposed pipe penetrations of all ceilings, floors and walls.

F. Conflict Prevention:

1. Review all building and system plans carefully and arrange the fire sprinkler work to avoid interferences and conflicts with other trades. Discuss and coordinate proposed sprinkler routing with other trades. The fire sprinkler system has the lowest priority of all building systems and is required to accommodate the space requirements of other systems.

2. If piping routes are not properly coordinated with other trades and structures, rerouting and possible re-sizing will be required as directed by the Architect/Engineer. Offset, crossover and otherwise route piping to install system in available space.

G. System Drainage: Special care shall be taken to ensure that entire sprinkler system is drainable in accordance with code. Provide drain valves as required (with labels) to allow for drainage; valves shall be concealed (with access doors) where possible; provide valves with provisions (male pipe nipple) for attaching temporary drain lines (where needed). Extend main drain(s) and 1 inch inspector's test connections to outside for drainage.

H. Fire Department Connections (FDC): Locate as approved by the AHJ and agreed to by the Architect/Engineer. Locations shown on drawings are preliminary only. Include in bid

an additional 50 linear feet of FDC piping and two elbows to allow for an alternate location. Paint free standing FDC's (and the exposed connecting pipe) bright red (unless another color is required by the AHJ).

I. Alarm Devices: Provide alarm indicators as required by the AHJ. Connection of devices to the fire alarm system is by Division 26 (unless indicated otherwise). Adjust water flow indicator time delay as necessary to prevent false alarms due to pressure fluctuations.

J. Labeling: Provide labeling of items per Section 200500. Provide additional labeling of items per AHJ requirements. All drain valves, alarm bells, and risers shall be labeled to clearly indicate purpose and area served. Label riser with hydraulic basis of design information. All piping shall be labeled per Section 200500.

K. Posted Plans: Provide reduced size as-built (or a building key plan) with all system drains and valves clearly indicated. Laminate plan(s) and post adjacent to each riser (or as directed by the Architect/Engineer and AHJ). Provide copy of plan(s) with the O&M Manual.

L. Tamper Switches: Provide valve tamper switches at all isolation valves and as required by the AHJ to indicate valves not fully open. Connection to central fire alarm system shall be by Division 26.

M. Sprinkler Heads: Heads shall be centered in ceiling panels. Where "scored" ceiling panels are used, heads shall be located to be centered in the flat portion of the tile between "scores".

N. Head Protection: Provide wire cage protectors for heads susceptible to damage (this includes all heads in mechanical loft areas with sprinkler heads 7 feet or less above walking surface, all gym heads, outside soffit heads below 9 feet, and similar areas).

O. Hangers and Supports: Shall comply with NFPA 13 and Section 200529. See also structural drawings for added limitations/requirements of supports and attachments to structure.

P. Room Signage: Rooms containing fire suppression risers, system control valves, and other major fire suppression components shall have signage on the outside of the door to the room. Verify AHJ requirements and locations prior to ordering.

3.02 SYSTEM DESIGN

A. General: System shall be Contractor designed in accordance with NFPA 13, AHJ requirements, and additional requirements as cited in the Contract Documents.

B. Hydraulically Designed: System design shall be based on hydraulic calculations using approved water flow test data on the water supply main serving the fire protection system. Such test data must meet the approval of the AHJ and the Engineer. Any water flow data indicated on the drawings is preliminary only. It shall be the Contractor's responsibility to obtain updated water flow data (including new water tests) and pay all associated test fees or charges. Design and calculations shall include complete system, including water main to building, and extending as far back into the local utility systems (i.e. to reservoirs) as deemed necessary by the AHJ.

3.03 TESTING

A. Testing: The systems shall be hydrostatically and operationally tested in accordance with

the requirements of NFPA 13 and the AHJ. Any changes required to meet time or flow test requirements shall be made without additional cost to the Owner. Certificates of acceptance shall be submitted to the Architect/Engineer.

3.04 OPERATING AND OWNER INSTRUCTIONS

A. Typed Instructions: Typewritten, plastic covered, framed operational and maintenance instructions shall be mounted in the building(s) near each fire sprinkler riser. Information shall clearly indicate portion of the building covered by the system, type of system, location of sub-risers, locations of system drains, when system was placed into service, installed, installers name (company) and contact information for service, how to close and open system main valve, and other pertinent operational instructions. Provide reference to O&M manuals provided to the Owner for additional operation and maintenance instructions.

B. O&M Manual: See Division 01 and Division 20.

C. Owner Instructions: The Owner or his representative shall be instructed by the Sprinkler Contractor in the operation of the system. The instruction shall be given by Contractor's personnel who are considered qualified in the opinion of the Architect/Engineer and shall be for a minimum of two hours. Instruction shall include location of all valves, drains, and pipe routing, as well as proper maintenance and testing procedures.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. Domestic Water Piping

B. Valves

C. Water Hammer Arrestors

D. Trap Primers

E. Domestic Water Expansion Tanks

F. Water Service Connections

G. Testing and Inspection

H. Flushing and Disinfection

1.03 DEFINITIONS

A. "Lead-Free" means not containing more than 0.2% lead in solder and flux; and not more than a weighted average of 0.25% lead in wetted surfaces of pipes, pipe and plumbing fittings and fixtures.

1.04 SUBMITTALS

A. General: Submittals shall comply with Section 200500.

B. Product Data: Submit manufacturer’s product information on all items to be used.

C. System Tests and Inspections: Submit documentation showing systems have satisfactorily passed all pressure tests and code inspections.

D. Cleaning and Disinfection: Submit documentation regarding completion of flushing, disinfection, bacteriological tests, and Health Department’s acceptance of tests and system.

1.05 GENERAL REQUIREMENTS

A. ANSI/NSF Compliance: All items in contact with potable water shall be lead free in accordance with ANSI/NSF 61. Plastic piping system components shall comply with ANSI/NSF 14. Only lead-free solder shall be used.

B. Valves: Shall be dezincification resistant, and shall not contain more than 15% zinc in their chemical composition.

1.06 REFERENCES

A. ASME B16.15: Cast Bronze Threaded Fittings: Classes 125 and 250.

B. ASME B16.18: Cast Copper Alloy Solder Joint Pressure Fittings.

C. ASME B16.22: Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

D. ASME B16.24: Cast Copper Alloy Pipe Flanges and Flanged Fittings: Classes 150, 300, 400, 600, 900, 1500, and 2500.

E. ASTM A53: Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.

F. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.

G. ASTM A312: Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.

H. ASTM A403: Wrought Austenitic Stainless Steel Piping Fittings.

I. ASTM A530: General Requirements for Specialized Carbon and Alloy Steel Pipe.

J. ASTM A774: As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures.

K. ASTM A 778: Welded, Un-annealed Austenitic Stainless Steel Tubular Products.

L. ASTM B16.18: Seamless Copper Water Tube.

M. ASTM B32: Solder Metal.

N. ASTM F876: Standard Specification for Cross-linked Polyethylene (PEX) Tubing.

O. ASTM F877: Standard Specification for Cross-linked Polyethylene (PEX) Plastic Hot and Cold Water Distribution Systems.

P. ASTM F1960: Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing.

Q. AWS A5.8: Filler Metals for Brazing and Braze Welding.

R. AWWA B300: Hypochlorites.

S. AWWA B301: Liquid Chlorine.

T. AWWA M20: Water Chlorination and Chlorination Practices and Principles, 2nd edition.

U. ANSI/NSF Standard 14 Plastics Piping System Components and Related Materials.

V. ANSI/NSF Standard 61 Drinking Water System Components – Health Effects.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 200500, 2.01, Acceptable Manufacturers.

B. Pipe and Fittings: Domestic Manufacturers only. Elkhart, CTS, Mueller, Cerro, Cambridge-Lee, US Steel, Anvil International, Wheatland Tube, Weldbend, Exltube.

C. PEX Tubing and Fittings: Uponor/Wirsbo, Viega, Vanguard, Zurn, Watts.

D. Valves: Conbraco/Apollo, Nibco, Stockham, Walworth, Milwaukee, Kitz, Red-White, Watts, Hammond.

E. Pressure Reducing Valves: Conbraco/Apollo, Watts, Cla-Val, Bell & Gossett, Zurn/Wilkins.

F. Thermostatic Mixing Valves: MCC Powers, Leonard, Symmons.

G. Backflow Preventers: Conbraco/Apollo, Febco, Watts, Ames, Zurn/Wilkins.

H. Balancing Valves: Bell & Gossett, Taco, Armstrong, Red-White.

I. Additional manufacturers are as listed for each individual item.

2.02 PIPE AND FITTINGS

A. Copper Pipe and Fittings:

1. Pipe: Seamless copper water tube, hard temper (unless noted otherwise), type K or L as indicated, per ASTM B88. Use Type K underground and Type L elsewhere.

2. Fittings:

a. Solder-Joint: Wrought copper and bronze fittings per ASME B 16.22 and cast copper alloy fittings per ASME B16.18, cast bronze threaded fittings per ASME B16.15.

b. Flanged: Cast bronze fittings per ASME B16.24.

c. Solder Material: 95/5 tin-antimony solder per ASTM B32 or “Silvabrite 100" (95.5 tin/4 copper/0.5 silver) solder; lead free.

d. Brazing Material: AWS A5.8, BCuP-5.

2.03 VALVES

A. Ball Valves: 2 Inches and Smaller: 600 psi non-shock cold working pressure, 100 psi at 300 deg F, bronze body, full port, 2 piece construction, anti-blowout stem, reinforced PTFE seats, stainless steel or chrome plated brass or silicon bronze ball, lever handle, solder or threaded connections. Provide with extended lever handle where valve is installed in systems with insulation thickness greater than 0.5 inch. Nibco S-585-66-LF, T-585-66-LF, Nibco S-585-80-LF, T-585-80-LF (or approved).

B. Drain Valves: Bronze ball valve, minimum 125 psi-swp, anti-blowout stem, stainless steel or chrome plated brass ball, reinforced TFE seat, solder or threaded inlet connection,

male 3/4 inch hose thread outlet connection, with brass cap and chain. Nibco S-585-70-HC, T-585-70-HC (or approved).

C. Thermostatic Mixing Valves - Master Mixing:

1. Type: Hot and cold water thermostatic mixing valve, thermostatic type, Powers “Hydroguard XP” Series (or approved).

2. Construction: Lead free brass (or bronze) body construction with union inlets, combination strainer check-stops, piping connection arrangement to suit application and as indicated. Rated for 125 psi at 200 deg F.

3. Listing: ASSE 1017 and CSA B125.

4. Range: Adjustable from 90° F to 160° F, with an approach temperature of 5 deg F. Setting shall be lockable. For use with hot water from 120 to 180 deg F; and cold water from 40 to 80 deg F.

5. Size: Valve shall be sized by manufacturer to handle indicated gpm with maximum 10 psi pressure drop (unless noted otherwise). Where gpm is not indicated, use following gpm’s according to tempered (i.e. mixed) water line size shown connecting to valve:

Line Size	Maximum gpm
1/2"	7

6. Finish: Rough brass.

D. Thermostatic Mixing Valves - Individual Fixtures (1 to 2): Hot and cold water thermostatic mixing valve for serving 1 to 2 fixtures. Brass construction, with stainless steel internals, integral checks and locking nut to prevent unauthorized adjustment. Adjustable from 90 to 110 degrees F, with accuracy in accordance with ASSE 1016. Valve shall have capacity of at least 2 gpm at 20 psi differential, and control down to 0.5 gpm. MCC Powers “Hydroguard Series 480" (or approved).

E. Pressure Relief Valves: ASME rated pressure relief valve, bronze body, stainless steel spring, set for pressure indicated or as required to protect system from over pressure. Valve shall have minimum 400,000 BTU/HR relief capability (at set pressure) and no smaller than 3/4-inch connection sizes.

2.04 ACCESSORIES

A. Water Hammer Arrestors: All metal, factory pre-charged with inert gas, sealed internal bellows; 125 psi working pressure. All wetted parts shall be type 300 stainless steel, brass or copper. PDI (Plumbing and Drainage Institute) sizes as indicated. Where not sized, provide sizes in accordance with PDI standards. Zurn "Shoktrol", Wade "Shokstop", or J.R. Smith "Hydrotrol".

B. Trap Primer Valve:

1. Pressure Drop Type: Activated by drop-in water pressure. Constructed of corrosion resistant brass with integral backflow preventor, vacuum breaker ports, distribution manifold to suit number of drains served, adjustable to line pressure for water delivery. Precision Plumbing Products Model P-1 and P-2 (or approved).

2. Water Flow Type: Activated by flow of water in line through the trap primer valve. Brass construction with integral air-gap backflow preventor, stainless steel screen, delivering 0.84 ounces of water at 20 psi with 5 seconds of water flow. Precision Plumbing Products “Prime-Pro” (or approved).

C. Sediment Water Filter:

1. Type: Replaceable cartridge type water filter. Watts “Flow-Max” filter and FH5000 series housing (or approved).

2. Performance: 5 micron filtration with maximum 0.4 psi pressure drop at 5 gpm.

3. Size: Minimum filter size of 4.5-inch OD x 9.75-inch length.

4. Filter Media: Synthetic filter media (cellulose free).

5. Filter Housing: Constructed of polypropylene or polyurethane, with removable threaded top having a EPDM o-ring. Rated for 125 psi.

2.05 BACKFLOW PREVENTERS

A. Reduced Pressure Type:

1. General: Washington State approved, with air gap drain fitting and resilient seated full flow shutoff valves and test cocks. Same size as connecting pipe. Configuration to suit application. Conforming to AWWA C511.

2. 2 Inches and Smaller: Bronze body, stainless steel springs, bronze ball valves, 175 psi working pressure, threaded end connections.

3. Discharge: Discharge from intermediate relief valve assembly shall not exceed 190 gpm for 2-inch and smaller backflow preventers, and not exceed 560 gpm for larger backflow preventers (rated at 75 psig inlet pressure).

2.06 DOMESTIC WATER EXPANSION TANK

A. Type: Diaphragm thermal expansion absorber. Amtrol “ST” Series (or approved).

B. Construction: Welded steel construction, with polypropylene liner, butyl/EPDM diaphragm, stainless steel air charging valve, 175 psig working pressure, configuration/connections to suit installation, NSF 61 approved, and ASME certified.

C. Capacity: As indicated on plans; where not indicated provide 4.0 gallon tank volume (minimum).

PART 3 - EXECUTION

3.01 GENERAL

A. Workmanship: Installation of all items shall comply with code, best professional practices, manufacturers written installation instructions, and to allow for proper functioning of items being connected to.

B. Complete System: Provide all piping as indicated and as required to allow supply

connections to each fixture and equipment item requiring water supply. Provide offsets as required to accommodate building construction and access requirements per Section 200500. For multistory buildings include costs to offset vertical piping at each floor level since structural member locations will not be the same on each floor.

C. Coordination: Coordinate installation of items with all trades that are affected by the work to avoid conflicts.

D. Hot Water Adjustment: Adjust the hot water circulation system for uniform circulation throughout the system; provide balancing of system where hot water circulation system has multiple branches with balancing valves (see balancing specification Section). Install, set, and adjust and all system components for proper operation.

3.02 PIPE AND FITTINGS

A. Concealed: All piping in finished areas shall be installed concealed unless specifically noted otherwise. Provide escutcheons where piping is allowed to be exposed and pipe passes through building elements (i.e. walls, floors, ceilings, etc.).

B. Non-Obstructing: Install piping at such heights and in such a manner so as not to obstruct any portion of windows doorways, passageways, or access to any items requiring routine service, maintenance, or inspection. Offset or reroute piping as required to clear any interferences which may occur.

C. Drawing Review: Consult all drawings for location of pipe spaces, ducts, electrical equipment, ceiling heights, door openings, window openings, and other details and report discrepancies or possible conflicts to Architect/Engineer before installing pipe.

D. Insulation: Allow sufficient clearances for installation of pipe insulation in thickness specified. If interferences occur, reroute piping to accommodate insulation.

E. Drainage: Slope all piping to low points to allow the system to be drained. Provide added drain valves where system cannot be drained through fixtures.

F. Install all piping parallel to the closest wall and in a neat, workmanlike manner. Horizontal exposed straight runs of piping shall not deviate from straight by more than 1/4-inch in ten feet. Vertical piping shall not deviate from plumb by more than 1/8-inch in ten feet.

G. Do not run any piping above electrical panels (and similar electrical equipment). Provide offsets around such panels as necessary.

H. Prior to the joining of any section of pipe to a pipe run, the section shall be thoroughly cleaned inside and out, the ends shall be reamed to remove any cutting burrs and piping prepared as recommended by piping and fitting manufacturer.

I. Threaded Connections: Cut piping carefully, ream, thread and work into place without springing. Use TFE tape or lead and graphite lubricant (on male threads only).

J. Soldered Connections: Polish contact surfaces of fittings and pipes with emery cloth before fluxing male and female surfaces of joints. Steel wool and sandpaper not permitted for polishing.

K. Unions: Install unions in pipe connections to valves, coils, and any other equipment where it may be necessary to disconnect the equipment or piping for repairs or

maintenance; and as indicated. Where flanged connections occur at equipment additional unions are not required unless indicated otherwise.

L. Insulating Unions: Install dielectric insulating connectors between all connections of copper piping and steel piping of steel equipment. Where flanged connections occur use insulating type flanges.

3.03 VALVES

A. General: Provide isolation valves as shown on the drawings. In addition to those shown, provide added valves to allow for the isolation of each group of fixtures, all water heaters, and all individual equipment items (e.g. dishwashers, heat exchangers, etc.).

B. Installation: Install valves so as to be easily accessible and oriented to permit ease of operation. Valve stem shall be directed toward operator in either the vertical or horizontal direction. Provide access doors for valves not otherwise accessible.

C. Drain Valves: Provide drain valves at the base of all risers (except not required where risers can be drained through plumbing fixtures or equipment drains). Provide drain valves at piping low points where the piping cannot be drained through fixtures, hose bibs, or equipment drains.

D. Thermostatic Mixing Valve: Provide inlet and outlet isolation valves and outlet thermometer.

3.04 ACCESSORIES

A. Water Hammer Arrestors: Install per manufacturer's instructions, just upstream of last fixture on branch line. Provide water hammer arrestors on branch water lines serving fixtures with flush valves, washer machines, solenoid valves, and similar quick-acting valves. Water hammer arrestors are typically not shown on the plans, but shall be provided per this paragraph. Provide ball isolation valve in piping to arrestor. Where access cannot be provided at water line location, the water hammer arrestor piping may be extended vertically and the water hammer arrestor located above ceiling outside of plumbing chase.

B. Trap Primers: Provide trap primers to all vented floor drains, floor receptors, and where required by the code. Install with an isolation valve in the branch line to the trap primer valve.

C. Access Doors: Provide access doors to all valves, water hammer arrestors, trap primers, backflow preventers, and any other piping accessories which would otherwise be inaccessible. See Section 200519 for access door specifications.

D. Backflow Preventers:

1. General: Provide backflow preventers as indicated in the Contract Documents and as required by code. Backflow preventers with threaded connections shall be installed with unions for ease of removal. Install to be accessible for testing and service. Pipe air gap drains to nearest floor drain or point of drainage.

2. Inspection: Arrange and pay for inspection of backflow preventers as required by the local AHJ and obtain installation acceptance from the AHJ.

3 Certification: Following inspection arrange and pay for testing of backflow

preventers by certified individuals in accordance with applicable portions of the Washington Administrative Code, other applicable regulations as set forth by the Washington State Department of Social and Health Services, and as required by the AHJ.

E. Domestic Water Expansion Tanks: Provide isolation valve for servicing expansion tank. All isolation valves between expansion tank and water heater shall be labeled, “Expansion Tank Service Valve: Must Be Open When System Is Operating.”

3.05 WATER SERVICE CONNECTIONS

A. Provide connection to water main outside the building as shown on the drawings.

B. Provide sleeve in floor for entrance of service main into building, seal watertight; anchor service main firmly to building. See Section 200530 for sleeves and seals.

3.06 TESTING AND INSPECTION

A. All piping shall be tested, inspected, and approved by the local authority having jurisdiction prior to being concealed or covered.

B. Testing shall be witnessed by the plumbing inspector and the Architect/Engineer (at his option). Notify Architect/Engineer minimum 72 hours prior to date of testing, and mutually agreed upon times arranged.

C. Piping shall be hydrostatically tested for a period of 2 hours (or as required by local authority having jurisdiction), during which time no drop in pressure or leakage shall occur.

D. Test pressure shall be not less than 150 percent of the maximum to which the pipe will ordinarily be subjected; but in no case less than 75 psig.

E. Any leaks or defective piping disclosed by testing and inspection shall be repaired with new materials and the system re-tested.

F. Provide documentation to the Engineer indicating that the system has been completely pressure tested, and all portions inspected and accepted by the local authority having jurisdiction.

3.07 FLUSHING AND DISINFECTION

A. System Flushing: After tests are completed, all water piping shall be flushed. In general, sufficient water shall be used to produce a minimum water velocity of 2.5 feet per second through piping being flushed. Flushing shall be continued until discharge water shows no discoloration. System shall be drained at low points. Strainer screens shall be removed, cleaned, and replaced in line. System valves and fixture faucets shall be opened and re-closed to completely flush system. After flushing and cleaning, systems shall be prepared for disinfection service by immediately filling water piping with clean, fresh potable water. Any stoppage, discoloration, or other damage to the finish, furnishings, or parts of the building during this process shall be repaired by the Contractor.

B. Disinfection:

1. Upon completion of the job and prior to final acceptance, the plumbing system shall be disinfected with Chlorine solution. Review procedures and disinfection

with the authority having jurisdiction to insure that all work complies with code requirements. Verify any deviations from specified procedures with the Architect/Engineer prior to proceeding. The chlorinating material shall be either liquid chlorine conforming to AWWA B301 or hypochlorite conforming to AWWA B300 (or as otherwise required by the authority having jurisdiction). Water chlorination procedure shall be in accordance with AWWA M20 (or procedure acceptable to AHJ and to the Architect/Engineer). The chlorinating material shall provide a dosage of not less than 50 parts per million and shall be introduced into the system in an approved manner. The treated water shall be retained in the pipe long enough to destroy all non-spore-forming bacteria.

2. The retention time shall be at least 24 hours and shall produce not less than 10 ppm of chlorine at the extreme end of the system at the end of the retention period. All valves in the system being sterilized shall be opened and closed several times during the contact period. The system shall then be flushed with clean water until the residual chlorine is reduced to less than 1.0 ppm. During the flushing period all valves and faucets shall be opened and closed several times.

C. Bacteriological Tests: The Contractor shall employ an approved agency to take test samples at several points of the system (i.e. end of each wing, each floor of building, etc.) in properly sterilized containers and arrange with the Health Department (or a test agency acceptable to the Health Department) having jurisdiction to test the samples. Test for coliform and other items as required by the AHJ. Should the samples not test satisfactory, the system shall be re-flushed and disinfected again until satisfactory samples are obtained.

D. Submittal: Submit documentation stating that flushing and disinfection has been completed, copies of the bacteriological test results, and certification from the Health Department having jurisdiction stating that system has been found acceptable.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. Domestic Circulators

1.03 SUBMITTALS

A. General: All submittals shall comply with Section 200500.

B. Product Data: Provide product information and performance data for all pumps.

C. Performance Data: Submit performance data, including pump curves, showing pump performance as head vs. GPM, BHP and NPSH vs. GPM, with system operating point clearly marked. (NPSH vs. GPM not required for pumps 1 HP and less.)

1.04 QUALITY CONTROL

A. Manufacturer: Manufacturer shall be IS0-9001 approved.

B. General: Provide quality assurance checks specified in Section 200500 prior to ordering materials.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 200500, Paragraph 2.01, Acceptable Manufacturers.

B. Domestic Circulators and Wet Rotor Circulators: Bell & Gossett, Armstrong, Grundfos, Taco.

2.02 GENERAL

A. Balancing: All rotating parts shall have been statically and dynamically balanced at the factory.

B. Alignment: Pump and motors shall be factory aligned, and have alignment checked and reset once installed in place.

C. RPM: Pumps and motors shall operate at 1750 rpm unless indicated otherwise.

D. Pump Capacity: Shall be no less than the values listed on the Mechanical Equipment Schedule on the drawings.

E. Pump Types: The type of each pump is indicated on the Mechanical Equipment Schedule under the "Type" column, and corresponds to the types specified herein.

F. Motors: Shall comply with Section 200500. Motors shall be of sufficient size so as to be non-overloading at any point on the operating curve and shall be no smaller than the size shown on the drawings. Motors shall be of drip-proof construction (unless indicated otherwise), resilient mounted with oil lubricated journal or ball bearings, and have built-in thermal overload protectors. Motors shall be for use with the voltage and phase as scheduled on the drawings.

G. Domestic Water Applications: Pumps used on domestic water systems shall be of all-bronze construction, and NSF certified for domestic water use.

H. Testing: All pumps shall be factory tested per the Hydraulic Institute standards and be thoroughly cleaned.

I. Finish: Pumps shall have minimum one coat high grade machinery enamel finish, factory applied, manufacturer's standard color.

J. Nameplate: Pumps shall have stamped metal nameplates identifying: manufacturer, model number, capacity (gpm and head), and date of manufacturer.

2.03 DOMESTIC CIRCULATORS

A. Type: Centrifugal, single stage, close coupled, in-line pump for domestic water circulation. Bell & Gossett Series NBF-10S/LW (or approved).

B. Operating Range: Pump shall be rated for continuous operation at 150 psi working pressure and 225 deg F.

C. Construction: Bronze body, mechanical carbon/silicon carbide seal system, stainless steel face plate, and permanently lubricated sealed bearings.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install pumps at locations shown on the drawings and in accordance with manufacturers instructions. Locate for ease of access.

B. Connections: Decrease from line size to pump inlet size with long radius reducing elbows and minimum 5-pipe diameter straight pipe into pump. Where reducers (in the horizontal) are used on pumps, they shall be the eccentric type installed with taper on the bottom.

C. Provide suction diffusers where indicated on the plans.

D. Provide flexible connectors in piping to base mounted pumps.

E. Check motor alignment after pump installation, re-align as necessary.

F. Grout in base of base mounted pumps after pumps have been set.

G. Start-Up: Check pump operation to ensure that pump operates with correct sequence, that specified flows are provided and that no unused conditions exist (i.e.) motor overloading or pump cavitation. Notify the Architect/Engineer of any unusual conditions or performance other than as specified.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. Soil, Waste and Vent Piping

B. Condensate, Overflow, Miscellaneous Drains

C. Cleanouts

D. Testing and Inspection

E. Accessories

1.03 SUBMITTALS

A. General: Submittals shall comply with Section 200500.

B. Product Data: Submit product information on all items to be used.

1.04 REFERENCES

A. ASME B 16.4: Gray Iron Threaded Fittings.

B. ASME B 16.12: Cast Iron Threaded Drainage Fittings.

C. ASME B 16.15: Cast Bronze Threaded Fitting Classes 125 and 250.

D. ASME B 16.18: Cast Copper Alloy Solder Joint Pressure Fittings.

E. ASME B 16.22: Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

F. ASME B 16.23: Cast Copper Alloy Solder Drainage Fittings.

G. ASME B 16.29: Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings (DWV).

H. ASTM A 53: Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

I. ASTM A 74: Cast Iron Soil Pipe and Fittings.

J. ASTM A 888: Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

K. ASTM B 32: Solder Metal.

L. ASTM B 88: Seamless Copper Water Tube.

M. ASTM B 306: Copper Drainage Tube (DWV).

N. ASTM C 564: Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

O. ASTM C 1277: Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings.

P. ASTM D 1785: Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

Q. ASTM D 2321: Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.

R. ASTM D 2466: Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

S. ASTM D 2564: Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.

T. ASTM D 2665: Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.

U. ASTM D 2843: Density of Smoke from the Burning or Decomposition of Plastics.

V. ASTM D 3034: Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

W. ASTM D 3212: Joints for Drains and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

X. ASTM D 3311: Drain, Waste, and Vent (DWV) Plastic Fittings Patterns.

Y. CISPI 301: Hubless Iron Soil Pipe and Fittings for Sanitary and Drain, Waste, and Vent Piping Applications.

Z. CISPI 310: Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 200500, 2.01, Acceptable Manufacturers.

B. Pipe and Fittings: Mueller, Cerro, Tyler, Charlotte Pipe and Foundry, AB & I Foundry, Spears Manufacturing, Cresline Northwest.

C. No Hub Couplings: ANACO, Mission Rubber, Tyler, MG Coupling, Fernco, Clamp-All, Mifab.

D. Cleanouts: Josam, Zurn, J.R. Smith, Wade.

2.02 PIPE AND FITTINGS - MATERIALS

A. No-Hub Cast Iron Pipe and Fittings:

1. Pipe and Fittings: Service weight no-hub cast iron pipe and cast iron fittings, per CISPI 301 and ASTM A 888, for use with mechanical no-hub couplings.

2. Couplings: Per CISPI 310 or ASTM C 1277, with a cast iron or stainless shield, and neoprene gasket per ASTM C 564.

B. Hub and Spigot Cast Iron Pipe and Fittings: Service weight hub and spigot cast iron pipe and cast iron fittings per ASTM A 74, for use with compression gaskets. Gaskets shall conform to ASTM C 564.

C. Copper DWV Pipe and Fittings: Copper drainage tube per ASTM B 306. Wrought copper and wrought copper alloy solder joint fittings per ASME B 16.29; or cast copper alloy solder joint fittings per ASME B 16.23.

D. Galvanized Steel DWV Pipe and Fittings: Schedule 40 galvanized steel pipe per ASTM A 53, Grade B, Type 5. Cast iron drainage fittings, threaded, per ASME B 16.12; and cast iron screwed fittings per ASME B 16.4.

E. Copper Pipe and Fittings: Seamless copper water tube, tube L or M, per ASTM B 88. Solder joint wrought copper and bronze fittings per ASME B 16.22 cast copper alloy fittings per ASME B 16.18, and cast bronze threaded fittings per ASME B 16.15 with 95/5 tin-antimony solder per ASTM B 32.

F. PVC DWV Pipe and Fittings: Polyvinyl chloride drain pipe, solid wall pipe per ASTM D 1785 and ASTM D 2665 with solvent cement joints. Foam (i.e. cellular) core pipe NOT allowed. Polyvinyl chloride DWV fittings conforming to ASTM D 2665 or ASDTM F 1866, with solvent cement joints. Solvent cement shall comply with ASTM D 2564.

2.03 PIPE AND FITTINGS – APPLICATION

A. Waste and Vent Piping:

1. Piping 2-1/2 Inches and Smaller Located Above Ground: Galvanized steel DWV, no-hub cast iron, copper DWV, or PVC DWV.

2. Piping 3 Inches and Larger Located Above Ground and All Piping Located Below Ground: No-hub cast iron, bell and spigot cast iron, copper DWV, or PVC DWV.

B. Cooling Condensate Drains: Copper DWV, copper, PVC DWV, or PVC.

C. Miscellaneous Drains: Copper DWV, copper, PVC DWV, or PVC.

2.04 CLEANOUTS

A. General:

1. All cleanouts shall have cast iron bodies with bronze countersunk rectangular slotted plugs, lubricated with a non-hardening teflon base thread lubricant and having a gasket seal.

2. Cleanouts located in waterproof membrane floors shall be provided with an integral cast flange and flashing device.

3. All cleanouts shall be the same size as the pipe which they are intended to serve (but not larger than 4-inch).

4. Pipe fittings for cleanouts which turn through walls or up through floors shall use long sweep ells or a "Y" and 1/8 bend.

5. All cleanouts and access covers shall be provided with vandal proof screws.

B. Floor Cleanouts:

1. Areas With Floor Tile (or Linoleum): J.R. Smith No. 4140 Series adjustable floor cleanout with round heavy duty nickel bronze top with tile recess.

2. Areas With Bare Concrete Floors: J.R. Smith No. 4100 Series adjustable floor cleanout with round heavy duty nickel bronze top.

3. Areas With Terrazzo (and Similar Poured Floors): J.R. Smith No. 4180 Series adjustable floor level cleanout with round heavy duty nickel bronze top with terrazzo recess.

4. Areas With Carpet: J.R. Smith 4020-X Series adjustable floor level cleanout with round heavy duty nickel bronze top and carpet clamp.

C. Wall Cleanouts: Cast iron ferrule with cast bronze taper threaded plug, with plug tapped 1/4-inch, 20 thread, to accept access cover screw; with stainless steel access cover and vandal proof screw.

D. Outside Cleanouts: Heavy duty, round, cast iron, double-flanged housing, having scoriated cast iron cover with lifting device, ferrule and bronze closure plug. Housing and lid shall be galvanized and have vandal resistant screws. J.R. Smith No. 4251 or 4256 Series.

2.05 ACCESSORIES

A. Vent Flashing:

1. General: Style and type to suit roofing system, match vent pipe size, and provide waterproof building penetration. Provide with adequate base size for proper flashing into roof system.

2. EPDM or compression molded rubber; suitable for temperatures from -60 deg F to 270 deg F; resistant to ozone and UV light. Flashing shall have aluminum or galvanized steel base for flashing or attachment to roof (style to suit roof type). Provide stainless steel clamp.

3. 2.5 lb sheet lead, extending as a sleeve all around vent pipe with base extended out minimum 10 inches all around; top counter-flashing overlap 2" and turned down inside vent pipe.

PART 3 - EXECUTION

3.01 GENERAL

A. Installation of all items shall comply with code, best professional practices, manufacturers written installation instructions, and to allow for proper functioning of items being connected to.

B. Provide all piping as indicated and as required to allow complete and proper waste, drain, and vent connections to each fixture and equipment item requiring connection. Provide offsets as required to accommodate building construction and access requirements per

Section 200500. For multistory buildings include costs to offset vertical piping through each floor level since structural member locations will not be the same on each floor.

C. Coordinate installation of items with all trades that are affected by the work to avoid conflicts.

D. The work of this section shall include all waste (sanitary sewer), drain, and vent lines inside of the building and 5-feet outside of the building (unless indicated otherwise), to the point of and including connections to outside sanitary sewer lines or sanitary sewer manholes.

E. Consult manufacturers data and architectural drawings for information on plumbing fixtures before beginning rough-in.

F. Verify points of connection, invert elevations, and grade requirements before beginning installation or ordering materials.

G. Stub all piping for all items requiring connections through wall or floor; cap and protect until connection to items is complete.

H. Vents extending through roof shall terminate at least 10 inches above roofing; and not less than 10 feet from and 3 feet above any building opening. Provide vent flashing at each vent through roof; utilize water-proof method as required to best suit roofing material and roofing system manufacturer.

I. Trap all fixtures and equipment items as required by governing code; provide proper venting for each trap.

J. Provide drain piping for all drip pans, unit condensate drains, unit P-traps, etc. Run piping to nearest point of drainage, or as shown on drawings. Where routing is not shown, route to nearest point of proper drainage.

K. All excavation, trenching and backfilling shall comply with code and pipe manufacturers recommendations. Below ground plastic pipe installation shall comply with ASTM D 2321 and shall exceed those standards as specified.

3.02 PIPE AND FITTINGS

A. All piping in finished areas shall be installed concealed unless specifically noted otherwise.

B. Install piping so as not to obstruct access to any items requiring routine service, maintenance, or inspection. Offset or reroute piping as required to clear any interferences which may occur. Prior to running any piping, confirm with Architect/Engineer (unless is clearly noted to be ran exposed). Install exposed piping so as not to obstruct any portion of windows, doors, doorways, passageways, or items requiring service or access.

C. Consult all drawings for location of pipe spaces, ducts, electrical equipment, structural elements, ceiling heights, door items requiring access, openings, window openings, and other details and report discrepancies or possible conflicts to Architect/Engineer before installing pipe.

D. Install all horizontal soil or waste lines with a slope of 1/4-inch per foot unless noted otherwise. Coordinate with AHJ if written approval is required for exceptions to 1/4-inch

per foot slope.

E. Make all changes of direction and junctions with Y fittings and 1/8 bends; use sanitary tee fittings in vertical pipe only.

F. Provide escutcheons where exposed pipe passes through walls, floors, or ceilings.

G. Install all piping parallel to the closest wall and in a neat, workmanlike manner. Horizontal straight runs of piping shall not deviate from straight by more than 1/4-inch in ten feet. Vertical piping shall not deviate from plumb by more than 1/8-inch in ten feet.

H. Do not run any piping above electrical panels (and similar electrical equipment). Provide offsets around such panels as necessary. Such offsets are typically not shown on the plans, but are required per this paragraph.

I. Prior to the joining of any section of pipe to a pipe run, the section shall be thoroughly cleaned inside and out, the ends shall be reamed to remove any cutting burrs and piping prepared as recommended by piping and fitting manufacturer.

J. Threaded Connections: Cut piping carefully, ream, thread and work into place without springing. Use TFE tape or lead and graphite lubricant (on male threads only).

K. Soldered Connections: Polish contact surfaces of fittings and pipes with emery cloth before fluxing male and female surfaces of joints. Steel wool and sandpaper not permitted for polishing.

L. PVC Pipe:

1. Solvent Joints: The outside of the PVC pipe shall be chamfered to a minimum of 1/16-inch at approximately 22 degrees. Chemicals used must penetrate the surface of both pipe and fitting which will result in complete fusion at the joint. Use solvent and cement only as recommended by the pipe manufacturer.

2. Plastic to Metal Connections: Work the metal connection first. Use a non-hardening compound on threaded connections. Use only light wrench pressure. Connections between metal and plastic are to be threaded utilizing female threaded adapters only, not male adapters.

3.03 INSTALLATION OF CLEANOUTS

A. General: Install cleanouts in all soil and waste piping:

1. As shown on drawings.

2. At no more than 100 foot intervals on horizontal runs (whether shown on drawings or not).

3. At the end of all piping runs.

4. At the base of all vertical risers.

5. At all changes of direction for a run of 10 feet or over.

6. Where needed to correct possible stoppage.

7. As required by Code.

B. Elevations:

1. Floor cleanouts shall be installed so as to be flush with the finished floor; where recessed cleanout covers are used the recess shall be filled flush with material to match the surrounding finished floor.

2. Wall cleanouts in finished areas shall all be installed at the same height for a uniform appearance throughout the facility. Heights shall be selected so as not to interfere with base molding or other trim work; verify with other trades.

C. Clearances and Access: Install cleanouts so as to assure proper clearances as required by governing code. Where cleanouts occur in concealed spaces provided extensions to floors above or to walls to allow access. Provide wall access covers or access doors for all wall cleanouts. See Section 200519 for access doors.

D. Outside Building: All cleanouts located outside shall be provided with an access housing located in a 24" x 24" x 6" thick concrete pad, flush with (or up to 1/4” above) the adjacent finished grade. The pipe and cleanout shall be independent of this access housing and pad.

3.04 TESTING AND INSPECTION

A. All piping shall be tested, inspected and approved prior to being concealed or covered.

B. Testing shall be by water or air, and comply with code.

C. Testing shall be witnessed by the code official, the Owner’s representative (at their option), and the Engineer (at their option). Prior to beginning testing confirm with the Owner and Engineer their level of involvement in the testing process and extent of witnessing; where they will be witnessing the testing notify them at least 72 hours in advance of the test and confirm their availability; coordinate and reschedule as necessary and arrange mutually agreed upon times for the tests and witnessing to occur.

D. Water Testing:

1. Fill system with water so that there is no less than 10 feet of head above the highest system section being tested.

2. System shall hold pressure for a period of at least 15 minutes with no leakage before the inspection starts.

3. The system shall be inspected and shall hold tight with no leakage at all points.

E. Air Testing:

1. Pressurize system with air so that there is no less than 5 psig of air pressure in the system.

2. System shall hold pressure for a period of at least 15 minutes without the introduction of additional air before the inspection starts.

3. The system shall be inspected and shall hold tight with no leakage at all points.

F. All leaks shall be eliminated and the system re-tested before proceeding with work or concealing pipe.

G. All repairs to piping shall be with new material and no caulking of screwed joints or holes is allowed.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. Water Heaters

1.03 REFERENCES

A. Boiler Code: State of Washington Boilers and Unfired Pressure Vessel Laws, Chapter 70.79 RCW, Chapter 296-104 WAC.

B. NSF 61: Drinking Water System Components – Health Effects.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's product data for all items to be used.

B. Manufacturer's Instructions: Submit manufacturer's installation instructions for water heaters.

1.05 GENERAL REQUIREMENTS

A. NSF: Manufacturers shall fabricate and label equipment components that will be in contact with potable water per NSF 61.

B. Quality Assurance: Provide quality assurance checks specified in Section 200500 prior to ordering products.

C. Code Compliance: Water heater efficiency and insulation levels shall comply with code. Provide water heater with accessories (i.e. heat traps, relief valves, etc.) as required by code.

D. Temperature Settings: Water heaters shall be able to be set at a leaving (or system) water temperature over a range. Low setting shall be at least 90 degrees F or 10 degrees F lower than the system water temperature indicated on the plans (whichever is lower). High setting shall be at least 10 degrees higher than the system water temperature indicated on the plans.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 200500, Paragraph 2.01, Acceptable Manufacturers.

B. Water Heaters – Tank Type: A.O. Smith, Rheem, Bradford-White, State, PVI.

2.02 WATER HEATERS

A. Type: Tank type electric water heater, constructed in accordance with ASME code, UL listed, and NSF approved. A.O. Smith DRE series (or approved).

B. Capacity: Shall have capacity as indicated on the drawings.

C. Tank and Insulation: Tank shall be of steel construction, constructed and stamped in accordance with ASME code for a minimum working pressure of 125 psi at maximum water heater operating temperature. All internal tank surfaces shall be glass coated; glass coating shall be an alkaline borosilicate composition, fused to tank by firing at a high temperature. Tank shall be insulated with foam to comply with local code requirements and no less than ASHRAE 90.1 (latest edition) for insulating rating and tank heat loss. Tank and insulation shall be fully enclosed within a steel enclosure having a baked on enamel finish and hinged access door to access unit controls and wiring.

D. Cathodic Protection: Tank shall be cathodically protected with an extruded magnesium rod, full size of unit, selected by manufacture to suit typical water conditions at the installation general location and adequate to last the tank warranty period. Rod shall be removable through top of tank.

E. Immersion Heaters: Minimum of three elements per immersion heater, incoloy sheathed, flange mounted and with factory wired terminal leads.

F. Accessories: Water heater shall have brass drain valve with 3/4-inch hose thread male outlet and an ASME rated pressure and temperature relief valve.

G. Electrical and Controls: Water heater shall be rated for use with electrical power of the voltage and phase as scheduled. Water heater shall have necessary contactors, controls, and safeties to control water heater temperature to within 5 degrees of value set. Contactors shall be magnetic type, rated for minimum 100,000 cycles. Unit shall have element fusing as required by local code and the NEC. Water heater control circuit shall be 120 or 24 volt, and unit shall have an integral control circuit transformer with fusing. Thermostat shall be the immersion type, shall control water heater temperature and be able to be set over a range. Water heater shall have a manual reset high limit to stop water heater operation at a high unsafe temperature. All wiring shall be color coded and labeled for ease of service.

H. Warranty: Tank shall be warranted to be free from defects for three years.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Comply with Section 200500. In accordance with manufacturer's written installation instructions, code, applicable standards, and best construction practices.

B. Coordination: Coordinate the work with all trades that may be affected by the work to avoid conflicts and to allow for an organized and efficient installation of all systems.

C. Connections: Connect and install all items shipped loose with equipment and as needed for proper system operation. Provide and connect all utilities and services to equipment as required for proper equipment and system operation.

D. Protection, Operation and Maintenance: Comply with Section 200500. Protect water heaters against use and damage during construction; provide guards and/or boxing as

required.

E. Relief Valves: Pipe all pressure relief valves to proper point of drainage.

F. Vacuum Breakers: Provide vacuum breakers on water heaters where water heaters serve fixtures located below the water heater height.

G. Clearances: Provide as required for maintenance or as required by Code; whichever is greater. Water heater sizes exceeding any of the following shall have minimum 18" clearance all around (or as required by Boiler Code for boilers; whichever is greater): 120 gallons, 160 psi, or 200,000 BTU/hr input.

H. Anchorage: Provide seismic strapping and anchorage of water heater to building structure.

I. Inspection: Inspect water heaters and connecting systems to confirm water heaters and system are ready for start-up and operation. As a minimum, check for: proper voltage and phase, correct gas pressure and regulator setting (for gas fired units), correct electrical connections, complete control connections, relief valve correctly sized and discharge piped, drain provisions installed, valving to water heater accessible and ready to be set in operating positions, and other items as listed by the manufacturer are properly provided and connected.

J. Start-Up and Adjustment: Put water heater into service following manufacturer start-up procedures. Adjust water heaters for proper operation; set thermostats for required supply temperature. Check operation of water heater by flowing water and confirming proper operation.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. Plumbing Fixtures and Trim

B. Installation/Connection of Equipment Specified Elsewhere

C. Adjustment and Cleaning

1.03 DEFINITIONS

A. "Plumbing Brass" means "P-traps, stops, strainers, tailpieces, flanges, and other brass fittings and accessories NOT including faucets or stops."

B. "Trim" includes all plumbing brass items, faucets, and any fixture accessories.

C. "Accessible" refers to the American's with Disabilities Act, and infers that these fixtures will meet Federal and local code requirements.

D. "Lead-Free" means not containing more than 0.2% lead in solder and flux; and not more than a weighted average of 0.25% lead in wetted surfaces of pipes, pipe and plumbing fittings and fixtures.

1.04 REFERENCES

A. UPC: Uniform Plumbing Code.

B. NSF/ANSI Standard 61: Drinking Water System Components – Health Effects.

1.05 SUBMITTALS

A. General: All submittals shall comply with Section 200500.

B. Product Data: Submit product data for all plumbing fixtures, plumbing trim, and water heaters.

C. Mounting Heights: Submit list of mounting heights to be used for all fixtures.

D. ADA Accessibility: Submit list (or plans) of which fixtures will be ADA accessible; indicated by room number and location; indicate how accessibility is achieved (i.e. side approach) where not readily obvious.

1.06 GENERAL REQUIREMENTS

A. Fixture Quality: Provide new fixtures and fittings, approved, free from flaws and blemishes with finished surfaces clear, smooth and bright. Visible parts of fixture brass and accessories, and all items located in accessible cabinet spaces, shall be heavily

chrome plated. All stops, P-traps and items exposed to view shall be chrome plated (except where specifically noted otherwise).

B. Code Compliance: All products and connections shall be in compliance with code, local Utilities Department standards, and Health Department requirements.

C. Off-The-Floor Mounted Fixtures - Movement:

1. General: Off-the-floor (i.e. wall) mounted fixtures shall be supported, anchored, and braced in a manner so that the fixture does not move more than the values indicated below with the imposed forces as indicated; nor shall the fixture or associated fittings leak or suffer damage of any kind. Deflection shall be measured at the front most part of the fixture (i.e. the point on the fixture furthest away from the wall containing the fixture supports), with the load imposed at the same location as the measured deflection. Deflection shall not be exceeded in any direction with the force imposed in any direction.

2. Water Closets: 1/16-inch with a 300 pound force.

3. Other Fixtures: 1/16-inch with a 150 pound force.

D. Spare Parts: Provide two spare stop valves.

1.07 QUALITY ASSURANCE

A. General: Provide quality assurance checks specified in Section 200500 prior to submitting product data. By submitting products for Engineer's review, the Contractor is confirming that such checks have been performed and that the products are suitable for the intended installation and use.

B. Fixtures:

1. Types: Verify specified fixture types with the Architectural and Plumbing drawings to confirm the requirements are consistent (e.g. fixtures are wall mounted versus floor mounted type, locations of ADA fixtures match, etc.). Where conflicts occur clearly identify the issue on the fixture submittal along with a proposed resolution; or resolve prior to making the submittal by the project RFI process.

2. Space Verification: Prior to ordering any fixtures or making submittals, Contractor shall check the drawings and verify that all fixtures will fit the space available (i.e. fixtures fit any cabinets fixtures are to be installed in; fixtures have adequate access clearances for proper use; etc.).

C. Lead-Free Requirement: All items in contact with potable water shall be lead free. Fixtures used to dispense potable water for drinking shall meet the requirements of NSF/ANSI 61.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 200500, Paragraph 2.01, Acceptable Manufacturers.

B. Water Closets: Kohler, American Standard, Eljer, Mansfield.

C. Vitreous china (other than water closets) and enameled cast iron fixtures: American Standard; Kohler, Eljer, Mansfield.

D. Water Closet Seats: Church; Beneke; Olsonite; Kohler; Bemis.

E. Carriers: Josam; J.R. Smith; Wade; Zurn.

F. Stainless Steel Sinks: Just; Elkay, Franke.

G. Service Sinks: Fiat; Stern and Williams; Swan; Kohler; Mustee.

H. Drinking Fountains: Haws; Elkay.

I. Hydrants and Hose Bibbs: J.R. Smith; Zurn; Josam; Mifab.

J. Floor Drains and Floor Receptors: J.R. Smith; Zurn; Josam; Mifab.

K. Plumbing Brass: American Standard; Brasscraft; Chicago Faucet; Crane; Eljer; Frost; Kohler; Speakman; Symmons; T & S Brass; McGuire; Elkay.

L. Faucets: Chicago Faucet; T&S Brass; Speakman; Kohler; American Standard; Delta; Grohe; Moen.

M. Stops: Brasscraft, ProFlo.

N. Flush Valves: Sloan, Zurn.

O. Hot Water Temperature Limiting Valve: Symmons, Watts, Chicago Faucet, Acorn Controls, Leonard, Cash Acme.

2.02 PLUMBING FIXTURES

A. General:

1. Plumbing Fixtures are listed below by reference numbers, corresponding to the reference number adjoining these items on the drawings.

2. All vitreous china and enameled cast iron fixtures shall be finished white unless specifically noted otherwise.

3. All stainless steel sinks shall be sound deadened, and shall have faucet ledge (except where noted specifically without ledge).

4. In interests of Owner's Standardization, fixtures of similar type shall be product of one manufacturer; trim of similar type shall be product of one manufacturer.

B. Water Closets:

P-1A Water Closet - Floor Mount - ADA:

Water Closet: Kohler “Highcliff”, No. K-96057, vitreous china, elongated bowl, floor mounted, siphon jet action bowl with 1-1/2" top spud, and 1.28 gallon flush.

Flush Valve: Sloan "Ecos" 8111-1.28 chrome-plated low consumption sensor operated flush valve with vacuum breaker, quiet-action, and screw driver stop.

Seat: Kohler “Lustra”, No. K-4670-SC, white plastic elongated seat, open-front and stainless steel self-sustaining check hinge.

ADA: Configure and install for ADA access. Verify with Architectural drawings for mounting heights and off-center stall dimensions. Provide with flush valve so that handle is on wide side of stall.

P-1B Water Closet - Wall Hung:

Same as P-1A fixture, except that fixture shall be mounted for normal use.

C. Lavatories:

P-3A Lavatory - Wall Hung - ADA:

Lavatory: Kohler “Greenwich”, No. K-2032, 20" x 18", vitreous china lavatory with 4" faucet centers, for use with concealed arm carrier.

Plumbing Brass: Kohler No. K-7129 lavatory drain with perforated grate and 1-1/4" tailpiece; Kohler No. 9000 1-1/4" cast brass "P" trap with cleanout; stops and risers per “Specialties” in this specification section.

Faucet: Chicago Faucet No. 802-VE2805-336 metering faucet with No. 336 push tilt handles, 4” centers, 1/2 GPM spout outlet/aerator, adjustable self-closing cartridge, 4" spout.

Cover: TrueBro Series 2018 ADA-compliant, high-impact, UV-protected vinyl cover, custom factory pre-cut to fit lavatory.

P-3B Lavatory - Wall Hung:

Same as P-3A fixture, except that fixture shall be mounted for normal use.

D. Sinks:

P-5A Sink - Double Compartment:

Sink: Elkay multi-hole drill, 18 gauge, type 304 stainless steel, 22" front to back x 33" left to right x 5-1/2" deep double compartment self-rimming sink with rear faucet ledge.

Plumbing Brass: Elkay stainless steel cup strainers with 1-1/2" stainless steel tailpieces and 1-1/2" cast brass "P" traps each with a cleanout. For stops and risers see “Specialties” in this specification section.

Faucet: Chicago Faucet No. 1102-E35ABCP top mount sink faucet on 8" centers, with No. 1000 handles, 8” L-Type swing spout, Quaturn cartridges, and pressure compensating aerator.

E. Service Sinks:

P-6A Service Sink - Floor Mount:

Sink: Swan No. MS-2424 molded fiberglass sink basin, 24" x 24" x 10" high, color white, with minimum 30" long heavy duty reinforced 5/8" diameter flexible hose for connection to 3/4" hose thread, spring loaded stainless steel hose bracket, vinyl rim guards.

Plumbing Brass: Combination dome strainer and lint bucket of minimum 16 gauge 302 stainless steel, with stainless steel screws and 3" drain connection.

Faucet: Chicago Faucet No. 897-RCF combination service sink fitting with 3/4" hose thread on spout, No. 369 handles, wall brace, pail hook, No. R-1/2" flanged female adjustable arms, integral stops, ceramic cartridges, polished chrome-plated.

F. Water Dispensers:

P-7A Hot Water Dispenser:

In-Sink-Erator No. H990 hot water maker, 60 cups/hour at 190 degrees F. capacity, adjustable 160 to 200 degrees F., 0.65 gallon tank, 750 watts, 120 volt/1 phase, vented tank, for use with 3 prong plug. Mount adjacent to sink through counter.

P-7B Food Disposer:

In-Sink-Erator Contractor 333 food disposer. Stainless steel grinding components and swivel lugs, insulated outer shell for noise reduction. Connection to standard sink outlet, complete with dishwasher drain inlet, dishwasher connector kit, and self-service wrench. 3/4 horsepower, 120 volt/1 phase.

P-12B Refrigerator Box:

Guy Gray Model BIM875 stainless steel rough-in box with angle valve (1/2-inch inlet, 1/4-inch compression outlet).

G. Drinking Fountains/Bottle Fillers:

P-8A Drinking Fountain - Dual - ADA:

Haws Model No. 1119.14 barrier-free dual drinking fountain, rounded corners, stainless steel type 304 14 gauge construction, with #4 satin finish, front push button operation, one-piece chrome-plated anti-squirt bubbler, anti-splash ridge, cabinet located automatic stream height regulator screwdriver stop, waste strainer, and 1-1/4" O.D. tailpiece. Unit shall comply with Washington State Handicap Access Regulations. Provide with mounting plate and supporting wall carrier No. 6800.

H. Hydrants and Hose Bibbs:

P-10A Wall Hydrant - Non-Freeze:

J.R. Smith No. 5519 recessed box type wall hydrant, non-freeze type, with polished bronze box and bronze hinged cover, bronze hydrant and casing, integral vacuum breaker, "T" handle key and 3/4" inlet, 3/4" hose outlet, and overall depth to suit wall thickness and provide suitable freeze protection.

I. Floor Drains:

P-11C Floor Receptor:

J.R. Smith Figure 3100 series, enamel coated floor receptor, 10" deep, with 12" square nickel bronze half grate and rim, sediment bucket, trap primer connection, vandal-proof screws. Size outlet to match pipe size noted on drawings.

2.03 OFF-THE-FLOOR FIXTURE SUPPORTS (CARRIERS)

A. General: Type to suit fixture and building construction, with added anchors, bracing, wall backing and accessories to comply with maximum specified fixture movement. Concealed in wall. Provide with all hardware and accessories for proper fixture support to suit the application. See Section 200529 for hangers and supports.

B. Lavatories: Steel construction, with 1-inch x 3-inch rectangular steel uprights welded to 4-inch square steel base plates for floor anchoring, and arms for lavatory support. J.R. Smith Figure 700 and 710 with added anchors, bracing, wall backing and accessories to comply with maximum specified fixture movement.

C. Other Fixtures: Manufacturers' standard carrier to suite fixture and application, steel construction with anchors, bracing, wall backing and accessories to comply with maximum specified fixture movement.

D. Non-Standard Fixtures: For fixtures that standard carriers are not manufactured for provide 3/16" thick steel back plate for block walls and wood stud walls; or a 2" x 2" x 1/4" angle welded to at least four studs for metal stud walls, with through bolts and fasteners to support fixture and comply with maximum specified fixture movement.

2.04 SPECIALTIES

A. General: Unless indicated otherwise, the following fittings and materials (i.e. specialties) shall be used.

B. Fixture Traps: 17 gage seamless chrome plated cast brass tubing, with 2 inch minimum seal, and cleanout, size as required by Uniform Plumbing Code (unless a larger size is indicated), and configured to suit the application.

C. Exposed Piping and Fittings: In finished areas and in accessible cabinets, provide piping with chrome plating or sleeved with chromed sleeves or of stainless steel construction/finish; all chrome to have a bright polished finish. No exposed copper allowed (includes accessible cabinet areas).

D. Stops: Quarter turn ball valve with loose key, size as required.

E. Risers: Flexible braided steel type; rated for 125 psig.

F. Escutcheons: See Section 200519.

G. Wall Box: 20 gauge hot dipped galvanized steel box with 18 gauge face plate, 1/2" inlet x 1/4" outlet compression angle valve. Guy Gray Model BIM875.

H. Hot Water Temperature Limiting Valve: Thermostatic water temperature mixing valve with integral checks, complying with ASSE 1070 and UPC Chapter 4. Brass body with brass and stainless steel internal components. Leonard "ECO-Mix" 270 / Symmons "Maxline" Model 5-210.

I. Sealant: See Section 200530. Sealant at fixtures shall be the silicone type, color to match fixture.

PART 3 - EXECUTION

3.01 INSTALLATION OF FIXTURES

A. General: All fixtures shall be completely connected to piping as needed to make a complete and operable installation.

B. Fixture Locations: Mounting heights and locations of fixtures shall be as shown on the Architectural drawings and in accordance with Contract Document requirements. Locations shall be verified and coordinated with the various trades affected by the installation of these fixtures. When none indicated or shown, obtain mounting location and heights from the Architect/Engineer prior to installation. Floor drains shall be installed in proper locations and coordinated with floor slopes so that drains are set at low points to allow for floor drainage. Floor receptors (or floor sinks) shall be set flush with floors to allow drains to serve as both indirect drain receptors and as floor drains (unless noted otherwise or required to be elevated by code).

C. Rough-In: Determine rough-in location of fixture utilities to suit fixture location, fixture dimensions, elements of construction (i.e. beams, studs, electrical, ducts, etc.), access requirements, casework dimensions, items which may drain/connect to fixture, use of fixture, and related considerations. The fixture rough-in locations indicated on the plans is schematic, and is not to be used for final rough-in purposes. Coordinate fixture locations with other systems so that either conflicting items are relocated or fixture locations are adjusted to suit.

D. Offsets: Provide offsets in piping to fixtures to accommodate building systems. Such offsets shall include off-setting waste piping into cabinet bases (in kick space where possible) to accommodate beams located directly below walls behind fixtures.

E. Carriers: All off-the-floor (i.e. wall) mounted fixtures shall be installed with supporting carriers and additional anchors, bracing and supports to transmit fixture loads to the floor and building structure without exceeding the maximum specified fixture movement. Prior to concealing carrier and associated supports review adequacy of support system with Architect/Engineer.

F. Fixture Sealant: Where fixtures abut to walls, floors, and cabinets seal all joints with a uniform fillet bead of sealant. Provide at other locations as recommended by fixture manufacturer.

G. Protection: Protect fixtures against use and damage until project substantial completion; provide guards and/or boxing to protect.

3.02 INSTALLATION OF SPECIALTIES

A. Escutcheons: Provide escutcheons at each point where an exposed pipe or other fitting passes through walls, floors, backs of cabinets, or ceilings.

B. Stops: Provide stops in water connections to all fixtures/equipment, except where a stop valve is integral to the fixture (e.g. flush valves) and in water connections to all items not served by another valve.

C. Hot Water Temperature Limiting Valve: Install on all lavatories, bathtubs, showers, whirlpools, bidets and as fixtures required by Code (reference UPC Chapter 4); set for 115 deg F maximum delivery temperature. Test and adjust for proper operation and submit written report documenting work performed.

3.03 INSTALLATION OF EQUIPMENT SPECIFIED ELSEWHERE

A. General: Refer to the drawing schedules, architectural specifications and related information in the Contract Documents. Under this section of the specifications provide and install and/or connect all plumbing services indicated to be by Mechanical (M), Plumbing (P), or by Divisions 20, 22, or 23.

B. Installation: Comply with installation requirements for fixtures and specialties per this specification Section.

C. Complete Connections: Provide all water supply stops and appurtenances necessary to make a complete installation of items. All lines between the stops and fixtures/equipment shall be hard piped, chrome plated and sized as indicated (or, where not sized, size per the UPC or manufacturer).

D. Exposed: All waste, drain, indirect drain, and traps exposed to view shall be chrome plated or sleeved with chromed sleeves.

3.04 ADJUSTMENT AND CLEANING

A. Cleaning: After completion of installation remove all labels and thoroughly clean all fixtures, trim and fittings.

B. Adjustment: Adjust all flush valves, fixture stops, faucets, valves, and associated plumbing items as necessary for the proper operation of all fixtures and equipment.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. Control System Design

B. Control System for Building Heating, Ventilation, Air Conditioning, Exhaust

C. Control Devices, Components, and Wiring

D. Testing, Adjustment, and Commissioning

E. Owner Training

1.03 SUBMITTALS

A. General: Shall comply with Section 200500.

B. Product Data: Submit product information on all items to be used.

C. Shop Drawings: Submit a complete set of shop drawings prior to installation containing the following information: interconnect drawings showing all wiring and control connections; control panel details; arrangement of devices in panels; schedule of dampers with sizes and where used; sequence of operation for all equipment; location of all control devices on scaled building plans; and list of actuators with sizes and where used.

D. Labeling: Submit list of proposed component labeling.

E. Operation and Maintenance Manuals: See Section 200200. In addition to the information required by that Section and Division 01, provide (for inclusion in the Manual) the following:

1. System description.

2. Complete sequence of operation.

3. Reduced size (11" x 17") copies of record drawings.

4. Submittal data on all products.

1.04 GENERAL REQUIREMENTS

A. Design and Installation: The entire control system shall be designed and installed by skilled control system designers, electricians and mechanics, all of whom are properly trained and qualified for the work they perform.

B. Sole Responsibility: One single Contractor shall be responsible to design, furnish and install the complete Section 230933 control system.

C. Sequence: System shall have sequence of operation as specified in Section 230993.

1.05 WARRANTY

A. Warranty: After completion of the installation of the control system and acceptance by the Owner, the system shall be warranted as free against defects in manufacturing, workmanship and materials for a period of two years from date of substantial completion. In addition, the system shall be warranted to provide the sequence of operation and basic features specified, with the accuracy and flexibility also specified. The system shall be repaired or replaced, including materials and labor, if in Owner's and Engineer's reasonable opinion, system is other than as warranted.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 200500, Acceptable Manufacturers.

B. Actuators: Belimo, Honeywell, Siemens, Johnson Controls.

C. Dampers: Ruskin, Greenheck.

D. Control Accessories: Idec, Hoffman, McDonnell, Tridelta, Edwards, Mamac, Penn, Belimo, Honeywell, Johnson Controls, Leviton, Arrow-Hart, Alerton.

2.02 BASIC SYSTEM

A. System Type: The system shall be an electronic or electric type.

2.03 CONTROL DAMPERS

A. Type: Dampers shall be parallel blade or opposed blade type, as selected by contractor to best suit application (unless a specific type is indicated).

B. Leakage: Class 1A leakage rated in accordance with AMCA 511 (or better, as required by Code).

C. Construction: Construct of galvanized steel, except where installed in ducts of stainless steel or aluminum construction or handling corrosive air, shall be of stainless steel or aluminum construction (to match duct material). All materials in contact with the airstream shall be suitable for the conditions without deterioration. Provide special coatings as necessary to provide corrosion resistance. Frame shall be minimum 16 gauge.

D. Blades: Single blade type, not exceeding 6 inches in width,16 gauge, with neoprene, extruded vinyl or butyl rubber edge seals and flexible metal jamb seals; linkage interconnecting all blades and actuator axle.

E. Bearings: Nylon, molded synthetic or oil impregnated sintered metal bearings (or other materials as conditions require).

2.04 ACTUATORS

A. Type: Actuators shall be a brushless DC motor type controlled by a microprocessor.

B. Operation: Shall be compatible with control devices used with to provide specified sequence and system features. Run time shall be constant, independent of torque. Actuator shall have manual positioning mechanism and control direction of rotation switch accessible on its cover. Provide with auxiliary switches as required for sequence of operation. Actuator shall be proportional or two position type, as required for application.

C. Sizing: Provide actuator with sufficient power and torque to suit items being controlled and allow proper operation against system pressures liable to be encountered. Actuator shall be capable of driving controlled items from full closed to full open in less than 15 seconds.

D. Spring Return: All actuators shall spring return upon power interruption: The spring return position shall be a “fail safe" position as dictated by freeze, fire, temperature protection, energy saving, or safe operating requirements. Outside air dampers shall spring return closed; return air dampers shall spring return open. VAV terminal units and zone dampers do not require spring return actuators.

E. Accessories: Units shall be complete with all linkages, brackets, and hardware required for mounting and to allow for proper control and operation.

2.05 SWITCHES

A. Air Flow Switches: General Purpose utilizing differential air pressure, SPDT snap-acting contacts, adjustable range to suit application, neoprene diaphragm, all aluminum construction.

2.06 ACCESSORIES

A. Wiring and Conduit: Shall comply with Division 26 specifications and with code. Wiring that performs code required life safety shutdown of equipment or fire alarm interface shall comply with NFPA standards and local codes for fire alarm system wiring.

B. Control Cabinet: Wall mounted, NEMA construction type to suit application, minimum 14 gauge sheet metal, hinged front door with latch. Size as required to house controls.

C. Relays: Shall be rated for the application, with a minimum of two sets of Form C contacts, enclosed in a dust-proof enclosure. Relays shall have Hand-Off-Auto switch, and LED’s (or pilot lights) to indicate the energized mode. Relays shall be rated for a minimum life of one million cycles. Operating time shall be 20 milliseconds or less, with release time of 10 milliseconds or less. Relays should be equipped with coil transient suppression devices to limit transients to 150% of rated coil voltage. Contact rating, and configuration selected to suit application.

D. Miscellaneous Components/Sensors/Transmitters/Transformers: Shall be manufacturer's standard, designed for application in commercial building HVAC control systems, compatible with other components so as to provide sequence of operation specified.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Provide all devices, sensors, relays, switches, dampers, actuators, conduit, tubing, wiring, motor starters and all other devices required to provide a complete integrated control system with the sequence of operation and features as specified. It is the Contractor's responsibility to coordinate with other trades for the installation of control devices in systems installed by others.

B. Installation: Install all control components in accordance with manufacturer's instructions and recommendations and best professional practices.

C. Coordination: Coordinate work with other trades to ensure that all trades have the information necessary so that they may properly install any necessary control components, interconnect with control components, and install their work to accommodate controls. Identify all items requiring ceiling or wall access doors (or other special requirements) to trade installing access doors or performing related work.

D. Space Requirements and Locations: Carefully check space requirements and coordinate with other trades to ensure that items can be installed in the allotted spaces, including above finished suspended ceilings. Adjust locations of panels, equipment, devices, and the like, to accommodate work and prevent interferences. Determine the exact route and location of wiring, conduit and other control devices prior to beginning work.

E. Mounting: Mount controls adjacent to associated equipment on vibration free elements on free standing fabricated supports; mount and locate for best access.

F. Control Cabinets: All electrical devices, relays, and components shall be installed in protective covers (i.e. control cabinets), except where installed concealed above ceilings a cover is not required. Controls/devices shall be logically assembled in cabinet, with all devices and cabinet labeled.

G. Power: It shall be the responsibility of this Contractor to provide power for all control devices requiring power. Coordinate with the Division 26 Contractor to arrange for necessary power circuits. All control devices shall obtain power from circuits dedicated to control power.

H. Wiring, Conduit and Electrical:

1. General: Provide all electrical wiring and devices in accordance with applicable codes and Division 26 requirements.

2. Conduit: All wiring shall be installed in conduit and in accordance with Division 26 specifications, except that low voltage wiring within ceiling plenum spaces, mechanical mezzanines, and attics may be installed without conduit. Wiring in walls shall be in conduit.

3. Wire Labeling: Label or code wiring at each end to show location of the opposite end. Each point of all field terminal strips shall be permanently labeled or coded to show the instrument of item served. Color coded cable with cable diagrams may be used to accomplish cable identification and terminal strip.

4. Service Loop: Provide minimum of 6" extra wiring at all wiring terminations for ease of future maintenance/servicing. Such extra wiring shall be neatly coiled/bundled to allow for uncoiling when the connected equipment is serviced.

5. Workmanship: Install all conduit and wiring parallel to building lines, in neat bundles, supported at not less than 5 foot intervals.

I. Component Labeling: All control components, except regular room thermostats, shall be equipped with name plates to identify each control component. Components in finished rooms shall be labeled as to generic item controlled for better user understanding; other devices shall be labeled with the same designation which appears on the Control Diagrams. Contractor shall submit list of proposed labeling prior to installing. Reference Section 200500.

J. Motor Starters: Shall be by Division 26; except for loads 1/2 hp and less which shall be by this Section.

K. Device Duct Installation: All control devices installed in ductwork shall be positively anchored and attached to the ductwork by mechanical means (fasteners, straps, unistrut, etc).

L. Miscellaneous Controls: Provide all miscellaneous control items as noted in the Contract Documents. Provide all necessary control wiring between items for proper control.

3.02 INSTALLER COMMISSIONING

A. Commissioning:

1. General: Check all system connections and control components for proper installation. Provide testing of the control system to verify proper system operation and that the specified sequences of operation are provided. Commissioning shall include checking system under all modes of operation, documenting system performance, making corrections as required for proper operation, and re-testing as needed to obtain final proper operation.

2. Dampers: Verify all dampers operate through their full range of motion and in the proper direction in response to controls signals.

3. Sensors/Thermostats: Check measurements of temperature sensors, thermostats, pressure sensors and other devices against independent readings to confirm proper operation and sensor locations. Readjust sensor locations as necessary to account for field conditions that may cause inaccurate measurements.

4. Calibration: Calibrate items as necessary to allow for their proper operation.

5. Adjustments: Adjust system settings as needed to allow for best system operation, consistent with the specified sequences and for facilities of the type the system serves.

B. Start-Up: Coordinate all system and equipment start-up with other trades. Start-up systems in accordance with equipment manufacturer's instructions and in conjunction with trades that installed the items being controlled, so that they (or manufacturer's representatives) are present at start-up. Operate and configure the controls for safe equipment start-up and so that equipment operates in a controlled manner. See equipment specification sections for equipment start-up requirements. Test and observe all equipment being controlled during start-up to confirm proper controls operation.

3.03 OWNER INSTRUCTION

A. Owner Instruction: Provide instruction to Owner on the operation and maintenance of the control system. Provide field demonstrations and show Owner the locations of all control

devices; explain and demonstrate how system adjustments are made; explain and demonstrate system sequences of operation.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. Sequence of Operation

1.03 SUBMITTALS

A. General: Shall comply with Section 200500.

B. Sequence: Submit complete description of sequence of operation. Sequence submitted shall not be a direct copy of the sequence specified herein, but shall be written to reflect the actual control sequence provided.

C. Shop Drawings: Provide complete control system shop drawings; see Section 230933.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 GENERAL

A. General: Provide complete system with sequences of operation as specified herein.

B. Warm-up Control: Control system shall provide warm-up switching for all HVAC units and items indicated as having a warm-up cycle.

C. Adjustability: All temperature setpoints and time control settings shall be adjustable.

D. Thermostats: Various thermostats are not shown on the drawings but are required per the sequence of operation specified. Coordinate with Engineer for location of all such thermostats prior to installing. Indicate proposed locations on submittals.

E. Miscellaneous Items: See plans for units with motorized dampers in the ducts and miscellaneous other items requiring control.

3.02 PUMPS

A. Domestic HW Circulation Pumps: Pump shall be enabled to operate by time clock schedule. When enabled, pump shall be controlled in conjunction with a sensor in the hot water recirculation line. When HWC falls to 5 degrees F below setpoint, the pump shall run; when temperature returns to setpoint, pump shall be off. Setpoint and differential shall be adjustable. Initial setpoint shall be 5 degrees less than domestic hot water setting for system used on.

3.03 ELECTRIC DUCT HEATERS

A. General: Heater shall be controlled by a duct mounted temperature sensor and outdoor air temperature sensor. Heater capacity shall be varied to meet the supply air setpoint. Heater shall have staged or proportional control as indicated.

B. Operation: Heater shall be allowed to operate once the outside air temperature has fallen below setpoint (initially set at 60 deg F) and duct air temperature (downstream of heater) has fallen below setpoint (initially set at 70 deg F).

C. Interlock: Shall be hard-wire interlocked with the supply fan on the unit which serves the heater, to only allow heater operation when the unit's fan is proven on. Provide differential pressure switch or CT's at unit fan to provide proof of operation.

3.04 MISCELLANEOUS CONTROLS

A. Water Heaters: Shall be controlled by integral thermostat provided with unit. Set for temperature as noted in water heater schedule.

B. Fire Alarm System Shutdown:

1. Provide necessary conduit, wiring, and accessories to shutdown each unit upon activation of that unit's smoke detectors (Smoke detectors are by Division 23 unless specifically shown on the electrical plans and Division 26 specifications). Connections shall be hardwired, independent of any control system logic, so that failure of control system or loss of control system will in no way prevent the fire alarm shutdown of the system. In addition to shutting down the unit with the alarmed smoke detector, all equipment interlocked or served by that unit shall be off. Other units shall also shut-off as required to avoid building pressure differentials and similar undesirable effects. Upon reset of alarmed device, system shall automatically return to normal, provide time delay start of equipment to prevent excess load starting at the same time.

2. In addition to the above specified hardwired fire alarm shut-down (which pertains to equipment with smoke detectors), provide the following: Shut-down all air handling equipment when the building fire alarm system goes into alarm. Zone contacts in the fire alarm system are available for this purpose. This added shut-down may be accomplished by use of control logic and is not required to be hardwired but shall be of a fail-safe nature so as to provide the necessary shut-down in case of control failure. Reset shall be same as that specified for hard-wired unit smoke-detector shut-down.

C. Wall Heaters: Shall be controlled by their integral thermostat, Heater shall be on once space temperature has fallen below setpoint, and shall be off once temperature has risen 2 deg F or more above setpoint.

D. Miscellaneous Items: See plans for units with motorized dampers in the ducts and miscellaneous other items requiring control. See Section 238127 for sequence of damper at heat recovery unit.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. Environmental Ductwork Systems

B. Flexible Duct

C. Preparation of Duct for Service

1.03 DEFINITIONS

A. Duct Sizes: All duct dimensions shown are inside clear dimensions. Where inside duct lining is specified or indicated, duct dimensions are to the inside face of lining.

1.04 QUALITY ASSURANCE

A. All work and materials shall comply with SMACNA-DCS, NAIMA-DLS, ASHRAE-F, IBC, IMC, NFPA-90A, NFPA-90B, and code. The most restrictive criteria governs.

B. Leakage Criteria: Duct system shall be constructed and sealed so that leakage does not exceed the following:

1. Supply Duct: From fan to connection to air outlet 5%.

2. Return Duct: 5%.

3. Exhaust Duct: 5%.

C. Fabrication Proximity: The Contractor performing the work of this section shall have fabricating facilities located within 100 miles of the project site.

D. Drawing Review: Prior to beginning any work review all drawings, duct routing, duct connections, equipment configuration, equipment connection locations, and other work details to discover conflicts in anticipated duct arrangement and improper or incomplete connections. Review shall include the following: supply ducts not connected into return (or exhaust) ducts, ducts not crossed and improperly connected in shafts, air outlets/inlets connected to ducts, unit configuration compatible with planned duct connections, louver locations match architectural plans. Submit resolutions of such possible conflicts as submittals with shop drawings of proposed solutions; written description in lieu of shop drawings is acceptable for minor issues.

1.05 SUBMITTALS

A. General: Comply with Section 200500.

B. Product Data: Submit product data for duct lining, flexible duct, and factory fabricated items.

C. Shop Drawings: Submit shop drawings for all HVAC ductwork which is to be installed differently than as shown on the drawings.

D. Conflict Resolution: Submit additional shop drawings showing proposed resolution of conflicts after review of documents and again after review of actual field conditions.

1.06 DUCT PRESSURE CLASS

A. Constant Volume Systems: Ductwork shall be constructed to the pressure class corresponding to the static pressure indicated for the fan which serves the duct system or 1-inch pressure class (plus or minus as appropriate), whichever is higher; unless noted otherwise.

1.07 REFERENCES

A. ADC-FLEX: Air Diffusion Council Flexible Duct Performance and Installation Standards.

B. ASHRAE-F: ASHRAE Handbook of Fundamentals.

C. ASTM A 653: Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.

D. ASTM A 924: General Requirements for Steel Sheet Metallic-Coated by the Hot-Dip Process.

E. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.

F. IMC: International Mechanical Code.

G. NAIMA-DLS: North American Insulation Manufacturers Association Fibrous Duct Liner Standards, 1st Edition.

H. NFPA 90A: Standard for the Installation of Air Conditioning and Ventilating Systems.

I. NFPA 90B: Standard for the Installation of Warm Air Heating and Air Conditioning Systems.

J. SMACNA-DCS: SMACNA HVAC Duct Construction Standards.

K. UL 181: Underwriter Laboratories Factory-Made Air Ducts and Air Connectors.

L. UL 181A: Underwriter Laboratories Closure Systems for Use with Rigid Air Ducts.

M. UL 181B: Underwriter Laboratories Closure Systems for Use with Flexible Air Ducts and Air Connectors.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 200500, Paragraph 2.01, Acceptable Manufacturers.

B. Sheet Metal: All domestic manufacturers.

C. Spin-in Fittings and ATTO: Sheet Metal Connectors Inc., United McGill, Royal Metal Products, Airflow Products Inc.

D. Duct Sealant and Tape: Carlisle (Hardcast), Ductmate, Benjamin Foster, Grace Construction Products, United McGill, Polymer Adhesives Sealant Systems, RCD Corporation, Nashua, 3M.

E. Flexible Duct: Flexible Technology Inc., JP Lamborn Co.; Hart & Cooley, Thermaflex.

2.02 GENERAL MATERIALS

A. Ducts: Construct of galvanized sheet steel, suitable for lock forming without flaking or cracking, conforming to ASTM A653 and A924, having a zinc coating of 0.90 ounces total per square foot for both sides of a sheet, corresponding to coating G90.

B. Fasteners: Steel construction, electroplated zinc coated, having strength properties adequate for the application, compatible with materials being joined, and in accordance with SMACNA-DCS. Where exposed to corrosive conditions shall be of Type 304 or 316 stainless steel. Type to meet duct pressure class and duct leakage requirements. Where used for the support and anchorage of ducts shall comply with Section 20 05 29, with independent test reports regarding strength.

C. Spin-in Fittings: Factory fabricated of galvanized steel with die-formed mounting groove and damper with raised damper quadrant where ducts are to be insulated. Collar length for flexible duct attachment shall be at least 2" long.

D. Air-Tight Take-Off Fittings (ATTO): Factory fabricated branch duct connector, of galvanized steel. Flange shall be 1-1/2” wide with 1/8” self-adhesive gasket and pre-drilled fastener holes. Collar length for flexible duct attachment shall be at least 2” long. Where used on round duct mains, shall be saddle type appropriately sized for main duct diameter.

E. Draw Bands:

1. Metal: Worm gear type clamp, constructed of galvanized steel, stainless steel, or aluminum; minimum 1/2-inch wide band; suitable for 200 pound loading.

2. Non-Metal: Nylon “zip-tie” with self-locking ability, designed for flexible duct usage, minimum 1/4-inch wide, rated for 175 pound load, suitable for temperatures from 0 to 185 deg F; listed per UL181B and labeled “UL181B-C”.

F. Duct Sealant/Mastic: Water based duct sealant, listed per UL 181B-M and UL 181A-M, suitable for indoor and outdoor use. Fire resistant with a flame spread rating of 5 or less, and a smoke developed rating of 0. Sealant shall be resistant to ultraviolet radiation and ozone. Fiberglass mesh shall be minimum 0.006-inches thick, with minimum 9 x 9 weaves per inch, and 2-inch width; for use with mastic in sealing ductwork. Sealant system shall be suitable for duct system pressure class and materials used with. Carlisle Hardcast “Versa-Grip 181”.

G. Foil Tape: Foil back adhesive tape, listed per UL181A-P and UL181B-FX, with listing labeled on tape outer foil face. Minimum 3-inch width for metal-to-metal applications; minimum 2-inch width for flexible duct applications. 3M No. 3340 or Nashua No. 324A.

2.03 DUCT FABRICATION

A. Duct Gauge and Reinforcement: Shall be as shown in SMACNA-DCS according to the pressure classification of the system and the duct dimensions; with heavier gauge duct used as required to minimize duct reinforcement to suit space available and other project constraints.

B. Joints and Seams: Construct in accordance with SMACNA-DCS, code requirements, and these specifications (more stringent governs). Ducts shall be constructed and sealed so that the leakage criteria is not exceeded. Round ducts shall be the spiral seam type; except that branch ducts to individual air inlets/outlets less than 16" diameter may be of other types as allowed by SMACNA-DCS. Coordinate joint spacing with duct reinforcement requirements so that transverse joints having the required stiffness may be incorporated in the reinforcement spacing schedule. Round duct transverse joints shall be made with beaded sleeve joints or flanged connections in accordance with SMACNA-DCS; except that branch ducts to individual air inlets/outlets less than 16" diameter may use other joining methods as a allowed by SMACNA-DCS.

C. Elbows and Tees: Shall be long-radius type with a center-line radius not less than 1-1/2 times the width or diameter of the duct. Where space does not permit the use of long-radius elbows, short-radius or square elbows with turning vanes may be used. Elbows in round duct systems with duct pressure class above 2-inches shall be stamped type, welded segmented type, or standing seam segmented type.

D. Transitions: Increase duct sizes gradually. Transitions for diverging air flow shall be made with each side pitched out not more than 22.5 degrees. Transitions for converging air flow shall be made with each side pitched in not more than 30 degrees. Except that eccentric transitions for round to flat oval may have up to a 45 degree pitch.

E. Branch Connections: Shall comply with SMACNA-DCS, and as required herein.

1. Rectangular-to-Rectangular: Rectangular take-off with 45 degree angle on “inside” of take-off, minimum 4" length. Reference SMANCA-DCS Figure 4-6. Close corner openings.

2. Rectangular-to-Round:

a. Serving Individual Air Inlet/Outlet: Spin-in type connector or air-tight take-off (unless a different fitting type is specifically noted).

b. Serving Branch Duct: Rectangular to round transition, with maximum degree pitch as specified for transitions. Rectangular end size shall have free area no less than round end. Rectangular connection to rectangular main shall be made as specified for “Rectangular-to-Rectangular” connections.

3. Round-to-Round:

a. Air-tight take-off or constructed in accordance with SMACNA-DCS and recognized professional practices.

4. Other Connections: In accordance with SMACNA-DCS and recognized professional practices.

F. Ductmate Systems:

1. Rectangular Duct: Transverse duct joints may be made with Ductmate System,

or approved equal. System shall consist of companion flanges of 20 gauge galvanized steel with an integral polymer mastic seal; corner pieces of 12 gauge G90 galvanized steel; 20 gauge G90 galvanized cleats; closed cell, high density gasket type; and galvanized carriage bolts with hex nuts. The flanges shall be securely fastened to the duct walls using self-drilling screws, rivets or spot welding. Fastener spacing shall be as recommended by the manufacturer for the size of duct and the pressure class. The raw duct ends shall be properly seated in the integral mastic seal. A continuous strip of gasket tape, size 1/4" x 3/4", shall be installed between the mating flanges of the companion angles at each transverse joint; and the joint shall be made up using 3/8-inch diameter x 1-inch long plated bolts and nuts. Galvanized drive-on or snap-on cleats shall be used at spacing recommended by the manufacturer.

2. Round Duct: Transverse duct joints may be made with Ductmate “Spiralmate” system, or approved equal. System shall consist of galvanized steel round connector flanges (fitting inside each duct section to be joined) and an exterior galvanized steel closure ring with tightening bolt to form an airtight duct connection and join flanges together. Duct connector flanges shall have non-hardening integral mastic to seal between flanges and duct, and a neoprene gasket to seal flange faces.

2.04 FLEXIBLE DUCT

A. Type: Factory insulated fully lined flexible duct.

B. Construction: Double-ply neoprene coated polyester fabric hose, reinforced with a steel wire helix. Black color. Fire hazard rating not to exceed 25 for flame spread and 50 for smoke development, as tested by ASTM E84.

C. Thermal Characteristics: Certified thermal resistance “R” of 4.2 Hr-SF-deg F/Btu, rated in accordance with ADC-FLEX. Except where duct is installed in an unconditioned area (and where required by code) provide certified thermal resistance “R” of 8 Hr-SF-deg F/Btu, rated in accordance with ADC-FLEX.

D. Working Pressure: As required to suit maximum pressure to be encountered on system, but no less than 4-inch wc positive, 0.5-inch wc negative.

E. Length: Shall not exceed 8 feet where used on duct systems with a pressure class of 2-inches and less; maximum 5 feet length on higher pressure class systems.

F. Code Compliance: Comply with code and applicable standards; including NFPA 90A, NFPA 90. Shall be UL listed and labeled as a Class 1 connector per UL 181.

PART 3 - EXECUTION

3.01 DUCTWORK INSTALLATION

A. General: Install all ductwork with all accessories and connections to provide complete and operable duct systems, in accordance with plans and specifications. See Section 200529 for hangers and supports. Provide quality assurance review of all drawings prior to beginning work (see paragraph titled Quality Assurance, this specification Section and see Section 200500). Provide duct and plenum sizes and locations as shown on the drawings; except as adjusted for field conditions and work of other trades, and with prior approval of the Engineer. See Section 200500 for offsets and transitions to be included

in project.

B. Coordination: The Contractor shall fully coordinate the work of all trades to avoid interferences and conflicts. Due to the extremely tight spaces in portions of the building, the Contractor shall coordinate duct reinforcement spacing and supports with other trades as necessary to avoid interferences. In addition, the Contractor shall select duct gauge and reinforcement types to avoid interferences. Changes required due to lack of coordination between trades, improper spacing or selection of hangers, or improper duct gauge and reinforcement selection, shall be done at no additional cost to the owner.

C. Field Measurements: Prior to fabricating any duct materials, the Contractor shall field measure all areas where ducts will be installed to verify room available and all offsets and fittings required. Field verify connection sizes and locations to equipment, louvers, and similar items.

D. Workmanship: All work shall comply with code, SMACNA-DCS, and other applicable standards. Ducts shall be installed level (unless noted otherwise) and in neat lines with the building construction using best professional practices.

E. Exposed Ducts: All ducts are to be installed concealed unless indicated otherwise. Ducts that are exposed shall be carefully fabricated, stored, and installed for best appearance. All dents, dings, scratches and other damage shall be repaired for a high quality finished look; all dirt, debris, labels, stickers, lettering, and marks removed; and the duct completely cleaned. Any sealant shall be cleaned to form a straight and even seam adjacent to joints, have no overlap onto duct areas not needing sealant, and have all excess sealant removed (mask off adjacent areas as necessary).

F. Flexible Duct: May only be used where specifically shown on the plans. Attach flexible duct inner core to sheet metal duct (or connector) with draw band. For insulated type, pull insulation and outer jacket completely over the inner core (at the connection to the sheet metal duct) with outer jacket covering the inner core and tucked back at its end to provide a continuous vapor barrier cover; install draw band to secure the outer jacket and insulation. Use metal type draw bands on duct systems where duct pressure class exceeds 3-inches or where temperature or other conditions do not allow the non-metal type and where indicated; use type of metal suitable for the conditions without corrosion or other deterioration. Install flexible duct with a centerline turning radius not less than one duct diameter. Where this turning radius cannot be maintained with the flexible duct use sheet metal elbows or (at air inlets/outlets) provide a plenum having a side connection.

G. Spin-in Fittings/ATTO's: May be used for branch ducts to individual outlets only. Apply a bead of duct sealant to all spin-in fittings where fitting seals against sheet metal duct.

H. Sealing:

1. General: Use materials listed and approved for the specific application. Foil tape may only be used at duct connections to air inlets/outlets (unless specifically noted otherwise). Clean surfaces to be sealed of moisture and all contaminants. Seal joints in accordance with SMACNA-DCS, sealant manufacturer's instructions, and UL 181.

2. Ductwork: Seal to meet duct leakage criteria as follows:

a. Ducts with pressure Class 1" and less: Seal Class C.

3. Flexible Duct: Coat connection of flexible duct to metal duct with duct sealant prior to installing the flexible duct.

4. Air Inlets/Outlets: Seal duct connections (including “cans” or plenums) at air inlets and air outlets with duct sealant or foil tape; except at louvers and exposed ducts only sealant shall be used.

I. Ductmate: All "Ductmate" and similar systems shall be installed in strict accordance with manufacturer's instructions.

J. Protective Caps: Provide temporary sheetmetal caps or heavy visqueen covers over all open portions of ductwork to prevent debris, dirt, and dust from entering the ductwork. Such covers shall be installed at the end of each work shift, and shall remain in place until all work activities or events that may cause duct contamination will no longer occur.

3.02 ACOUSTICAL DUCT LINING INSTALLATION

A. General: Install acoustical duct lining in ducts to extent shown on drawings, covering all interior surfaces. Round ducts shall use factory fabricated double-wall ducts as specified.

B. Installation: Installation shall comply with NAIMA-DLS and these specifications. The liner shall be cut to assure tightly butted joints.

C. Horizontal Duct Runs: Tops of ducts over 12" wide and sides of duct over 16" high shall have liner additionally secured with mechanical fasteners.

D. Vertical Duct Runs: Any side of duct over 12" in size shall have liner additionally secured with mechanical fasteners.

E. Exposed Edges: All joints, exposed edges and any damaged areas of the liner, shall be heavily coated with fire resistant adhesive/mastic.

F. Metal Nosing: Install metal nosings on the leading edges of the liner in ducts where the velocity exceeds 4000 feet per minute.

3.03 PREPARATION FOR SERVICE

A. Cleaning: All ducts shall be wiped or blown clean of all dust and debris prior to the installation of grilles or diffusers. Notify the Engineer to allow for an inspection prior to installing grilles or diffusers.

B. Contaminated Ducts: Where ducts have been contaminated by dirt or debris during the construction process, the affected duct systems shall be cleaned by an independent firm specializing in the vacuum cleaning of ductwork. All costs associated with such cleaning shall be the responsibility of the Contractor.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. Manual Dampers

B. Flexible Connectors

C. Duct Access Doors

1.03 QUALITY ASSURANCE

A. General: Comply with Section 200500.

B. Workmanship: Construction and installation of all duct accessories shall comply with applicable SMACNA-DCS, and exceed those standards as noted.

1.04 SUBMITTALS

A. General: Submittals shall comply with Section 200500.

B. Product Data: Submit product information on all items to be used.

1.05 REFERENCES

A. AMCA 500D: Laboratory Methods for Testing Dampers for Rating.

B. SMACNA-DCS: SMACNA HVAC Duct Construction Standards, 3rd Edition.

C. UL 555C: Ceiling Dampers.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 200500, Paragraph 2.01, Acceptable Manufacturers.

B. Manual Damper Hardware: Duro-Dyne, Young Regulator Co., Ventfabrics, Krueger.

C. Flexible Connections: Ventfabrics, Duro-Dyne Elgen.

D. Duct Access Doors: National Controlled Air, Ventfabrics, United-McGill, Kees, Ruskin, Vent Products.

E. Building Access Doors: J.R. Smith, Zurn, Acudor, Elmdoor, Kees, J.C. Industries.

2.02 MANUAL DAMPERS

A. Type: Manually adjustable volume dampers.

B. Blades: Damper blades shall be fabricated of galvanized steel or stainless steel (unless a specific material is indicated), two gages heavier than duct in which installed, and in accordance with SMACNA-DCS. Maximum blade width 12 inches; fabricate multi-blade dampers with opposed blade pattern for ducts larger than 12" x 48".

C. Regulators: Damper regulator sets shall have quadrant dial regulator with locking nut, square end bearing one side, and spring round end bearing other side (small sizes) or open end square bearing (larger sizes), axis of blade the long dimension. Multiple blade dampers shall have individual quadrants for each blade or one quadrant with interconnected blades. Regulator sets shall be Duro-Dyne model numbers (or approved equal) as follows:

Max. Blade Dimension	Duro-Dyne Regulator Set	Shaft Size
10" and less	KS-145, 145L	1/4"
11" to 14"	KSR-195, 195L	3/8"
15" to 23"	SRS-388, SB-138, KP105	3/8"
24" and larger	SRS-128, SB-112, KP105	1/2"

D. Extractor Fittings: Galvanized steel construction, 24 gauge steel blades on 2 inch centers, with worm gear operator for adjustment through face of grille. Krueger EX-88 (or approved equal).

2.03 FLEXIBLE CONNECTORS

A. Type: Flexible fabric type connectors, to provide vibration isolation at equipment duct connections and to allow for movement in duct systems.

B. Flexible Fabric:

1. General: Flexible glass fiber fabric with an inorganic elastomeric coating.

2. Width: Minimum 3” wide except at equipment 3 hp or larger with external vibration isolators fabric shall be minimum 6” wide.

3. Indoor Applications: Neoprene type, black color, minimum 22 oz/sq. yard, 500 lbs x 500 lbs tensile strength.

4. Outdoor Applications: Durolon type, while color ozone resistant, 24 oz/sq. yard, 250 lbs x 275 lbs tensile strength.

C. Metal Collars: Minimum 24 gauge galvanized steel 3” wide metal edge connectors, each side of fabric, connected to fabric by folded over metal seam.

D. Temperature Rating: Shall be suitable for temperatures from -40 to 200 deg F.

2.04 BUILDING ACCESS DOORS

A. Type: Hinged lockable steel access doors, for wall or ceiling installation.

B. Construction: Minimum 16 gauge frame and 14 gauge door, concealed hinge, cam and cylinder lock, anchoring provisions, and 1” wide frame to conceal rough building opening. Provide of 18-8 stainless steel construction with No. 4 finish where used in restrooms,

locker rooms, kitchens, and similar "wet" areas. Provide of steel construction with prime coated finish in other areas.

C. Size: Size shall be 12" x 12" (unless indicated otherwise) but shall be large enough to allow necessary access to item being served and sized to allow removal of the item (where access door is the only means of removal without disturbing fixed construction).

D. Fire Rating: Door shall maintain fire rating of element installed in; reference drawings for required rating.

E. Keys: Access doors shall all be keyed alike. Provide two (2) keys for each door.

PART 3 - EXECUTION

3.01 MANUAL DAMPERS

A. General: Dampers shall be fabricated and installed in accordance with SMACNA-DCS requirements for volume dampers.

B. Locations: Install dampers at locations shown on the drawings in branch ducts to all air inlets/outlets, and at all other locations as required by the Balancer to allow for the balancing of the system. Locate dampers at a point where the damper is most accessible; orient damper regulator for best access.

C. Initial Setting: Set and lock all dampers in the full open position prior to balancing.

D. Extractor Fittings: Provide where indicated on the plans and at wall type inlets/outlets where such outlets cannot be served by a manual damper in the branch duct.

E. Identification: Provide orange surveyor’s tape, approximately 18” long tied to each damper regulator (except not required on dampers in ducts exposed to view in finished areas).

3.02 FLEXIBLE CONNECTORS

A. General: Provide flexible connectors at all duct connections to all equipment, where ducts of dissimilar metals are connected, and where shown on the drawings. Except that flexible connectors are not required on internally spring isolated fans where the fan is located in a separate mechanical room and a flexible connector has not been shown.

B. Round: For round ducts, the flexible material may be secured by zinc-coated, iron clinch type draw bands directly to adjoining duct; or with normal duct joining methods and using metal collars furnished with flexible connectors.

C. Slack: Install flexible connections with sufficient slack to permit 1 inch of horizontal or vertical movement of ducts or equipment at flexible connection point without stretching the flexible material. At building expansion joints install sufficient flexible material to allow for 2 inch movement in any direction; provide two flexible connectors separated by a 12 inch section of duct. At tilting heat pipe type heat recovery coils, provide sufficient flexible material to allow full tilting and operation of coil.

D. Outdoors: Where installed exposed to outside weather, provide a galvanized "hat" channel protecting top and vertical stretches of flexible connector from sunlight and weather.

3.03 BUILDING ACCESS DOORS

A. General: Provide access doors in walls, floors, ceilings, etc. as indicated on the drawings and where needed to provide service access or maintenance to duct access doors, backdraft dampers, damper actuators, automatic dampers, coils, control devices, fans, HVAC equipment and similar items.

B. Coordination: Consult architectural drawings and coordinate location and installation of access doors with trades which are affected by the installation.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. GRD Outlets

B. GRD Inlets

C. Louvers

1.03 DEFINITIONS

A. GRD's: Grilles, Registers, and Diffusers.

1.04 REFERENCES

A. AHRI 885: Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets.

B. AMCA 500: Laboratory Methods of Testing Louvers for Rating.

C. ASHRAE 70: Method of Testing the Performance of Air Outlets and Air Inlets.

D. ASHRAE-F: ASHRAE Handbook of Fundamentals.

E. SMACNA-DCS: HVAC Duct Construction Standards, 3rd Edition.

1.05 SUBMITTALS

A. General: Comply with Section 200500.

B. Product Data: Submit product information for all items to be used.

C. Operation and Maintenance: Submit operation and maintenance data and submittal data for inclusion in project O&M Manuals.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 200500, Paragraph 2.01, Acceptable Manufacturers.

B. Grilles, Registers and Diffusers: Titus, MetalAire, Krueger, Price, Tuttle & Bailey, Kees, Carnes

C. Louvers: Ruskin, Greenheck, Leader Industries, American Warming and Ventilating.

2.02 GENERAL REQUIREMENTS

A. Type: Air outlets and inlets shall be of the size, type, and with number of throws as shown on the drawings; and shall match the appearance and performance of the manufacturers' models specified and scheduled on the drawings.

B. Performance: Air outlet and outlet performance shall be based on tests conducted in accordance with ASHRAE 70.

C. Sound Level: Air outlets and inlets shall not exceed a sound level of NC 30 for the size indicated and airflow rate application. Sound levels shall be determined in accordance with AHRI 885 and ASHRAE-F.

D. Finish: Grilles, Registers and Diffusers shall have factory applied finish, color as selected by Architect/Engineer, except where indicated to have a brushed aluminum finish (or other finish type). Finish shall be an anodic acrylic paint, baked on, with a pencil hardness HB to H. Pint shall pass a 90 hour ASTM B117 salt spray test, 250 hour ASTM D870 water immersion test, and an ASTM D2794 reverse impact test with at least a 50 inch-pound force applied.

E. Frame Style: Provide air outlets and inlets with frame style to match ceiling or wall construction installed in. Where supply air outlets or inlets are installed in T-bar ceiling systems, they shall be factory installed in 2' x 2' or 2' x 4' metal panel to match ceiling layout. Where installed against gypsum board surface, brick or similar hard surface, or where exposed, provide with 1-1/4-inch wide outer border. Where space does not permit installing 2' x 2' metal panel, provide outlets or inlets with 1-1/4-inch wide outer border. Where air outlets are installed adjacent to surface mounted light fixtures, outlets shall have 4-inch deep drop frames. (See reflected ceiling plan and/or electrical lighting plan for ceiling and lighting types).

F. Transfer Grilles: Ceiling transfer grilles shall be same as ceiling exhaust grilles (CEG) unless noted otherwise; wall transfer grilles (WTG) shall be same as wall exhaust grilles (WEG) (unless noted otherwise).

G. Construction: Air outlets and inlets shall be of steel or aluminum construction.

2.03 SUPPLY AIR OUTLETS

A. Ceiling Diffuser (CD): Aluminum or steel construction, modular core, with multiple curved (or angled) discharge blades, and square neck. Cores shall consist of four separate sections which can be repositioned to allow for one, two, three or four way discharges. Cores shall be easily removed with no tools required. Krueger 1240 Series, Titus MCD, MCD-AA Series (or approved equal).

B. Ceiling Diffuser (CDL): Aluminum or steel construction, with curved backpan and formed edge of face panel designed for 360 deg airflow for low flow applications (50 cfm and less). Titus TJD (or approved equal).

2.04 RETURN AIR INLETS

A. Ceiling Transfer Grille (CTG): Aluminum construction, "cube-core" or "egg-crate" type, with 0.025-inch thick x 1/2-inch deep strips mechanically joined to form 1/2" x 1/2" x 1/2" cubes. Krueger Series EGC5. Titus Series 50F.

B. Ceiling Return Filter Grille (CRFG): Aluminum construction, "cube-core" or "egg-crate"

type, with 0.025-inch thick x 1/2-inch deep strips mechanically joined to form 1/2" x 1/2" x 1/2" cubes, with hinged grille face and 1" thick MERV 8 filter mount. Titus Series 50FF.

2.05 EXHAUST AIR INLETS

A. Ceiling Exhaust Grille (CEG): Same as CTG.

B. Ceiling Exhaust Register (CER): Same as CEG but with opposed blade damper operable from face of register.

2.06 LOUVERS

A. Type: High performance, 4-inch deep, stationary, drainable louvers. Ruskin Model ELF375DX or approved.

B. Frame: 4-inch deep, constructed of a minimum 0.090-inch, 6063 extruded aluminum, with integral caulking slots and downspouts in jambs and mullions.

C. Blades: Shall be constructed of minimum 0.081-inch, 6063 extruded aluminum, at 37.5 degree angle, on approximately 3-inch centers, with drain gutter.

D. Bird Screen: Shall be constructed of 1/2-inch mesh, 0.051-inch aluminum.

E. Performance: Nominal free area of 50% with pressure drop and water penetration equal to specified manufacturer's model.

F. Wind Loading: Louver shall incorporate structural supports required to withstand a wind load of 30 pounds per square foot.

G. Finish: Provide with clear anodized finish.

H. Accessories: Provide extended sill and top drip cap; of same material and finish as blades. See drawings for configuration.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install air outlets and inlets in locations indicated and so as to conform with building features and coordinated with other work.

B. Connections: Furnish all necessary screws, clips, duct collars, and transitions required to allow for the installation and connection of ductwork to all air outlets/inlets.

C. Location Verification: Verify all air inlet/outlet locations with building features and other trades prior to installing any duct systems that will connect to the air outlets/inlets. For locations where air inlet/outlet location is noted to be verified, or location is not clear, develop shop drawings showing the proposed location, or the location that best suits field conditions, and submit for review.

D. Painting:

1. Paint ductwork and accessories which are visible behind air outlets and inlets flat black. Painting to include ductwork, duct liner, turning vanes, liner attachments,

and all visible items (including fastening pins for duct lining).

2. Coordinate with the Division 09 Contractor for any necessary painting of air outlets/inlets/louvers prior to installation.

E. Weather Exposure: All outlets and inlets exposed to the weather shall be adequately flashed and installed in a manner to assure complete weatherproofness. Sealing and caulking of all outlets and inlets exposed to the weather shall conform to Section 200530.

F. Provide screened openings (SO) on all duct openings where indicated and where openings do not have grilles or registers.

G. Louver: Slope bottom of all ducts within 18 inches of connecting to louvers and wall caps at minimum 1% slope toward bottom of louver; seal bottom water tight.

H. Louver Sizes: Contractor shall measure actual louver wall openings prior to ordering or fabricating louvers. Notify Architect/Engineer of any discrepancy between actual wall opening and specified opening.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. Energy Recovery Ventilators

B. Start-up

1.03 SUBMITTALS

A. General: Submittals shall comply with Section 200500.

B. Product Data: Submit product information on unit including fan curves, coil performance, unit construction details, wiring diagram, data showing energy recovery, filter data, and weight.

C. Shop Drawing: Submit drawings of unit showing all dimensions, locations of unit components, and point of connection of all utilities.

D. Operation and Maintenance: Submit Operation and Maintenance data and submittal data for inclusion in project O&M Manuals.

1.04 GENERAL REQUIREMENTS

A. Standardization: All units of the same type shall be the product of the same manufacturer.

B. Substituted Equipment: The drawings show design configuration based on a particular manufacturer's equipment (i.e. basis of design). Use of another manufacturer's equipment (i.e. substituted equipment) that is configured different from what is shown will require redesign of mechanical ductwork, piping, electrical, structural, unit support systems, and general building construction to accommodate the substituted equipment. Such redesign shall meet the requirements and have the approval of the Architect/Engineer prior to fabrication. Contractor shall submit complete shop drawings showing all alternate unit installation plans and details; shop drawings shall comply with Section 200500. The redesign shall be equal or superior in all respects to the Architect/Engineer's design (as judged by the Architect/Engineer), including such aspects as equipment access, ease of maintenance, duct connection locations, unit electrical requirements, noise considerations, vibration unit performance, and similar concerns. Cost of redesign and all additional costs incurred to accommodate the substitutional equipment shall be borne by the contractor. Contractor is cautioned that certain aspects of the equipment cannot be fully evaluated until items are installed and operational, and all added costs after installation to make units equal to the basis of design shall be by the Contractor.

1.05 REFERENCES

A. AMCA 230: Laboratory Methods of Testing Air Circulating Fans for Rating and

Certification.

B. AHRI 1060: Standard for Performance Rating of Air-to-Air Exchangers for Energy Recovery Ventilation Equipment.

1.06 WARRANTY

A. General: See Division 00 and Section 200500 for basic warranty requirements.

B. Extended Warranty: The ERV core shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances or normal use, for a period of ten years from the date of purchase. The balance-of-unit shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of two years from the date of installation.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 200500, Paragraph 2.01, Acceptable Manufacturers.

B. Energy Recovery Ventilator: RenewAire.

2.02 GENERAL

A. Fan Balancing: The shaft and fan wheel(s) shall be factory statically and dynamically balanced.

B. Motors: Shall be UL listed and comply with Section 200500. Motor efficiency shall comply with Code. Motors shall have integral thermal protection with automatic reset.

C. Outlets and Inlets: Equipment shall be furnished with attachment angles and/or flanges to allow for attaching external ductwork.

D. Fan Performance: Shall be based on laboratory tests conducted in accordance with AMCA 230. Fan capacity shall not be less than the values scheduled on the drawings and shall be constructed to be able to operate with total pressures 20% higher than that indicated.

E. Controls: Coordinate with Section 238127 Contractor for required interfaces between air handling equipment and building control system.

F. Gasketing: Where units are furnished in sections, unit manufacturer shall furnish unit with gasketing to allow sealing of adjoining sections.

G. Factory Tests: Every unit shall be factory tested prior to shipping. Tests shall include (as a minimum): Motor dielectric voltage-withstand test, unit dielectric voltage-withstand test, continuity of internal control circuits test, unit amperage test, proper fan operation.

2.03 ENERGY RECOVERY VENTILATOR

A. Type: Indoor energy recovery ventilator using fixed plate enthalpy heat exchanger.

B. General:

1. Unit shall be complete single package, self contained factory assembled unit, requiring only electrical, duct, and control connections to operate.

2. Capacity: Shall be as scheduled at the conditions noted.

3. Unit configuration shall be as shown on plans.

C. Cabinet:

1. General: Constructed of minimum 20 gauge G-90 galvanized steel, reinforced and constructed for maximum anticipated static pressures involved, but no less than 4" w.c. with cabinet leakage less than 1% of scheduled airflow.

2. Access Doors: Constructed same as cabinet, size to access unit internals, with full perimeter gasket. Doors shall be opened by releasing multiple latches or similar method requiring no tools.

D. Fan(s): Integral supply and exhaust fans, direct drive, steel or aluminum construction, multi-blade centrifugal type. Motors shall be ECM type.

E. Energy Recovery Core:

1. General: Total enthalpy type, capable of transferring both sensible and latent energy between airstreams. Latent energy transfer shall be accomplished by direct water vapor transfer from one airstream to the other, without exposing transfer media in succeeding cycles directly to the exhaust air and then to the fresh air. No condensate drains shall be required.

2. Certifications: The energy recovery cores used in these products shall be third party Certified by AHRI 1060 for Energy Recovery Ventilators. AHRI published certifications shall confirm manufacturer's published performance for airflow, static pressure, temperature and total effectiveness, outdoor air (OACF) and exhaust air leakage (EATR). OACF shall be no more than 1.02 and EATR shall be a 0% against balanced airflow.

F. Filters: Unit shall be provided with filter racks for accommodating 2" thick filters (unless noted otherwise), with minimum filter area (or sizes) as scheduled. Access to filters shall be through unit access doors.

G. Electrical: Unit shall be for use with single point electrical power connection. Unit shall be furnished with all necessary wiring, raceway, transformers, contactors, relays, motor starters, and accessories with power and controls connected to all unit devices for unit operation and with the specified sequence. Electrical shall comply with NEC and local code requirements. Unit shall have a main fused power disconnect. Disconnects shall comply with NEC, and be accessible from outside unit enclosure.

H. Controls: Unit control shall be by Section 238127 (unless otherwise noted); unit shall have limited factory controls to provide necessary safeties and to allow for control by Section 238127. Section 238127 shall enable unit fans when "run" terminals are connected. Unit shall be furnished with all necessary relays, starters, wiring terminal strips, timers, safety devices, etc. to allow for the sequence of operation as specified in Section 238127 using the Section 238127 control system. Unit wiring shall be color coded and numbered corresponding to unit's wiring diagram. Access panels to unit controls shall be hinged with latches (or equivalent device), requiring no tools to open.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install the units as shown on the drawings, in accordance with manufacturer's instructions, Code, and best construction practices.

B. Locations: Install at locations indicated, to allow for maintenance access and proper clearances.

C. Duct Connections: Provide flexible connections in ductwork connections to units.

3.02 START-UP

A. Initial Checks: Prior to operating units, checks shall be made to insure that adequate voltage, duct connections, electrical connections, control connections, and other items as listed by the manufacturer are properly provided/connected and ready to ensure safe and proper unit operation.

B. Testing and Adjustment: Operate unit to test for proper operation, including fan rotation, and correct interface to other controls.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. VRF Split System Heat Pumps

B. Refrigerant Piping

C. Heat Recovery Unit

D. VRF System Controls

E. VRF System Interface to Other Controls

F. Start-Up and Commissioning

1.03 QUALITY ASSURANCE

A. Listing: Units shall be listed by an approved testing agency for the use and application intended.

B. Ratings and Certification: Unit performances shall be tested and rated in accordance with AHRI Standards and shall be AHRI certified.

C. Energy Efficiencies: Equipment energy efficiencies shall not be less than code requirements and shall exceed code efficiencies as indicated.

1.04 SUBMITTALS

A. General: Comply with Section 200500.

B. Product Data: Provide complete product information submittals on all units; include performance capacities as a function of indoor and outdoor coil db/wb temperatures and indoor coil air flow rates, supplementary heater capacity, fan performance (cfm vs. esp), and information on all filters and accessories.

C. Refrigerant Piping: Submit proposed refrigerant pipe sizes, schematic of routing, and refrigerant system accessories.

D. Control Shop Drawings: Submit shop drawings of complete control system, including the following information: interconnect drawings showing all wiring and control connections, all control device locations, sequence of operation for all controlled systems, building floor plans with all proposed thermostat and other control device locations shown.

E. Installer Qualifications: Submit qualifications of the personnel installing the refrigeration system components and the system controls (when requested by the Engineer).

1.05 GENERAL REQUIREMENTS

A. System Type: System shall be a Variable Refrigerant Flow (VRF) heat pump system, allowing for simultaneous heating and cooling modes operation of indoor units, with indoor units operating independently of other indoor units, changeover from one mode to the other (heating to cooling, cooling to heating) with no interruption to system operation, and the recovery of energy between units in different modes. The system shall be capable of accommodating a range of the sum of all indoor unit capacity, from 50% to 150% of outdoor unit capacity.

B. Standardization: In interests of Owner's standardization, all system heat pumps and heat pump controls shall be the product of the same manufacturer.

C. Alternate Manufacturers: The project has been designed around equipment by the manufacturer scheduled on the drawings. Alternate manufacturers may be used (see Acceptable Manufacturers, Section 200500); however, any redesign (from what is shown on the drawing) to mechanical, electrical, structural, or general construction to accommodate such an alternate manufacturer shall be provided by the Contractor. Furthermore, such redesign shall meet the requirements and have the approval of the Architect/Engineer prior to fabrication. Contractor shall submit complete shop drawings showing all alternate installation plans and details; shop drawings shall comply with Section 200500. The redesign shall be equal or superior in all respects to the Architect/Engineer's design, including such aspects as equipment access, ease of maintenance, duct connection locations, unit electrical requirements, noise considerations, unit performance, and similar concerns. Cost of redesign and all additional costs incurred to accommodate the alternate heat pumps shall be borne by the Contractor.

D. Installer Qualifications:

1. General: The installer shall have experience installing VRF systems by the manufacturer being used for this project. Installer shall be certified by the VRF system manufacturer as a “certified installer”.

2. Refrigeration Components: Shall be installed by a licensed refrigeration mechanic having experience with VRF systems, and the work shall be supervised by personnel trained by the VRF system manufacturer.

3. Controls: Control work shall be done by individual trained and certified by the VRF manufacturer for the installation of the specified controls.

E. Warranty - VRF System Equipment:

1. Basic: Entire heat pump (outdoor and indoor sections) shall be warranted by the manufacturer to be free from all manufacturing defects and capable of providing satisfactory operation for the project warranty period. Repair and/or replacement of defective items (labor and parts) during the project warranty period shall be at no additional cost to the Owner.

2. Extended: Compressors and all coils shall be warranted by the manufacturer to be free from defects and capable of operating satisfactorily for a period of 5 years beyond the basic project warranty. Extended Warranty shall cover all warranted parts and associated shipping to the site, with repair labor by the Owner.

F. Warranty - VRF System Controls:

1. Basic: System shall be warranted for the project warranty period to provide the sequence of operation and basic features specified, with the accuracy and flexibility specified. The system shall be repaired or replaced, including materials and labor, if in Owner's reasonable opinion, system is other than as warranted.

2. Emergency Service: During the warranty period maintain a 24 hour emergency phone service and be able to respond by a trained and qualified Controls Engineer familiar with the installed system.

3. Warranty Service Allowance: Include 8 hours of control technician/programmer's time for special service (i.e. software changes, system consultation, setting up additional trends, etc.) and other services during the warranty period as required by the Owner or Engineer. The Owner and Contractor will jointly track the amount of time used. Only time directly authorized and agreed to by the Owner may be tracked as part of this allowance. This allowance is for work outside of other required project work, and is for specific tasks assigned to the Contractor by the Owner or Engineer.

4. End of Warranty Service: At the end of the warranty period, the Contractor shall provide a re-check of the entire system operation, including calibration testing of a sample number of components and providing any necessary control adjustments for proper system operation. Such work shall be for a minimum of 8 hours on site.

5. Extended Warranty: System shall be warranted for 2 years, beyond the project warranty period.

G. Refrigerant Pipe Sizing: Due to the use of proprietary selection criteria by the heat pump manufacturers, the heat pump supplier shall size all refrigerant piping between the indoor and outdoor units and provide such sizes to the installing Contractors prior to the bid date. The heat pump supplier shall also determine the need for any additional accumulators, solenoid valves, and similar accessories and size/select such devices and inform potential installing contractors to allow proper bids. The heat pump supplier is obligated to furnish complete heat pump units, with properly calculated pipe sizes and accessories so as to allow the unit performances as scheduled.

H. Electrical and Controls: Component wiring shall comply with NEC and be color coded and numbered and match unit wiring diagrams. All necessary terminal blocks, fuse, wiring, junction boxes and electrical/control accessories shall be factory installed within the unit cabinet (unless noted otherwise).

1.06 REFERENCES

A. AHRI 210/240: Standard for Unitary Air Conditioning and Air Source Heat Pump Equipment.

B. AHRI 350: Standard for Sound Rating of Indoor Air Conditioning Equipment.

C. AHRI 270: Standard for Sound Rating of Outdoor Unitary Equipment.

D. AHRI 1060: Performance Rating of Air-to-Air Exchangers for Energy Recovery Ventilation Equipment.

E. ASME B16.22: Standard for Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

F. ASME B16.26: Standard for Cast Copper Alloy Fittings for Flared Copper Tubes.

G. ASME B280: Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 200500, Paragraph 2.01, Acceptable Manufacturers.

B. VRF Heat Pumps: Mitsubishi, Samsung, L.G., Daikin.

C. Refrigerant Pipe and Fittings: Domestic made products only.

2.02 SPLIT SYSTEM HEAT PUMP - OUTDOOR UNIT

A. Type: VRF air-to-air heat pump, outdoor section, for serving multiple indoor units.

B. Capacity: Units shall allow the indoor units to have the minimum cooling and heating capacities scheduled on the drawings at the conditions shown; rated in accordance with AHRI standards.

C. General: Unit shall be fully factory assembled and shall be complete with casing, coils, fans, compressor, piping, wiring, controls, and all other accessories required to be ready for field connections and operation. Unit shall be capable of operating in the cooling mode from 30 to 125 degrees F ambient, and in heating mode from 0 to 65 degrees F ambient. Unit shall be factory run-tested to verify proper heating, cooling, defrost, control, and fan operation.

D. Unit Casing: Shall be constructed of galvanized steel, bonderized and finished with manufacturer's standard color. Casing shall be able to withstand 960 hours per ASTM B117 criteria.

E. Compressor(s): Shall be high performance, inverter driven, modulating capacity scroll type. Compressor shall have internal overcurrent protection and thermal overload protection, high pressure safety switch, and crankcase heaters. Compressor(s) shall be mounted to avoid transmission of vibration.

F. Refrigerant Circuit: Units shall be for use with refrigerant R-410A and shall be fully charged at the factory for the piping and indoor units used with. Unit shall include an accumulator with refrigerant level sensors and controls.

G. Coils: Shall be of nonferrous construction with lanced or corrugated plate fins on copper tubing, with a factory applied corrosion resistant finish and integral metal guard protector.

H. Fan: Shall be direct drive, variable speed propeller type with a raised guard to prevent contact with moving parts. Fan motor shall have permanently lubricated bearings and inherent overcurrent protection.

I. Electrical and Controls: Units shall be for use with power of voltage and phase as scheduled on the drawings. Unit shall have over-current protection and DC bus protection. Unit shall include all controls for units components, interconnection to other system components for automatic operation, safeties to prevent unsafe operation, to

accommodate system defrost, and to allow for 8 stages of operation. Units controls shall be 24 volt.

J. Sound: Unit shall have a sound rating not higher than 60 db(A) individually, and 64 dB(A) where twinned. In “night mode” unit shall have a sound rating not higher than 50 db(A) individually, and 53 dB(A) where twinned.

2.03 SPLIT SYSTEM HEAT PUMP – INDOOR - CEILING CASSETTE

A. Type: Indoor VRF heat pump for overhead suspended installation in a ceiling (or at ceiling height).

B. General: Unit shall be fully factory assembled and shall be complete with fan, four way adjustable discharge outlet, evaporator coil, refrigerant metering device, heavy gauge steel chassis, refrigerant piping controls, condensate pan, drain connection, and related accessories to operate properly with VRF system.

C. Capacity: Unit shall have minimum cooling and heating capacities as scheduled on the drawings at the conditions shown and with the outdoor unit indicated; rated in accordance with AHRI standards.

D. Unit Casing: Fabricated of galvanized steel, with support provisions for hanging from building structure. Unit shall have bottom discharge grille, adjustable for two, three, or four-way discharge. Grille vane angles shall be adjustable via room wall thermostat. Exposed portion of unit shall have finished paint, manufacture’s standard color.

E. Refrigerant Circuit: Shall be fully factory piped and shall include an electronic linear thermostatic expansion device to allow for both heating and cooling operation. Units shall be factory charged with dehydrated air (or an inert gas).

F. Coil: Non-ferrous construction with plate fins on copper tubing, with all joints silver brazed. Coils shall be factory tested to a minimum of 1.5 time’s normal working pressure. Coil shall have corrosion resistant drain pan and drain fitting; configured to allow draining either end of unit. Unit shall have an integral condensate pump, rated for unit condensation rate and 2.5 feet of head.

G. Fan: Direct drive, multi-speed type, statically and dynamically balanced, with permanently lubricated motor, manually adjustable guide vanes for side to side discharge, and a motorized discharge louver directing air up and down automatically. Air speed shall be adjustable via room wall thermostat.

H. Filter: Unit shall have an integral washable filter, easily removable.

I. Electrical and Controls: Unit shall be for use with power of voltage and phase as scheduled on the drawings. Unit shall include all controls for unit’s components, interconnection to other system components, and to provide the specified sequence of automatic operation. Unit shall include controls providing self-diagnostic checks, auto restart (on power outage or loss of control communication), test run switch, auxiliary contacts for control of an external heat source, four digital inputs for custom control applications, and three digital outputs for custom control applications.

2.04 SPLIT SYSTEM HEAT PUMP – INDOOR - CEILING CONCEALED DUCTED

A. Type: Indoor VRF heat pump for ceiling-concealed ducted installation.

B. General: Unit shall be fully factory assembled and shall be complete with fan, a fixed horizontal discharge outlet, evaporator coil, refrigerant metering device, heavy gauge steel chassis, refrigerant piping controls, condensate pan, drain connection, shall be suitable for use in plenums and related accessories to operate properly with VRF system.

C. Capacity: Unit shall have minimum cooling and heating capacities as scheduled on the drawings at the conditions shown and with the outdoor unit indicated; rated in accordance with AHRI standards.

D. Unit Casing: Fabricated of galvanized steel, with support provisions for hanging from building structure. Cabinet panel shall have provisions for a field installed filtered outside air intake.

E. Refrigerant Circuit: Shall be fully factory piped and shall include an electronic linear thermostatic expansion device to allow for both heating and cooling operation. Units shall be factory charged with dehydrated air (or an inert gas).

F. Coil: Non-ferrous construction with plate fins on copper tubing, with all joints silver brazed. Coils shall be factory tested to a minimum of 1.5 time's normal working pressure. Coil shall have corrosion resistant drain pan and drain fitting. Unit shall have an integral condensate pump, rated for unit condensation rate and 2.5 feet of head.

G. Fan: Direct drive, multi-speed type, statically and dynamically balanced, with permanently lubricated motor, shall have external static pressure settings from 0.14 to 0.60 in. WG.

H. Filter: Return air shall be filtered by means of a standard field installed MERV-8 minimum return air filter. Optional factory provided return filter box (rear or bottom placement) with high-efficiency filter shall be available.

I. Electrical and Controls: Unit shall be for use with power of voltage and phase as scheduled on the drawings. Unit shall include all controls for unit's components, interconnection to other system components, and to provide the specified sequence of automatic operation. Unit shall include controls providing self-diagnostic checks, auto restart (on power outage or loss of control communication), test run switch, auxiliary contacts for control of an external heat source, four digital inputs for custom control applications, and three digital outputs for custom control applications.

2.05 BRANCH CIRCUIT CONTROLLER

A. Type: Refrigerant Branch Circuit (BC) Controller controlling refrigerant flow and with controls and accessories for system heating/cooling operation.

B. General: The BC Controller shall be fully factory assembled, and complete with all piping, valves, controls, and wiring. Unit shall be factory run tested. Provide unit size and capacity appropriate for the system and number/size of indoor units.

C. Unit Cabinet: Fabricated of galvanized steel, sized to enclose all components. An integral condensate pan and drain connection shall be provided. Provided with factory supplied condensate pump.

D. Refrigerant Circuit: Unit shall have multiple tow-position automatic refrigerant valves to control refrigerant flow, and each branch line shall have a service valve to allow servicing any indoor unit without interruption of service to other units. Unit shall have a liquid-gas separator a tube-in-tube heat exchanger. Linear electronic expansion valves shall be

provided for control of refrigerant flow.

E. Electrical: Unit shall be for use with power of voltage and phase as scheduled on the drawings. Unit shall include all controls for proper operation interconnection to other system components

F. Condensate Pump: Provide unit with condensate pump. Where not available internal to unit, provide external type, with controls, and gpm capacity to suit unit maximum condensate rate, at 10 feet of head. Provide mounting assembly, accessories for complete connections.

2.06 VRF SYSTEM CONTROLS

A. General: System shall come with VRF manufacturer's controls to control all space indoor units, heat recovery unit, and outdoor unit, as a unified system. System shall provide the sequence of operation specified.

B. EMCS: System controls shall have BACnet interface for connection to the building EMCS, to allow EMCS to monitor system operation and to allow enable/disable of the overall system (i.e. placing in off or Auto modes remotely). Coordinate with Division 25 to ensure compatibility of controls.

C. Room Thermostats: Shall provide space temperature control for indoor units, completely independent of other indoor units. Thermostats shall include: occupant setpoint adjustment of plus or minus 3 deg F, room temperature display, room setpoint display, fan speed adjust, indoor unit diagnostics, and discharge vane/louver adjust (where applicable).

D. Master Controller:

1. General: Shall provide time schedule, warm-up, optimum start, night setback and other control functions for the system and to serve as the users interface for system programming and setup. Shall be wall mounted, with visual display of all settings, and system diagnostics.

2. Scheduling:

a. Time Schedules: The Control System shall provide time clock schedule with at least 20 time schedules. Each schedule to be 8-day type, 6 entries per day. All entries to be in 12 hour AM/PM format. The complete schedule shall be displayed at one time on the operator workstation for easy editing. Each time program shall be able to include on/off, high/low speed or duty cycle commands, or Analog Control Values as applicable for the application. Equipment may be assigned to named schedules, with master revisions to the schedule revising all assigned equipment.

b. Holiday Schedules: A minimum of 24 holiday time schedules shall be available and shall be assigned to any number of available points.

c. Holiday schedule shall display entire year and shall also allow for an interval holiday time, program showing holiday start date to end date (example: December 24 to January 2).

3. Warm-up Mode: Control System shall have warm-up mode prior to occupied mode on heating to pre-warm building prior to occupancy. Time of beginning warm-up cycle shall be determined by an optimum start/stop program.

4. Optimum Start/Stop: Control System shall have optimum start/stop program to reduce run time of HVAC equipment. Optimum start/stop program shall consider building mass, building temperatures, outdoor air temperatures, and other system factors in determining time of system start-up or shut-down. Program shall record previous warm-up times versus actual warm-up times and shall adjust the program algorithm so that program calculated warm-up time corresponds to actual.

E. Wiring and Conduit: As specified in Division 25 and 26, and in accordance with NEC.

F. Miscellaneous Control Components: Complying with Divisions 25 and 26. Standard components, for use in commercial and institutional occupancies, rated and designed for the application and able to provide the specified sequence of operation.

2.07 REFRIGERANT PIPING AND ACCESSORIES

A. Piping and Fittings: rated for system pressures per VRF system manufacturer. Hard drawn ACR copper tubing per ASTM B280, Type L, with silver brazed joints and wrought copper fittings per ASME B16.22. Use only long radius elbows. Flared fittings (at equipment connections only) shall comply with ASME B16.26. Soft copper tubing may only be used on runs less than 50-feet or where necessary (i.e. when routing through sleeves, or similar poor access areas) and where acceptable to VRF system manufacturer.

B. Isolation Valves: Brass ball valve, full port, rated for system pressures and temperatures, but no less than 700 psig and -40 deg F to 300 deg F. Compatible with refrigerant used with, UL listed, with rupture proof encapsulated stem, extended copper connections for ease in brazing. Provide in configuration (i.e. angle, straight, with access port) as required to suit application.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install system in accordance with code, manufacturers written installation instructions, and best construction practices. Set units in locations as shown on the drawings and maintenance to units.

B. Location and Arrangement: Install all equipment at locations and as shown on the drawings. Install so as to allow maximum access to units. Prior to selecting unit final location, confirm that: Proper unit clearances and access will be provided; no adverse airflow conditions are present; confirm location and installation details with other trades. Units shall be level and aligned with building walls. Set outdoor unit on concrete pad (or roof sleepers); anchor to pad (or sleepers).

C. Complete Connections: Connect and install all items shipped loose with units; provide and connect all utilities and accessories as required for proper unit operation.

D. Refrigerant Piping: Shall be silver brazed. Bleed dry nitrogen through piping during brazing to minimize oxidation. Keep all open ends of piping capped when not being

worked. Soft copper shall have long radius bends; install without kinks or excess bends. Piping shall be routed concealed, except where routed outdoors and where noted. Piping shall be ran plumb and square to building walls, and in a neat professional manner.

E. Refrigerant Charge: System shall be checked for proper refrigerant charge and oil level and charged to proper levels after all leak testing and evacuation work has been completed. Refrigerant to be added to the system shall be delivered to the site in factory charged containers and charged into the system through a filter/drier.

F. Unit Protection: Units shall be protected during construction to prevent mud, dirt, paint overspray, plaster materials, and similar debris from depositing on the unit. Units shall be clean and in new condition prior to Owner acceptance.

G. Cleaning: Units shall be thoroughly cleaned of all debris prior to operation. Units shall be clean and in new condition prior to Owner acceptance.

H. Operation: Units shall not be operated until all construction activities that generate dust, dirt, fumes, or odors are complete; system checkout has occurred; and the Engineer has reviewed the system and granted approval.

3.02 VRF SYSTEM CONTROLS

A. General: Installation shall comply with Divisions 25 and 26. Provide all software, hardware, licensing, sensors, relays, switches, dampers, actuators, conduit, tubing, wiring, motor starters and all other devices required to provide a complete integrated VRF control system with the system features and sequence of operation specified.

B. Room Sensors: Room sensors (i.e. thermostats) shall be mounted at 48" above finished floor (unless indicated otherwise). Thermostats shall control the equipment which affects the temperature serving the space the thermostat is located in (unless indicated otherwise). Not all room sensors are shown on the drawings and the locations shown are preliminary only. Contractor shall review all drawings, coordinate with other trades, and indicate all final proposed room sensor locations on the submittal shop drawings. Contractor is responsible for coordinating locations to avoid chalkboards, tack boards and other interferences.

C. Electrical Power:

1. General: Provide all electrical wiring and devices in accordance with codes, Division 25, and Division 26 requirements.

2. Sources: It shall be the responsibility of the installer of the VRF control system to provide power for all VRF control devices requiring power. Coordinate with the Division 26 Contractor to arrange for necessary power circuits. System Master Controller shall obtain power from a UPS (uninterruptible power supply); unless the unit has an internal battery back-up. Where the building has a generator, equipment served by the generator shall also have their control power served by the generator.

3. Conduit: All wiring shall be installed in conduit and in accordance with Divisions 25 and 26, except that low voltage wiring within the ceiling plenum spaces and in mechanical mezzanine areas may be ran without conduit provided that plenum rated cable is used. Install all conduit and wiring parallel to building lines.

D. Component Labeling: All control components, except regular room thermostats, shall be

equipped with name plates to identify each control component. Components in finished rooms shall be labeled as to generic item controlled for better user understanding; other devices shall be labeled with the same designation which appears on the Control Diagrams. Contractor shall submit list of proposed labeling prior to installing.

E. Complete System: Provide all devices as required to allow for automatic control with sequence of operation specified. Provide all control interconnections between indoor and outdoor units, and other equipment.

F. Adjustability: All setpoints and differentials shall be adjustable. Setpoints indicated are initial settings.

G. Confirm Settings: Confirm with Owner all setpoints, all time schedules, and all other adjustable programming parameters before substantial completion.

H. Thermostats Setpoints: Shall be adjustable, with initial settings as follows unless indicated otherwise:

Occupied Heating	70 degrees F
Unoccupied Heating	65 degrees F
Occupied Cooling	76 degrees F
Unoccupied Cooling	85 degrees F

I. Sequence Terminology: Wherever the control sequences refer to an article, device or piece of equipment in the singular number, such reference shall mean to include as many of such articles, devices, or equipment as are shown on the plans, required for the sequence, or required to complete the installation. Wherever the control sequence refers to an operating stage in the singular number, such reference shall mean to include as many stages as are specified for the equipment and shall mean analog (i.e. proportional) type control where specified for the equipment (reference drawings and equipment specifications).

3.03 VRF HEAT PUMPS - SEQUENCE OF OPERATION

A. General: VRF controls shall provide time schedule control and heating/cooling/fan operation of indoor units, with BC and outdoor units automatically operating in response to system loads and needs using their integral controls.

B. Occupied Mode:

1. Fan: Indoor fan shall run continuously.

2. Heating: Indoor heat pump section shall operate in heating as required to satisfy the space setpoint.

3. Cooling: Indoor heat pump section shall operate in the cooling mode as required to satisfy the space setpoint.

C. Unoccupied Mode: Indoor fan and indoor heat pump heating/cooling shall cycle on and off as required to maintain unoccupied setpoints.

D. Mode Control: Units' mode of operation shall be determined by time schedule and time schedule override; warm-up mode shall be initiated by optimum start controls.

E. Outdoor unit and Refrigerant Controller: Shall operate to provide adequate and correct

refrigerant flow to serve indoor units and to reject or recover heat.

3.04 HEAT RECOVERY UNITS - SEQUENCE OF OPERATION

A. General: VRF controls shall provide time schedule control of HRU (or DOAS) in conjunction with heat pump units. When any heat pump (served by the HRU) is in the occupied mode, the HRU shall be on in the occupied mode.

B. Occupied mode:

1. Fans: Supply and exhaust fans are on.

2. Outside Air and Exhaust Air Dampers: 100% open (provided and controlled by HRU unit internal controls).

C. Unoccupied mode: Unit shall be off.

D. Warm-up mode: Unit shall be off.

E. Frost Control: Controlled by HRU integral controls.

3.05 ELECTRIC HEATERS - SEQUENCE OF OPERATION

A. See Section 230933.

3.06 DAMPERS AT DOAS UNIT

A. General: Interlock Motorized dampers with DOAS unit to open when energized.

3.07 REFRIGERANT LEAK TESTING AND EVACUATION

A. Notification/Witnessing: Prior to beginning any testing, notify the Architect/Engineer when the testing will occur. The Architect/Engineer will witness (at his option) various parts of the test. Failure to notify the Architect/Engineer will be cause to re-test all piping in the presence of a representative of the Architect/Engineer.

B. Disconnect and isolate from the system any components that may be damaged by the test pressure.

C. Connect oil-pumped, dry nitrogen to the system through a pressure reducing gauge manifold. Charge enough nitrogen into the system to raise the pressure to 50 psig. Let stand for 2 hours and check for signs of leakage. If no leakage is noted, slowly increase pressure to 300 psig (or as required by local code, whichever is higher). Tap all brazed connections with a rubber or rawhide mallet sufficiently hard to start any leak that might subsequently open from thermal expansion/contraction or vibration. Check the manifold gauge for any drop in pressure. Let the system stand pressurized for 24 hours. Re-check the manifold gauge. If no change in pressure is noted (after adjusting for temperature) the system may be considered free of leaks.

D. If leakage is suspected or apparent, check joints with a glycerin soap solution or other means to locate the leaks. Repair any leaks found by completely disassembling the connection, cleaning the fitting and remaking the connection. Re-test the system after repairs are made both with pressure (300 psi for 24 hours) and at the leak location with a glycerin soap solution or other means of determining leaks.

E. When the system has been proven free of leaks with the above methods, the system shall be completely evacuated of all air and moisture. Connect a vacuum pump to the system and pump the system down to 500 microns and let stand for a minimum of 2 hours. If the vacuum reading remains unchanged, the system may be charged with refrigerant.

F. After satisfactory pressure testing and vacuum evacuation, fully charge the system with refrigerant. Any final connections that were not subject to the full test pressure (e.g. connections at unit, etc.) shall be carefully checked with a halide or electronic leak detector after the system has been charged.

3.08 START-UP/TESTING AND ADJUSTMENT

A. Initial Checks: Prior to operating units, checks shall be made to insure that adequate voltage, air flow, duct connections, electrical connections, control connections, crankcase heaters (where applicable), and other items as listed by the manufacturer are properly provided/connected and operating to insure safe and proper unit operation.

B. Testing and Adjustment: Manufacturers representative shall provide start-up. Operate unit in various modes of operating to test for proper operation, including fan rotation, proper damper travel (where applicable), proper cooling/heating, correct interface to other controls (time clock, fans, etc.), etc. Make necessary adjustments.

C. System Commissioning: As the systems become operational, the VRF system installer shall test and observe the operation of each and every air moving and heating/cooling unit and shall adjust all controls so that the items function according to the intent of the specifications. The VRF system installer shall commission the VRF system controls, including a point-to-point check of all devices, and provide documentation substantiating the work.

D. Report/Statement: After making all necessary system testing and adjusting, the Contractor shall submit a report to the Engineer indicating all testing/adjustment work done and comment on how system is operating. Such report shall be signed by the individual directly responsible for supervision of the installation of the control system. When the Contractor feels that the system is complete and ready for review by the Engineer, Contractor shall submit a written statement (signed by same individuals as for report) stating that the system is in compliance with the project requirements and ready for review.

3.09 OWNER INSTRUCTION

A. Comply with Section 200500.

B. After all testing and adjustments have been satisfactorily completed, the heat pump owner shall be provided with operator instructions (including start-up, shut-down, emergency, maintenance, and repair instructions) by the manufacturer's authorized service representative.

C. Time Period: Instruction period shall be for a minimum of four (4) hours.

D. Instruction and notification shall comply with Section 200500.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 200500 apply to this Section.

1.02 WORK INCLUDED

A. Electric Heaters

1.03 SUBMITTALS

A. General: Comply with Section 200500.

B. Product Data: Submit product information on all items.

1.04 GENERAL REQUIREMENTS

A. Listing: All heaters shall be listed by an independent testing laboratory for the application indicated.

B. Installation Verification: Prior to ordering units confirm finishes at heater location and type of installation and associated trim required; i.e. fully recessed, semi recessed, surface mount, etc.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Products: Shall comply with Section 200500 Part 2.01 - Acceptable Manufacturers.

B. Wall Electric Heaters: Q-Mark, Chromalox, Berko, Markel.

C. Duct Heaters: Indeeco, Berko, Markel, Q-Mark.

2.02 WALL HEATERS

A. Type: Fan forced commercial duty wall mounted electric heater. Q-Mark CWH Series (or approved).

B. Construction: Unit back box shall be constructed of minimum 20 gauge galvanized steel, with inner frame assembly and heavy gauge steel louvered front cover. Inner frame assembly shall be a heavy gauge steel panel upon which are upon which are mounted all heater operational parts, factory pre-wired. Unit back box shall contain knock outs through which field wiring leads can enter. All exposed portions of unit shall have baked-on enamel white finish.

C. Configuration: For wall surface, recessed, or semi-recessed installation (as shown on plans). Where surface mounted (or semi-recessed) provide with surface mounting frame (or trim kit) so that all exposed surfaces of heater are finished to match the heater front cover.

D. Heating Element: Constructed of 80/20 nickel-chromium resistance wire enclosed in a steel sheath with brazed steel plate fins. Element shall cover the entire discharge area to provide uniform heating of all discharge air.

E. Fan and Motor: Fan shall be low profile multi-blade propeller type, direct connected to motor. Motor shall be totally enclosed, impedance protected, permanently lubricated type.

F. Controls: Fan shall be controlled by bi-metallic, snap-action controller, which shall start fan once element is up to temperature and stop fan after all heat has been dissipated. Over temperature protection shall be by a bi-metallic, snap-action, automatic reset type to shut off heater in the event of overheating. Thermostat shall be integral with unit, operated at face of heater, with 40 to 80 deg F setpoint range.

G. Warranty: Entire heater shall be warranted for 3 years.

2.03 DUCT ELECTRIC HEATERS

A. Type: Open coil type electric duct heaters; of size and capacity as shown on the drawings.

B. Listing: Heaters shall be UL listed for zero clearance to combustibles, and shall be built to meet all requirements of the National Electric Code and NFPA.

C. Construction: Heating coils shall be made of 80% nickel and 20% chromium coiled resistance wire. Coils shall be supported in an aluminized steel frame and insulated by floating ceramic bushings. Heaters shall be of the configuration to suit the application as shown on the drawings.

D. Overtemperature Protection: All heaters shall be equipped with primary and secondary overtemperature safety devices. The primary safety device shall be a disc or liquid filled bulb type with automatic reset; the secondary device shall be a disc type with manual reset, wired in series with each heater stage, set to trip at a higher temperature than the primary safety device.

E. Overcurrent Protection: Fuses shall be provided for overcurrent protection; fuse capacities shall be rated for at least 125% of the circuit amperage.

F. Proof of Air Flow: Where project's control system is the DDC type, and heater is controlled by the DDC, proof of airflow is to be provided via the DDC system; no proof of airflow devices are required to be furnished integral with the heater. For non-DDC control systems or where the DDC control system is not providing heater control, provide heater with differential air pressure device and sensing tube (or sail flow switch), interlocked with the heater to prevent heater operation in case of insufficient airflow across the coil. Differential air pressure device (or sail flow switch) shall have sufficient sensitivity to suit velocity and duct pressures of the application. Configure and arrange differential air pressure device (or sail flow switch) for proper operation as the application requires. Air differential air pressure device shall have a pitot tube on high pressure side installed to sense duct total air pressure; except where heater is used on the suction side of a fan, the air differential air pressure device shall be connected to the low pressure side and be configured sensor to measure static pressure only. Where sensitive enough differential air pressure devices (or sail flow switches) are not available, provide heater with 24 volt relay for interlocking to a fan proof device (i.e. motor starter auxiliary contacts, fan start relay, or equivalent).

G. Terminal Box: All heater controls shall be mounted in a side mounted terminal box, unless a separate remote mounted terminal box is shown on the drawings. Terminal box shall be insulated from the heater casing.

H. Disconnect: Heaters shall be provided with a built-in power disconnect switch, having a terminal door interlock.

I. Controls: Heaters shall be furnished with 24 volt transformer and shall be for use with 24 volt controls unless indicated otherwise. Transformer shall have secondary fusing, and transformers which are not class 2 shall have primary fusing. Mercury control contactors shall be used for controlling heater stages unless indicated otherwise. Where SCR control has been indicated the heater shall be furnished with a solid state proportional power controller allowing modulation of heater capacity from 0 to 100% of full capacity. The SCR control shall energize the heater only for the number of AC cycles necessary to produce the amount of heat required. For heaters with loads greater than 90 amps SCR control combined with a step controller in a vernier configuration (still providing full proportional control) is acceptable. (Backup or safety contactors - where used - shall be magnetic type).

J. Electrical: Heaters shall be for use with electricity of the voltage and phase indicated, and provide the output and number of control stages indicated. Three phase heaters shall have equal balanced three phase circuits. Heater element circuits shall be subdivided so that no circuit load exceeds 48 amperes. All internal wiring shall be suitable for 220 degrees.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Comply with Section 200500. Install in accordance with manufacturer's written instructions, code, applicable standards and best construction practices.

B. Coordination: Coordinate heater power and control requirements with other trades; confirm location of any required heater contactors, relays, thermostats, and similar devices. Provide any required wiring for proof of fan operation between fan devices and heater; wiring shall comply with the HVAC control portion of the specifications and Division 26.

C. Location and Trim Verification: Install equipment at locations indicated in accordance with the Contract Documents. Review and confirm installation locations, that proper clearances are provided, unit controls are accessible, and installation has been coordinated with other trades.

D. Complete Connections: Connect and install all items shipped loose with units; provide and connect all contactors, relays, wiring, interconnections and accessories as required for proper unit operation.

E. Cleaning: Units shall be thoroughly cleaned (internally and externally) of all debris prior to operation. Units shall be clean and in new condition prior to Owner acceptance.

F. Owner Instruction: Instruct Owner on equipment operation and maintenance.

3.02 START-UP

A. Pre Start-Up Inspection: Inspect equipment and connecting systems to confirm equipment and connecting systems to confirm equipment has been installed properly and is ready for start-up. As a minimum, check for: proper voltage and phases, correct electrical connections, complete control connections, all unit safety devices properly set and connected, coils clear of obstructions, and other items as listed by the manufacturer are properly provided/connected and operating to ensure safe and proper start-up. If items are discovered that prevent start-up to be completed, notify the installing Contractor and Engineer of issues. Coordinate and re-schedule start-up after items are corrected.

B. Start-Up: Perform start-up in accordance with manufacturers written start-up procedures. Observe proper operation of all unit components.

C. Adjustments: Adjust and set unit components to allow for proper operation. Observe unit to detect any unusual vibration, leakage, loose wiring, or other situations that could affect unit operation.

END OF SECTION

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PART 1 - GENERAL

1.01 SECTION INCLUDES

A. General requirements specifically applicable to Division 26 in addition to provisions of General Conditions, Supplementary Conditions, Special Conditions, and Division 01.

B. General requirements of this section also apply to Divisions 27 and 28.

1.02 SCOPE OF ELECTRICAL WORK

A. Provide electrical systems and Work described, identified, specified, referenced, and shown in the Project Documents that are covered under Divisions 26, 27, and 28 of the Construction Specifications Institute (CSI) and/or as otherwise regulated by national, state, and local electrical codes. Electrical Work includes providing all equipment, materials, devices, appurtenances, and accessories necessary to provide complete and operating systems according to the intent of Project Documents.

B. Electrical work is not limited to Division 26, 27 and 28 specifications and what is shown on the electrical drawings. The Contractor is responsible to review all Project Documents for additional Electrical Work and requirements and to include this work as part of their scope under the Contract.

1.03 REGULATORY REQUIREMENTS

A. Comply with requirements of the following codes as adopted and supplemented by authority having jurisdiction:

ANSI/NFPA 70 - National Electric Code (NEC)
NFPA 101 - Life Safety Code
International Building Code (IBC)
International Mechanical Code (IMC)
WAC 296-46B - Washington State Electrical Safety Standards, Administration, and Installation
Washington State Energy Code (WSEC)

B. Comply with additional codes and regulations referenced in other sections.

C. Comply with additional codes and regulations required by authority having jurisdiction.

D. Obtain and pay for permits and inspections from authorities having jurisdiction over work included under applicable Division Sections.

E. Include all testing, shop drawings, and documentation required by the inspection authorities for permitting and final approval.

1.04 SUBMITTALS

A. Comply with requirements of Division 01. Unless otherwise specified, furnish product data and shop drawings to Architect/ Engineer within 30 calendar days from date of contract signing as follows:

1. Product information sheets shall be neat, readable, 8.5 x 11 inch, submitted in PDF format. Generic product sheets with multiple products or product descriptions shall clearly highlight or otherwise indicate which product is being

furnished.

2. Furnish product submittals with index tabs between categories or in separate submittals that correspond to each section of the specifications. Transmittal shall indicate name of the Project, Owner, Architect, Engineer, Contractor, and Date of Submittal.

3. Furnish system design shop drawings in PDF format. Title block shall include Project, Owner, Contractor, and Date of Submittal.

4. Furnish product data and shop drawings specifically indicating any conflict or deviation from requirements of contract documents.

B. Confirm dimensions, ratings, and specifications of electrical materials, devices, fixtures, and equipment conform to project requirements prior to furnishing submittals. Coordinate electrical requirements with utilization equipment submitted under other sections and verify that voltage, phase, and rating are compatible with work shown in the electrical project documents.

C. Provide shop drawings showing proposed feeder and branch circuit wiring plan required under Section 260500.

D. Do not order materials or commence Work until applicable submittal has been reviewed and the Architect/Engineer has approved or taken other appropriate action.

1.05 SUBSTITUTIONS

A. Comply with requirements of Division 01. Products specified by naming one or more manufacturers establishes a basis for quality, styling, capacity, and function. Unless otherwise specified, written requests for substitution must be received at least 14 days prior to Bid Opening by Architect/Engineer who will determine acceptability of proposed substitution. Written acceptance must be obtained from Architect/Engineer prior to Bid Opening.

B. Substitution requests may be submitted for any manufacturer or named product unless specified as "no substitute".

C. Substitution approval does not relieve the Contractor of complying with the work requirements or the concept and intent of the project documents. Pay for any and all additional project costs that may be caused by Contractor requested substitutions, regardless of whether or not additional costs are overlooked, missed, or unforeseen, and regardless of when substitutions may be approved.

1.06 RECORD DOCUMENTS

A. Comply with requirements of Division 01. Maintain at project site one set of clean, dry, and legible red-lined record drawings for submittal at Contract Close-out. Record information concurrently with construction progress.

B. Indicate electrical changes in the contract documents. Include change orders, revised branch circuit and feeder wiring layouts, revised circuit identification, pull & junction boxes added during construction, and actual dimensioned location and routing of each underground conduit on record drawings.

C. Record branch circuit routing, switch legs, equipment connections, and home runs on the

power and lighting plans. Indicate conduit size, wire counts, and conductor size if greater than a #12 2-wire branch circuit or feeder.

1.07 LABELING

A. Where labeling that includes room names and numbers is required for any system to identify devices or for programming purposes, use final room names and numbers determined during construction. Verify room names and numbers with Architect prior to manufacturing labels or programming software.

1.08 OPERATION AND MAINTENANCE MANUALS

A. Comply with requirements of Division 01. Unless otherwise specified, furnish one labeled CD in PDF format and two duplicate hard copy printed sets of Operation and Maintenance Manuals prior to completion of contract. Submit hard copy manuals in labeled and indexed 3-ring binder(s).

B. Include the following information as applicable:

1. Names, addresses, and telephone numbers of the contractor, the installing sub-contractor, and the local representative for each system or equipment.

2. All approved product data and shop drawings.

3. Identify all manufacturer warranties which exceed one year.

4. Model number and serial number of each piece of equipment provided.

5. Data from test results performed under the Contract.

C. Operation and maintenance data shall include complete parts lists, installation and maintenance instructions, safety precautions, operation sequence describing start- up, operation, and shut-down, internal and interconnecting wiring and control diagrams with data to explain detailed operation and control, and testing methods for each system and item of equipment.

D. Furnish a draft copy of Operations and Maintenance Manual for Architect/Engineer review and incorporate comments prior to final submittal. Allow 14 days for Architect/ Engineer review.

1.09 CONFLICTS

A. Notify the Architect/Engineer of any conflicts or discrepancies before proceeding with any work or the purchasing of any materials related to the conflict or discrepancy until requesting and obtaining written instructions from the Architect/Engineer on how to proceed. Where conflicts occur, the most expensive and stringent requirement as judged by the Architect/Engineer shall prevail. Any work done after discovery of such discrepancies or conflicts and prior to obtaining the Architect/Engineer's instructions on how to proceed shall be done at the Contractor's expense.

1.10 WARRANTY

A. In addition to requirements covered under General Conditions or Division 01, include manufacturer product warranties that exceed one year. Assemble or list warranties that exceed one year in Operation and Maintenance Manuals indicating start date.

Certificates of extended warranty shall identify the Owner as the beneficiary.

B. If the Electrical Contractor does not have offices located within 150 miles of the project, provide a service/warranty work agreement with a local electrical subcontractor approved by the Owner. The service/warranty work agreement shall extend for the contract warranty period, and a copy shall be included in the Operation and Maintenance Manuals.

1.11 INTENT OF PROJECT DOCUMENTS

A. Drawings and specifications are complementary and what is called for in either is binding as if called for in both.

B. The drawings are diagrammatic and show the general arrangement of the construction and do not attempt to show all features of work, exact construction details, or actual routing of conduit and cable. Provide all necessary supports, off-sets, bends, risers, fittings, boxes, wiring, and accessories which are required for a complete and operating installation. Determine locations for required electrical outlets and connections prior to rough-in base on equipment product and installation submittal data and/or review of equipment on site.

C. The level of design presented in the documents represents the extent of the design being furnished to the Contractor; any additional design needed to perform the Work shall be provided by the Contractor. All design by the Contractor shall be performed by individuals skilled and experienced in such work, and where required by local code (or elsewhere in the documents) shall be performed by engineers licensed in the State where the project is located. Include in bid the costs of all such project design; including engineering, drafting, coordination, and all related activities and work. Contractor provided design services shall be included for but not limited to bidder design specifications, temporary electrical systems, layout routing to install the Work and share project space with other building systems, hanger and support systems, seismic bracing, preparation of shop drawings, locating and identifying requirements for equipment and fixture terminations, and methods/means of accomplishing the work.

1.12 COORDINATION

A. Examine architectural, civil, structural, and mechanical drawings and specifications and consult with other trades, as required to coordinate use of Project space and sequence of installation.

B. Arrange wiring and equipment to avoid interference with other work and to maximize accessibility for maintenance and repairs.

C. Coordinate with suppliers and installers to obtain product electrical data, shop drawings, and installation requirements for systems, equipment, and products furnished by Owner and/or other trades as required perform electrical work.

D. Contractor is responsible ensure that equipment, fixtures, and devices being furnished and installed shall fit the space available, taking into account connections, service access, and clearances required by product manufacturer and/or Code. Contractor shall make the necessary field measurements to ascertain the space requirements for proper installation, and shall furnish and/or install equipment so that final installation meets the intent of the Project Documents. If approval is received by Addendum or Change Order to use other than the originally specified items, Contractor shall be responsible for specified capacities and for ensuring that items to be furnished will fit the space available.

E. Contractor is responsible to review all the Project Documents and approved shop drawings provide under other divisions to identify and resolve conflicts between electrical systems and building construction, equipment, cabinets, counters, trim, and special finishes, prior to rough-in.

F. Facilitate coordination between low voltage system sub-contractors during construction. Include time for a minimum of one meeting with all sub-contractors prior to building rough-in to review requirements for each system per Section 260530. Include a second meeting with all sub-contractors to review requirements for all systems utilizing IP structured cabling prior to cover.

1.13 REQUIREMENTS FOR EQUIPMENT FURNISHED UNDER OTHER SECTIONS OR BY OWNER

A. Provide power wiring, disconnect switches, electrical connection of equipment, installation of furnished electrical controllers, parts, and accessories, and field wiring for systems, equipment, and products furnished under other divisions or by Owner. Install controllers, operator stations, and control devices such as limit and temperature switches furnished with equipment.

B. Review equipment submittals prior to electrical rough-in and installation. Verify location, rating, size, type of connections, and required space requirements. Coordinate field wiring requirements and details with supplier and installer. Notify Architect/Engineer of conflicts between requirements for actual equipment being furnished and equipment indicated in contract documents prior to commencing Work.

C. Provide motor controllers and operator stations unless otherwise indicated on the project drawings.

D. Make final connections to equipment. Provide cord and plug where required for plug-in connection.

E. Integrated automation systems covered under Division 25 are not included as part of electrical work.

1.14 DEFINITIONS

A. Electrical terms used in these specifications are as defined in NEC Art. 100 unless otherwise noted.

B. Abbreviations: Where not defined elsewhere in the Contract Documents, shall be as defined in RS Means Illustrated Construction Dictionary.

C. Accessible Ceiling: Signifies access that requires the removal of an access panel or similar removable obstruction.

D. As Required: As necessary to form a safe, neat, and complete working installation (or product), fulfilling all the requirements of the specifications and drawings and in compliance with all codes.

E. Concealed: Hidden from view as in walls, trenches, chases, furred spaces, crawl spaces, unfinished attics, and above suspended ceilings.

F. Conduit: Includes conduit and tubing raceways.

G. Coordinate: Accomplish the work with all others that are involved in the work by directly discussing the work with them, arranging and participating in special meetings with them to discuss and plan the work being done by each, obtaining and completing any necessary forms and documentation required for the work to proceed, reaching agreement on how parts of the work performed by each trade will be installed relative to each other both in physical location and in time sequence, exchanging all necessary information so as to allow the work to be accomplished with a united effort in accordance with the project requirements.

H. Equipment Connection: Make branch circuit connection, mount and connect control devices as required. Provide disconnect and overcurrent protection when required by NEC and IMC, if not otherwise indicated or furnished with equipment.

I. Exposed: Exposed to view in any room, hallway, passageway or outdoors.

J. Finished Areas or Spaces: Areas and/or spaces receiving a finish coat of paint on one or more wall surface.

K. Furnish: Obtain and/or prepare and deliver to the project.

L. Indicated: Shown, scheduled, noted, or otherwise called out on the drawings.

M. Install: Enter permanently into the project complete and ready for service.

N. Open Cable or Wiring: Conductors above grade not installed in conduit or raceway.

O. Panel: Distribution panelboard, lighting and appliance panelboard, load center, and/or low voltage cabinet.

P. Provide: Furnish and install complete and ready for service.

Q. Wiring: Conductors in raceway or an approved cable assembly.

R. Verify: Obtain, by a means independent of the project Architect/Engineer and Owner, the information noted and the information needed to properly perform the work.

1.15 SCHEDULE OF VALUES

A. Provide Schedule of Values for use by Architect/Engineer to evaluate progress payment requests during construction.

B. Submit Schedule of Values using the line items included at the end of this Section. Include additional line items as requested.

PART 2 - PRODUCTS

2.01 MATERIALS, EQUIPMENT

A. General: Furnish only products that are new and free from defects with a manufacture date that is less than six months from date of installation. Where product and applicable software updates or upgrades are available from the manufacturer, furnish the latest version unless otherwise specified. Furnishing discontinued products and/or products of manufacturers who are no longer in business is not permitted.

B. Listing and Labeling: Furnish and install only products that are listed and labeled by one or more of the following testing laboratories as approved by the Authority Having Jurisdiction:

Underwriter's Laboratories, Inc.	(UL)
ETL Testing Laboratories, Inc.	(ETL)
Factory Mutual	(FM)

C. Each specified product and system to be furnished shall be from a single approved manufacturer. Providing multiple product brands or manufacturers for each type or category, or for multiple units of the same specified product and/or system, is not permitted.

D. Products shall be delivered, handled, and stored per manufacturer recommendations. Protect fixtures, materials, and equipment from rain, water, dust, dirt, snow, and damage. Do not install products that have marred, scratched, deformed, or otherwise damaged. Do not install products that have been wet or exposed to the weather prior to assembly and/or installation.

PART 3 - EXECUTION

3.01 WORKMANSHIP

A. Electrical work shall conform to requirements of ANSI/NECA 1-2015, Standard Practice of Good Workmanship in Electrical Construction.

3.02 INSTALLATION

A. Provide all electrical work as specified and shown in the Project Documents. Provide all labor, equipment, material, accessories, and testing for electrical systems complete and operating. Include all scaffolding, rigging, hoisting, and services necessary for delivery and installation of materials and equipment.

B. Include all required software applications, licensing and associated system programming for electronic products. Provide all software to owner for onsite programming and interfacing

C. Provide as part of the Electrical Work all hangers, brackets, supports, framing, backing, accessories, incidentals, not specifically identified the project documents, but required to complete the system(s) in a safe and satisfactory working condition.

D. Quantity of materials and layout of the Work shall be provided based on field measurement of the actual project conditions and shall not be based on plan dimensions.

E. Provide all testing and documentation of electrical systems as required to demonstrate compliance with the Project Documents.

F. Provide testing, documentation, and filing required to comply with commissioning requirements of Section C408 of the Energy Code. Include documentation in Operation and Maintenance Manuals.

3.03 CUTTING AND PATCHING

A. Provide cutting and patching to complete electrical work and to provide openings in

elements of Work for electrical penetrations. Comply with requirements of Division 01.

B. Locate and execute cuts so as not to damage other work or weaken structural components. Core drill or saw cut rigid materials.

C. Patch to restore to original condition. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

Division 26, 27 and 28 Schedule of Values

Mobilization and Temporary Facilities
Utility Company Charges
Electrical Site Work
- Lighting Systems Rough-in (Conduit, Handholes, Wire, Pole Bases - Material & Labor)
- Lighting Fixtures & Poles (Material & Labor)
- Power & Signal Rough-in (Conduit, Vaults, Wire - Material & Labor)
- Transformers, Switchgear (Material & Labor)

Lighting Systems
- Fixtures & Lamps Material
- Fixtures & Lamps Labor
- Branch Circuit Rough-in (Conduit and Wire - Material & Labor)
- Devices and Trim (Material & Labor)

Power Systems
- Distribution Equipment Material (Switchgear, Panels, Transformers, Starters, TVSS, Disconnects)
- Distribution Equipment Labor
- Feeder Rough-in (Distribution Conduit and Wire - Material & Labor)
- Branch Circuit Rough-in (Conduit and Wire for Devices- Material & Labor)
- Devices and Trim (Material & Labor)
- Equipment Circuit Rough-in (Conduit and Wire for Scheduled Equipment - Material & Labor)
- Equipment Connections (Material & Labor)

Signal Systems
- Fire Alarm Rough-in (Conduit and Wire - Material & Labor)
- Fire Alarm Trim (Equipment, Devices, Testing - Material & Labor)
- Telecommunications Pathway (Material & Labor)
- Telecommunications Premises Wiring (Material & Labor)

Electrical Closeout (Punchlists, O&M Manuals, Record Drawings, Training)

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Conduit and Fittings

B. Surface Metal Raceway

C. Building Wire and Cable

D. Wiring Connections and Terminations

E. Boxes

F. Wiring Devices

G. Supporting Devices

H. Cable Tray

I. Requirements for Fire Rated Construction

J. Earthwork for Underground Electrical

1.02 RELATED SECTIONS

A. Excavation and Backfill for Underground Conduit: Comply with Division 31 - Earthwork.

B. Concrete for Encased Conduit: Comply with Division 03 - Concrete.

C. Materials and Methods for Utility Services: Comply with Section 260580.

1.03 SUBMITTALS

A. Submit product data for conduit fittings, wire and cable, watertight connectors, wiring devices, floor boxes, cord reels, smoke detectors, and cable tray.

B. Submit shop drawings for installation of cable tray, including wire basket type.

C. Submit reports for tests required under Part 3 of this section.

1.04 OPERATION AND MAINTENANCE DATA

A. Include data for wiring devices, floor boxes, smoke detectors, and cable tray in Operation & Maintenance Manuals.

1.05 SPARE PARTS

A. Concealed Service Floor Box Cover Assemblies: Provide to owner (3) each flush cover and carpet flange.

B. Concealed Service Floor Box Service Plates: Provide to owner (3) each duplex knockout, voice/data, blank single receptacle, and rectangular opening.

C. Flush Service Floor Box Cover Assemblies: Provide Owner (3) each device plates and carpet flanges for both power and signal (six sets total).

PART 2 - PRODUCTS

2.01 CONDUIT

A. Rigid Steel Conduit (RGS): ANSI C80.1; hot dipped galvanized.

B. Intermediate Metal Conduit (IMC): Hot dipped galvanized.

C. Electric Metallic Tubing (EMT): ANSI C80.3; galvanized tubing.

D. Flexible Metal Conduit: Galvanized steel. Heavy wall except reduced wall may be used where concealed in building construction.

E. Liquid Tight Flexible Metal Conduit: Galvanized steel, PVC jacket.

F. Non-Metallic Conduit: NEMA TC 2; EPC-40-PVC [and EPC-80- PVC].

2.02 FITTINGS

A. RGS and IMC Conduit: ANSI/NEMA FB 1; threaded type. Provide bushings, hubs and connectors with insulated throat, for conduit terminations.

B. EMT Conduit: ANSI/NEMA FB 1; steel, compression type. Crimp-on, drive-on, indenter, and set screw type prohibited. Provide connectors with insulated throat for conduit larger than 3/4 inch diameter. Provide raintight fittings for conduit installed outdoors.

C. Flexible Conduit: ANSI/NEMA FB 1; steel, single screw squeeze type.

D. Liquid tight Flexible Conduit: ANSI C33.84, steel. Provide PVC coated fitting where installed outdoors.

E. PVC Conduit: NEMA TC 3; solvent welded type, same manufacture as conduit. Provide bushings, hubs and connectors with insulated throat, for conduit terminations.

F. Water and Vapor Conduit Sealants: Hydra-Seal S-50 conduit sealing putty or approved; Tyco/Rachem/TE blank duct plug or approved; Polywater FST conduit sealing foam system or approved.

G. Metal-Clad Cable: ANSI/NEMA FB 1; steel, single screw squeeze type with insulated throat.

H. Expansion Fittings for PVC Conduit: Same manufacture as conduit.

I. Hazardous Locations: UL886; Crouse-Hinds, Appleton, O-Z/Gedney.

J. Corrosion Protection: Zinc plated minimum indoors and hot dipped galvanized minimum outdoors and indoor wet locations for all metal fittings and accessories except use PVC coated or stainless steel for chlorine treatment rooms, agricultural buildings, within 100 feet of shoreline, and other corrosive environments.

2.03 WIRE MANAGEMENT SYSTEMS

A. One-Piece Surface Metal Raceway (SMR): Wiremold or approved, steel surface raceway system sized for number of wires, complete with fittings, supports and accessories designed or recommended by product manufacturer. Ivory finish unless otherwise noted.

B. Two-Piece Surface Metal Raceway (SMR): Wiremold or approved, steel surface raceway system complete with divider, fittings, supports, and accessories designed or recommended by product manufacturer. Suitable for fiberoptic cables. Provide 4000 series with 4050 series thermoplastic overlapping device covers to match wiring devices installed unless otherwise noted. Ivory finish unless otherwise noted.

C. Multi Outlet Plug Strip Assemblies: Wiremold Plugmold systems or approved, type as noted complete with fittings, supports, and accessories designed or recommended by product manufacturer. Ivory finish unless otherwise noted.

D. Miscellaneous Wire Management System(s): Wiremold or approved, type as noted complete with fittings, supports, and accessories designed or recommended by product manufacturer. Ivory finish unless otherwise noted.

2.04 WIRE AND CABLE

A. Copper Building Wire, Interior: Type THWN-2, 600 volt insulation; conductors 8 AWG and larger shall be stranded. Type XHHW-2 may be substituted for conductor sizes 4 AWG and larger.

B. Copper Building Wire, Outdoors: Type RHW/USE-2, 600 volt insulation; conductor 8 AWG and larger shall be stranded.

C. Fire Rated Building Wire: Type RHH or RHW-2, UL2196, 600 volt insulation, copper conductor, UL classified 2-hour rated cable when installed in approved steel conduit system. Type RHH may be used only in dry locations.

D. Flexible Cords: Oil resistant thermoset insulated Type SO multi-conductor with identified equipment grounding conductor, sized for connected load of equipment and rating of branch circuit overcurrent protection.

E. Metal Clad (MC Cable): UL 1569; #12 AWG copper conductors, 600 volt 90 degree C rated conductor insulation, phase identified, with green insulated copper grounding conductor and steel outer covering. Include neutral conductor for switch legs per NEC 404.2(C). Provide PVC jacketed MC cable listed for the purpose where used in damp or wet locations or where otherwise indicated.

F. Cord Sets for Electric Ranges: Four conductor, 50 ampere (NEMA 14-50), 6 feet long.

2.05 WIRE CONNECTORS

A. Connectors for Wire Size 10 AWG and Smaller: Insulated steel spring twist-on pressure connector with plastic cap. Outdoors use watertight type with prefilled sealant gel.

B. Connectors for Wire Size 8 AWG and Larger: Solderless mechanical or compression type with pre-formed or shrink sleeve insulated cover. Outdoors make watertight using shrink sleeve or pigtail cap and sealing mastic.

C. Outdoor Taps Below Grade for Wire Size #6 AWG and Larger: Ilsco PED series underground multi-tap, wire range and number of ports as required.

D. Gutter/Wireway Taps for Wire Size #6 AWG and Larger: Ilsco type PDB series AL/CU lug type distribution block, number of poles and quantity/size of primary/secondary lug ports as required for the application.

E. Connectors at Pole Bases: WSDOT Spec 9-29.7; waterproof quick-disconnect. Provide fused type for ungrounded conductors.

2.06 BOXES

A. Outlet Boxes: ANSI/NEMA OS 1; galvanized sheet steel, with 1/2-inch male fixture studs or plaster rings as required.

B. Surface Outlet Boxes Below 8 Feet: Cast aluminum or malleable iron, threaded hubs.

C. Surface Outlet Boxes for Outdoor and Wet Locations: Cast aluminum with baked enamel or epoxy finish, gasketed cover, stainless steel hardware. Outlet boxes shall have threaded hubs.

D. Concrete and Masonry Boxes: Galvanized steel, suitable for the purpose.

E. Junction and Pull Boxes: Outlet box with blank cover except boxes larger than 4-inch square shall be screw cover type, galvanized steel with grey enamel finish, NEMA 1 indoors and NEMA 3R outdoors, unless otherwise indicated.

F. In-Ground Boxes: Concrete [structural plastic] type with locking cover. Provide traffic ratings, dimensions, features, and installation requirements indicated.

G. Concealed Service Floor Boxes: Hubbell HBLCFB series for concrete floors, with steel flush cover/carpet flange assembly, listed for scrub water exclusion. Provide 301 base for maximum 4-gang device applications. Where large capacity box is indicated, provide 501 base for maximum 8-gang applications.

H. Flush Service Floor Boxes: Hubbell 2536 series, concrete tight, cast iron, adjustable. Finish as specified under service fittings.

I. Flush Service Floor Boxes, Wood Floors: Hubbell 2588 series non adjustable. Finish as specified under service fittings.

J. Fire Rated Construction: Recessed outlet boxes and rough-in cans that are installed in 2 hour rated area separation walls shall be UL listed with 1 ½ hour rating label.

K. Barriers: Provide permanent barriers in outlet boxes to separate adjacent wiring devices where voltage exceeds 300 volts. Provide permanent voltage separation barriers in outlet and junction boxes to separate wiring above 100 volts from wiring below 100 volts and where otherwise required by Code.

L. Color Coding of Device and Junction Boxes for Special Systems: Field painted or otherwise manufactured in the specified color, both inside and outside of box and cover. Provide color identification for the following electrical systems: Fire Alarm System - RED, Emergency Systems (NEC 700) - ORANGE.

M. Sound Attenuation Wrap: UL listed, 0 VOC, sound attenuating wrap for sealing around outlet boxes. SpecSeal SSP Putty Pad or approved.

2.07 WIRING DEVICES

A. Wall Switches: Hubbell 1221, Leviton 1221, Pass & Seymour 20AC1, Cooper 2221; specification grade, 20 ampere, 277 volt, quiet type. Single pole, double pole, 3-way, 4-way as required. Color: Ivory.

B. Wall Switch with Integral Pilot Light: Hubbell 1221-PLG, Leviton 1221-PLG, Cooper 1221-PLG, Pass & Seymour 20ACI-GPL, specification grade, 20 ampere, 120 volt, quiet type, single pole, 1 horse-power rated, green pilot light illuminates when switch is on. Color: Ivory.

C. Wall Switches, Key Type: Leviton 1221 with 55500 key, no substitute.

D. Duplex Receptacles: Specification grade 5362 series, NEMA 5-20R, grounding type, Decora style, as manufactured by Hubbell, Leviton, Pass & Seymour, Cooper. Color: White.

E. Receptacle assemblies face up located in Counter Tops and Work Surfaces: Same manufacturer, rating, and style as specified for duplex or GFCI receptacles except receptacle assemblies shall be listed for the application.

F. Duplex Receptacles, Controlled: Same manufacturer, rating, and style as specified for duplex receptacles except devices shall have special purpose identification symbol and permanently marked with the word “controlled” visible on face of each receptacle automatically controlled. Color: as selected. Automatic control devices for receptacles are specified under Section 260920, Lighting Controls.

G. Ground Fault Circuit Interrupter (GFCI) Receptacles: Same manufacture, rating, and color as duplex receptacles except devices shall comply with UL 943, Class A, with self test.

H. Duplex Receptacles, Weather Resistant for Damp and Wet Locations: Same manufacture, rating, and color as duplex and GFCI receptacles except devices shall be UL listed as weather resistant and permanent special purpose identification shall be visible on the device.

I. Special Purpose Receptacles: NEMA WD 5, same manufacture as duplex receptacles; premium specification grade, grounding type, NEMA configuration as indicated on project plans, black color. Provide matching plug for each receptacle.

J. Pin & Sleeve Generator Connectors: UL 1682 and UL 1686; Multi-contact, industrial grade, arc-quenching, circuit interrupting, water tight, style II (grounded pole) pin and sleeve connector system. Provide 55 degree angled outlet [inlet] with self closing spring cover, matching back box, and matching connector. Ampere rating and voltage configuration as indicated on project drawings. Cooper Crouse-Hinds, Hubbell, Appleton, or approved.

K. Flush Mounted Device Plates: Super heavy duty for high abuse application, rigid high impact thermoplastic, smooth finish, color to match device. Thermoset, phenolic, urea, nylon, and flexible polycarbonate not approved. Cooper PJ series manufacture or approved.

L. Surface Mounted Device Plates: Raised galvanized steel on steel boxes; cast or stamped sheet aluminum on cast boxes.

M. Damp and Wet Location Device Plates: ANSI/UL 514D; Commercial grade, low profile, lockable, die cast metal cover assembly, listed as weatherproof when in use and identified as extra duty. Hubbell/TayMac MX series or approved.

N. Work Station Outlet Plates: Provide one manufactured system device plate for each outlet gang position (power, signal, or blank) as indicated, color to match outlet trim. Coordinate signal plate configuration with Owner.

O. Floor Box Service Fittings, Concealed Service: Screw type modular face plates offered by product manufacturer, configuration to match wiring devices provided. Provide blank plates for unused outlets. Provide raceway connection between outlets on opposite side of the box where required to meet application requirements.

P. Floor Box Service Fittings, Flush Service: Polished brass [Brushed aluminum] device plates with matching carpet flange. Receptacle outlets shall have [single or duplex screw caps] single or duplex hinged lift flaps to match device, listed for scrub water exclusion. Signal outlets shall have [combination 3/4" and 2" diameter screw cap] hinged lift flap.

Q. Cord & Plug Connectors: Hubbell Insulgrip, Leviton Spec-Master, Slater Metalist series, GE Gator Grip; premium specification grade grounding type cord connector and matching plug, NEMA configuration indicated. Provide with weatherproof boot in damp and wet locations.

2.08 CABLE TRAY FOR COMMUNICATIONS AND SIGNAL CIRCUITS

A. MDF/IDF Room Cable Tray: NEMA VE 1, class 12A, aluminum open ladder type with 9 inch rung spacing; 3 inch deep with side rails.

B. Distribution Cable Tray: NEMA VE 1; high strength welded steel 2 inch x 4 inch pattern wire mesh basket type tray, pre-galvanized zinc or zinc plated with clear sealer, 4 inch deep x 12 inch wide unless otherwise indicated. Chalfant VersaTray, Cooper B-Line WB Series, GS Metals Flextray, or approved.

C. Accessories: Provide manufacturer's standard elbows, tees, clamps, connectors, splice plates, hangers, brackets, supports, and attachments. Elbows and tees shall have 24 inch radius.

D. Wall Sleeves: Galvanized steel wall sleeve accessory, flanged each end, and sized to accommodate cable tray installed.

2.09 SUPPORTING DEVICES

A. Metal Conduit Clamps & Straps: Steel, screw type; zinc or cadmium plated minimum indoors, hot dipped galvanized minimum outdoors.

B. Support Channel: Slotted 12-gauge steel channel with fittings, fasteners, brackets, clamps, floor plates, and accessories required; Pre-galvanized zinc coated (G90) indoors, ASTM 123 hot dipped galvanized outdoors.

C. Fasteners: Expansion anchors in concrete and solid masonry; toggle bolts in hollow masonry, plaster, or gypsum board wall construction; sheet metal screws in metal construction; wood screws in wood construction; set screw type beam clamps on steel columns and beams; U.L. listed clips for metal studs. Metal parts and accessories to be zinc or cadmium plated minimum indoors and hot dipped galvanized minimum outdoors.

D. Support Wires: Support wires above accessible ceiling grids, steel #12 AWG minimum.

E. Roof Supports: Free standing, stackable, 7.5 inch square, one piece molded PVC pipe support with U shaped rolling cradle, MIRO Industries Pillow Block #24-R.

F. Corrosive Environments: Use stainless steel rods, fasteners, clamps, straps, and hardware for [chlorine treatment rooms, agricultural buildings, within 100 feet of shoreline, and other corrosive environments. Support channel shall be PVC coated.

2.10 ACCESSORIES

A. Air-Vapor Barriers:

1. Pre-molded polyethylene box installed in all exterior framing walls (thermal envelope) around recessed outlet boxes. Lessco or equal.

2. Foam electrical outlet gaskets for installation between device plate and finished outlet. Conceal behind device plate. Outlet gaskets or equal.

B. Pulling Wire:

1. Interior; continuous fiber pulling line, 190# tensile strength.

2. Below grade; Polyester measuring pulling tape 5/8 inch wide, 1800# tensile strength. Muletape.

C. Warning Tape: 6 inch wide detectable underground warning tape, black lettering, on red background for high voltage, yellow background for medium voltage and general utility, orange background for low voltage, with wording to describe buried installation.

D. Corrosion Protection Metal Conduit Tape: 3M Scotchrap 10 mill PVC All Weather Corrosion Protection 50 tape and pipe primer system, or approved.

2.11 FIRE RATED CONSTRUCTION

A. Products for Fire Stopping to Seal Around Enclosures and Annular Space between Conduit and Building Construction at Conduit Penetrations: ANSI/UL 1479; Comply with requirements of Division 07.

B. Conduit Sleeves for Open Cable: ANSI/UL 1479; Fire stop conduit sleeve kit, with mounting escutcheons, gaskets, end bushings, warning labels, and non-hardening fire stop putty. SpecSeal READY SLEEVE, FS100 (1 inch diameter sleeve) and FS200 (2 inch diameter sleeve), or approved.

C. Pathway Sleeves for Open Cable, Greater than 2 Inch Diameter: ANSI/UL1497; Fire stop rectangular sleeve kit, 3-inch wide by 3-inch high by 10.5-inch length, expandable in 6-inch increments, self-contained integral fire sealing system that automatically adjusts to the installed cable loading. Provide radius control modules (each end of pathway), single or multiple gang wall kits, and expansion modules as required. Specified Technologies, Inc., EZ-Path System Series 33 or approved.

PART 3 - EXECUTION

3.01 WIRING METHODS

A. General:

1. Fixed wiring shall be conductors installed in conduit except where cable is specifically permitted in this specification.

2. Conceal all wiring within construction unless otherwise noted on drawings or specifically authorized by the Architect/Engineer.

3. Where contractor wiring methods require the application of conductor ampacity adjustment or correction factors under NEC 310.15, the contractor shall submit calculations that show Code compliance, except the adjusted ampacity of the conductors installed shall not be less than the circuit overcurrent device rating shown or specified.

4. Conduit sizes shall not be reduced to smaller size than shown or otherwise noted on plans.

5. Feeders shown or otherwise noted on plans shall not be combined to share a common conduit homerun. Branch circuit homeruns shown or otherwise noted on plans shall not be combined to share a common conduit with other circuits.

6. Device Plates: It is the electrical contractor's responsibility to ensure that all line voltage and low voltage system faceplates and visible trim pieces are the same color. Exception: Where stainless steel device plates are used for line voltage systems, low voltage systems may use non-metallic plates of the same color.

B. Conduit Requirements:

1. Rigid Steel Conduit (RGS): May be used in all areas. Required at penetrations thru fire rated construction rated greater than 1 hour and where wiring is located in hazardous (classified) locations.

2. Intermediate Metal Conduit (IMC): May be used in all areas except where RGS is required or indicated.

3. Electrical Metallic Tubing (EMT): May be used in dry and damp locations where not subject to damage. May not be used in concrete, where in contact with earth, or where RGS is required or indicated. May not be used for service entrance conductors inside a building. Maximum trade size 2 inches.

4. Flexible Conduit: May be used concealed in casework and where concealed in walls, up to 1 inch maximum trade size. Required for final equipment connections (maximum length 36 inches), to recessed lighting fixtures from an outlet box (maximum length 72 inches), and where raceway passes thru seismic joints. Use liquid tight in damp or wet locations.

5. Rigid Non-Metallic Conduit (PVC): May be used underground. May be used within buildings where encased in not less than 2 inches of concrete. Terminate inside building using RGS or IMC elbow and riser to first coupling above slab on grade.

6. Corrosive Environments: Use RGS conduit with 40 mil PVC exterior coating and urethane interior coating where exposed in [chlorine treatment rooms, agricultural buildings, within 100 feet of shoreline, and other corrosive environments.]

C. Wire and Cable Requirements:

1. Use copper conductors.

2. Metal Clad (MC) Cable: May only be used for fixture whips and for branch circuit wiring where concealed in walls between wiring devices in finished spaces of 300 SF or less, and extending no more than 72 inches to first junction box in a crawl space or above an accessible ceiling. May not be used for branch circuit homeruns, feeders, or services. May not be used in mechanical ducts or fabricated air plenums. May not be used for any portion of a homerun to a single outlet or device. May not be used in concrete or below concrete slabs on grade. May not be used between floors.

3.02 SUPPORT - GENERAL

A. Support wiring, conduit, raceways, boxes, equipment, and fixtures from building structural members. Provide additional framing, channel, or listed support attachments as required to span or support between structural members and to avoid interference from pipes, ducts, and other equipment.

B. Do not install support anchors to penetrate thru roof deck.

C. Do not violate the integrity or exceed the capacity of the building structure used for support. Provide/fabricate additional support elements to transmit loads to the floor or other parts of the building structure that can carry the load as approved by the Architect/Engineer.

3.03 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

A. Minimum conduit trade size 1/2-inch diameter except all homeruns and where installed below grade outdoors conduits shall be 3/4-inch minimum diameter. Prewired 3/8 inch diameter flexible conduit not to exceed 72 inches in length may be used for fixture whips from an outlet box to recessed light fixture.

B. Arrange conduit to maintain headroom and present a neat appearance.

C. Route conduit parallel and perpendicular to walls and adjacent piping.

D. Maintain 12-inch clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.

E. Locate holes in joists within center third of member depth measured from the edge and at least 24 inches from load bearing points. Maximum hole diameter one inch.

F. Support conduits from building structure with conduit straps or rods and hangers. #8 solid wire and CADDY clips may be used to hang 3/4-inch diameter conduit and smaller above accessible ceiling spaces.

G. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.

H. Do not support conduit with perforated pipe straps or tie wraps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.

I. Do not bore holes in truss members or notch structural members.

J. Steel conduit installed as part of a 2 hour fire rated wiring assembly shall be supported 5 feet on center where required by the cable system installation requirements.

3.04 CONDUIT INSTALLATION

A. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes and for fastening conduit to sheet metal boxes in damp locations.

B. Use conduit bodies to make sharp changes in direction, as around beams.

C. Use factory elbows for PVC conduit and for bends in metal conduit larger than 1 inch. Conduit bends for signal systems that are greater than 45 degrees shall be minimum radius sweeps as follows:

Under 2 inches	Standard radius
2 inches - 3 inches	24 inch radius
Over 3 inches	36 inch radius

D. Use factory RGS elbows for PVC conduit runs below grade.

E. Install insulated bushings on each end of conduit larger than 1 inch.

F. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.

G. Install pull wire in empty conduits.

H. Conduit in Concrete Slabs Above Grade: Do not install in concrete slabs above grade except where written approval and installation requirements are provided by the Architect/Engineer.

I. Metal Conduit Installed Below Grade: Provide 20 mil thick factory PVC coating or field wrapped using corrosion protection tape and primer system with 50 percent wrap overlap; extend 8 inches above grade at risers.

J. Conduit Below Concrete Slabs On Grade: Install at minimum depth required for vertical penetration of radius bend at conduit risers, except install at minimum 48 inch depth for power systems above 600 volts and for feeders below 600 volts and rated 1000 amps and larger. See paragraph Earth Work for Underground Electrical under this section for thermal backfill requirements.

K. Underground Conduit for Site Power (Below 600 Volts) and Signal Systems: Install to provide 24 inches minimum cover up to final grade unless otherwise indicated or specified. Maintain minimum 7.5 inch on center spacing between power conduits; maintain minimum 12 inch spacing between power conduits and signal conduits; maintain minimum separation from public utilities established by regulation. See paragraph Earth Work for Underground Electrical under this section for thermal backfill requirements.

L. Conduits at Roof Decks: Conduit installed within 1.5 inches of the nearest surface of metal corrugated roof decks and conduit concealed within roofing systems on top of roof decks shall be RGS or IMC conduit.

M. Install flexible conduit thru oversized bushed sleeve or cored opening where conduit crosses building wall expansion or seismic joints. Provide up to 54 inches of flexible

wiring with 6 inches minimum of conduit slack each side of the wall assembly to allow for free movement across the joint.

N. Do not install conduit in concrete slab on grade.

O. Do not install conduit in direct contact with underside of roof deck.

P. Seal all underground conduits entering and terminating within a building or structure using approved non hardening duct seal putty or a sealing bushing. Seal spare conduits using a watertight blank plastic duct plug. Seal all underground conduits entering and terminating below grade, such as in a crawl space or basement, using an approved closed cell foam sealant system.

Q. Provide conduit sealing fittings where conduits pass through hazardous (classified) locations.

3.05 CONDUIT PENETRATIONS

A. Roof Penetrations: Provide flashing around each conduit which penetrates a roof. Materials and installation shall comply with applicable provisions of Division 07 for roofing. Seal top of flashing around conduit with a weatherproof non-hardening mastic.

B. Exterior Walls: Core drill or cast sleeve for each conduit one size larger than conduit diameter. Seal all openings at each penetration with acrylic weatherproof caulking suitable for painting. Below grade seal with "Chase-Foam" silicone sealant or other approved method acceptable to Architect/Engineer.

C. Interior Walls and Partitions: Cut one size larger than conduit diameter. Seal all openings at each penetration with low VOC level general purpose interior sealant as specified in Section 07900.

D. Fire Rated Construction: Comply with requirements of paragraph, FIRE RATED CONSTRUCTION, this specification.

3.06 SURFACE METAL RACEWAY (SMR)

A. Provide SMR in lieu of conduit in finished spaces where exposed raceway is specifically indicated or otherwise approved.

B. Install parallel to building surface in least conspicuous location. Verify routing with Architect/Engineer and make directed adjustments prior to installation.

C. Where multiple-compartment SMR is used for both signal and power, identify compartments per NEC 386.70.

3.07 METAL CLAD CABLE

A. Arrangement and Support: Comply with requirements specified for conduit. Provide maximum support spacing of 6 feet on center and within 12 inches of terminations.

3.08 CONDUCTOR INSTALLATION

A. Minimum Conductor Size: #12 AWG, except #10 AWG minimum for outdoor and exterior building lighting circuits and #14 AWG minimum for control circuits and for lighting fixture taps not to exceed 72 inches.

B. Splice conductors only in junction or outlet boxes [and handholes].

C. Arrange conductors neatly at termination such that a clamp-on ammeter may be used.

D. Clean conduit free of debris before conductor installation; install conductors using pulling lubricant.

3.09 CONDUCTOR IDENTIFICATION

A. Provide non-metallic wire markers on each conductor in panelboards and in junction boxes having more than 6 conductors. Identify branch circuit or feeder number for power and lighting circuits.

B. Color Coding of Insulated Equipment Ground: Solid green.

C. Color Coding of 208/120 Volt System: Phase A - black, Phase B - red, Phase C - blue, Neutral - white.

D. Color Coding of 480/277 Volt System: Phase A - brown, Phase B - orange Phase C - yellow, Neutral - gray.

E. Color Coding of Switch Legs: Pink.

F. Color Coding of Travelers (3-Way and 4-Way Switching): Purple.

G. Provide color tracers on neutrals to differentiate circuits on multi-wire branch circuits with separate neutrals.

3.10 BOX LOCATIONS

A. Provide electrical boxes for outlets, junctions and equipment connections as shown and as required for splices, taps, wire pulling, and code compliance.

B. Electrical box locations shown are approximate unless dimensioned. Obtain equipment outlet locations from equipment manufacturer prior to rough-in. Coordinate outlet and wall switch locations with casework and finish elements shown on Architectural drawings. Install to fit conditions or as directed.

C. Change location of wall outlets, wall switches, and lighting outlets up to fifteen feet without charge when requested by Architect/Engineer prior to installation.

D. Height of outlets unless otherwise directed: See Drawings.

3.11 BOX INSTALLATION

A. Set wall outlet and wall switch boxes vertically.

B. Support boxes independently of conduit, piping, and ductwork; securely fasten in place.

C. Provide recessed outlet boxes in finished areas. Flush front edge of box or plaster ring even with finished surface.

D. Provide blank cover plate over all boxes that do not contain devices or are not covered by equipment.

E. Do not install flush boxes on opposite sides of a wall within the same stud space. Maintain 24 inch minimum box separation in fire rated wall assemblies.

F. In-Ground Boxes: Set on 9 inch minimum deep gravel base extending 6 inches minimum beyond each side. Set flush with final grade.

3.12 WIRING DEVICES

A. Ground Fault Circuit Interrupter (GFCI) Protection: Provide for receptacles located outdoors, within 6 feet of sinks, in bathrooms, kitchens, indoor wet locations, locker rooms with associated shower facilities, elevator pits, elevator machine rooms, crawl spaces, garages, service bays, rooftops, at counters and work surfaces where food and/or beverage preparation occurs, and as otherwise indicated. GFCI receptacles are not required where branch circuit is protected by GFCI circuit breaker.

3.13 CABLE TRAY FOR COMMUNICATIONS CIRCUITS

A. Install in accordance with requirements of NEMA VE 2 and manufacturer's instructions. Provide shop drawings for installation of cable trays showing layout, supports, connectors, accessories, and installation details.

B. Unless otherwise indicated support cable tray from building structure with center support using ½ inch threaded rod. Provide supports at each end, each connection point, and other points required to maintain maximum support spacing of 12 feet on center for ladder type tray and 6 feet on center for wire basket type tray.

C. Install warning signs 50 feet on center along cable tray to read "WARNING! DO NOT USE CABLE TRAY AS WALKWAY, LADDER, OR SUPPORT. USE ONLY AS MECHANICAL SUPPORT FOR CABLES."

D. Seismic Restraint: Provide seismic bracing of suspended cable tray. Comply with product manufacturer’s standard installation details and recommendations for Seismic Design Category F.

E. Coordinate cable tray layout and installation with HVAC and Plumbing requirements. Locate supports to clear ducts, equipment and piping. Allow for offsets to share space at three locations minimum.

F. Provide wall sleeve wherever cable tray passes through a wall or other permanent partition. Do not install cable through fire rated construction.

3.14 FIRE RATED CONSTRUCTION

A. Verify location of fire rated walls and ceilings with Architectural plans prior to rough-in.

B. Installation of boxes, rough-in cans, conduits, and sleeves that result in membrane or through penetrations shall comply with IBC 712.1 through 712.4 as required to maintain fire rating of construction assembly. Coordinate locations and construction requirements with General Contractor.

C. Provide approved conduit and/or pathway sleeve kits for installation of open cable through fire rated construction.

3.15 EARTHWORK FOR UNDERGROUND ELECTRICAL

A. Locating and Protecting Existing Utilities: Existing utilities in areas of new construction must be identified and located by the Contractor prior to commencing Work. Location of underground utilities shown on plans are diagrammatic and shall not be considered as a complete representation of all utilities that may exist on site.

1. Coordinate with Owner to identify and locate existing underground utilities including landscape irrigation in areas of Work.

2. Prior to excavation, contact and coordinate with local Utilities Underground Location Center to identify and locate existing underground public utility services in areas of Work, including power, water, sewer, telephone, gas, and cable TV.

3. Prior to excavation, obtain services of a utility locator service to scan areas of Work and to locate and mark where known and unknown private underground utilities or other interfering obstructions exist.

4. Existing active utilities damaged or interrupted by the Contractor during construction shall be replaced at the Contractor's expense. Repairs to power and signal systems using junction boxes or splices will not be accepted.

B. Excavation and Backfill:

1. Saw cut and remove pavement and hard surfaces along straight parallel lines.

2. Dig trenches of uniform width and depth. Provide uniform grade at bottom of trenches and excavations free of rocks, debris, and soft spots. Over depths shall be filled with sand.

3. Tree Roots: Hand excavate near trees to expose roots. Tree roots 2" to 5" in dia. are to be cut with a sharp saw and tree root heal material applied. For roots 5" in dia. and larger, do not cut. Tunnel under to install conduit.

4. Backfill materials shall be soil free of debris, roots, wood, refuse, and of rocks exceeding 3 inches in largest dimension. Bedding and backfill up to 12 inches of cover shall be select fill consisting of building sand or backfill material free from particles that would be retained on a 3/8 inch sieve.

5. Place backfill in 6 inch loose lifts and compact to 95% of maximum density in accordance with ASTM D 1557, except the first 6 inches of backfill material above PVC conduit shall not be compacted.

6. Removed material, excess material, and excavated material not suitable for use as backfill shall be removed and legally disposed off Owner's property.

7. Provide de-watering of trenches and excavations as required to perform work.

8. Barriers, Trench Covers, Safety Guards, Warning Lights: Provide protection against damage and injury to the public and to those persons using premises while work is in progress. Comply with applicable law and ordinance.

C. Thermal Resistivity of Bedding and Backfill Around Cable and Conduit Not Concrete Encased: Provide suitable materials that have a maximum thermal resistivity (Rho) of 90 when compacted and moist [120 when compacted and dry]. Native or imported materials shall be approved by the Civil Engineer to verify thermal compliance. Man made and/or

mixed materials shall be provided with a certification by the manufacturer verifying thermal compliance.

D. Thermal Backfill to Dissipate Conductor Heat: Low strength fluidized thermal backfill (FTB) shall be used for underground wiring above 600 volts and for underground wiring below 600 volts that is rated 2000 amps and above. Conform to local electric utility FTB specifications.

E. Finish Operations:

1. Restore all surfaces disturbed by new construction to its original grade and condition unless otherwise indicated. Comply with requirements of Divisions 31 and 32.

2. Landscape materials shall be similar type and quality as that removed. New topsoil shall be three-way mix (50% black silt sand, 30% peat moss, 20% chicken manure), 2-inch minimum depth. Top dress and seed damaged turf areas using approved seed mix and application rate. Repair paved surfaces as indicated.

3. Correct settling that occurs during the project warranty period. Restore grade, appearance, quality, and condition of surface or finish to meet original Contract requirements.

3.16 LABELING

A. Outlets: Identify panel and circuit number on faceplate of convenience and special purpose outlets. Use self-adhesive, polyester or vinyl laminated labels with machine generated alpha-numeric circuit identification, 1/4 inch high black letters on clear background. Exception: Use white letters on black or brown color device plates.

B. Junction Boxes: Label or mark cover with panel and circuit number. Locate on inside of cover except locate on outside of junction box cover in attics, crawl spaces, equipment rooms and above accessible ceilings.

3.17 TESTS

A. Perform continuity test on all feeder and branch circuit conductors. Verify proper phasing and that no short circuits or accidental grounds exist.

B. Check all convenience outlets for correct wiring connections using a polarity circuit tester. Test AFCI and GFCI circuits for proper operation with an approved tester.

C. Torque test conductor lug terminations to manufacturers recommended values.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Power System Grounding

B. Electrical Equipment and Raceway Grounding

C. Communication System Grounding

1.02 SUBMITTALS

A. Submit reports for tests required under Part 3 of this section.

1.03 OPERATIONS AND MAINTENANCE DATA

A. Include data on testing procedures, obtained test values, and correction of deficiencies in the Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Ground Rods: Copper-clad steel, 3/4 inch diameter, 10 feet long unless otherwise indicated.

B. Mechanical Connectors at Accessible Ground Rods: Tin-plated, heavy duty, high strength, corrosion resistant copper alloy, hex head bolt and clamp.

C. Mechanical Connectors at Ground Connections: Heavy duty, solderless, bolted pressure or compression type connectors or clamps labeled as being suitable for the purpose. Manufacturer's standard grounding lug when furnished as part of panelboards and other equipment.

D. Exothermically Welded Connections: Copper Thermit weld process conforming to manufacturer's instructions; use molds, weld material, tools, and accessories supplied by the manufacturer. ERICO CADWELD or equal.

E. Ground & Bonding Conductors: Bare, soft drawn copper; stranded for 8 AWG and larger, unless otherwise indicated or specified. Equipment grounding conductors may be insulated with green color identification per Code.

F. Grounding Bus Bars: UL 467; 1/4 inch thick x 4 inch high tin plated copper bus with predrilled holes for bolted lug terminations, 2 inch high insulated spacers, and stainless steel standoff wall brackets. Provide 16 inch long with holes for (8) horizontal terminations unless otherwise indicated.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Ground electrical service system neutral per Code. Size grounding electrode conductor, main bonding jumper, equipment bonding jumpers, and supplemental electrode bonding

connections per applicable paragraphs of NEC Article 250 except when larger size is shown or specified. Minimum of two (2) NEC 250.52 permitted grounding electrodes must be installed and shall include a concrete encased electrode where concrete building foundation is provided.

B. Make grounding connections which are buried or otherwise inaccessible using exothermic welds. Where installed outdoors, bury ground conductors with minimum 18 inches of cover unless otherwise indicated.

C. Driven Electrodes: Drive ground rods full depth unless otherwise indicated or specified. Provide 15 feet minimum separation between driven electrodes.

D. Equipment Grounding Conductor: Provide separate insulated green equipment grounding conductor in feeders and in branch circuits. Provide equipment grounding conductor in non-metallic conduits and flexible conduit. Size equipment grounding conductors per NEC 250.122 unless larger size is shown or specified.

E. Provide grounding locknuts on each end of feeder conduits serving panelboards.

F. Provide conduit sleeves where ground conductors pass through concrete slabs. Metal conduit sleeves shall have threaded end extending above slab to accommodate a grounding bushing or conduit hub per NEC 250.64(E).

G. Provide minimum 1/0 AWG conductor for communications service grounding. Leave 10 feet slack conductor at terminal board. Connect conductor to building ground electrode system.

H. Ground exposed non-current carrying metal parts of equipment fastened in place or connected by permanent wiring and likely to become energized per Code. In MDF and in IDF rooms, bond cable trays and equipment racks to terminal board ground bus using #6 minimum AWG conductor.

I. Concrete Encased Electrode: Provide 20 feet minimum of bare copper conductor encased by at least 2 inches of concrete and located within and near bottom of concrete foundation or footing that is in direct contact with earth. Size electrode to match grounding electrode conductor or No. 4 AWG, whichever is larger. Provide 3/4" non-metallic conduit sleeve where conductor enters concrete foundation.

J. Grounding Bus Bars: Provide at building electrical service entrance and at all telecommunication terminal boards. Install 12 inches above floor unless otherwise indicated.

3.02 REMOTE BUILDINGS AND STRUCTURES

A. Provide equipment grounding conductor with circuit conductors between buildings and/or structures. Size equipment grounding conductor per NEC 250.122 unless larger size is shown or specified.

B. Ground electrical system per Code. Size grounding electrode conductor, equipment bonding jumpers, and supplemental electrode bonding connections per applicable paragraphs of NEC Article 250 except when larger size is shown or specified. Minimum of two (2) NEC 250.52 permitted grounding electrodes must be installed and located at least 10 feet apart and shall include a concrete encased or a driven electrode.

C. Provide isolation of grounded circuit conductor (neutral) at the disconnecting means and/or main panelboard as required.

3.03 TESTS

A. Service Entrance Ground Electrode System: ANSI/IEEE 81; measure and record ohmic value by performing fall of potential tests using a ground testing megger. Tests shall be performed with the ground electrode system disconnected/isolated from neutral and with the test current probe located at least 100 feet from the nearest ground system electrode.

B. Maximum Acceptable Resistance to Ground: 25 ohms. Designer note: Minimum of 25 ohms for personal safety (per NEC).

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Conduit sleeves, risers, and horizontal pathways and outlet rough-in for structured cabling and other low voltage systems to include lighting control, audio video (AV), television (TV), amplified sound, intrusion alarm, access control, video surveillance (CCTV), master clock, and intercom.

B. Telecommunications Terminal Boards

1.02 RELATED SECTIONS

A. Section 260500, Basic Materials and Methods

B. Section 260526, Grounding and Bonding

C. Section 260920, Lighting Controls

D. Section 271001, Telecommunications Structured Cabling System

PART 2 - PRODUCTS

2.01 OUTLETS

A. General: 4-11/16-inch square x 2-1/8-inch deep outlet box with single gang plaster ring. Provide blank device plates on unused outlets. Provide multi-gang box and/or plaster ring where otherwise indicated on plans.

B. Two-piece Surface Metal Raceway: Provide single gang or combination power/signal device mounting bracket and cover plate for indicated outlets as required. Provide blank device plate on unused outlets.

C. AV: Legrand Evolution Series wall box.

D. TV: Flush wall box with 180 degree lockable hinged cover, duplex receptacle, TV wall tap and data outlet with jack. Legrand Evolution series EHWB4 or equal.

2.02 MATERIALS

A. Boxes, Conduit, Raceway, Device Plates, Cable Tray: Comply with section 260500.

B. Fire Rated Sleeves: Comply with section 260500.

2.03 TELECOMMUNICATIONS TERMINAL BOARDS

A. 3/4 inch plywood mounting board with Class A fireproofing, locations and size as indicated. Paint white with two (2) coats of fire retardant paint. At least one fire retardant stamp or permanent label shall be visible on each sheet of plywood.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Comply with Section 260500.

B. Outlets:

1. Mounting height unless otherwise directed: See Drawings.

2. Do not install signal outlets on same side of wall stud common with electrical outlets or vertical power wiring.

3. Conduit: Comply with requirements of Section 260500. Unless otherwise indicated, provide conduit concealed inside wall or casework from each outlet up to nearest accessible ceiling space of same floor [crawl space] or homerun under floor to nearest terminal. Terminate conduit with plastic bushing. Install maximum two 90 degree equivalent bends between raceway terminations. Minimum conduit sizes unless otherwise indicated:

Voice and/or Data	1 inch diameter
All Other Systems	3/4 inch diameter

C. Risers and Horizontal Pathway: Provide conduit for signal pathway between floors and as otherwise indicated. At MDF, IDF's, and equipment head ends, tag or otherwise label with permanent marker each conduit termination to identify its destination.

D. Install nylon pull cord in each conduit longer than 20 feet. Leave 18 inches of slack minimum each end. Tag end of pull cord at conduit termination to identify outlet location at other end.

E. Sleeves: Provide conduit sleeves for installing open signal cables through draft stops and partition walls in attics, crawl spaces, and accessible ceiling spaces. Use specified fire rated sleeves through fire rated construction. Locate and size sleeves per approved shop drawings provided under related sections and as otherwise indicated.

F. Device Plates: It is the electrical contractor's responsibility to ensure that all line voltage and low voltage system faceplates and visible trim pieces are the same style and finish.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Electrical Service Requirements

B. Telephone Service Requirements

C. Cable Television Service Requirements

1.02 REGULATORY REQUIREMENTS

A. Contact and coordinate with Mason County PUD #3 regarding electrical service requirements, including entrance fittings, meter enclosures and socket arrangement, and current transformer provisions.

B. Contact and coordinate with Mason County PUD #3 regarding fiber service requirements.

C. Obtain, prepare, and file application forms required by the serving utilities for obtaining temporary and permanent services.

D. Do not install any equipment or service entrance rough-in prior to contact, coordination, and obtaining all requirements from the applicable serving utilities.

1.03 UTILITY CHARGES

A. Obtain and pay all utility company charges for installing power and fiber cable service. Utility company charges for installing power and cable service shall be paid by the Owner and are not included in the Contract.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and Equipment: Conform to requirements of the Utility companies.

B. Raceway: Schedule 40 PVC below grade; rigid galvanized steel for sweeps, risers, and for conduit above grade.

C. Cable Terminal: 48" wide x 72" high x 3/4" plywood painted with class A fireproofing, unless otherwise indicated.

PART 3 - EXECUTION

3.01 INSTALLATION, ELECTRICAL SERVICE

A. Make arrangements with Utility Company to obtain [temporary and] permanent electrical service to the Project. Coordinate and arrange for scheduling of Utility Work.

B. Installation: Comply with Utility Company rules, regulations, and installation requirements.

C. Maintain minimum 7.5 inch on center spacing between underground parallel electrical service conduits. Install conduits for electrical service rate above 600 volts with 36 inches minimum cover.

D. Where utilities share common trench or routing, maintain minimum 12 inch clear separation between power and other utility systems.

E. Provide meter bases, metering conduit, current transformer (CT) enclosure, and service entrance conduit and wire. Leave sufficient service conductor length at transformers for terminations by Utility.

F. Install current transformers (CT's) furnished by Utility.

G. Provide excavation, trenching, and backfill for utility company transformer vault and primary service duct from property line to transformer location(s). Allow for installation of gas service to share trench with primary service conduit. Provide trench width and depth per Utility requirements. Exact routing of primary service conduits shall be determined by the Utility. Quantity and location of junction and pull vaults shall be determined by the Utility. Obtain written approval from Utility prior to commencing Work.

3.02 INSTALLATION, FIBER CABLE SERVICE

A. Make arrangements with Utility Company to obtain permanent cable service to the Project. Coordinate and arrange for scheduling of Utility Work.

END OF SECTION

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Commissioning of lighting and lighting and receptacle control systems for compliance with the Energy Code and contract documents. Work includes sequencing and scheduling, pre-function checks, functional performance testing, and documentation.

1.02 RELATED SECTIONS

A. Section 250800 - Commissioning of Integrated Automation

1.03 DESCRIPTION OF LIGHTING CONTROLS

A. The lighting system is designed to be in compliance with the 2015 Washington State Non-Residential Energy Code.

B. Intent of the Lighting Control Systems:

1. Individual Offices, Classrooms, Conference Rooms or Break Rooms: Lights are to be turned on manually with occupancy sensor control to turn lights off automatically after a period of 30 minutes. Daylight harvesting systems controlling primary and secondary zones will automatically dim fixtures in response to natural light when light levels reach approximately 150% of design (initially 80 FC / 800 lux unless otherwise indicated).

2. Individual Toilet Rooms or Storage Rooms without Daylight: Lights are to be turned on manually with occupancy sensor control to turn lights off automatically after a period of 15 minutes.

3. Means of Egress Corridors and Stairways: Lights are to be turned on manually with low voltage lighting control system to turn lights off automatically on set time schedule. Manual controls to be located as indicated on drawings. Manual override of timeclock scheduled automatic off to be set to a maximum of two hours. Daylight harvesting systems controlling primary and secondary zones will automatically dim fixtures in response to natural light when light levels reach approximately 200% of design (initially 30 FC / 300 lux unless otherwise indicated).

4. Multi-Purpose Room: Lights are to be turned on manually with low voltage lighting control system to turn lights off automatically on set time schedule. Manual controls to be located as indicated on drawings. Manual override of timeclock scheduled automatic off to be set to a maximum of two hours. Daylight harvesting systems controlling primary and secondary zones will automatically dim fixtures in response to natural light when light levels reach approximately 150% of design (initially 80 FC / 800 lux unless otherwise indicated).

5. Kitchens: Lights are to be turned on manually with low voltage lighting control system to turn lights off automatically on set time schedule. Manual controls to be located as indicated on drawings. Manual override of timeclock scheduled automatic off to be set to a maximum of two hours. Daylight harvesting systems controlling primary and secondary zones will automatically dim fixtures in response to natural light when light levels reach approximately 200% of design (initially 100 FC / 1000 lux unless otherwise indicated).

6. Public Restrooms With More Than One Stall: Lights are to be turned on and off by occupancy sensor with 30 minute time delay set to maximum sensitivity with manual switch to enable occupancy sensor located as indicated on drawings. Daylight harvesting systems controlling primary and secondary zones will automatically dim fixtures in response to natural light when light levels reach approximately 200% of design (initially 50 FC / 500 lux unless otherwise indicated).

7. Electrical Rooms and Mechanical Rooms: Local switch with manual on and manual off.

8. Emergency Egress Lighting: Controls shall be in place to override all automatic dimming and turn fixtures on emergency circuits to full brightness.

9. Exterior Lighting:

10. Other

1.04 SUBMITTALS

A. General: Comply with requirements of Division 01.

B. Preliminary Commissioning Report: Provide a commissioning plan with narrative description of activities and the personnel tasked for each, required test equipment, measurable performance criteria, and functions to be tested. The report shall include all functional test documentation, and shall identify uncorrected deficiencies, functional tests that have been deferred, and a proposed date for completion. Maintain onsite a copy of the Preliminary Commissioning Report and make available to the Building Official and Owner.

C. Commissioning Compliance Checklist (reference figure C408.1.2.1 of the Washington State Energy Code): Prepared and submit after submission of the Preliminary Commissioning Report and at least one week prior to final inspection.

D Final Commissioning Report and Closeout Documents: Amend Preliminary Commissioning Report to include commissioning plan revisions, if any, action taken to address deficiencies, and all final documentation of commissioning activities. The final Commissioning Report, Record Documents, and Operations and Maintenance Manuals must be turned over to the Owner within 90 days of the receipt of certificate of occupancy.

1.05 QUALIFICATIONS

A. Commissioning Agent shall be a third party hired by the Contractor, independent and separate from the company installing the systems to be commissioned.

B. Commissioning Agent shall be a firm having three (3) years experience with commissioning lighting and lighting control systems and be certified by the Building Commissioning Association or the AABC Commissioning Group.

1.06 COMMISSIONING TEAM

A. General Contractor: Shall be responsible to review and verify sub-contractor's commissioning activities, participate in commissioning meetings, maintain and update the

schedules, prepare Commissioning Compliance Checklist, and deliver required submittals.

B. Electrical Contractor: Shall work with General Contractor to establish commissioning schedule, participate in commissioning meetings, arrange for required product manufacturer involvement, perform and document pre-functional checks and functional checks, complete commissioning checklists, prepare Record Documents and Operation & Maintenance Manuals, and provide Owner training.

C. Product Manufacturer's Representative: Shall provide assistance for installation, programming, startup, troubleshooting, and Owner training.

D. Design Engineer: Participate in commissioning meetings when requested, review and approve submittals, provide assistance to the Commissioning Agent in understanding design intent.

E. Commissioning Agent: Prepare and submit preliminary and final Commissioning Reports, furnish commissioning checklists, schedule necessary meetings, witness all functional testing or otherwise perform independent functional testing (spot checking) in 10% or more of spaces and on time control systems, review and approve functional test documentation, Operations and Maintenance Manuals, and record documents, verify function of the installed lighting control systems meet design intent, verify Owner training has occurred, verify that all final submittal documentation is turned over to the Owner, and participate in follow-up review of system operation.

F. Owner: Participate in commissioning meetings, approve lighting system control sequences and provide time schedules for programming of time controllers, review Preliminary Commissioning Report, participate in training and follow-up review of system operation, receive all closeout documentation.

1.07 SEQUENCING AND SCHEDULING

A. Perform pre-function checks after each system to be commissioned is substantially complete.

B. Perform functional testing after pre-function checks and room finishes are completed.

C. Perform Owner training after functional performance testing is complete.

1.08 COMMISSIONING MEETINGS

A. All members of the Commissioning Team shall attend and participate in a pre-commissioning conference to be held prior to the Contractor beginning any commissioning work. The conference shall occur after all submittals have been satisfactorily reviewed by the Architect/Engineer and returned to the Contractor, and approximately 30 days prior to pre-function checks, unless otherwise required under Section 019100. The purpose of this conference is to review the commissioning plan, checklists, schedule, requirements for coordination with other trades, and related construction/design issues to allow for efficient and proper commissioning.

B. Members of the Commissioning Team shall attend and participate in additional commissioning meetings as specified under Section 019100.

PART 2 - PRODUCTS

2.01 TEST EQUIPMENT

A. Test equipment for electrical systems testing shall be provided under Division 26 as necessary for all start-up, testing, adjusting, and commissioning of the electrical equipment.

B. Light meters and multi-meters shall be digital type calibrated on the manufacturer's recommended intervals with calibration tags affixed to the instrument. In absence of calibration tags, calibration documentation shall be submitted to the Commissioning Agent 30 days prior to use. Documentation shall include description and serial number of instrument, calibration data and date submitted.

C. Furnish proprietary equipment and additional testing devices and material as needed or recommended by system product manufacturer for startup, programming, and to perform required tests.

PART 3 - EXECUTION

3.01 CHECKLISTS

A. Checklists shall be prepared for each room and automatic time control system. Each checklist shall be completed, dated, certified by the person performing the commissioning activity, and included as part of the preliminary and final commissioning reports.

B. Checklists in the Appendix of this section may be used for the commissioning work unless approved alternative checklists are provided by the Commissioning Agent.

3.02 PRE-FUNCTION CHECKS

A. Perform pre-function checks using applicable checklist provided. Correct deficiencies discovered in accordance with the applicable contract requirements.

B. Provide all equipment, materials, services, and labor required to perform the pre-function checks.

3.03 FUNCTIONAL PERFORMANCE TESTING

A. Perform performance tests using applicable checklists provided. Functional performance tests shall begin after all pre-function checks have been completed. Tests shall prove all modes of the sequences of operation, and shall verify all other relevant contract requirements. Tests shall begin with equipment or components and shall progress through subsystems to complete systems. Upon failure of any functional performance test checklist item, the Contractor shall correct all deficiencies in accordance with the applicable contract requirements. The checklist shall then be repeated until it has been completed with no errors.

B. Provide all equipment, materials, services, and labor required to perform the function checks and follow up spot check activities.

C. Occupancy Sensor Testing Procedures:

1. Use manual switch to turn lights on.

2. Set sensor for Test mode. Follow product manufacturer recommended checkout/adjust procedure. Set sensor to User mode after completion of testing.

D. Time Switch and Low Voltage Lighting Control Panel Time Controller Testing Procedures:

1. Set time to turn lights on and verify occurrence.

2. Set time to turn lights off and verify occurrence.

3. In spaces set for “flick warn” feature, set override time to 15 minutes and verify lights flicker as required, manually override lights to stay on and that lights turn off within 15 minutes.

E. Low Voltage Lighting Control Panel Low Voltage Switch Testing Procedures:

1. Verify that device address descriptions match device type, location description, circuit assignments, and control assignments as shown on approved shop drawings and contract supplemental instructions.

2. Verify each switch controls lights as indicated on Shop Drawing

3. Where switches are programmed as “on” only, verify lights cannot be manually turned off.

4. Verify switch programming and identification is labeled, matches approved Shop Drawing, and is correctly identified in programming.

F. Automatic Daylight Control System Testing Procedures:

1. Shine an incandescent or fluorescent light source directly onto the sensor for at least 30-40 seconds. The lights connected to the sensor should begin to dim.

2. If they do not dim, they may already be at the dimmed level because of available daylight. Cover the sensor for 30-40 seconds. The lights should become brighter.

3. If the lights do not dim or brighten, check the sensor’s wiring, verify that it is receiving sufficient voltage, and consult the manufacturer for guidance.

4. During daylight hours, window coverings may be used in lieu artificial light source for testing.

3.04 SPOT CHECKING

A. The Commissioning Agent, Design Engineer, and/or Owner Representative may participate in the commissioning process on a spot-check basis during the commissioning work. Contractor shall arrange mutually agreeable times to demonstrate and assist in performing spot checks. Items found not complete or not as represented by Commissioning Reports shall be corrected at the Contractor’s expense, including costs for the Commissioning Agent, Design Engineer, and/or Owner’s Representative to re-check the commissioning work.

APPENDIX A

ROOM CONTROL PRE-FUNCTIONAL CHECKLIST

Electrical Contractor to complete and submit checklist prior to scheduling of functional testing.

Space Description:	Room #:	Date:	
		Complete	N / A
Light fixtures wired and installed		☐	☐
Manual switches installed		☐	☐
Manual switches labeled		☐	☐
Occupancy sensor(s) installed for maximum coverage		☐	☐
Occupancy sensor(s) installed so coverage does not extend into adjacent spaces		☐	☐
Occupancy sensor(s) at least 6 feet from air diffusers		☐	☐
Occupancy sensor initial sensitivity set if not self adapting		☐	☐
Occupancy sensor initial time delay set if not self adapting		☐	☐
Daylight sensor(s) located per manufacturer directions		☐	☐
Daylight sensor(s) aimed per manufacturer directions		☐	☐
Daylight sensor(s) initial calibration set		☐	☐
Daylight sensor furnished programming and calibration device(s) is available		☐	☐
Automatic time switch installed and programmed		☐	☐
Room finishes complete (ceilings, flooring, paint, wall coverings)		☐	☐
Window coverings installed		☐	☐
Horizontal and vertical glazing cleaned		☐	☐
Light shelf installed		☐	☐
Normal power on		☐	☐
Emergency power available		☐	☐
HVAC air balancing completed		☐	☐
Other observations:			

Signatures	
Checks Completed & Submitted By (E):	Verified By (C):
_____ Name Date	_____ Name Date
Reviewed & Accepted By (G):	Reviewed & Accepted By (D):
_____ Name Date	_____ Name Date

LEGEND:
N/A – Not Applicable
E – Electrical Contractor
G – General Contractor
C – Commissioning Agent
D – Design Team Representative

APPENDIX A

ROOM CONTROL FUNCTIONAL CHECKLIST

Space Description:	Room #:	Date:	
		Complete	N / A
MANUAL CONTROL			
Verify ON/OFF each switch per circuit/zone		☐	☐
Verify manual dim function each switch per circuit/zone		☐	☐
OCCUPANCY SENSOR CONTROL			
Sensor type: ☐ PIR ☐ Ultrasonic ☐ Dual Technology		☐	☐
Sensor ON setting: ☐ Manual ☐ Automatic		☐	☐
Verify sensor LEDs function		☐	☐
Verify sensor control function		☐	☐
Verify sensor coverage adequate		☐	☐
Verify sensor coverage does not extend into adjacent spaces		☐	☐
Time delay setting: ☐ Manual ☐ Self Adapting		☐	☐
Verify sensor time delay function		☐	☐
Indicated final time delay setting if not self adapting: _____Minutes		☐	☐
TIME SWITCH CONTROL			
Verify lighting control function		☐	☐
Record relay panel circuit: Panel:	Circuit No.:	☐	☐
Record time switch control group:		☐	☐
Record time switch circuit:		☐	☐
AUTOMATIC DAYLIGHT CONTROL			
Sensor type: ☐ Open Loop ☐ Closed Loop ☐ Hybrid		☐	☐
Verify primary and secondary zone response		☐	☐
Verify lights outside of daylight zones do not dim		☐	☐
Verify emergency lights are full on upon loss of normal power		☐	☐
Record foot candle level with window coverings full open: _____FC		☐	☐
Record foot candle level with window coverings 1/2 open: _____FC		☐	☐
Record foot candle level with window coverings full closed: _____FC		☐	☐
Other observations:			

Signatures	
Checks Completed & Submitted By (E):	Verified By (C):
_____ Name Date	_____ Name Date
Reviewed & Accepted By (G):	Reviewed & Accepted By (D):
_____ Name Date	_____ Name Date

LEGEND:
N/A – Not Applicable
E – Electrical Contractor
G – General Contractor
C – Commissioning Agent
D – Design Team Representative

APPENDIX A

AUTOMATIC TIME SWITCH/CONTROLLER FUNCTIONAL CHECKLIST

Lighting Control Panel Designation:	Date:	
	Complete	N / A
Time switch daily and holiday schedules programmed	☐	☐
Furnished field programming equipment is available	☐	☐
Program schedule sheets by control group and switched circuit are available	☐	☐
Time switch relays labeled	☐	☐
Relays function as scheduled	☐	☐
Flick warning functions as programmed	☐	☐
Local switches function as scheduled	☐	☐
Master switches function as scheduled	☐	☐
Manual override switches function as scheduled (2 hour maximum override)	☐	☐
Remote switch enable/disable feature functions as scheduled	☐	☐
Exterior building light circuit(s) function as scheduled	☐	☐
Exterior site lighting circuit(s) function as scheduled	☐	☐
Exterior sign lighting circuit(s) function as scheduled	☐	☐
Verify remote outdoor photosensor control function	☐	☐
Time switch backup power functions on loss of power	☐	☐
Other observations:		

Signatures	
Checks Completed & Submitted By (E): _____ Name Date	Verified By (C): _____ Name Date
Reviewed & Accepted By (G): _____ Name Date	Reviewed & Accepted By (D): _____ Name Date

LEGEND:
N/A – Not Applicable
E – Electrical Contractor
G – General Contractor
C – Commissioning Agent
D – Design Team Representative

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Manual Controls

B. Occupancy Sensors

C. Low Voltage Control Panels

D. Daylight Sensors

E. Room Controllers

F. Emergency Transfer Devices

G. Factory Start Up Requirements

1.02 RELATED SECTIONS

A. Section 250500, Integrated Automation

B. Section 260800, Commissioning of Lighting Systems

C. Section 265000, Lighting Fixtures

1.03 SUBMITTALS

A. Submit product data for all products and associated components specified under Part 2 of this section.

B. Submit shop drawings showing control sequence, bill of material, and wiring or schematic diagrams for each type and variance of room lighting control system. Indicate by plan or instruction the best mounting and installation location for each occupancy and daylight sensor. For multi-room and networked control systems include additional shop drawings of floor plans that show location of panels, system components, and interconnecting wiring. Wiring diagrams shall clarify field installed from factory installed wiring.

C. Submit commissioning check list and testing procedures for approval prior to commissioning of automatic lighting control system(s).

1.04 OPERATION AND MAINTENANCE DATA

A. Include submittal data, shop drawings, installation and operating instructions, commissioning and test reports, and warranties that exceed one year in Operations and Maintenance Manuals.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. 0-10 VDCWall Box Dimmers: Lutron Diva series or approved.

B. Line Voltage Photocells: General Electric, Intermatic, Tork.

C. Occupancy Sensors: Greengate, Sensor Switch, WattStopper.

D. Outdoor Occupancy Sensors: Sensor Switch SBOR/ODP series or approved.

E. Time Switches: BRK Electronics, Intermatic, Tork.

F. Low voltage control panels, sensors and switches: Douglas, Greengate, LC&D, WattStopper.

G. Digital room controllers, sensors, and wall stations: Greengate, LC&D, nLight, WattStopper.

H. Wireless Receptacle Control: WattStopper WRC series.

2.02 MANUAL CONTROLS

A. Line Voltage Switches: Provide as specified under Section 260500 for wiring devices.

B. Low Voltage Switches: Heavy duty, 3-position, momentary contact, toggle switch, rated 3 amperes at 25 VAC. Two wire, single relay control switches shall include integral diodes for transformer/relay operation as required. Color: Match wiring devices specified under Section 260500.

C. 0-10VDC Wall Box Dimmer: Architectural line voltage on/off switch with low voltage preset linear slide dimming control feature, 120/277 volt, 8 amp minimum switching load capacity, 50 milliamp minimum 0-10VDC sink capacity, UL listed for use with fixture type, driver, and/or dimming ballast provided, single pole or 3-way as indicated, suitable for use with decora style wall plates Color: Match wiring devices specified under Section 260500.

D. Digital Wall Stations: Low voltage, local network, manual switch station with feed thru RJ45 ports, suitable for use with decora style wall plates. Provide On/Off, On/Off/Dim, and/or multi-pushbutton On/Off/Scene/Dim switch stations as indicated. Color: Match wiring devices specified under Section 260500.

E. Switch Plates: Match material and finish of device plates specified in Section 260500.

2.03 OCCUPANCY SENSORS

A. Room Sensors:

1. Dual technology (ultrasonic/passive infrared) 24VDC occupancy detector, adjustable sensitivity and time delay, manual override, LED motion indicator, compatible with fluorescent electronic ballasts. Rated area coverage shall conform to manufacturer's recommendation for complete room coverage without gaps, using single or multiple sensors as required. Sensors may be wall or ceiling mounted type. Exception: In restrooms and toilets with privacy partitions or showers, provide ultrasonic type without passive infrared feature.

2. Provide low temperature sensors (-4 degree F/-20 degree C) where installed in unheated spaces and in refrigerated spaces. Provide high humidity sensors where installed in damp locations, refrigerated spaces, and adjacent to shower stalls.

3. Wire Guard: Provide in public restrooms, gymnasiums, locker rooms, and similar

areas where sensor may be subject to abuse.

B. Transformer/Relay Pack: 120/277 volt control interface providing NEC class 2 input/output to occupancy sensor(s) and automatic line voltage switch control. Relay contacts shall be isolated, normally open, rated 20 amperes for ballast loads and 1 HP. Provide auxiliary isolated dry contact set to allow for air temperature control (ATC) interface with the occupancy sensor control system; a slave relay may be provided for this purpose.

C. Wall Switch Sensors:

1. Passive infrared occupancy sensor, automatic OFF, manual ON/OFF, continuous self adapting sensitivity and time delay, LED motion indicator, compatible with magnetic ballast, electronic ballast, and motor loads, 170 degree minimum field of view. Minimum load rating shall be 600 VA and 1/6 HP at 120 volts and 1000 VA and 1/3 HP at 277 volts. Minimum rated area coverage shall be 900 square feet.

2. Provide low temperature sensors (-4 degree F/-20 degree C) where installed outdoors, in unheated spaces, and in refrigerated spaces. Provide high humidity sensors where installed in damp locations, refrigerated spaces, and adjacent to shower stalls.

3. Two Level Switching: Where indicated, provide wall switch sensor with independent dual switching control, user selectable for control of one or two switch legs to provide two levels of room illumination.

4. Finish: Match wiring devices and plates specified under Section 260500.

D. Outdoor Sensors: Digital passive infrared (PIR) occupancy sensor, outdoor rated (water tight, -41 to +160 degree F), 360 degree coverage, line voltage On/Off control, 0-10VDC output for dimming, integrated photo sensor, suitable for control of fluorescent, HID, and LED light fixtures, suitable for low and high mounting up to 30 feet above grade, with chase nipple for mounting to outlet box, light fixture, or pole, housing color as selected.

2.04 LOW VOLTAGE RELAY CONTROL PANELS

A. Transformers: ANSI/NFPA 70; Class 2 energy limited, 120/277:15-24 volt, sized for load.

B. Low Voltage Relays: Mechanical or magnetic latching remote control relays rated 20 amperes at 120/277 volts and suitable for HID lighting. Shall have isolated pilot contacts where required.

C. Master Controllers: Solid state device allowing group control of more than 3 relays by a momentary and/or maintained contact input from manual switch, photo controller, or time controller. Installed configuration shall have 20% minimum spare relay capacity. Separate modules may be used for momentary and maintained contact switch control. Include programmable enable/disable of any relay function, and flick warn option with off sweep 2 hour override enabled from local or master switch control during 5 minute warning period. Provide with RS485 networking between controls panels within a building. Provide RS232 port and ethernet interface module and associated software for local and remote PC programming, control, and troubleshooting. Provide modem for offsite factory trouble shooting and programming over a standard telephone connection when this support service available from the system manufacturer.

D. Photo/Time Controllers: Programmable solid state 365 day astronomic time/photo controller, membrane key pad entry with LCD graphic display, 8 time/photo control programmable outputs, remote photo sensor input, indefinite program and 72 hour minimum time backup on power loss, 600 events per week with week day and holiday scheduling. Any output can be time, astronomic, photo or combination controlled.

E. Photo Controllers: Solid state device for operating relays and/or auxiliary contacts to control remote master controllers using a remote low voltage photo sensor. An override input shall allow a remote switch or time clock to enable or disable the photo control function.

F. Relay Control Cabinets: NEMA ICS6 Type 1; shop fabricated and wired sheet metal box with screw on flush cover, side hinged flush locking door, and painted enamel finish. Assembly shall include labeled terminal blocks, line voltage - low voltage separation barriers, mounting provisions for 20% or more additional relay and associated transformer capacity, and removable circuit index card inside protective pocket on inside of front cover. Key all relay cabinets alike. Furnish two keys. Cabinets shall be flush mounted where indicated.

G. Flush Switch Cabinets: NEMA ICS6 Type 1; shop fabricated sheet metal box with screw on flush cover, side hinged flush locking door, and painted enamel finish. Keys shall match relay cabinets. Size cabinets to accommodate switch layouts indicated.

H. Remote Time Controllers: Programmable solid state 365 day, 600 events per week with week day and holiday scheduling, provided under Section 250500, Integrated Automation. Provide master controller that accepts both remote momentary and maintained timed inputs. Allow for 8 time control groups minimum.

2.05 DAYLIGHT SENSORS

A. Indoor Digital Daylight Sensors: Multi-zone photo sensor with RJ45 network connection, infrared (IR) transceiver for calibration using a handheld remote programmer, and suitable for semi-flush ceiling mount or for surface mounting in skylight wells. Sensor measures room daylight contribution and communicates with a compatible room controller to automatically dim or switch up to three separate zones of lighting, raising and lowering light fixture illumination in response to available daylight.

B. Low Voltage Photo Sensors, Outdoors: Weather proof, water tight sensor head suitable for outdoor mounting to an outlet box, auto ranging 1 to 10,000 FC, + or - 5%, compatible with control panel controller for off-day/on-night operation of outdoor light fixtures.

C. Line Voltage Photocell: Weatherproof, off-day/on-night, 2000 watt tungsten rated, SPST with time delay, adjustable 2-50 footcandles.

D. Line Voltage Photocell, Flush Mounted: Weatherproof, off-day/on-night, button type, thermal relay, 1000 watt, SPST, with stainless steel cover plate and gasket.

2.06 DIGITAL ROOM CONTROLLERS

A. General: UL listed low voltage network lighting and power controller, 120/277 volt, 20 ampere rated, three (3) on/off relay outputs, four (4) minimum RJ45 digital input/outputs.

B. Dimming: Where manual and/or automatic daylight control is indicated, provide three (3) 0-10Volt DC Class 2 dimming control outputs. Controls shall be configured to completely shut off all controlled lights in the control zone.

C. On/Off Receptacle Load Control: Where automatic switch control of receptacles is indicated, provide a UL listed low voltage network 20 ampere plug load rated standalone controller [and/or wireless transmitter in combination with approved wireless receptacles].

D. Sensors, Devices, and Accessories: Provide compatible sensors, wall stations, interface device, and cabling for a complete control system.

E. Emergency Lighting: Controllers with dimming control shall be programmed or otherwise designed to ensure 100% full light output of controlled dimmable emergency lights upon loss of normal power.

F. Provide hand held wireless configuration device for remote programing of system sensor, control, and dimming functions. Furnish two (2) hand held devices.

G. Provide required software and PC USB interface device for programming and managing the digital lighting control system using a personal computer.

2.07 EMERGENCY TRANSFER DEVICES

A. Integral with Light Fixture: Emergency transfer devices installed in light fixtures are specified under Section 26 50 00, Light Fixtures.

B. Remote Emergency Lighting Transfer Relay: UL 924, 120/277 volt, 20 amp rated, integral test switch, LED power status indication, fail safe emergency power ON upon loss of normal power.

C. Integral with Digital Room Controller: UL 924, 120/277 Volt, 3 amps minimum; provide emergency relay and control to automatically power ON designated emergency light fixture(s) at full brightness upon loss of normal power.

2.08 MATERIALS

A. Low Voltage Wire: UL Type CL2P, NEC class 2P or better, with teflon jacket overall and listed for use in ducts, plenums, and other air handling spaces; multi-conductor, stranded copper cable, #20 AWG minimum, color coded.

B. RS 485 Communications and Digital Control: UL type CMP, Category 5 extended frequency (350MHz), 24 AWG solid copper, 4-pair unshielded twisted pair, jacket overall, color coded, listed for use in ducts, plenums, and other air handling spaces. Cable installed below grade shall have a water blocking core and be suitable for wet locations in conduit.

C. Conduit and Outlet Boxes: As specified under Section 260500.

D. Cable Supports: Molded nylon clamps, heavy duty nylon ties, or galvanized steel bridle rings; sized to match cables supported. Tyton, Brady, Burndy, or Thomas & Betts manufacture.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install lighting controls in accordance with manufacturer's instructions and approved shop drawings. Provide programming, setup, and calibration for complete operation of each

control system.

B. Install low voltage wiring in conduit except cable may be installed without conduit above accessible ceilings. Install open cable parallel and perpendicular to building lines; support cable from structure at intervals not to exceed 4.5 feet on center. Do not splice open cable.

3.02 OCCUPANCY SENSORS

A. Room Sensors: Provide number and location required for complete coverage within room (including toilet and shower stalls) and to minimize false activation thru open doors as recommended by manufacturer. Ceiling mounted sensors shall not be used above 12 feet. Provide additional transformer/relays or room controllers as required where multiple branch circuits are controlled.

B. On/Off Operation: Wall switches and occupancy sensors shall be wired or otherwise programmed to provide manual on, manual off, and automatic sensor off control of room lighting unless otherwise indicated.

C. Time Delay: Set manual time delay for automatic off at 15 minutes unless otherwise directed or indicated.

3.03 TIME CONTROLS

A. Provide initial and final programming and testing, scheduled at the convenience of the Owner. Arrange for an Owner representative to be present for each programming session. Start up control sequence shall be as scheduled on drawings. Final control sequence shall be as directed by Owner.

3.04 LOW VOLTAGE CONTROL PANELS

A. Provide typewritten circuit index in each relay cabinet identifying relay numbers, line voltage, circuit numbers, loads controlled, and master/local/special sensor switch control information.

B. Arrange with Owner's voice/data system installer to provide one phone line and one data line terminated with required jacks for modem and ethernet connections.

3.05 DAYLIGHT SENSORS

A. Locate daylight sensors per plan and/or instructions shown on approved shop drawing.

B. Provide calibration of daylight sensing controls after substantial completion. Calibrate indoor daylight sensors to lower fixture illumination when daylight zone ambient illumination is above 80FC unless otherwise indicated.

3.06 DIGITAL ROOM CONTROLLERS

A. Areas with Accessible Ceiling Space: Locate controller above ceiling within 6 feet of first lighting outlet serving lights to be controlled unless otherwise indicated. Low voltage wiring between sensor and relay may be installed without conduit.

B. Coordinate with Division 25 contractor to identify auxiliary relay contacts provided for air temperature control (ATC) interface.

3.07 FACTORY STARTUP

A. General: Field start-up, testing, and adjustment for low voltage control panels and for digital room control systems shall be performed under the supervision of a factory trained manufacturer's representative.

B. Low Voltage Control Panels: Include programming, calibration, and testing, as part of commissioning specified under Section 260800. Allow separate site visits for initial and final programming. Start up control sequence shall be as scheduled on drawings. Final control sequence shall be as directed by Owner. Arrange for an Owner representative to be present for each programming session.

C. Digital Room Control Systems: Include initial programming, calibration, and testing, as part of commissioning specified under Section 260800.

3.08 COMMISSIONING

A. Comply with requirements of Section 260800, Commissioning of Lighting Systems for commissioning of lighting controls as required under Section C408 of the Washington State Energy Code.

B. Provide all tools, equipment, materials, services, and labor required to test lighting control system in each space per manufacturer’s installation instructions. Verify settings, coverage, and operation. Correct deficiencies, replace malfunctioning devices, and retest as required. Submit test reports indicating compliance with specifications and manufacturer’s installation requirements.

3.09 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of system to Owner's personnel prior to contract closeout. Allow one site visit and two hours of total instruction scheduled at convenience of Owner.

B. Use operation and maintenance manuals as basis of instruction, reviewing contents of manual with personnel in detail.

C. Follow-Up Training: Include a second site visit for training and programming adjustments between 6 months to one year of substantial completion scheduled at convenience of Owner.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Service Cabinet Exterior

B. Panelboards and Circuit Breakers

C. Disconnect Switches

D. Fuses

E. Motor Controllers

F. Contactors

G. Enclosed Circuit Breakers

H. Nameplates

I. Compression Lugs

J. Arc Flash Hazard Labels

1.02 RELATED SECTIONS

A. Concrete for Equipment Pads: Comply with Division 03 - Concrete.

1.03 SUBMITTALS

A. Submit product data for switchboards, panelboards, circuit breakers, motor controllers, contactors, and enclosed circuit breakers.

B. Submit shop drawings for switchboards, and panelboards. Include installation requirements for anchoring and bracing meeting requirements of the International Building Code for Seismic Design Category F.

C. Coordinate dimensions of equipment with site and project space dimensions to verify equipment will fit, conform to indicated layout, and meet NEC and manufacturer clearance requirements.

D. Submit reports for tests required under part 3 of this section. Submit manufacturer's performance testing instructions and signed written performance test records for equipment ground fault protection systems.

E. Submit product data and shop drawings for service equipment to serving utility for review and approval in addition to Architect/Engineer submittal requirements.

1.04 OPERATION AND MAINTENANCE DATA

A. Include data for switchboards, panelboards, circuit breakers, motor controllers, fuses, contactors, and tests in Operation & Maintenance Manuals.

1.05 SPARE PARTS

A. Fuses: Furnish to Owner 3 spare fuses of each type and rating installed.

B. Fuse Pullers: Furnish 2 fuse pullers to the Owner.

1.06 ARC FLASH HAZARD LABELS

A. Comply with NEC 110.16 Arc-Flash Hazard Warning.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Panelboards, Circuit Breakers and Disconnects: Square 'D', Siemens, Eaton.

B. Service Cabinet Exterior: Skyline Electric & Manufacturing.

C. Motor Controllers and Contactors: Allen-Bradley, Square 'D', General Electric, Furnas, Cutler-Hammer.

D. Fuses: Bussman and Littelfuse.

2.02 SERVICE CABINET EXTERIOR

A. Utility Metering: Include provisions for utility company metering. Comply with Utility Company requirements.

B. Outdoor Switchboards: Provide NEMA ICS 6 Type 3R, non walk-in enclosure with pad locking doors, and stainless steel hardware. Provide a NEMA 5-20R convenience receptacle and thermostatically controlled space heater(s) in switchboard sections with adequate wattage to prevent the accumulation of moisture. All devices, instrumentation, and accessories shall be suitable for the environmental conditions associated with outdoor switchgear. Provide surge protective device and panelboard as scheduled.

2.03 POWER DISTRIBUTION PANELBOARDS

A. Panelboards: UL 67, NEMA PB 1; fusible switch type or circuit breaker type with provision for 225 amp frame branch breakers, suitable for use as service equipment. See drawings for additional features.

B. Electrical Ratings, Switch Arrangement, Special Features: As indicated on drawings. Indicated ampere interrupting capacity (AIC) is the full rms symmetrical integrated equipment short circuit rating of bussing and of overcurrent devices without series rating.

C. Cabinet: ICS 6; Type 1 for dry locations, Type 3R for damp or outdoor locations; surface mounted, with gutter space for metering current sensors shown on one line diagram and specified under Section 255000. Coordinate maximum dimensions with room layout shown on plans.

D. Finish: Manufacturer's standard enamel over rust inhibitor.

E. Circuit Directory: Index card under plastic with metal frame holder on each branch switch.

F. Main Overcurrent Protective Device(s): UL 489; molded case circuit breaker with thermal magnetic trip or LSI solid state trip unit, fixed mounted, single handle common pole

operation, AIC rating greater than available symmetrical short circuit amperes. Circuit breakers rated 1000 amps or larger for solidly grounded wye electrical systems rated more than 150 volts to ground shall have ground fault protection. Circuit breakers rated or otherwise adjustable to 1200 [1000] amperes and larger shall have an arc energy reducing maintenance switch with electronic trip and status indication to reduce clearing time.

G. Fusible Switches: NEMA KS 1; plug-on quick make, quick break, handle lockable in OFF position, Class J fuse provisions unless otherwise required for short circuit protection of circuit breakers. Fuses must comply with NEC 240.86 series rating requirements for load side circuit breakers that are not rated for the available fault current.

H. Circuit Breakers: UL 489; molded case, thermal magnetic trip, AIC rating greater than available symmetrical short circuit amperes. Multi-pole breakers shall be single handle with common pole operation. Feeder circuit breakers required to selectively coordinate shall have LI or LSI solid state trip. Circuit breakers rated 1000 amps and larger shall have LSI solid state trip.

I. Bussing: Copper with full neutral and ground bus.

J. Future Provisions: Provide fully equipped spaces for future devices with bussing, device supports, and bus connections.

K. Where surge protective device (SPD) is indicated, coordinate requirements with Section 264300.

2.04 BRANCH CIRCUIT PANELBOARDS

A. Panelboards: UL 67, NEMA PB 1; bolt-on circuit breaker type.

B. Electrical Ratings, Circuit Breaker Arrangement, Special Features: As indicated on drawings. Indicated ampere interrupting capacity (AIC) is the rms symmetrical integrated equipment short circuit rating of the complete assembly. Indicated AIC rating shall be base upon manufacture listed series rating with the panelboard main device or the line side overcurrent protective device, as applicable, unless otherwise indicated.

C. Cabinet: Concealed trim clamps, concealed hinge, lockable door-in-door (one lockable latched door over interior and one lockable latched door which exposes gutter) with flush locks all keyed alike, 6" deep x 20" wide. Provide two keys for each panelboard furnished.

D. Finish: Manufacturer's standard enamel over rust inhibitor for exposed surfaces; galvanized steel for recessed boxes.

E. Circuit Directory: Index card under plastic with metal framed holder on inside door.

F. Main Overcurrent Protective Device(s): UL 489; molded case circuit breaker with thermal magnetic trip fixed mounted, single handle common pole operation, AIC rating greater than available symmetrical short circuit amperes. Main circuit breakers required to selectively coordinate shall have LI or LSI solid state trip.

G. Circuit Breakers: UL 489; molded case, thermal magnetic trip. Multi-pole breakers shall be single handle with common pole operation.

1. Provide type SWD circuit breakers for lighting circuits.

2. Provide type HACR circuit breakers for air conditioning equipment, refrigeration equipment, and surge protection devices (SPD).

3. Provide approved manufacturer handle ties between single pole circuit breakers serving branch circuits sharing a common neutral (disconnecting means for multiwire branch circuits).

4. Provide approved manufacturer handle padlock attachment on circuit breakers serving branch circuits for permanently connected appliances without local disconnecting means and where otherwise indicated.

5. Provide combination-type arc-fault circuit interrupter protection (AFCI) circuit breakers for branch circuits where indicated.

6. Provide ground fault circuit interrupter protection (GFCI) circuit breakers for branch circuits where indicated.

7. Provide ground fault equipment protection (GFEP) circuit breakers for pipe heat trace and for deicing and snow melting equipment.

8. Circuit breakers used as mains (back-fed) shall be suitable for the purpose and shall include an auxiliary fastener listed and approved by the panelboard manufacturer where plug-in type device is used.

H. Bussing: Copper with full neutral and ground bus. Provide separate ground bus isolated from cabinet where isolated grounding requirements are indicated.

I. Where surge protective device (SPD) is indicated, coordinate requirements with Section 264300.

J. Where fusing is required to comply with selective coordination requirements of NEC 700 and 701, provide lighting and appliance panelboard that includes UL listed, special purpose, low peak branch circuit fuses with Class J performance in series with each branch circuit breaker or disconnect. Fuses shall be IP20 finger-safe with neon open fuse indication, single and multi-pole as scheduled. Cooper Bussmann QSCP, Eaton PRL1aF or 2aF, or approved.

K. Provide flush mounted panelboards with bullnose trim where full recessed depth is not available.

L. Provide sheet metal skirt with matching panelboard finish from bottom of surface mounted panelboards to floor.

2.05 ENCLOSED CIRCUIT BREAKERS

A. Circuit Breakers: UL 489; molded case circuit breaker with thermal magnetic trip [LSI solid state trip unit] fixed mounted, single handle common pole operation, AIC rating greater than available symmetrical short circuit amperes. Circuit breakers rated 1000 amps or larger for solidly grounded wye electrical systems rated more than 150 volts to ground shall have ground fault protection. Circuit breakers rated or otherwise adjustable to 1200 [1000] amperes and larger shall have an arc energy reducing maintenance switch with electronic trip and status indication to reduce clearing time.

B. Electrical Ratings, Configuration, and Special Features: As shown on drawings. The indicated ampere interrupting capacity (AIC) shown on the drawings is the full rms

symmetrical equipment short circuit rating of bussing and of all overcurrent devices installed.

C. Enclosures: NEMA ICS6; Type 1 for dry locations, Type 12 for industrial locations, Type 3R for damp or outdoor, with pad locking provisions, and suitable for use as service equipment. Include neutral and/or ground kits as required.

2.06 DISCONNECT SWITCHES

A. Safety Switches: NEMA KS 1; heavy duty, quick make, quick break, handle with lock out / tag out provisions. Provide rating, number of poles, and fusing required for load served.

B. Safety Switches for Variable Frequency Drives (VFD): Safety switches installed on the load side of VFD controllers shall include an interlock to disable controller operation when the safety switch handle is operated to the open positon.

C. Toggle Switches for Small Motors and Appliances: NEMA WD 1; horsepower rated 20 ampere general use snap switch with lock-out attachment.

D. Switch Enclosures: NEMA ICS 6; Type 1 for dry locations, Type 12 for industrial locations, Type 3R for damp or outdoor locations.

2.07 FUSES

A. Approved Fuses, 600 Amperes and Less, for Branch Circuits and Power Distribution:

1. ANSI/UL 198C Class J low peak with time delay unless otherwise indicated except ANSI/UL 198E Class RK5 may be used in safety switches for protection of motors and transformers.

2. For protection of circuit breakers: Fuses must comply with NEC 240.86 series rating requirements for load side circuit breakers that are not rated for the available fault current. Coordinate series rating requirements with published manufacturer’s listings for circuit breakers installed.

B. Approved Fuses, Over 600 Amperes, for Branch Circuits and Power Distribution:

1. ANSI/UL 198C Class L low peak with time delay unless otherwise indicated.

2. For protection of circuit breakers: Fuses must comply with NEC 240.86 series rating requirements for load side circuit breakers that are not rated for the available fault current. Coordinate series rating requirements with published manufacturer’s listings for circuit breakers installed.

2.08 MOTOR CONTROLLERS

A. Manual Motor Starters: NEMA ICS 2; AC general purpose Class A manually operated full-voltage controller for fractional horsepower induction motors, with thermal overload unit, green neon pilot light, and toggle operator.

B. Magnetic Motor Starters: NEMA ICS 2; full voltage non-reversing (FVNR) type, hand reset solid state overload relay with phase loss protection, green 20,000 hour "ON" pilot light, one normally open and one normally closed auxiliary contacts, fused 120 volt control transformer, 120 volt operating coil; additional features as indicated. Provide cover mounted "Hand-Off-Auto" selector switch unless operator station is indicated.

C. Overload Relay: Installed relay shall have an adjustable current range up to 140% of NEC rated motor full load amperes.

D. Combination Motor Starters: Combine Magnetic Motor Starter and fused disconnect switch with Class R fuse provisions in common enclosure.

E. Fire Alarm Shutdown: Provide magnetic starters with auxiliary control relay for fire alarm shutdown interface where indicated.

F. Operator Stations: NEMA ICS 2; heavy duty oil tight, operator and legend plate indicated.

G. Enclosures: NEMA ICS 6; Type 1 for dry locations, Type 12 for industrial locations, Type 3R for damp or outdoor locations.

H. Enclosure Finishes: Manufacturer's standard enamel over rust inhibitor on all interior and exterior surfaces.

2.09 CONTACTORS

A. Lighting Contactors: NEMA ICS 2; electrically or mechanically held, 100% continuous rating for tungsten and ballast lighting and resistance loads, 120 volt control coil, fused control circuit. Contact rating and number of poles as indicated on drawings. 20 ampere contacts shall be convertible type.

B. General Purpose Contactors: NEMA ICS 2; mechanically held, 100% continuous rating for lighting, resistance, and motor loads, 120 volt control coil fused control circuit. Contact rating and number of poles as indicated on drawings.

C. Emergency Stop Station (Kill Switch): NEMA ICS 2; red 50mm mushroom head pushbutton, push- pull maintained operation with normally closed contact rated 10 amps at 300 volts (minimum) and yellow device plate, flush [surface] mounted. Furnish with EMERGENCY STOP labeling engraved on mushroom head or device plate. Square D, Siemens, Cutler-Hammer, or approved.

D. Remote Operator Station: NEMA ICS 2; key operated two or three position momentary selector switch with contacts rated 10 amps at 300 volts (minimum), flush mounted in finished spaces. Furnish with legend plate or engraving on device plate to indicate function(s). Provide as key operated station where indicated. Square D, Siemens, Cutler-Hammer, or approved.

E. Enclosures: NEMA ICS 6; Type 1 for dry locations, Type 12 for industrial locations, Type 3R for damp or outdoor locations.

2.10 NAMEPLATES AND LABELS

A. Nameplates: Engraved three-layer laminated plastic, white letters on black background, affixed with stainless steel screws, adhesive acceptable in dry locations. Use black letters on yellow background for series combination rating identification. Use white letters on red background for emergency distribution.

B. Letter Height: 1/2 inch for series combination rating identification. 1/4 inch for switchboards, panelboards, motor control centers, circuit breakers, switches, and disconnecting means; 1/8 inch for motor starters, contactors, time switches, and equipment served.

C. Arc Flash Hazard Warning at Service Equipment Rated 1200 Amps and Larger: ANSI Z535.4; Self adhesive vinyl label factory installed by the equipment manufacturer to read WARNING, Electrical Arc Flash Hazard, Appropriate PPE Required, and informational text to indicate system voltage, available fault current at the service overcurrent protective devices, clearing time of service overcurrent protective devices based on the available fault current, and date the label was applied.

D. Arc Flash Protection Labels: ANSI Z535.4; Self adhesive vinyl label factory installed by the equipment manufacturer with ANSI header to read WARNING or DANGER and informational text to include:

Electric Arc Flash Hazard
Turn off all power before opening
Follow all requirements in NFPA 70E for safe work practices and for Personal Protective Equipment.
Failure to comply can result in death or injury

E. Arc Flash Protection Labels for Switchgear, Panelboards, and Motor Control Centers: ANSI Z535.4, NFPA 70E; Self adhesive vinyl labels consisting of arc flash information based on the approved hazard study. Labels shall include Flash Category, Arc Flash Rating (cal/cm^2), Hazard Boundary, and required Personal Protective Equipment (PPE).

PART 3 - EXECUTION

3.01 SWITCHBOARDS

A. Install in accordance with manufacturer's instructions and NEMA PB 2.1.

B. Seismic Restraint: Comply with requirements of the International Building Code (IBC). Obtain anchoring plans from equipment manufacturer indicating size and location of anchors suitable for Seismic Design Category F. Secure floor mounted equipment to concrete floor or pad with corrosion proof 1/2 inch -13 SAE Grade 5 wedge anchors having a minimum embedded depth of 5 inches unless otherwise approved or recommended by manufacturer.

C. Provide initial programming and set up for microprocessor based switchboard instrumentation. Coordinate with Owner to verify requirements for User selected programming inputs.

3.02 PANELBOARDS

A. Install in accordance with NEMA PB 1.1.

B. Height: 78 inches maximum measured from finish floor to top of enclosure; 78 inches maximum measured from finish floor to highest device handle for panelboards over 66 inches high.

C. Provide typewritten circuit directory for each panelboard listing load description for each circuit. Use final room names and numbers as verified with the Owner.

D. Stub 3 empty 3/4-inch conduits to accessible location above ceiling from each recessed panelboard.

E. Fire Rated Construction: Recessed rough-in cans that penetrate fire rated wall assemblies shall comply with requirements of Section 260500. Verify location of fire rated assemblies with Architectural plans prior to rough in.

3.03 FUSES

A. Install fuses in fusible switches.

B. Size fuses for motor loads at 150% of nameplate full load amperes; size fuses for air conditioning and refrigeration equipment at maximum recommended nameplate rating.

3.04 CIRCUIT BREAKERS

A. Install circuit breakers in accordance with manufacturer instructions and recommendations.

B. Set adjustable breakers to comply with the approved protective device coordination study or as directed by the Engineer.

3.05 MOTOR CONTROLLERS

A. Adjust solid state overload relay to match installed motor characteristics and ambient conditions. Initial setting shall not exceed 125% of nameplate full load amps.

3.06 NAMEPLATES AND LABELS

A. Switchboards, Panelboards: Provide nameplate to identify equipment designation, voltage, and source of supply for each, e.g. Panel A, 208/120V, Fed from Panel M. Provide arc flash protection label. Provide series combination rating nameplate where such rating is applicable.

B. Individual Circuit Breakers, Switches, and Motor Starters Installed in Switchboards, Distribution Panelboards Without Circuit Index: Provide nameplate to identify circuit number and load served.

C. Motor Starters and Contactors: Provide nameplate to identify load served. May be deleted when load is immediately adjacent and obvious as determined by Architect/Engineer. Provide arc flash protection label.

D. Individual Enclosed Circuit Breakers, Safety Switches, and Disconnecting Means: Provide nameplate to identify load served and circuit source and circuit number.

E. Equipment Served: Provide nameplate to identify equipment designation corresponding with nameplate of serving overcurrent device, disconnect switch, or controller when there is more than one of same type of equipment being served, e.g. Air Handler No. 2. Coordinate with Architect/Engineer to assign numbers when not designated in equipment schedules.

F. Emergency-Stop Pushbutton: Engraved three-layer laminated plastic, white letters on red background, affixed with stainless steel screws, adhesive acceptable in dry locations. Letter height 1/2 inch to read: "EMERGENCY POWER OFF".

G. Nameplate and Label Location: Secure to equipment fronts, except recessed panelboards in finished locations secure nameplates and labels to inside face of door.

H. Service Equipment: Provide label identifying short circuit rating indicated along with date of construction documents.

3.07 EQUIPMENT PADS

A. Service Equipment - Outdoors: Provide concrete slab foundation, 5-1/2 inch thick reinforced with 6 inch x 6 inch No. 6 welded steel fabric uniformly centered in slab. Slab shall be placed on a well compacted 9 inch deep gravel subbase so that the top is 3 inches above grade. All edges shall have 1/2 inch chamfer. Pad dimensions shall extend at least 6 inches beyond the enclosure footprint on all sides of the equipment unless otherwise indicated. Conduit entrance dimensions and location shall comply with equipment manufacturer's recommendations.

3.08 TESTS

A. Motors and Compressors: Record all nameplate data. Measure actual voltage and running amperes for each phase. Record manufacturer and catalog number of overload thermal units installed.

3.09 COMMISSIONING OF ELECTRICAL ENERGY METERING

A. Comply with requirements of Section 019100 for commissioning of electrical energy metering as required under Sections C408 and C409 of the Washington State Energy Code.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Surge Protective Devices (SPD's) for electrical distribution equipment.

1.02 SUBMITTALS

A. Submit product data for all items specified under Part 2 of this Section. Include product installation requirements. Include test data demonstrating compliance with specified performance and peak surge withstand ratings.

1.03 OPERATION AND MAINTENANCE DATA

A. Include data for each device type in Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Integral SPD: Distribution equipment manufacturer's standard products that meet or exceed the minimum requirements of this specification.

B. Remote SPD: Standard products of the following manufacturers that meet or exceed the minimum requirements of this specification: Innovative Technologies, Joslyn TPS series, Eaton SPD series.

2.02 SPD PRODUCT DESIGN

A. General: UL 1449, 3rd Edition, Type 2 Devices; MOV hybrid circuit design with EMI/RFI noise rejection filter. For wye configured systems provide line to neutral (L-N), line to ground (L-G), and neutral to ground (N-G) suppression. For delta configured systems provide line to line (L-L) and line to ground suppression. Designs incorporating replaceable modules are not approved.

B. Diagnostics: LED circuit status indication for each phase. Provide the following additional diagnostics:
Audible alarm
Form C contacts for remote alarm
Transient counter

C. Enclosure (Remote Devices): NEMA ICS 6; Type 12 or type 4X, unless otherwise indicated. Provide flush trim plate for recess mounting at flush mounted panelboards.

D. Overcurrent Protection: Comply with UL 1449 standard. Coordinate requirements with distribution equipment supplier. Size protection based on wire size of the SPD conductor leads using RK5 fusing or high inrush rated circuit breaker.

E. Disconnecting Means: Provide a disconnecting means for each switchboard and panelboard SPD regardless of whether it is integral or remote mounted. Coordinate requirements with distribution equipment supplier.

F. Product Warranty: 10 year minimum.

2.03 SPD ELECTRICAL REQUIREMENTS (MINIMUM)

A. Voltage Rating: Conform to nameplate of distribution equipment.

B. Ampere Interrupting Capacity (AIC) Rating: Meet or exceed rating of highest rated overcurrent device in the distribution equipment.

C. UL 1449 3rd Edition Voltage Protection Rating (VPR):

System Volts	L-N (Normal Mode)	N-G (Common Mode)	L-L
120 to Ground	700 volts	700 volts	700 Volts
277 to Ground	1200 volts	1200 volts	1200 volts

D. UL 1449 VPR Voltage Let Through:

System Volts	L-N	L-G	L-L	N-G
480/277 Wye	1100	1100	1900	1100
208/120 Wye	700	700	1000	700
120/240 1-Phase	700	700	1000	700

E. Peak Surge Withstand Rating per Phase (8 x 20 microsecond impulse wave form):

Service Entrance	160,000 Amps
Distribution Switchboards and Panels	65,000 Amps
Branch Circuit Panelboards	40,000 Amps

F. Noise Attenuation: 55 dB minimum at 100 kHz using MIL-STD-220A insertion loss test method.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Provide SPD at all switchboards and panelboards.

B. Provide factory mounted SPD integral with distribution equipment except remote mounted SPD may be used for panelboard construction.

C. Remote Mounted SPD Installation Requirements:

1. Provide SPD next (close nippled) to equipment enclosure near panelboard overcurrent device provided for the purpose. Wiring leads for remote device shall be as short and straight as possible, but in no case shall exceed 12 inches in length.

2. Comply with manufacturer's recommendations for overcurrent protection.

3. Provide additional equipment grounding terminal in panel for SPD ground connection where required to comply with maximum lead length specified for remote mounted SPD.

4. Provide recessed mounting with flush trim plate where SPD is installed at flush mounted panelboards. Obtain rough-in inspection by the Architect/Engineer prior to cover of recessed installation.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Interior Luminaires and Accessories

B. Exterior Luminaires and Accessories

C. Lamps

D. Ballasts and LED Drivers

E. Poles and Concrete Bases

F. Emergency Lighting Equipment

1.02 RELATED SECTIONS

A. Concrete for Bases: Comply with Division 03 - Concrete.

1.03 COORDINATION

A. Confirm luminaire type, mounting, and recessed depth is compatible with ceiling system prior to ordering. Coordinate with architectural reflected ceiling plans, sections, and details.

B. Determine final luminaire locations according to architectural reflected ceiling plans and elevations. In spaces open to structure, coordinate final luminaire locations and mounting heights with ductwork, piping, and structural members and submit final plan to Architect/Engineer for approval.

C. Coordinate dimensions and mounting of under-cabinet and other casework lighting with the cabinet and/or casework product vendor(s) prior to ordering light fixtures.

1.04 SUBMITTALS

A. Submit product data for all items specified under Part 2 of this section and scheduled on the drawings. Include in submittal and in Operations and Maintenance Manual a coversheet listing each fixture type with corresponding LED/lamp and driver/ballast data.

B. Submit shop drawings for Emergency Lighting System UPS equipment.

1.05 OPERATION AND MAINTENANCE DATA AND TRAINING

A. Submit all data in Operation and Maintenance Manuals.

B. Provide onsite training on driver and LED board replacement for each type of luminaire installed.

C. Lighting Inverter: Include instructions for normal operation, routine maintenance requirements, service manuals and testing procedures in Operation and Maintenance Manual. Provide onsite Owner training.

D. Include documentation from system start up.

1.06 WARRANTY

A. LED Luminaires and Fixture Ballasts: Provide five year comprehensive warranty.

B. Lighting Inverters: Provide two year extended warranty with factory start up and onsite service.

1.07 EXTRA STOCK

A. Provide extra stock under provisions of Section [ ].

B. Lenses: Three percent of quantity furnished, minimum of one of each size and type.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Luminaires & Accessories: Identified in Fixture Schedule.

B. Unit Emergency Ballasts and Transfer Relays: Identified in Fixture Schedule.

2.02 LED LUMINAIRES

A. Indoor luminaires shall comply with following requirements unless otherwise scheduled on the drawings: UL listed, Reduction of Hazardous Substance (ROHS) compliant, 3500K color temperature, 80 CRI minimum, listed for 25 degree C minimum ambient operation, integral driver, integral surge, open circuit, short circuit, and overload protection, L70 at 50,000 hours or better per IESNA LM-80. Provide dimmable driver for low voltage 0-10 volt control to 10 % of lumen output except dimming drivers that have daylight responsive control shall dim to completely OFF.

B. Outdoor luminaires shall comply with following requirements unless otherwise scheduled on the drawings: UL listed, Reduction of Hazardous Substance (ROHS) compliant, IP66 rated, 3000K color temperature, 70 CRI minimum, listed for -20 degree C to 40 degree C ambient or better operation, integral driver, integral surge, open circuit, short circuit, and overload protection, rated L70 at 50,000 hours or better per IESNA LM-80. Provide dimmable driver suitable for 0-10 volt control.

C. Recessed LED luminaires shall have drivers, modules, and reflectors accessible, serviceable, and replaceable from below the ceiling.

2.03 FIXTURE WHIPS

A. 3/8 inch flexible conduit or approved MC cable assembly with circuit and equipment ground conductors; 72 inch maximum length.

B. Where fixtures are provided with pre-installed whips, verify wiring arrangement, termination location, and installation clearances prior to ordering.

2.04 FIXTURE ACCESSORIES

A. Provide necessary hangers, brackets, plates, anchors, and other mounting accessories required by construction features and ceiling conditions. Comply with requirements of Section 260500, Basic Materials and Methods.

B. Pendants: Provide single pipe stem type with self-aligning swivel hangar and canopy and suitable for sloped ceilings, stem length as required.

C. Allow sufficient length for pendants, cables, chains, conduit, or rods as specified to install hanging fixtures at 8 feet above finished floor or 36 inches below the ceiling, whichever is lower, unless otherwise indicated in the construction documents.

D. Wireguards: Provide wireguards for all surface mounted and industrial fixtures installed in Gymnasiums and Multi-Purpose Rooms.

2.05 LIGHTING POLES

A. Wind Load Rating: 100 mph with luminaires and brackets installed.

B. Anchor Bolts: As recommended by pole manufacturer. Provide template, flat washers, lock washers, and hex nuts for each pole.

2.06 LIGHTING FIXTURE SCHEDULE

A. See Drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Provide LED modules/lamps in luminaires provided under this Section.

B. Provide wiring, installation, and lamps for lighting fixtures furnished under other Sections or by Owner, including fixtures furnished as part of hoods and equipment (e.g. range hoods, kitchen hoods, fume hoods, and walk-in HVAC equipment). Incandescent lamps shall be maximum listed wattage of fixture except when smaller wattage is indicated.

C. Set lighting fixtures plumb, square, and level; measure mounting heights to center of fixture for wall mounted and to bottom of fixture for pendant hung.

D. Support lighting fixtures from building structural members; provide metal channels or additional blocking and framing as required for fixture support between structural members or to avoid interference from mechanical pipes and ducts. Conceal supports within building construction in finished spaces.

E. Recessed and surface mounted lighting fixtures weighing less than 56 lbs (25.4 kg) may be supported from metal ceiling suspension systems when auxiliary support from structural members using two #12 AWG wire hangers at diagonal corners are provided (hangers may be slack). Fixtures weighing 56 lbs or more must be supported directly from the structure by approved hangers.

F. Light fixtures hung below suspended ceilings by pendants, cables, chains, conduit, rods, or other means shall be supported from structure above using #9 AWG wire hanger or alternate support approved by Inspection Authorities.

G. Securely fasten recessed and surface fixtures in place; provide seismic clips (one each corner) for lay-in fixtures; attach surface fixtures tight to ceilings and walls, and secure fluorescent fixtures within 12 inches of each end.

H. Mounting height for wall mounted fixtures and for hanging fixtures supported by pendants, cable, chain, conduit, rods, or other means shall be determined by the architect/engineer during construction unless otherwise indicated in the construction documents.

I. Install suspended fixtures so that no obstruction is located within the swing range. [Pendants, rods, chains, or cables 48 inches and longer shall be braced to prevent swaying. In finished spaces, use stainless steel aircraft cable for sway bracing. Single stem fixtures shall be braced with cables installed 120 degrees apart. Fixtures and fixture assemblies with two or more supports shall be braced with two cables separated 120 degrees apart and attached to the suspension yoke or bracket located at each end of the fixture or assembly (4 cables total) OR Single stem fixtures shall be braced with stainless steel aircraft cable stretched taut across the room and attached to fixture stem using a suitable stainless steel shackle and cable clamp.]

J. Prior to substantial completion and before testing and operating manual or automatic fluorescent dimming systems, operate fluorescent lamps at full brightness for the minimum hours recommended by the lamp manufacture to meet burn-in requirements.

3.02 FAILED LUMINAIRES

A. Replace luminaires which have failed LEDs or drivers at completion of work.

3.03 ADJUSTING AND CLEANING

A. Align and tighten luminaires and clean reflectors, lenses and diffusers at completion of work. Clean paint splatters, dirt, and debris from installed luminaires.

B. Make final aiming adjustment of directional luminaires as directed by Architect/Engineer at completion of work.

3.04 EMERGENCY LIGHTING EQUIPMENT

A. Exit, Self-Contained Emergency, Night lights: Connect ahead of switch control on local lighting circuit.

3.05 FIRE RATED CONSTRUCTION

A. Recessed Luminaires: Provide field fabricated fire resistive shell acceptable to Fire Marshal and conforming to requirements of UL assembly rating for ceiling installed. Allow clearances around fixture for adequate ventilation per fixture manufacturers recommendations and UL listing.

3.06 THERMAL AND SOUND INSULATION

A. Coordinate with General Contractor to ensure provisions are made to support insulation materials minimum of 3 inches clear of recessed lighting fixtures that are not IC rated.

3.07 CONCRETE BASES

A. General: Provide concrete bases for anchor base poles and for pathway lights.

B. Pole Bases: Size and construction as indicated. Install anchors using template obtained from pole manufacturer. Install poles on bases plumb; provide double nuts or shims for adjustment. Grout around pole bases.

3.08 EMBEDDED POLES

A. Hole Auguring: Provide round hole to depth indicated. Hole width shall be sufficient to allow mechanical compaction around pole base.

B. Backfill and Compaction: Backfill hole with 8-1 dry mix of fine crushed stone and Portland cement, compacted in 12-inch lifts.

3.09 TRAINING

A. Coordinate with Architect to arrange onsite training for luminaire and lighting inverters. Allow 20 minutes per each type of installed luminare to review driver and LED board replacement. Allow four hours of factory training for the lighting inverters.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Cable and Accessories

B. Station Outlets

C. Cross-Connect Components

D. Equipment Mounting

E. System Design

1.02 RELATED SECTIONS

A. Section 260100, Electrical General Requirements

B. Section 260400, Existing Systems

C. Section 260500, Basic Materials and Methods

D. Section 260526, Grounding and Bonding

E. Section 270528, Signal Systems Pathway

1.03 REGULATORY REQUIREMENTS

A. Conform to requirements of the latest revisions of the following standards:

TIA/EIA-569A	Commercial Building Standard for Telecommunications Pathways and Spaces
TIA/EIA-568B.1, 2, 3	Commercial Building Telecommunication Standards
TIA/EIA-455-61	FOTP-61, Measurement of Fiber or Cable Attenuation Using an OTDR
TIA/EIA-606	Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
TIA/EIA-607	Commercial Building Grounding and Bonding Requirements for Telecommunications

1.04 SYSTEM DESCRIPTION

A. Provide design and installation of a registered Premises Distribution System (PDS) consisting of unshielded twisted pair (UTP) horizontal station wiring with fiber optic backbone for data PDS and copper backbone for voice PDS. Verify fiber connector (ST, SC or LC) type with Owner.

B. Horizontal station PDS: Conform to TIA/EIA Category 6 requirements. Terminate each station jack via a dedicated cable to a patch panel at the nearest Distribution Frame or wiring closet located on same floor unless otherwise indicated. PDS shall provide for cross connect to telephone system using voice grade patch panels.

C. Horizontal fiber PDS: Terminate each station duplex fiber coupler via a dedicated 2-strand multimode fiber cable to a fiber patch panel at the nearest Distribution Frame or wiring closet located on same floor unless otherwise indicated.

D. Voice PDS backbone: Conform to TIA/EIA Category 6 requirements or better. Provide (1) 25 pair cable for every 24 ports, between each telephone patch panel and the main telephone cross connect. Terminate trunk cables at telephone patch panels using (1) pair per port, and at the main cross connect end using wiring terminal blocks.

E. Data PDS backbone: Provide multi-strand fiber optic cable from each Intermediate Distribution Frame (IDF) to the MDF. Each fiber cable shall be terminated at a fiber patch panel each end.

1.05 SUBMITTALS

A. Submit product data for all items specified under Part 2 of this section.

B. Submit shop drawings showing floor plans with room numbers, station outlet locations, horizontal station cable routing, backbone cable routing, and alpha numeric identification of terminals and jacks. Include elevation plans showing layout of cross-connect and wire management hardware. Show location and size of conduit sleeves for open cable routing.

C. Submit terminal labeling plan.

D. Submit documentation for tests required under Part 3 of this section.

1.06 OPERATION & MAINTENANCE DATA

A. Include data and extended warranty information for complete PDS in Operation and Maintenance Manual.

B. Include cable certification test results for each UTP and Fiber Optic cable.

1.07 QUALIFICATIONS

A. Company: Contractor specializing in the design, installation, and testing of high speed data and voice network systems for a minimum of five years.

B. Installers: Trained and experienced technicians of the company, certified by the product manufacturer and by Building Industry Consulting Service International (BICSI) for the PDS cabling, hardware, and accessories being installed, shall perform the work.

1.08 WARRANTY

A. Provide 5 year minimum product warranty and 15 year minimum link/channel transmission warranty for the PDS.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

A. UTP Cable: Systimax, Bert-Tek, CommScope, AMP, or other approved under the PDS warranty certification.

B. UTP Station Outlets and Cross-Connect Components: Systimax, AMP, Ortronics, Leviton

C. Fiber Optic Cable, Equipment, and Accessories: Siecor, CommScope, AMP, Ortronics, or other approved under the PDS warranty certification.

2.02 CABLE

A. Station Cable: UL type CMP , TIA/EIA Category 6, 24 AWG solid copper, 4-pair unshielded twisted pair, color coded jacket overall, listed for use in ducts, plenums, and other air handling spaces. Cable installed outdoors or below slab on grade shall have a water blocking core and suitable for installation below grade in conduit.

B. Trunk Cable (Telephone Backbone): UL Type CMR [CMP], TIA/EIA Category 5 or better, 24 AWG solid copper, multiple unshielded twisted pairs, color coded, jacket overall, [listed for use in ducts, plenums, and other air handling spaces]. Cable installed outdoors or below slab on grade shall be gel filled and suitable for installation below grade in conduit.

C. Multi-Mode Indoor/Outdoor Riser Rated Fiber Optic Cable (Site CCTV or signage): UL listed OFNR four (4) strand multi-mode 50/125 micron, high performance laser core, 10 GB certified for 300 meters at 850nm., indoor/outdoor rated, loose buffer.

D. Singlemode Indoor/Outdoor Riser Rated Fiber Optic Cable (Data Backbone): UL listed Type OFNR, (12) strand, match clad fiber-optic distribution cables, tight buffered with fire retardant polyethylene, glass reinforced polymer central strength member, aramid yarn flexible strength elements, and fire retardant polyethylene outer jacket and water blocking system. Optimum performance from 1265 nm to 1625 nm.

2.03 CABLE ACCESSORIES

A. Cable Support: Extra wide base J hooks, with plenum rated tie wraps. Caddy cable cat system or equal. Staples, straps, bridle rings, and similar supports are prohibited.

B. Fiber Protection, Inside Plant: Non-metallic corrugated flexible raceway, 3/4 inch minimum diameter, orange color, UL listed for use with OFNP plenum rated fiber cable. Carlon Plenum-Gard or equal.

C. Fiber Protection, Outside Plant: Non-metallic corrugated flexible raceway, 1 inch diameter, orange color, UL listed for use as an innerduct within conduit systems.

D. Wire Management, Backboards: Provide open “D” style wire rings for horizontal and vertical cable management, including strain relief, bend radius, and cable routing.

E. UTP Voice Cable Circuit Protection, Outside Plant: UL 497, solid-state, fused, press to fit cross-connect block protectors with automatic reset and ground bar attachment. ITW Linx UltraLinx series protector or equal. Provide for each circuit pair.

F. UTP Data Cable Circuit Protection, Outside Plant: UL 497, solid state modular protector. Provide rack mounted patch panel configuration for bundles or pathways that exceed 6 cables. ITW Linx or equal. Provide for protection for each cable.

2.04 STATION OUTLETS

A. Outlet Jacks: TIA/EIA -Category 6 RJ45, T568A/B wired for T568B pin configuration, 8-position/8-conductor, keyed modular jack, with color coded replaceable icons to identify use. For wall phones provide integral stainless steel wall plate with mounting lugs compatible with telephone handset.

B. Outlet Fiber Couplers: Duplex ST multimode/single-mode modular adapter with 45 degree metal sleeves and dust caps.

C. Faceplates: Thermoplastic with identification strip top and bottom; 3 module/6 port capacity; color to match wiring devices. Provide blank modules for unused plate opening.

D. Floor Box Outlets: Standard duplex mounting strap with modular snap-in outlet jacks. Provide blank insert where ever jack is not installed.

E. Outlets in Two-Piece Surface Metal Raceway: Decorator (rectangular) style duplex mounting strap with modular snap-in outlet jacks. Provide blank insert where ever jack is not installed.

2.05 CROSS-CONNECT COMPONENTS

A. Terminating Blocks: AT&T 110 series connecting blocks with stand-off brackets, bridging clips, cable troughs, and distribution rings as required for cable management. Provide labeling strips for conductor assignment identification.

B. Telephone Cross Connect: TIA/EIA Category 5, printed circuit board patch panels, multi-port modular construction with RJ45 8-position jacks, AT&T 110 connector system, T568A wiring, identification strips, 19 inch rack mounting, unless otherwise indicated. Provide sufficient panels and quantity of ports equal to at least 40% of the number of installed stations jacks.

C. Station Outlet Cross Connect: TIA/EIA Category 6 printed circuit board patch panels, 6-port modular construction with RJ45 keyed 8-position jacks, AT&T 110 connector system, T568A wiring, identification strips, and 19 inch rack mounting, unless otherwise indicated. Provide sufficient panels and quantity of ports equal to the number of terminated stations cables plus 20%.

D. Fiber Cross Connect: Twelve (12) port ST or LC style panel installed in locking protective cabinet with provisions for fiber storage, fiber routing, and connector identification; 19 inch rack mounting, unless otherwise indicated.

E. Voice Patch Cords: UL type CM, TIA/EIA Category 5, 4-pair cable with RJ45 plug each end, length not to exceed 4 meters, quantity equal to 40% of total installed station jacks. Provide 25% 3-feet, 50%-5-feet, and 25% 7-feet long, color white unless otherwise directed.

F. Data Patch Cords: UL type CM, 4-pair cable with RJ45 plug each end, length not to exceed 4 meters, quantity equal to 75% of total installed station jacks. Provide 25% 3-feet, 50%-5-feet, and 25% 7-feet long, color blue unless otherwise directed.

G. Fiber Optic Connectors: Multi-mode ST or LC style. Quick cure epoxy adhesive. Bayonet style coupling with multi-mode ceramic or glass-in-ceramic ferrule, keyed for repeatable performance.

H. Multi-Mode Fiber Patch Cords: Preassembled single fiber, multi-mode 62.5/125 micron/ULTRA grade jumper cord with connectors each end, length 3 meters. Provide one patch cord for each terminated/assigned fiber patch panel port plus 10%, with ST to ST, ST to SC, or ST to LC connectors as required (verify).

I. Singlemode Fiber Patch Cords: Preassembled singlemode patch cord with pull-proof connectors each end, length 3 meters. Provide one patch cord for each

terminated/assigned fiber patch panel port plus 10%, with ST to ST, ST to SC, or ST to LC connectors as required (verify).

2.06 EQUIPMENT MOUNTING

A. Equipment Racks, Floor: Aluminum self supporting frame designed for open rack mounting of telecommunications equipment, base anchor design, pre-drilled EIA mounting holes, 19 inches wide by 84 inches high unless otherwise indicated. Provide four equipment shelves with mounting hardware. Finish: black.

B. Equipment Racks, Wall: Steel or aluminum one piece wall bracket with hinged swing out panel mount feature, 19 inches wide by 6 inch nominal deep.

C. Wire Management, Equipment Racks: Provide vertical wire management channels each side of equipment racks for strain relief; bend radius, and cable routing. At each patch panel provide rear mounted strain relief bar for station cable routing and front mounted wire management rings or cable trough for patch cords.

D. Power Supplies: Rack mounted, 120 VAC, line interactive, uninterruptible power supply (UPS) with surge protection and filtering, (6) NEMA 5-15R receptacle outlets (minimum), USB connectivity, status display for On Line/On Battery/Replace Battery/Overload, and low battery/on battery alarms. VA rating indicated. APC Smart UPS SUA series or approved.

E. Plug Strips: Rack mounted, 120 VAC power strip, with (8) NEMA 5-15R rear mounted 90 degree receptacle outlets, power switch, UL 1449 surge protective device, and 20 amp 6-foot cord & plug input.

PART 3 - EXECUTION

3.01 PREPARATION

A. Provide location and size of conduit sleeves for routing open cables thru fire rated construction, draft stops, and partition walls in attics, crawl spaces, and accessible ceiling spaces. Size sleeves with 25% minimum space capacity. Indicate on shop drawings for coordination with Section 270528.

3.02 INSTALLATION

A. Comply with product manufacturer installation instructions. Conform to requirements of TIA/EIA- 568-B and TIA/EIA-569 for the specified Category.

B. Unless otherwise indicated, provide one cable drop per jack. Locate voice jacks above data jacks at outlets where both type are installed.

C. Label station outlets sequentially using the following alpha/numeric identification plan unless otherwise directed: IDF# - Room# - Outlet# -Jack (A, B, . . .). In each room start with first outlet by main entrance door and continue clockwise around room. Label station cable at each end with a permanent cable marker to match the corresponding terminal number. Label each station jack using polyester film adhesive pre-labeled markers to indicate corresponding terminal number. Use final room names and numbers identified by Owner.

D. Label voice cross-connect terminals sequentially using an approved numeric or alpha-numeric plan submitted for approval.

E. Conceal wiring in suspended ceiling spaces, attic spaces, crawl spaces, and in wall construction. Utilize conduit rough-in specified in Section 270528 and shown on drawings. Install cable in neat parallel runs within cable trays and down to cross-connect hardware without rolls, twists, or loops.

F. Install cables continuous without splicing. Install open cable above accessible suspended ceilings parallel and perpendicular to building lines. Bundle cables with nylon tie wraps and support cable in tray, conduit sleeves, or from structure using specified J hooks at intervals not to exceed 4 ½ feet. Maximum number of cables per bundle shall be 48.

G. Provide cable slack to meet TIA/EIA standards, minimum.

H. Seal conduit sleeves thru fire rated construction using silicone foam system, Chase-Foam CTC PR-855, 3M CP 25, or Dow Corning RTV.

I. Maintain a minimum 6 inch separation from parallel power wiring. Do not share bore or knock out holes thru wall studs and other structural members with power wiring.

J. Secure floor mounted equipment racks with four (4) 5/8 inch diameter anchor bolts, one near each corner of floor base. Use lead expansion anchors in concrete floors.

K. Bond together all equipment racks to room cable tray and to communications service ground using #1/0 AWG conductor minimum. Comply with Section 260526 for grounding materials.

L. Provide fiber optic cable within protective non-metallic raceway system. Install raceway to within 18 inches of fiber termination. For horizontal station fiber PDS, provide conduit connector for protective raceways that terminate at station outlet conduit riser.

M. Provide required telecommunication wiring between fire alarm transmitter and telephone service demarcation point. Verify requirements with fire alarm system provider. Allow for (2) RJ31 jacks with dedicated Category 5 or better station cable terminated at a shared headend cross connect block reserved for analog telephone service interface.

N. Provide required telecommunication wiring between intrusion alarm transmitter and telephone service demarcation point. Verify requirements with intrusion alarm system provider. Allow for (2) RJ31 jacks with dedicated Category 5 or better station cable terminated at a shared headend cross connect block reserved for analog telephone service interface.

O. Provide UL497 primary circuit protection at building entrance and building exit for all outside plant copper telecommunication cabling.

3.03 TESTING

A. UTP Cabling:

1. Test new station drops for specification compliance at completion of work. Correct deficiencies by replacing terminations, components, or cable as required.

2 Perform continuity test on each wire/pair prior to cover. Verify no open circuits, short circuits, or accidental grounds exist.

3. PDS shall be certified to meet or exceed the specifications as set forth in TIA/EIA TSB40 and TIA/EIA 606-A for specified Category compliance. Certifications shall include the following parameters for each pair of each cable installed:

   a. Wire map (pin to pin connectivity)

   b. Length (in feet)

   c. Attenuation to Crosstalk Ratio (ACR)

   d. DC Loop Resistance

   e. Ambient noise

   f. Near-End Crosstalk (NEXT)

   g. Equal-Level Far-End Crosstalk (ELFEXT)

   h. Return Loss (RL)

4. Use test equipment such as the Ideal LANTEK 6 or approved equal to measure all essential cable parameters specified by TIA/EIA and UL thru Category 6. Provide a written record of these tests.

5. Correct malfunctions when detected and proceed with testing. Record test results on a "UTP Cable Test Results" form showing frequency tested and PASS/FAIL results.

B. Fiber Optic Cabling:

1. OTDR Acceptance Tests: Test fiber optic cable for continuity, normalized fiber loss, and overall length verification, using an Optical Time Domain Reflectometer (OTDR). Attenuation measurements in dB/km shall be performed for each multi-mode fiber at 850 nm and 1300 nm wavelengths [and each single mode fiber at 1310 nm and 1550 nm wavelengths]. Perform tests of cable both on reel when delivery of cable is taken, and after cable is installed and before connectorizing. Attenuation of multimode fibers shall be no greater than 3.0 dB/km at 850 nm and no greater than 1.0 dB/km at 1300 nm. [Attenuation of singlemode fibers shall be no greater than 0.4 dB/km at 1310 nm and 0.3 dB/km at 1550 nm.] Installed cables with any damaged fibers shall be removed and replaced at Contractor expense.

2. Visual Inspection Reports: Visual inspection of each field installed fiber optic connector shall be documented to include report on end face quality, polish, and informational comments.

3. Optical Loss Tests: Fibers shall be loss tested in both directions at 850 nm and 1300 nm wavelengths [1310 and 1550 nm wavelengths for singlmode fiber] after connectorization. Acceptable attenuation shall be any value less than the fiber attenuation plus 0.5 dB per multimode fiber connector [and 0.2 dB per singlemode fiber connector].

4. Use test equipment such as the Ideal FIBERTEK or approved equal to measure all essential parameters specified. Provide a written record of these tests.

5. Correct malfunctions when detected and proceed with testing. Record test results on a "Fiber Optic Cable Test Results" form showing PASS/FAIL results.

3.04 DOCUMENTATION

A. Documentation includes the following and shall be delivered to the Architect/Engineer within 20 working days after the wiring is completed.

1. Certification documents and test results

2. Record drawings

3. Permanent ID record at each MDF and IDF location.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Building fire detection and alarm system, bidder design.

1.02 RELATED SECTIONS

A. Section 211000, Water Based Fire Suppression System

B. Section 255000, Automatic Temperature Controls

C. Section 260100, Electrical General Requirements

D. Section 260500, Basic Materials and Methods

E. Section 260526, Grounding and Bonding

1.03 REGULATORY REQUIREMENTS

A. Conform to requirements of Washington State Fire Marshal's office and local Fire Marshal.

B. Conform to requirements of following publications in addition to requirements of 260100:

IFC	International Fire Code
NFPA 72	National Fire Alarm Code

Local fire alarm code adopted by the jurisdiction

1.04 SYSTEM DESCRIPTION

A. Fire Alarm System: Supervised, non-coded, addressable, using Style 4 (Class B) signaling line circuit (SLC) intelligent loop wiring for initiating and monitoring, and Class B (two wire with end-of-line device) for signaling.

B. Alarm Sequence of Operation: Actuation of any manual or automatic initiating device results in system ALARM which includes the following operations:

1. Display alarm status information at control panel and remote annunciator.

2. Audible and visual alarm signals operate continuously until initiating devices are restored to normal and control panel is reset. If alarm silence switch is activated, alarm LED annunciation continues. New alarm resounds signals.

3. Alarm signal is transmitted to remote Central Station.

4. Relays activate to initiate HVAC shut down, release door hold open devices, close smoke dampers, and operate elevator and stairwell pressurization fans.

C. Trouble Sequence of Operation: Grounded circuit, open circuit, power failure, or system failure results in system TROUBLE which includes the following operations:

1. Display trouble status information by zone at the control panel. Audible trouble signal operates continuously until activation of silence switch.

2. Trouble signal is transmitted to remote Central Station.

D. Sprinkler Supervision: Closing OSY, PIV, or zone valves, or abnormal air pressure for dry systems results in a system supervisory which includes the following operations:

1. Display supervisory status information at the control panel. Audible trouble signal operates continuously until activation of silence switch.

2. Sprinkler supervisory signal is transmitted to remote Central Station.

E. Duct Detector Supervision: Actuation of any smoke duct detector results in supervisory which includes the following operations:

1. Display supervisory status information at the control panel. Audible trouble signal operates continuously until activation of silence switch.

2. Duct detector supervisory signal is transmitted to remote Central Station.

F. Zoning: As approved by authority having jurisdiction. Use final room names, room number, and area designations as verified with the Owner.

1.05 SYSTEM PARAMETERS

A. Design: Comply with requirements of the International Fire Code, International Building Code, and local fire alarm code as adopted and supplemented by authority having jurisdiction and applicable for the Building Occupancy, by Group and Division, indicated in the Construction Documents. Location of control panel, remote annunciator, and door hold open devices are indicated on the Electrical Plans. Desired location of equipment and minimum requirements for signaling and initiating devices are indicated on the Electrical Plans. Provide additional devices as required.

B. Pre-bid Coordination: Obtain and review all construction documents prior to bidding as required to verify site conditions, floor plans, building sections, ceiling types, building construction, mechanical systems, building equipment and other conditions that will affect the fire alarm system design. Verify fire alarm design and system requirements with local authority having jurisdiction.

C. Fire Suppression System(s): Building(s) have a water based fire suppression system. Coordinate scope of sprinkler coverage with Section 211000.

D. Device Compatibility: All alarm, initiating, and accessory devices provided shall be listed in the device compatibility document available from the manufacturer for the fire alarm control panel installed.

E. Detectors: Unless otherwise indicated, provide detectors as follows:

1. Smoke Detectors: Photo-electric or ionization type.

2. Heat Detectors:

a. Indoor high ambient temperature areas (e.g. boiler rooms, kitchens, attics, ceiling spaces, etc.): rate anticipation heat detectors.

b. Other locations: combination rate of rise and fixed temperature heat detectors.

F. Outdoor Installation: Equipment and devices installed outdoors shall be weatherproof and otherwise suitable for the application.

G. Wire Guards: Provide for detectors and signaling devices located in gymnasiums, multipurpose rooms, play sheds and similar areas of high abuse. Guards shall be listed for use with the device protected.

H. Audible Signaling Devices: Spacing, locations, and system design shall provide alarm audibility of not less than 15 db above ambient noise levels. Horn devices installed in individual rooms under 900 square feet shall be small area type.

I. Visual Signaling Devices: The following building areas and spaces are to be considered public areas subject to requirements for ADA visual signal devices: Halls, corridors, toilets, rest rooms, conference rooms, open offices, reception areas, break rooms, work rooms, waiting areas, and entries. Spacing, location, and candela rating shall comply with alarm notification visibility requirements of NFPA and ADA.

J. Access: Provide service access to detectors not readily accessible and to sampling tubes of duct smoke detectors.

K. Duct Smoke Detectors:

1. Provide for HVAC units rated above 2000 CFM.

2. Provide for smoke dampers unless total coverage smoke detection is provide in all areas served by the HVAC system per IMC requirements.

3. Provide each duct smoke detector with a remote LED/Test station located in an accessible location approved by the Fire Marshal.

4. Coordinate quantity, location, and access for duct smoke detectors with Division 23 Contractor.

L. Provide identification sticker on end of line (EOL) devices.

M. Provide conductors installed in conduit except fire rated MC cable or fire rated open cabling is approved where concealed in ceiling spaces and/or building construction if acceptable to the AHJ.

N. Device Locations: Subject to review and approval by Architect/Engineer during shop drawing review. Changes in device locations may be directed and shall be accommodated subject to Code compliance.

O. Additional Devices: In addition to initiating and signaling devices indicated and specified, include in the Contract an allowance to provide *5* additional initiating and/or signaling devices as directed at no additional cost. Include conduit, wire, outlet box, programming, and testing.

P. Transient Voltage Surge Suppression (TVSS): Provide TVSS protection on outside plant fire alarm circuits.

1.06 SYSTEM MONITORING

A. Provide wireless RF or cellular transmission of addressable supervisory, alarm and trouble signals to an approved local UL Central Station. Include Central Station setup and connection charges

B. Charges for 24 hour Central Station monitoring shall be paid by Owner.

1.07 SUBMITTALS

A. Submit qualifications specified under Part 1 of this section.

B. Submit product data for all items specified under Part 2 of this section.

C. Provide shop drawings of complete system. Include graphic annunciator plaque, wiring diagrams, system layout and battery calculations. Indicate wire color coding and termination points for control panel, remote annunciator, and each type of device. Show equipment and device locations, size, type, quantity, and routing of interconnecting wiring, end of line locations, and zoning.

D. Submit product data and shop drawings to Fire Marshal for review and approval in addition to Architect/Engineer submittal requirements.

E. Submit record drawings along with reports specified under Testing.

1.08 OPERATION AND MAINTENANCE DATA

A. Include data for complete system in Operation and Maintenance Manuals.

1.09 QUALIFICATIONS

A. Company: Have minimum five (5) years experience in the installation of fire alarm systems and capable of providing 24 hour repair service with 2 hour response time.

B. Shop Drawing Preparation: Technician possessing a current Certification in Engineering Technologies (NICET) Level III certification shall design and prepare the fire alarm system shop drawings unless otherwise approved by the AHJ.

C. Installers: Trained technicians possessing a current specialty electrician certificate of competency issued by the State of Washington and National Institute for Certification in Engineering Technologies (NICET) Level II certification shall perform the work.

D. Authorized factory representative of the system being installed shall supervise installation, testing, and adjustment of the system.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Kidde

B. Gamewell

C. Edwards

D. Notifier

E. Faraday

F. Farenhyt (Silent Knight)

2.02 CONTROL PANEL

A. Fire Alarm Control Panel (FACP): Microprocessor based addressable control panel with wall mounted cabinet.

B. Power Supply: 120 volt AC power input, 24 volt DC system operation. Include transient surge protection, automatic battery charger and 24 volt rechargeable, maintenance free, sealed lead-acid batteries capable of operating system under alarm condition for five minutes after a 60 hour interruption of 120 volt AC power.

C. Initiating Circuits: Supervised programmable input/output circuits (500 [125] [50] point minimum capacity) with 80 character minimum LCD status display and keypad.

D. Smoke Alarm Verification Circuit: Delays alarm and resets smoke detectors allowing second (verified) alarm initiation. Adjustable alarm delay 1-60 seconds; adjustable verification period 1-120 seconds.

E. Signal Circuits: Supervised signal modules with march time feature and trouble LED indication. Provide signal controller(s) for synchronizing strobes to flash together. Provide sufficient size and quantity so that no signal circuit is loaded more than 75% of listed capacity.

F. Audio Communications: UL 864 and UL 1711; Supervised modules as required to provide oscillator tone and voice communications through system alarm speakers. Include audio master control, oscillator control switches, speaker circuit manual control switches, pre-amp monitors, power amplifiers, hand held paging microphone, and approved recorded message announcement system. Provide amplifier(s) as required for speaker system operating capacity plus 125% minimum spare capacity. Provide flush mounted remote microphone/audio control station where indicted.

G. Panel Status Indicators: LED annunciation of normal power, battery power, battery trouble, ground detection, system trouble, alarm silence, and trouble silence. Audible signal annunciation of any alarm or trouble condition or system.

H. Operating Controls: Lamp test, panel reset, alarm silence, trouble silence, and Drill. Operating controls shall be enabled by key switch or shall be located behind locking cabinet door.

I. History File: Minimum 400 event capacity in non-volatile memory. Include provisions to allow RS232 interfaces with remote personal computer and printer (2 ports minimum).

J. Signal Transmission: Provide output connections for addressable alarm, trouble, and supervisory signal transmission via the alarm transmitter.

K. Auxiliary Relays: As required, with 120 VAC rated contacts; include for HVAC fan shutdown, electro-magnetic door holders, and smoke dampers.

2.03 REMOTE ANNUNCIATOR

A. Annunciator: Recessed weatherproof enclosure containing supervised back-illuminated LCD display with key enabled acknowledge, system reset, and signal silence.

B. Option: Where approved by the AHJ, remote annunciation may be deleted if system alarm is transmitted, received, and reported to the fire department by zone.

2.04 GRAPHIC PLAQUE

A. White plexiglass with dark contrast graphics and painted or anodized metal frame (finish selected by Architect/Engineer). Show one-line building layout by floor with zone configuration approved by Fire Marshal. Provide adjacent to each control panel and remote annunciator.

2.05 INITIATING DEVICES

A. Manual Stations: UL 38; addressable, single or dual action, downward pull lever, key reset without break-glass feature.

B. Heat Detectors: UL 521; addressable combination rate-of-rise and fixed temperature 135 deg F rated, self restoring rate-of-rise element, low profile addressable twist lock base, LED status indicator, listed for 2500 square feet. In high ambient areas provide 190 deg F fixed temperature rated detectors listed for 625 square feet.

C. Smoke Detectors, Photo-Electric Type: UL 268; addressable light scattering photodiode principle of operation, LED status indicator, test feature, integral 135 deg F fixed temperature sensor, addressable twist-lock base, supervised 2-wire operation.

D. Smoke Detectors, Ionization Type: UL 268; addressable dual chamber, LED status indicator, test feature, adjustable sensitivity, addressable twist- lock base, supervised 2-wire operation.

E. Duct Detector, Smoke: UL 268; addressable photoelectric or ionization type smoke detector, duct mounted detector housing with sampling tubes extending width of duct, visual indication of detector actuation. Provide auxiliary DPDT contacts for HVAC shutdown and/or smoke damper actuation, rated 1/8 HP at 120 VAC and 1/4 HP at 240 VAC minimum.

F. Remote Status/Test Station: 24 volt DC detector status LED indicator and key operated alarm initiating test switch mounted on a flush stainless steel cover plate. Provide engraved nameplate indicating function and location (e.g. "SMOKE DETECTOR, ELEVATOR SHAFT").

2.06 SIGNALING DEVICES

A. Alarm Speakers, Indoor: UL 1480; high fidelity voice/tone re-entrant loudspeaker, low profile housing, 400 to 4000Hz frequency range or better, 25V or 70V field selectable input, multi- tap power selection up to 2 watts minimum, rated 77 dB (UL) or better at 10 feet and 1/4 watt. Provide integral alarm strobe where indicated. Housing color shall be white or red as selected by Owner.

B. Alarm Speakers, Outdoor: UL 1480; basic voice/tone re-entrant loudspeaker, low profile weatherproof housing, 25V or 70V field selectable input, multi- tap power selection up to 8 watts rated 77 dB (UL) or better at 10 feet and 1/4 watt. Provide integral alarm strobe where indicated. Provide exterior mounted devices with weather resistant backbox. Housing color shall be white or red as selected by Owner.

C. Alarm Horns: UL 464; basic electronic horn rated 96 dB at 10 feet. Provide integral alarm light where indicated. Provide exterior mounted horns with weather resistant backbox.

D. Alarm Horns, Small Areas: UL 464; compact electronic horn rated 60 dB minimum at 10 feet, designed for flush mounting. Provide integral alarm light where indicated, mounted on front of device plate.

E. Alarm Strobes: UL 1971; lamp and flasher, field selectable intensity settings, with clear lens and visible FIRE markings on device housing. Provide standard or high candela intensity strobes as required for location and spacing of devices. Housing color shall be white or red as selected by Architect. Strobes shall be synchronized to flash together.

F. Ceiling mounting signaling devices may be installed in lieu of wall mounted subject to location, spacing, and intensity rating complying with alarm notification audibility and visibility requirements of NFPA and ADA.

2.07 AUXILIARY DEVICES AND ACCESSORIES

A. SLC Interface devices: Remote addressable module for monitoring status of alarm initiating circuit devices or to provide remote control (pilot duty) from the SLC loop.

B. Door Holders: Semi-flush magnetic door holder, 24 volt DC coil, for wall-to-door installation. Provide floor installation where indicated.

C. Door Closer, with Electric Hold Open: Specified under Division 08, 24 volt DC.

D. Fire Door Releasing Device, Overhead Coiling Shutters: Specified under Division 8, 24 volt DC.

E. Wire Guards: Provide on automatic detectors and signaling devices located in Gymnasium, Multipurpose Rooms, Play Sheds, and similar areas of high abuse.

F. Access Doors: Milcor Style M locking access panel, keyed to match electrical panelboards. Provide where required to maintain service access to detectors.

G. Signal Expander: Independent 4-circuit power supply with battery back-up, 120 VAC input, 24 VDC output. 1.5 amp minimum output each circuit.

H. Audio Power Booster: Independent 2 or 4-circuit audio power supply with synchronized strobe power and battery back-up, 120 VAC, as required. Wheelock SPB series or approved.

I. Batteries for Equipment Power Supplies: Provide maintenance free, rechargeable type, as recommended by equipment manufacturer. Batteries provided shall not be older than 60 days from date of manufacture.

J. Transient Voltage Surge Suppression (TVSS): UL 497B; modular, solid state, multistage, automatic reset circuit protectors with screw terminals. Provide matching base for plug-in devices. Device selection shall be as recommended by product manufacturer based on type of signal circuit. Provide Edco #SLCP, PHC, and SAC series protectors installed in a Hoffman CH series hinged door enclosure with mounting board and phenolic label on enclosure front to read “FIRE ALARM TVSS”.

2.08 CODED TRANSMISSION

A. Digital Communicator: Fire Marshal approved, UL listed, digital communicator for alarm system reporting complete with power supply, dual phone line monitoring, line seizure, supervisory feature, battery back-up, low battery reporting, and required phone cable for

connection to two (2) phone jacks. Communicator shall be integral with the fire alarm control panel.

B. Alarm Transmitter: Fire Marshal approved, UL listed, wireless radio frequency (RF) or GSM transmission system complete with power supply, transceiver module, antenna, battery back-up, battery charger, low power reporting, failure reporting, mounting hardware, coaxial cable. Transmission format shall provide full addressable alarm, trouble and supervisory data and be compatible with the approved Central Station. Provide a NEMA 1 surface mounted cabinet with locking hinged door to house all transmitter components. Wireless transmitters shall be furnished with remote antenna where required for proper system operation.

2.09 MATERIALS

A. Conductors for 120 Volt Circuits: Building wire as specified in Section 260500.

B. Conductors for 24 Volt DC Circuits: Comply with NFPA 70, Article 760 for insulation requirements. Solid copper conductor, minimum #14 AWG for signal circuits and #16 AWG for initiating circuits. Jacketed twisted pair, copper conductor, with shielding as recommended by alarm system manufacturer for SLC intelligent loop wiring. Outside plant cable shall UL listed for the purpose.

C. Conduit: As specified in Section 260500, metallic only.

D. MC Cable: Dual rated MC/FPLP, 90°C MC/105°C FPLP copper conductors, with ground conductor(s) and steel outer covering with red identifier. UL listed and approved for fire alarm and control, multi-conductor and/or twisted shielded pair as required.

E. Device and Junction-Boxes: As specified in Section 260500, except surface boxes shall be furnished by alarm system manufacturer to match devices. Boxes shall be red in color. Device and junction boxes located outside of buildings shall be tamper proof. Outdoor boxes shall be weatherproof.

PART 3 - EXECUTION

3.01 PREPARATION

A. Coordinate with the approved Central Station to verify type of wireless transmission system to be provided. Wireless transmission system type shall be as selected by Owner where more than one option is available. Where approved wireless transmission service is not available, arrange with Owner's telephone system installer to provide two phone lines terminated at the FACP digital communicator with required telephone jacks.

B. Coordinate and arrange with the approved Central Station to verify wireless signal strength at the project site as required to verify wireless service availability.

C. After building structure is in place and prior to completion of rough-in, meet with the inspecting authority on site to review system requirements and location of devices and equipment using the approved shop drawings. The purpose of this meeting is to avoid additional devices and other required changes that are often identified during final inspection.

3.02 INSTALLATION

A. Install system in accordance with manufacturer's instructions. Provide all necessary programming and adjustment of system equipment to make operational.

B Wiring methods shall comply with requirements of Section 260500. Exposed wiring is not permitted in finished spaces. Wiring shall be dedicated to the fire alarm system consistently color coded per shop drawings. Wiring shall not share conduits with other systems.

C. Coordinate quantity, location, and access for duct smoke detectors and sampling tubes with Division 23 Contractor. Furnish sampling tube/detector housing assemblies for installation by ductwork installer. Do not locate sampling tubes less than 6 duct widths from return air inlet, bend in duct, or other obstruction in duct. Locate sampling tube/detector housing assemblies for smoke dampers on the damper housing where recommended by smoke damper manufacturer.

D. Do not locate detectors within 4 feet of HVAC supply and return registers and not in a direct airflow. Do not locate detectors within 1 foot of light fixtures.

E. Provide recessed backboxes for semi-flush installation of devices where construction permits, otherwise provide surface boxes.

F. Mounting Heights: Install wall mounted equipment and devices, measured to center of device above finished floor, unless otherwise indicated on shop drawings approved by the Authority Having Jurisdiction (AHJ).

Manual Stations	48 inches to top
Alarm Signaling Devices and Remote Alarm Lights	80 inches to bottom
Remote Annunciator and Graphic Plaques	60 inches to bottom

G. Detectors shall not be installed until finish work and construction clean up of all trades is complete, and area is ready for occupancy.

H. Provide 24 volt DC power to electro-magnetic door holders and door closers with electric hold open. Mount outlet box for electro-magnetic door holder to withstand 80 pounds pulling force.

I. Fire Protection Monitoring and Signal Power: Provide addressable interface modules, conduit, wire and connections to fire sprinkler flow switches, sprinkler valve tamper switches, pressure switches, and electric sprinkler alarm bell. Include 24 VDC power for sprinkler alarm bell furnished under Section 211000. Coordinate number and location of alarm and supervisory connections with fire protection shop drawings.

J. Smoke Control: Provide conduit, wire, interface relay, and connection to smoke dampers and to motor controllers of pressurization and/or exhaust fans. Include addressable interface modules where required.

K. Fan Shut-Down: Provide conduit, wire, relays and connection for shutdown of air moving equipment rated over 2000 cfm per IMC Section 606. Final connection to HVAC equipment with integral motor controls shall be provided under Division 25.

L. Adjust sensitivity for each smoke detector based on the application and type of space being protected as recommended by the product installation instructions.

M. SLC Interface: Provide addressable interface modules for all non-addressable initiating devices and equipment furnished under other sections.

N. Provide 24 volt DC power to fire door releasing devices unless otherwise indicated. Provide wiring to initiate release upon activation of the smoke detection located adjacent to the door opening.

O. Primary Power Supply: Provided dedicated branch circuit(s) for fire alarm control, transmitter, and NAC auxiliary power supplies. The location of the circuit disconnecting means shall be permanently identified at each cabinet. Where the circuit disconnecting means is located at the panelboard branch circuit breaker, provide a red pad locking attachment.

P. Wireless Transmitter: Locate and install wireless transmitter in vicinity of the Fire Alarm Control Panel (FACP) as approved by the Fire Marshal. Provide required wiring and connections between the FACP communicator and the transmitter for addressable alarm, trouble, and supervisory transmission. Where wireless signal strength is not sufficient for use of an integral antenna at the transmitter, install a remote antenna at an Architect/Engineer approved location as required.

Q. Alarm speakers: Adjust speaker taps meet decibel and intelligibility requirements of NFPA. Connect speakers for 70 volt operation. Add addition speakers where required by Fire Marshal.

R. TVSS: Provide transient voltage surge protection on each outside plant fire alarm system signaling, notification, initiating, and control/interface circuit. Locate TVSS with 15 feet of the fire alarm control panel for dedicated inter-building circuit home runs. Locate TVSS within 15 feet of building entrance for indoor circuits extending outdoors (e.g. PIV tamper). Bond TVSS to the building grounding electrode system using #10 AWG minimum copper ground conductor.

S. Pathway Identification: J-boxes, outlets and condulet covers shall be identified red in color. Conduit in accessible attic and ceiling spaces, and where surface mount in electrical, telecomm and mechanical spaces, shall be identified red in color every 8 feet or fraction thereof, along its length.

3.03 TESTING

A. Test system in accordance with NFPA 72 and Fire Marshal requirements.

B. During testing verify device address descriptions match device type, location description, and zoning assignments shown on record drawings. Submit address log and correction report and confidence test report with record drawings.

3.04 DEMONSTRATION AND INSTRUCTIONS

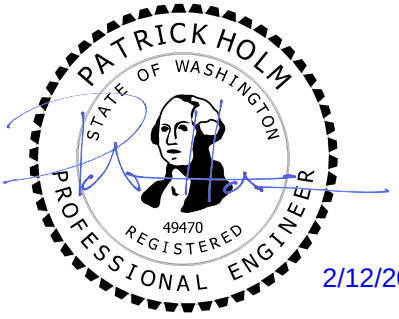
A. Demonstrate operation, maintenance and programming of system to Owner's personnel prior to Contract Closeout. Allow one four hour session scheduled at convenience of Owner.

B. Use operation and maintenance manuals as basis of instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

C. Demonstrate operation, control, trouble shooting, maintenance, and testing of system.

END OF SECTION

MASON TRANSIT AUTHORITY
MTA – BELFAIR PARK AND RIDE PROJECT



2/12/2020

DIVISION 31
EARTHWORK

SECTION 31 11 00

SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Locate existing utilities.
2. Protection of existing vegetation, landscaping materials, utilities, pavement and site improvements not scheduled for removal.
3. Clearing and grubbing of stumps, vegetation, debris, rubbish, and site improvements, and stripping of organic material.
4. Protection of adjacent property, structures, benchmarks, and monuments.
5. Removal of curbs, slabs, fencing, rockery, catch basins, pavement, utility structures and lines and other items as required to install new improvements.
6. Removal and legal disposal off site of material resulting from these operations.

1.2 REFERENCES

A. Reference the following standards:

1. Mason County Design and Construction Standards.
2. Department of Ecology 2019 Stormwater Management Manual for Western Washington.
3. WSDOT-APWA 2020 Standard Specifications for Road, Bridge, and Municipal Construction.
4. Mason County Standard Details.
5. WSDOT Standard Specifications

1.3 SUBMITTALS

A. Photographs and/or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

1.4 EXISTING CONDITIONS

A. Coordinate with utility companies and verify that all appropriate services have been disconnected. Contractor shall pay all fees and costs associated with utility disconnects, capping, line and meter removals.

B. Do not shut off or cap utilities without prior notice. Site utilities shall remain in service unless otherwise indicated. Coordinate work with Division 1 requirements.

C. Construct temporary erosion and sediment controls and maintain as required. Contractor shall provide temporary building access.

D. Maintain street drains and sewers open for free drainage.

E. Objectionable Noises: Conform with local governing requirements regarding Noise Control.

F. Maintain vehicular and pedestrian traffic routes:

1. Ensure minimum interference with roads, streets, alleys, sidewalks, and adjacent facilities.

2. Do not close or obstruct streets, fire lanes, sidewalks, alleys or passageways without permission from authorities having jurisdiction.

3. If required by governing authorities, provide alternate routes around closed or obstructed traffic ways. Contractor shall provide temporary building access as indicated in the plans.

G. Contractor is responsible for the verification of all utility locations. A minimum of five working days in advance of construction, use a private utility locate service to verify location and elevation of existing utilities within the areas shown on the plans to allow for coordination and mitigation of conflicts without down time.

1.5 DIMENSION AND LAYOUTS

A. Comply with all applicable Federal, State and Local codes and safety regulations. If there are any conflicts among referenced standards, the more stringent requirements shall govern.

B. Obtain necessary permits, including but not limited to:

1. All permits required due to Contractor's Method of Operation.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Obtain required permits and permission from local governing authorities and Engineer prior to commencing work.

B. Prior to commencement, meet with the Project Landscape Architect and Engineer to review construction plan. Coordinate removal of landscape materials with the Project Landscape Architect. Locate and clearly flag trees and vegetation to remain or be relocated. Provide protection for landscape materials to remain.

C. Verify that site improvement removal may safely and appropriately begin.

3.2 EROSION CONTROL

A. Refer to TESC plan and SWPPP.

B. Construct and maintain TESC measures in accordance with the plans, SWPPP, and Section 31 2500 Erosion and Sedimentation Controls.

3.3 CLEARING

A. All trees, brush, logs, upturned stumps, roots of downed trees, rubbish and debris shall be removed and disposed of. Clear all areas to permit installation of new construction as directed by Project Engineer and Project Landscape Architect.

B. Do no clearing within those areas that the Engineer and Landscape Architect specifies to remain undisturbed. Contractor to coordinate Engineer and Landscape Architect to be on site prior to site work.

3.4 GRUBBING

A. Grub all areas to be graded, except as noted below.

B. Do no grubbing within areas that the Engineer and Project Landscape Architect specifies to remain undisturbed.

C. Grubbing shall be to the depth necessary to remove all stumps, large roots, buried logs and other objectionable material.

3.5 STRIPPING

A. Strip all areas to be graded, except as noted below.

B. Remove all sod and grass before stripping topsoil. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

3.6 SITE IMPROVEMENT REMOVALS

A. Adjacent improvements and natural conditions to remain that are damaged by the Contractor during the work shall be replaced and restored at no additional cost to the Owner.

B. Sprinkle excavated material and access roads with water as necessary to limit dust to the lowest practicable level. Do not use water to such an extent as to cause flooding, contaminated runoff, or icing.

C. All utility piping and structures not designated for removal are to remain until new services are tested and in operation and shall be protected during construction unless indicated otherwise. Damage to existing utilities, which are to remain, shall be repaired immediately at the Contractor's expense.

D. In the event the Contractor encounters utility lines not shown on the site plan or otherwise indicated to be saved, removed, or abandoned, the location of such lines shall be marked in the field and the Owner notified immediately.

E. Sawcut, remove, recycle and dispose of slabs, pavement and other obstructions in areas to be improved or as required to construct new improvements. Materials not designated for reuse shall be broken up, loaded, and legally disposed of or legally recycled by the Contractor. Care shall be taken removing items in place. All concrete walk removals shall be sawcut at the next adjacent joint. Adjacent materials designated to remain that are damaged by the Contractor during the work shall be replaced at no additional cost to the Owner.

3.7 DRAINAGE AND FILL

A. Keep natural drainage ways open for drainage at all times. Provide erosion control facilities as required according to the plan or per the County inspector to prevent sediment transport either downstream or offsite. At no time shall more than one foot of sediment be allowed to accumulate within a catch basin, ditch, or swale. All catch basins and conveyance ditches shall be cleaned prior to paving. Mud/sediment build-up shall be removed, and the cleaning operation shall not flush sediment-laden water into the downstream system.

B. Fill open pits and holes caused by the work with imported structural fill, unless further excavation or earthwork is indicated. Open pits and holes shall be kept free of standing water.

3.8 UTILITY SYSTEMS

A. Locate, identify, disconnect, and remove, seal or cap off utilities as indicated on the plans.

1. Arrange to shut off indicated utilities with utility companies.

2. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted by the Owner and then only after arranging to provide temporary utility services.

B. Remove and dispose of existing structures and pipes as indicated on plan. Plug or cap all pipes to remain unless designated otherwise on plans.

C. Abandonment of existing catch basins, inlets and other utility structures: per County Standards.

D. Cap or plug pipes per Mason County Standards.

3.9 DISPOSAL OF MATERIALS

A. Remove the refuse from site preparation, including trash and debris, and legally dispose of it off Owner's property. Refuse shall either be recycled or disposed of in a manner consistent with all government regulations. In no case shall refuse material be left on the project site, shoved onto abutting private properties, or be buried in embankments or trenches on the project site. Maintain hauling routes clean and free of any debris resulting from work of this Section.

END OF SECTION

SECTION 31 20 00

EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Accomplishing indicated and required stripping, excavation, filling, compaction, sub-grade preparation, rough and finish grading, and the like.

2. Excavate and backfill trenches as necessary for water, storm drain, foundation drain, sanitary sewer installation and other work as shown on drawings.

3. Removing materials from the site which are either

   a. unsuitable for use, or;

   b. are in excess of that required.

4. Importing additional required materials.

5. Coordinating earthwork operations with other project related work.

6. Dewatering requirements including: providing, operating, maintaining and removing temporary dewatering systems for controlling surface water in the construction area.

7. Preparing subgrades for slabs-on-grade, walks, pavements, turf and grasses, and plants.

8. Excavating and backfilling for buildings and structures.

9. Drainage course for concrete slabs-on-grade.

10. Subbase course for concrete walks and pavements.

11. Subbase course and base course for asphalt paving.

12. Excavating and backfilling for utility trenches.

1.2 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.

2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting a slab-on-grad that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Contracting Office Representative. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Contracting Office Representative. Unauthorized excavation, as well as remedial work directed by Contracting Office Representative, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 REFERENCES

A. Reference the following standards:

1. Mason County Design and Construction Standards.

2. ASTM D-1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.

3. WSDOT-APWA 2020 Standard Specifications for Road, Bridge, and Municipal Construction.

4. Mason County Standard Details.

5. Geotechnical Engineering Report dated July 15, 2019 as prepared by Landau Associates.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

1. See referenced codes and ordinances.

2. Obtain all permits.

B. A qualified Soils Engineer shall be employed by the Owner to perform all required tests of fill and of soil compaction, and for supervision of the earthwork. Contractor shall notify the Soils Engineer 24-hours prior to completion of each lift and phase of the work in order to permit him/her to make tests as required. Samples of all fill materials proposed for use shall be delivered to him at least five days prior to the time that such materials are expected to be placed in the work. No materials shall be placed until receipt of written approval of samples and all materials used shall be the same as those in the samples submitted. The Soils Engineer shall be considered the Engineer's/Owner's representative on the job during earthwork operations. Any fill which in his/her opinion does not meet the specification requirements shall be removed or otherwise corrected as he/she directs.

C. Submittal: Submit samples of all imported fill materials to be used 7 days in advance of use. Samples shall consist of sieve analysis of material gradation.

D. Conform to requirements of the Geotechnical Report referenced in these specifications.

1.5 PROJECT CONDITIONS

A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.

B. Do not commence earth moving operations until Erosion and Sedimentation Control measures are in place as specified in Section 31 2500.

C. Contractor shall protect existing utilities to remain in place.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Earth Fill Materials: Furnish the following materials for fills and backfills where indicated or where specified.

1. Imported Structural Fill: During dry, warm weather imported structural fill should consist of well-graded sand and gravel with a maximum particle size of 6 inches and at least 75 percent of the material passing the 3-inch sieve. The material

should contain less than 30 percent fines. During wet weather conditions, imported all-weather fill should consist of well-graded sand and gravel or crushed rock with a maximum particle size of 4 inches and less than 5 percent passing a U.S. Standard No. 200 sieve, based on the minus ¾-inch fraction. Imported structural fill should be free of debris, organic material, and rock fragments larger than 6 inches.

2. Gravel Borrow, as described in Section 9-03.14(1) of the Washington State Department of Transportation's 2016 Standard Specifications for Road, Bridge, and Municipal Construction (2016 WSDOT Standard Specifications), is a suitable source of imported all-weather fill, provided the requirements set forth in this paragraph are satisfied.

3. Gravel Backfill for Walls: Free draining sand and gravel conforming to Section 9-03.12(2) of the WSDOT-APWA Standard Specifications.

4. Gravel Backfill for Pipe Bedding: Rigid pipe bedding shall be in accordance with the Sections 7-08.3(1)C and 9.03.12(3) of the WSDOT-APWA Standard Specifications.

5. Backfill for Utility Trenches; Utility trench backfill shall be in accordance with Section 7-08.3(1)A of the WSDOT-APWA Standard Specifications.

6. Furnish additional off-site material as may be required for completion of work.

7. Excavated materials for use as Structural fill: The suitability of excavated site soils for compacted backfill will depend on gradation and moisture content of soil when placed. In general, use excavated on-site material except as specified above. Excavated materials shall meet the following requirements:

   a. be tested and approved for use.

   b. be free from organic and deleterious matter.

   c. be maintained at moisture content suitable for compaction.

   d. no silty soils permitted.

   e. no demolition debris permitted.

   f. Soil shall contain not more than 5% fines passing a No. 200 sieve.

8. Fill Under Sidewalks: depth and material per plan; material shall meet the requirements of Section 9-03.9(3) of the WSDOT-APWA Standard Specifications.

9. In structure and pavement areas, structural fill should be placed and compacted in accordance with Section 2-03.3(14)C, Method C of the 2016 WSDOT Standard Specifications.

10. Recycled concrete materials used as structural fill should meet the requirements set forth in Section 9-03.21 of the 2016 WSDOT Standard Specifications;

the materials also must meet the minimum gradation criteria for Select Borrow, outlined in Section 9-03.14(2) of the 2016 WSDOT Standard Specifications.

B. QUARRY SPALLS

1. Conform to materials specified in Section 9-13.6 “Quarry Spalls” of the WSDOT-APWA Standard Specifications.

2. Minimum 1-ft-thick layer of 4- to 6-inch quarry spalls is used in high-traffic areas to protect the subgrade soil from disturbance

2.2 DEWATERING

A. Dewatering includes lowering the water table for the purposes of reducing seepage which would otherwise emerge from the slopes or bottom of the excavation, increasing the stability of excavated slopes, preventing loss of material from beneath the slopes or bottom of the excavation, reducing hydrostatic heads and seepage forces, and preventing rupture or heaving of the bottom of an excavation. Provide necessary pipe, pumps, and filter material suitable for conditions of construction.

B. Disposal of dewatering water shall be to an approved location and water shall be free of silts and fines. Settlement of dewatering water may be required prior to disposal. Contractor should be responsible for design and implementation of the dewatering system.

PART 3 - EXECUTION

3.1 PREPARATION

A. Field Measurements: Locate and carefully maintain all bench marks, monuments, control markers and other reference points; if disturbed or destroyed, replace as directed at no cost to Owner.

B. Permits and Inspections: Obtain all permits and required inspections; pay all fees. Maintain property in as good condition as possible. At completion, leave in as good condition as before work started.

C. Protection:

1. Utilities

a. The Contractor shall protect from damage private and public utilities. Contractor shall, before excavation begins, call the Utilities Underground Location Center 1-800-424-5555. Contractor shall pay all costs associated with location of existing utilities; including costs for private locate service to determine connection points and crossings.

b. Notify owners of underground facilities at least two full business days prior to commencing any excavation. Provide schedule of excavation to all owners of underground facilities in accordance with RCW 19.122.

c. In addition to the pothole locations that are shown / called out on the Drawings, the Contractor shall, at its own expense, make excavations and borings ahead of the work, as necessary, to determine the exact location of utilities, service stubs, and underground structures.

d. All existing utilities to remain shall be protected and maintained by the Contractor and shall not be disturbed, disconnected or damaged during work. The Contractor shall be responsible for all expenses arising from damaged utilities/structures except for unforeseen underground items.

2. Site Improvements

a. The Contractor shall protect from damage all pavement, curbs, sidewalks, paved areas, and other improvements to remain.

b. Contractor shall be responsible for replacement if damage occurs to improvements to remain.

3. Access: Contractor shall provide full access to adjacent driveways, fire hydrants, building entrances as indicated on the drawings, sidewalks, use of the fire lane, and other points as designated by the Owner.

3.2 SITE GRADING

A. General: Required contours and elevations are indicated and noted on Drawings; should indicated figures conflict with actual conditions, notify Engineer and await his/her directions before proceeding.

B. Grading:

1. Shape surface of site to grades and contours as noted (as applicable).

2. Strip topsoil in areas to be graded and those to be excavated and stockpile on site where directed and remove excess subsoil and topsoil not being reused from site.

3. Remove debris and rocks, which will interfere with reusable topsoil and lawn maintenance.

4. Control grading around building areas and building excavations at all times to prevent flow of water into excavated areas.

5. At paving and other site improvements, shape subgrades to lines, grades, and cross sections indicated; remove and replace soft or otherwise unsatisfactory material; excavate rock encountered to a depth of 6” below finish subgrade elevations; bring low areas up to required elevations with suitable structural fill materials.

3.3 EXCAVATION

A. General: Do all excavation work for building and other work shown on the drawings, to lines and elevations required for the work.

B. Removal of Obstructions: Remove rocks, boulders, and other obstructions.

C. Depth of Excavation:

1. Excavation shall not undermine any foundation.

D. Excess Excavation: If through error, excavation is to levels lower than shown, and is in compacted fill, recompact to required compaction percentages at Contractor's expense. Where excess excavation is in undisturbed soil, fill with lean concrete or deepen footing, at Contractor's expense.

E. Do not excavate wet topsoil or subsoil without approval of General Contractor; refer to paragraph 3.9 in this section for work completed in wet weather conditions. Co-ordinate all wet conditions work stoppages beforehand with General Contractor.

F. Dewatering Excavation: Maintain excavation in dry condition as required, free from frost.

G. Trench Excavations:

1. Excavate trenches to depths required and widths as necessary; make sides as nearly vertical as practicable. Brace and shore per governing agency requirements. Grade and smooth trench bottoms for uniform support of utility lines. Excavate to depths allowing for bedding.

2. Excavation Near Mature Trees: Preserve and protect existing trees at the site which are designated to remain, and those adjacent to the site. Any fines levied by Olympic College or the Mason County for tree damage or destruction shall be the responsibility of the Contractor.

H. Catch basins, manholes, inlets, and similar utility structures: Excavate to furnish a minimum of 12 inches between sides of excavation and outer surfaces of structure. Take care to excavate to exact depths required; fill over excavation with compacted gravel borrow. If the material at the bottom of excavations becomes unstable or muddy due to weather conditions, the Contractor shall excavate all unsuitable material below grade and replace the unstable material with gravel borrow.

I. Excavation Safety Systems

1. Provide all trench excavation in excess of 4 feet in depth with a safety system conforming to the referenced standards and requirements.

2. All excavation not requiring trench safety systems shall also meet the WISHA safety standards.

J. Trench Excavation

1. Trenching shall include all excavation of every description and of whatever materials encountered to the depth indicated on the Drawings or in the Project Manual.

2. Grade and smooth bottoms of trenches to furnish uniform bearing and support for utility lines; remove rocks and similar material causing point bearings.

3. Form bell holes and depressions for joints after grading of bottom limit such depressions to lengths, depths, and widths required for particular type of joint.

4. Excavate to depths allowing for bedding.

K. Bedding and Backfilling for Utility Lines

1. Bedding shall provide uniform support along the entire pipe barrel, without load concentration at joint collars or bells. No blocking of any kind shall be used to adjust the pipe to grade except when used with embedment concrete.

2. Bell holes shall be excavated as required to ensure uniform support along the pipe barrel. Bedding disturbed by pipe movement or by removal of shoring or movement of a trench shield or box shall be reconsolidated prior to backfill. Special care shall be taken to provide adequate bedding support at wye or tee connections and adjacent to manholes or other Structures, so as to avoid bending or shearing stresses at these critical points.

3. In backfilling the trench, the Contractor shall take all necessary precautions to protect the pipe from any damage or shifting. The Contractor shall backfill from the side of the trench to a uniform depth of 2 feet above the crown of the pipe before starting compaction.

4. During all phases of the backfilling operations and testing as outlined herein, the Contractor shall protect the pipe installation, provide for the maintenance of traffic as may be necessary, and provide for the safety of property and pedestrians.

5. Pipe trenches shall be backfilled as soon as possible after the pipe installation. Backfilling of trenches in the vicinity of catch basins, manholes, or other appurtenances will not be permitted until the cement in the masonry has become thoroughly hardened. Walking on the pipe shall not be allowed until at least 1 foot of earth has been placed upon it.

6. Trench backfill shall be spread in layers and be compacted by mechanical tampers of the impact type approved by the Owner's Soils Engineer. The backfill material shall be placed in successive layers with the first layer not to exceed 2 feet above the pipe, and the following layers not exceeding 12 inches in loose thickness, with each layer being compacted to the density specified herein.

7. If the required compaction density has not been obtained, the Contractor shall remove the backfill from the trench and recompact using heavier compaction

equipment or more passes. This process shall be repeated until the Contractor has established a procedure that provides the required field density. The Contractor will then be permitted to proceed with backfilling and compacting the remainder of the pipeline under the approved compaction procedure. In the event routine field densities taken during the course of construction show the specified compaction is not being obtained because of changes in soil types or for any other reason as determined by the Owner's Soils Engineer, the Contractor will be required to reestablish the compaction procedure. In no case will excavation and pipe installation operations be allowed to proceed until the specified compaction is attained. Water setting will not be allowed as a method for compaction of backfill.

8. All bedding and trench backfill of utility lines in the County of Right-of-Way shall be in accordance with County Standards.

9. All filling and trench backfill of storm drains and sanitary sewers in the County Right-of-Way shall be in accordance with County Standards.

L. Embankment Construction:

1. The Contractor shall place earth embankments in horizontal layers of uniform thickness. These layers shall run full width from the top to the bottom of the embankment. Slopes shall be compacted to the required density as part of embankment compaction.

2. During grading operations, the Contractor shall shape the surfaces of embankments and excavations to uniform cross-sections and eliminate all ruts and low places that could hold water.

3. Embankments shall be constructed in accordance with the requirements for fill placement in the Geotechnical Report.

3.4 FILLING AND BACKFILLING

A. General: Fill to elevations or grades indicated or required. Remove debris and decayable matter from all areas before filling. Protect shored walls from damage during filling operations. Verify foundation walls are braced to support surcharge forces imposed by placed fill materials near optimum (+/- 2%) moisture content to permit compaction to specified density. Fill over excavated areas under structure bearing surfaces in accordance with geotechnical report.

1. Backfill areas to contours and elevations as shown on plans and in accordance with the Soils Report. Use unfrozen and unsaturated materials.

2. Backfill systematically, as early as possible, to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

3. Place and compact fill materials in continuous layers not exceeding 12 inches loose depth.

4. Employ a placement method so not to disturb or damage foundations, foundation perimeter drainage, foundation damp-proofing, foundation waterproofing and protective cover, or utilities in trenches.

5. Maintain optimum moisture content of backfill materials to attain required compaction density. Certification of proper placement shall be provided by Soils Engineer.

6. Backfill against supported foundation walls. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.

7. Slope grade away from building minimum of 2%, unless noted otherwise.

B. Backfill: Place fills and backfills in lifts, before compaction, not to exceed 6 inches for hand operated mechanical compactors and not to exceed 12 inches for heavy equipment compactors. Place fill and backfill as soon as practicable to allow time for thorough settlement at time of completion of the Work.

1. Under Interior Concrete Slabs: Provide 4 inch minimum layer of free draining material and leave ready for compaction and installation of vapor barrier/03299.

2. Bedding for Utility Lines: Properly place material in trenches. Do not disturb sides of trenches. Place and compact and shape material to conform to the barrel of the pipe to ensure continuous firm bedding for full length of pipe. Backfill trenches in lifts as specified above.

3. Topsoil: Distribute evenly around site as required.

3.5 COMPACTION

A. General: Place fills in uniform lifts, depending on equipment used for compaction, see paragraph 3.5 B, this Section. Compact with approved vibratory compactors, or other approved rollers, or equipment necessary to obtain specified density.

B. Compact areas occupied by building and paving to attain 95% minimum of maximum dry density in accordance with ASTM D-1557.

C. Compact designated landscaped areas to attain 90%, as indicated in soils report, minimum of maximum dry density, in accordance with ASTM D-1557.

D. Moisture Content of Fill Material: Material shall be at near optimum moisture content (within +/-2%) when compacted. Take appropriate means to obtain moisture content.

3.6 EXCESS OR SHORTAGE OF EARTH MATERIAL

A. Remove all excavated material, except as required for fill onsite, at Contractor's expense. Legally dispose of off site. Keep streets free from spillage of excavated material and debris by power sweepers or other approved methods.

B. If shortage, provide suitable materials as needed to complete work.

3.7 FINISH GRADING (AS APPLICABLE)

A. Finish grade to +/-0.05 foot.

B. Finish grades flush with adjacent surface unless otherwise indicated.

1. Finish grades will be inspected and approved by Engineer.

2. Place topsoil in areas where seeding, sodding and planting is scheduled.

3. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles, and contours of sub-grade.

4. Remove large stones, roots, grass, weeds, debris, and foreign material while spreading.

5. Roll placed topsoil.

6. Leave stockpile area and site clean and raked, ready to receive landscaping.

C. Protect and maintain finished surfaces. Allow no heavy objects, to be moved over finish grade surfaces. At no cost to Owner, repair any ruts or holes in finished surfaces, and any obstructions to positive drainage. Repair areas showing settlement.

3.8 FIELD QUALITY CONTROL

A. Conduct inspections to verify conformance with Specifications and Drawings.

B. Provide equipment to roll compact site areas as advised by the project geotechnical or field engineer. Roll compact such areas as requested by general contractor.

3.9 PROTECTION FROM WEATHER

A. The Contractor shall protect excavated sub-grade, stockpiled soils and excavations from damage due to weather, surface runoff or other source of water that may render the soil unworkable or unusable for filling and compaction on the site.

B. The Contractor shall furnish, install, maintain, replace, operate and remove any and all facilities necessary to keep excavations, stockpiled materials, exposed sub-grades and surrounding working surfaces free from water, surface runoff, mud or deterioration during construction.

1. The Contractor shall provide plastic sheeting, tarpaulins, rock armoring and protection, or other methods to protect exposed sub-grades and stockpiled material from deterioration or damage from water or construction traffic.

2. The Contractor shall dewater all excavations and dispose of the water so as not to cause injury to public or private property, or to cause a nuisance or menace to the public. The Contractor shall at all times have on hand sufficient pumping equipment and machinery in good working condition for all emergencies, including power outage and flooding, and shall have available at all times

competent workers for the continuous and successful operation of the dewatering systems. Systems shall be operated so as to accomplish dewatering as necessary to perform and protect the work.

3. It is understood that the Contractor shall, throughout the course of construction which will be occurring during normally wet weather conditions, adequately protect, stabilize or armor all site areas. The Contractor agrees that the measures required to work in wet weather conditions are usual and ordinary, and are reflected in the bid and plan of operation. It is understood that additional compensation will not be granted to the Contractor for impacts due to construction in typical wet weather conditions.

3.10 CLEANING

A. Cleaning: Leave premises clean and free of residue of work of this Section.

END OF SECTION

SECTION 31 25 00

EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This work shall consist of temporary erosion and sediment control measures, as shown on the temporary erosion control and sediment (TESC) plans and per the approved Stormwater Pollution Prevention Plan (SWPPP). This work is intended to provide prevention of erosion and control of sediment within the limits of the project and to minimize damage to the Work and adjacent property in accordance the Department of Ecology NPDES permit. The Contractor is responsible for installation, maintenance, and revisions to the erosion and sediment control measures as site conditions change.

1.2 REFERENCES

A. Reference the following standards:

1. Mason County Design and Construction Standards
2. Department of Ecology 2019 Stormwater Management Manual for Western Washington.
3. Temporary Erosion and Sedimentation Control (TESC) plans.
4. Stormwater Pollution Prevention Plan (SWPPP).
5. WSDOT-APWA 2020 Standard Specifications for Road, Bridge, and Municipal Construction.

PART 2 - PRODUCTS

A. Erosion control and sediment control products are numerous and varied. The following is a listing of the expected products that will be used based on the TESC plan. If erosion control and sediment control needs change during construction, the Contractor may propose alternative measures and products. All alternative products must be approved by the Engineer prior to implementation.

2.1 FILTER FABRIC FENCE

A. Filter Fabric Silt Fence that meets WSDOT Standard Specifications per Sections 8-01.3(9)A and 9-33.2(1) Table 6 shall be used.

2.2 INLET PROTECTION

A. Inlet protection shall meet WSDOT Standard Specification 8-01.3(9)

2.3 QUARRY SPALLS

A. Quarry spalls shall be placed per WSDOT Standard Specification Section 8-15.3(3) and 9-13.1.

2.4 STRAW MULCH AND BALES

A. Straw mulch and bales shall meet WSDOT Standard Specifications per sections 8-01.3(10) and 9-14.6(5).

PART 3 - EXECUTION

3.1 GENERAL

A. Maintain, upgrade and/or relocate existing temporary erosion and sedimentation control measures as necessary.

1. The implementation of the Erosion and Sediment Control plans and the construction, maintenance, replacement, and upgrading of these facilities is the responsibility of the Contractor until all construction is approved. The Temporary Erosion and Sediment Control (TESC) facilities shown on the plan must be constructed in conjunction with all clearing and grading activities, and in such a manner as to ensure that sediment-laden water does not enter the drainage system or violate applicable water standards.

2. The TESC facilities shown are the minimum requirements for anticipated site conditions. During the construction period, the erosion control facilities shall be upgraded (e.g. sumps, construction of ditches and silt fences, etc.) as needed. Contractor shall pay for all costs associated with the construction, maintenance, upgrading, relocation and removal of the erosion control system throughout project duration.

3. Provide catch basin protection for catch basins in and adjacent to work area. Provide catch basin protection for new catch basins and area drains following installation, until site paving is completed.

B. Provide additional temporary erosion and sedimentation control measures as required by plans, notes, details and specifications.

C. When Mason County execution requirements are more stringent than DOE, the Mason County requirements shall be met.

3.2 FILTER FABRIC FENCE

A. The filter fabric fence shall prevent soil carried by runoff water from going beneath, through, or over the top of the silt fence, but shall allow the water, without soil, to pass through the fence.

B. Install per plan.

3.3 DRAINAGE COLLECTION

A. Contractor shall install and put into service those sections of the proposed storm drain system necessary to collect TESC outflows.

B. Additional collection structures shall be installed as necessitated by construction activities to ensure that sediment laden water does not enter the natural or public drainage system.

C. Storm drains shall be installed in accordance with Section 33 40 00. Clean storm drain system of all debris following removal of TESC facilities and following permanent stabilization of site.

END OF SECTION

MASON TRANSIT AUTHORITY
MTA – BELFAIR PARK AND RIDE PROJECT

2/12/2020

DIVISION 32
EXTERIOR IMPROVEMENTS

SECTION 32 12 00

ASPHALT PAVING

PART 1 GENERAL

1.1 SUMMARY

A. Work Includes:

1. Saw-cutting and removing existing asphalt concrete pavement.
2. Removing unsuitable base material.
3. Furnishing and placing base course materials for asphalt concrete pavement.
4. Furnishing and placing plant mix asphalt concrete.
5. Furnishing and placing extruded asphalt concrete curb.

B. Work shall be in accordance with Section 5-04 of the WSDOT-APWA Standard Specifications, except as modified herein.

C. Pavement sections shall be per the requirements of the soils investigation report dated July 15, 2019 as prepared by Landau Associates and as shown on the plans.

1.2 REFERENCES

A. Reference the following standards:

1. Mason County Design and Construction Standards.
2. Mason County Standard Details
3. WSDOT-APWA 2020 Standard Specifications for Road, Bridge, and Municipal Construction.
4. ASTM D 1557 Methods of Test for Moisture-Density Relations of Soils, Using 10lb (4.5 kg) Rammer and 18 in. (457 mm) Drop.
5. ASTM D 2922 Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods
6. APWA Designs and Specifications for Asphalt Concrete Pavements and Bases, 1990 Edition.
7. Geotechnical Report by Landau Associates, dated July 15, 2019.

1.3 SYSTEM DESCRIPTION

A. This work shall consist of one or more courses of plant mixed asphalt concrete placed on a prepared foundation, base, or existing pavement in accordance with these Specifications and in conformity with the lines, grades, thicknesses, and typical cross-sections shown in the plans or established by the Engineer.

B. Asphalt concrete shall be composed of asphalt and aggregate which, with or without the addition of mineral filler and blending sand as may be required, shall be mixed in the proportions specified to provide a homogenous, stable and workable mixture.

1.4 SUBMITTALS

A. Submit Certificates: Furnish certification that all materials comply with Specification requirements; include laboratory test reports verifying compliance. Tests shall have been performed within 4 months of anticipated use of material.

1. Mixing plant to be member of Asphalt Paving Association of Washington (APAW) and approved by Engineer.

2. Certified test results that meet WSDOT and or Washington Chapter of APWA. Testing requirements shall have been performed within 4 months of anticipated use of material.

1.5 PROJECT SITE CONDITIONS

A. Environmental Requirements:

1. In accordance with referenced standard specifications and the following:

a. Do no paving in rain or when subgrade or base is wet or frozen.

b. Do not apply tack coats when temperature is below 50 degrees F. or when base is wet.

c. Apply asphalt concrete paving only when temperature is above 40 degrees and when base is dry.

1.6 WARRANTY

A. Note that work correction is to include aggregate separation, soft spots, and excess porosity.

B. Repair cracks; repair unsatisfactory elevation irregularities immediately upon notification; replace any paving not draining properly.

PART 2 - PRODUCTS

2.1 GENERAL

A. Comply with "Quality Control" provisions, "References", Specifications, and

Manufacturer's data. Where these may be in conflict, the more stringent requirements govern.

1. Conform to APAW - Section II, "Specifications for Asphalt Paving" of above referenced manual.

2.2 CRUSHED SURFACING

A. Crushed surfacing shall conform to the requirements of Section 9-03.9(3) of the WSDOT-APWA Standard Specifications (see plans and soils report for more information).

2.3 BALLAST

A. Ballast shall conform to the requirements of Section 9-03.9(1) of the WSDOT-APWA Standard Specifications (see plans and soils report for more information).

2.4 ASPHALT CONCRETE

A. Asphalt concrete shall be Commercial Hot Mix. Asphalt concrete mixing and proportioning shall comply with APWA and WSDOT Section 5-04 (HMA Class ½", PG 64-22).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify installation conditions as satisfactory to receive work of this Section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes your acceptance of conditions as satisfactory.

1. Construction shall conform to the details, dimensions and grades specified. Maximum variations in finished grade of paving shall be +/- 1/16" in 10 feet.

2. The sub-grade in all areas to be paved shall be graded and compacted in accordance with Section 31 20 00 Earth Moving.

3.2 PREPARATION

A. Protect surrounding areas and surfaces to preclude damage from work of this Section.

1. Protect work of other trades. Take special care in work adjacent to buildings.

2. Should any defacement or damage occur, repair or replace as directed at no additional cost to the Owner.

3. Where new pavement is to abut existing concrete or asphalt pavement, the existing pavement shall be sawcut to provide a neat and straight edge at the joint.

B. Preparation of Asphalt Patches:

1. Where existing asphalt concrete pavement upon a granular base is required to be removed due to trenching or regrading, the area shall be uniformly defined in size and shape. The existing asphalt shall be removed by sawcutting pavement vertically at a sufficient distance of at least 6 inches outside the undisturbed base surface, and then the affected pavement shall be broken up and removed.

C. Preparation of Sub-grade: Sub-grade shall be prepared in accordance with these Specifications and the Geotechnical Report.

D. Conform to the requirements of the Geotechnical Report.

3.3 BALLAST AND CRUSHED SURFACING

A. Placement of ballast and crushed surfacing shall comply with WSDOT. Compaction shall be as specified in the soils report.

B. Prior to asphalt placement the prepared surface shall be treated in accordance with Section 5-04.3 of the WSDOT-APWA Standard Specifications.

3.4 ASPHALT CONCRETE

A. Placement of asphalt shall be in accordance with the WSDOT-APWA Standard Specifications.

1. Asphalt shall be placed in one or two lifts.

2. All patching of existing asphalt paved surfaces shall be per the trenching detail in the plans.

B. Joints shall be constructed in accordance with Section 5-04.3(12) of the WSDOT-APWA Standard Specifications. Surface smoothness shall be in accordance with Section 5-04.3(13) of the WSDOT-APWA Standard Specifications. Paving shall be accomplished in accordance with the weather limitations outline in Section 5-04.3(16) of the WSDOT-APWA Standard Specifications.

3.5 CLEANING

A. After completion of paving operations, clean surfaces of excess or spilled asphaltic materials.

B. Do not permit vehicular traffic on asphaltic paving until it has cooled and hardened, and in no case sooner than six (6) hours after placing.

C. Provide barricades and warning devices as required and in accordance with WSDOT/APWA, and MUTCD.

END OF SECTION

SECTION 32 13 00

CONCRETE PAVING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete Walks

B. Concrete Access Ramps.

1.2 REFERENCES

A. Mason County Design and Construction Standards.

B. Mason County Standard Details

C. WSDOT-APWA 2020 Standard Specifications for Road, Bridge, and Municipal Construction.

1.3 QUALITY ASSURANCE

A. Concrete Standards: Comply with provisions following standards except where requirements that are more stringent as indicated:

1. Section 8-04 and 9-14 of WSDOT Standard Specifications for Road, Bridges, and Municipal Construction 2020.

2. Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C94 requirements for production facilities and equipment.

3. Mason County Design and Construction Standards

1.4 SUBMITTALS

A. General: Submit the following according to the General Provisions and Division 1 Specifications Sections of the Contract.

1. Design mixes for the concrete. Include revised mix proportions when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

2. Material certificates may be submitted in lieu of material laboratory test reports when permitted by the Owner. Material certificates shall be signed by the manufacturer and the Contractor certifying that each material item complies with or exceeds requirements.

1.5 WARRANTY

A. Replace cracked sidewalk panels, unsatisfactory finish work, irregularities immediately upon notification.

PART 2 - PRODUCTS

2.1 GENERAL

A. Sidewalks shall be commercial Class 3000 concrete per Section 6-02 of WSDOT.

B. Concrete Mix: Comply with requirements of Section 5-05.3(5) of WSDOT Standard Specifications for Road, Bridges, and Municipal Construction 2020.

2.2 FORMS

A. Forms shall be metal or wood and comply with Section 8-14.3(2) of WSDOT Standard Specifications for Road, Bridges, and Municipal Construction 2020.

PART 3 - EXECUTION

3.1 PLACING AND FINISHING

A. Refer to plans

B. Comply with the requirements of Section 8-14.3(3) of WSDOT Standard Specifications for Road, Bridge, and Municipal Construction 2020.

C. Thoroughly compact concrete during and after pouring so as to eliminate honeycombing and voids.

3.2 CURING

A. Comply with the requirements of Section 8-14.3(4) of WSDOT Standard Specifications for Road, Bridge, and Municipal Construction 2020.

3.3 CONSTRUCTION JOINTS

A. Whenever placing concrete is suspended for 30 minutes or more, provide a construction joint located at the nearest control joint or expansion joint. Expansion and Contraction Joints to be spaced as shown on the plans. They shall be installed so that expansion joint material is ¼ inch below the surface of the concrete.

3.4 CONCRETE STRENGTH

A. At 28 days, 3,000 psi compressive.

END OF SECTION

SECTION 32 16 00

CURB AND GUTTERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete Curb and Gutter

1.2 REFERENCES

A. Mason County Design and Construction Standards

B. Mason County Standard Details

C. WSDOT-APWA 2020 Standard Specifications for Road, Bridge, and Municipal Construction.

1.3 QUALITY ASSURANCE

A. Concrete Standards: Comply with provisions following standards except where requirements that are more stringent as indicated:

1. Section 8-04 of the WSDOT-APWA Standard Specifications.

2. Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C94 requirements for production facilities and equipment.

3. Mason County Engineering Design & Construction Standards.

B. Asphalt Concrete Standards: Comply with Section 8-04.3(2) of the WSDOT-APWA Standard Specifications.

1.4 SUBMITTALS

A. General: Submit the following according to the General Provisions and Division 1 Specification Sections of the Contract.

1. Design mixes for the concrete. Include revised mix proportions when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

2. Design mixes for asphalt concrete shall meet the requirements for commercial hot mix asphalt as specified in Section 5-04 of the WSDOT-APWA Standard Specifications.

3. Material certificates may be submitted in lieu of material laboratory test reports when permitted by the Owner. Material certificates shall be signed by the

manufacturer and the Contractor certifying that each material item complies with or exceeds requirements.

1.5 REPAIRS AND PROTECTION

A. Replace cracked, unsatisfactory finish work, or irregularities immediately upon notification.

PART 2 - PRODUCTS

2.1 GENERAL

A. Concrete curb and gutter shall be commercial Class 3000 concrete per Section 6-02 of WSDOT-APWA Standard Specifications.

B. Concrete Mix: Comply with requirements of Section 5-05.3(5) of the WSDOT-APWA Standard Specifications

2.2 FORMS

A. Forms shall be metal or wood and comply with Section 8-14.3(2) of the WSDOT-APWA Standard Specifications.

2.3 CONCRETE MATERIAL

A. Portland Cement: shall be in accordance with Section 9-01.2(1) Type 1 of the WSDOT-APWA Standard Specifications. Use one brand of cement throughout project unless otherwise acceptable by Owner

B. Fine Aggregate: shall be in accordance with Section 9-03.1(2) of WSDOT-APWA Standard Specifications. Provide aggregates from a single source.

C. Coarse Aggregate: shall be in accordance with Section 9-03.1(4) of WSDOT-APWA Standard Specifications. Provide aggregates from a single source.

D. Water: shall be in accordance with Section 9-25.1 of WSDOT-APWA Standard Specifications.

PART 3 - EXECUTION

3.1 PLACING AND FINISHING

A. Refer to plans

B. Comply with the requirements of Section 8-14.3(3) of WSDOT-APWA Standard Specifications.

3.2 CURING

A. Comply with the requirements of Section 8-14.3(4) of WSDOT-APWA Standard Specifications.

3.3 CONCRETE CURBS

A. Forming: Form straight sides against wood or metal. Form tapered sides with a metal mule constructed to required section profile.

B. Mixing and Placing Concrete: Conform to the requirements for mixing and placing 3,500 psi 28-day concrete. Concrete to be placed per Section 8-04 of WSDOT-APWA Standard Specifications.

C. Joints: Expansion joints to be placed at 10 feet on center.

END OF SECTION

SECTION 32 17 23

PAVING MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Painting Pavement Marking for parking lot

1.2 REFERENCES

A. Mason County Design and Construction Standards.

B. WSDOT-APWA 2020 Standard Specifications for Road, Bridge, and Municipal Construction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Paint for pavement markings shall meet the requirements of Section 8-22 and 9-34 of the WSDOT-APWA Standard Specifications. Crosswalk paint shall be thermoplastic.

B. Selection of paint must be from WSDOT Qualified Products List.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for applying paint.

B. Pavement surface shall be clean and dry and free of moisture, dirt, loose particles, grease, curing compounds and the like. The ambient air temperature is to be above 40 degrees. Weather is not to be rainy or foggy.

C. Ensure paint is applied in two coats as specific application rates in Section 8-22.3(3)F of the WSDOT-APWA Standard Specifications.

D. Protect painting area until paint is completely dry and drivable.

END OF SECTION

SECTION 32 90 00

LANDSCAPE INSTALLATION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Conform to the General Conditions, Supplementary Conditions and Division 1.

1.2 DESCRIPTION OF WORK

A. Contractor shall coordinate all activities necessary for the provision of all labor, materials, tools, equipment, services, trees, shrubs, and ground covers necessary to complete all landscape operations in accordance with these specifications, as shown on the plans and details, or as directed by the Landscape Architect/Owner.

B. These landscape operations shall be performed only by a licensed, bonded landscape contracting firm that specializes in landscape installation.

C. Trees, shrubs, and ground covers will hereinafter be referred to collectively as plant material.

1.3 PRESERVATION OF PROPERTY

A. The planting operations shall be conducted in such manner that no damage shall result to existing site improvements and plantings. The Contractor shall be responsible for any damage resulting from his operation, and shall repair or replace such damage at his own expense by qualified trades and/or installers acceptable to the Owner.

1.4 JOB CONDITIONS

A. Planting operations including soil preparation, shall proceed only during periods, which are normal for work as determined by season, weather conditions, and accepted practice. Do not perform work when there is prolonged freezing weather, or when the soil is in a wet or muddy condition.

B. Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required. Any utilities, structures, or other facilities damaged due to work on this project shall be restored, equal to their original condition at the Contractor's expense.

C. When conditions detrimental to plant growth are encountered, such as rubble, rubble fill, adverse drainage conditions, or obstructions, notify Landscape Architect/Owner before planting.

1.5 PRODUCT HANDLING & TEMPORARY STORAGE

A. Handling and shipping of plant material shall be done in a manner that is not detrimental to the plants. Plant material shall be packed for shipment in accordance

with prevailing practice for the type of plant being shipped. All plants shall be protected against drying, sun, wind, heat, freezing, and similar detrimental conditions at all times. When necessary, plant material shall be temporarily healed in.

B. Protect work by placing stakes and twine barrier (visible day or night) around any planted area if required as a barrier for pedestrians, animals, vehicles, or any other cause until acceptance of work.

C. Plant materials showing damage from shipping, or while in storage, or during planting shall be rejected by the Landscape Architect/owner and be replaced by the Contractor at his own expense.

1.6 SUBSTITUTION OF PLANTS

A. No substitution of plant material will be permitted unless evidence is submitted to the Landscape Architect that a specified plant or variety cannot be obtained. If substitution is permitted, it can be made only with the approval of the Landscape Architect/Owner.

PART 2 - MATERIALS

2.1 PLANT MATERIALS

A. All plant material furnished shall meet the grades established by the American Standard Nursery Stock (ANSI Z60.1). Each shall conform to the size and acceptable conditions as listed on the plans and shall be free of all foreign plant material. An exception to this standard shall concern tree caliper measurements. All tree calipers shall be sized at 'ANSI' (American National Standards Institute) height, which shall be considered to be 6" above the top of the root-ball.

B. All plant material shall consist of live woody or herbaceous materials that are vigorous, well formed, with a well-developed fibrous root system. The material shall be free from dead branches, lichens, and from damage caused by an absence or an excess of heat or moisture, insects, disease, mechanical, or other causes detrimental to good plant development.

C. Deciduous trees shall have solitary leaders (unless indicated otherwise on plan) and shall have only lateral branches thinned by pruning. All conifer trees shall have only one leader (growing apex) and one terminal bud. Trees having a damaged or missing leader, multiple leaders, or Y-crotches shall be rejected.

D. Root-balls of the evergreen plants shall be solidly held together by the fibrous root system of the plant in its natural position and shall be composed only of the earth in which the plant has been actually growing.

E. Container grown plants must be plants transplanted into a container and grown in that container sufficiently long for new fibrous roots to have developed so that the root mass will retain its shape and hold together when removed from container.

F. Landscape Architect/Owner reserves the right to inspect all plant material at place of growth for compliance with requirements for size, variety, condition, including disease, and if rootbound. This preliminary approval does not constitute final approval of plants at completion of installation operations.

2.2 SOD

A. Sod, if used, shall be field grown one calendar year or longer, have a well-developed root structure, and be free of all weeds, disease, and insect damage..

B. Prior to cutting, the sod shall be green, in an active and vigorous state of growth, and mowed to a height not exceeding one inch.

C. The sod shall be cut with a minimum of one inch of soil adhering. Provide sod composed of the following:

Medallion Perennial Ryegrass	20%
Sonata Perennial Ryegrass	20%
Fiesta 3 Perennial Ryegrass	20%
Wildhorse Kentucky Bluegrass	20%
Stonehenge Hard Fescue	20%

D. Sod shall be equal to that as grown by Country Green Turf Farms, 7725- B Yelm Highway S.E., Olympia, Washington 98513, (360) 456-1006.

E. If sod is used in athletic field areas, it shall contain no netting.

2.3 SEED

A. Grass seed of the type specified shall conform to the standards for "Certified" grade seed or better as outlined by the State of Washington Department of Agriculture "Rules for Seed Certification", latest edition. Seed shall be furnished in standard containers on which shall be shown the following information:

1. Common name of seed
2. Lot number
3. Net weight
4. Percentage of purity
5. Percentage of germinations (in case of legumes, percentage of germination to include hard seed.)

6. Percentage of weed seed content and inert material clearly marked for each kind of seed in accordance with applicable State and Federal Laws.

B. Upon request, the Contractor shall furnish to the Landscape Architect duplicate copies of a statement signed by the vendor certifying that each lot of seed has been tested by a recognized seed testing laboratory within 6 months before date of delivery on the project. Seed which has become wet, moldy, or otherwise damaged in transit, or storage will not be accepted.

2.4 GROUND COVER

A. Provide plants established and well-rooted in removable containers or integral peat pots and with not less than the minimum number and length of runners required by ANSI Z60.1 for the pot size shown or listed.

2.5 TOPSOIL

A. Imported topsoil for berming and other required sub-grade work shall be a friable sandy loam typical of topsoils cultivated locally. Topsoil shall be free of objectionable subsoil materials, weeds, noxious weed seeds, refuse, sticks, brush, and rocks larger than 1" across the greatest dimension. Topsoil shall contain no more than 10% rocks or gravel by volume.

2.6 FERTILIZER

A. Fertilizer for backfill mix and soil preparation shall be standard commercial grade of organic or inorganic fertilizer of the kind and quality specified herein. It may be separate or in a mixture containing percentage of total nitrogen, available phosphoric acid, and soluble potash in the amounts specified. All fertilizers shall be furnished in standard unopened containers with weight, name of plant nutrients, and manufacturer's guaranteed statement of analysis clearly marked, all in accordance with State and Federal Laws

B. Commercial fertilizer shall have the following guaranteed chemical analysis:

	Percentage	
Ingredient	*Minimum*	*Maximum*
Nitrogen	10	16
Phosphoric Acid	10	16
Water Soluble Potash	5	16

C. Top dress fertilizer shall be applied on the surface of all plant pits after installation and shall be Osmocote 18-6-12, 9 month slow release applied at the following rates:

Trees Over 10' Height	2 Cups
Trees Under 10' Height	1 Cup
All Shrubs Except 1 Gallons	½ Cup
All 1 Gallon Plants	¼ Cup
All Ground Covers	¼ Cup

D. Fertilizer tablets for plant material shall be a nitrogen-phosphorus-potassium ratio similar to 20-10-5. The nitrogen shall be derived from ureaformaldehyde and shall be supplied in a two year controlled release 21 gram or 10 gram size table. Tablets shall be manufactured by "Agriform" or equal.

E. Apply fertilizer tablets in the following quantities per plant:

2 ¼" pots and 4" pots	1-10 gram tablet
1 gallon container	1-21 gram tablet
All shrubs	3-21 gram tablets
All trees	1 tablet per ½" tree caliper. (min. 4-21 gram tablets)

F. Where more than 1 tablet is required, they shall be evenly spaced around the plant, directly next to the rootball.

2.7 BED MULCH TOP DRESSING

A. Bed mulch top dressing for all shrub and ground cover areas shall be Ground Fir & Hemlock bark of uniform color, free from weeds, seeds, sawdust, splinters, resin, tannin, wood fiber, salts, or other compounds detrimental to plant like. Size range shall be ¼” to 1” with a maximum of 50% passing a ½” screen. Submit sample to Landscape Architect for approval.

2.8 SOIL AMENDMENT

A. Soil amendment for soil preparation and use in soil mix shall be nitrified wood residual product, composted at 130° to 160° for four (4) and six (6) months and screened to 1/2" minus in size. Soil amendment shall be equal to the following compost brands as available from: (Submit sample for approval to landscape architect.)

Pacific Garden Mulch Pacific Topsoils, Inc. 805 80th St. SW Everett, WA 98203 (425) 337-2700	**Prep Compost** Randles Sand & Gravel 19209 Canyon Road East Puyallup, WA (253) 531-6800	**Groco** Sawdust Supply Co., Seattle, WA , (206) 622 4321 or Great Western Supply, Olympia, WA, (360) 754-3722

2.9 SOIL MIX

A. Soil mix for planters and backfill mix shall consist of the following by volume:

60% screened clean loamy sand

40% specified soil amendment

B. Submit sample of soil mix to Landscape Architect for approval prior to use on project. No rocks or gravel shall be allowed in soil mix.

2.10 PREPARED BACKFILL MIX

A. For all plant materials (except Rhododendrons & Azaleas) shall consist of the following per cubic yard (Submit sample for approval to landscape architect):

1/3 c.y. clean site soil
2/3 c.y. specified soil mix
4 c.f. bagged Canadian shredded peat moss
3 lbs. specified commercial fertilizer
3 lbs. single superphosphate
1 lb. iron sulfate

B. Backfill mix for Rhododendrons & Azaleas shall consist of 2/3 above specified backfill mix and 1/3 fine grind hem-fir bark mulch. (Submit sample for approval to landscape architect.)

C. Prepared backfill mix shall be thoroughly blended and mixed in an area adjacent to the planting work, and shall be accurately proportioned using a suitable container. Unused site soil excavated from plant pits shall be disposed of off-site. Protect backfill mix from moisture until it has been placed in backfill around plants.

2.11 CHEMICAL HERBICIDE

A. A weed control pre-emergent herbicide which is approved for ornamental nursery stock and approved by the Landscape Architect/Owner. Application of herbicide must be in compliance with all local and state codes and laws. Do not use Casaron or Norasac brands. Apply at conclusion of specified maintenance period. Verify compatibility of herbicide with landscape plant materials.

B. Do not apply herbicide or pre-emergent on or within 25’ of hydroseeded areas or retention basins.

2.12 STAKES AND GUYING

A. Stakes and guys shall be installed as shown on Plans.

PART 3 - EXECUTION

3.1 LAYOUT OF PLANTING

A. All location layout and staking will be the responsibility of the Contractor, subject to the approval of the Landscape Architect.

B. The Contractor shall place the plants starting from the perimeter of the bed area and progressing to the center of any planting bed as shown on the plans and details.

C. Tree locations shown on the plans shall be considered approximate unless shown with specific distance. Tree locations shall be adjusted so that the tree is not directly in front of sprinkler heads.

D. Plant material quantities shown on the plans are approximate and for reference only. The Contractor is responsible for determining the exact number of plants required to place all plants at the spacing indicated, and to verify those indicated quantities with plan drawings.

3.2 PLANT BED PREPARATION

A. All planting areas shall be prepared so that they remain weed and debris free until the time of final acceptance. The planting areas shall include all planting beds and those areas shown on the plans or directed by the Landscape Architect/Owner.

B. Preparation of all planting areas shall be undertaken as indicated on the plans and shall include the following:

1. Kill and remove existing weeds and vegetation except as directed by Landscape Architect or indicated otherwise on plans.

2. Remove all debris, including asphalt, stumps, rocks, and clods from all planting surfaces.

3. Scarify and cultivate existing compacted subgrades in proposed landscape beds prior to any grading operations.

4. Supply specified topsoil and soil amendment to depths indicated on plans, in specifications, and in details. All landscape areas shall receive topsoil, whether indicated on the plans or not, so that finish grades after soil preparation and bed mulch application shall conform to final grading requirements listed in the following paragraphs.

3.3 FINISH GRADING

A. SURFACES

1. All planting surfaces shall be left with a firm, uniform surface, free of undulations or other irregularities. Remove all rocks, clods, and debris from all planting surfaces. Finish grade of all non-turf areas shall be 2" below tops of adjacent pavements and curbs, unless indicated otherwise on plans

B. PRELIMINARY GRADING

1. Shall be done in such a manner as to anticipate the finished grade. Excess soil shall be removed or redistributed before application of soil mix, fertilizer, and mulch. Where soil is to be replaced by plants and mulch, allowance shall be made so that when finish grading has begun, there shall be no deficiency in the specified depth of mulched planting beds.

C. FINAL GRADING AND DRAINAGE

1. The Contractor shall bear final responsibility for proper surface drainage of the site and the features thereon. Any discrepancy in the drawings or specifications, obstructions on the site, or prior work done by another party which the Contractor feels precludes establishing proper drainage, shall be brought to the attention of the Landscape Architect in writing for correction or relief of said responsibility.

D. STRUCTURAL FILL AREAS

1. Any landscape areas occurring within structural fill zones shall have said structural fill materials excavated to a depth of 12” below finish grades in shrub beds and 6” below finish grades in lawn areas, and replaced with specified topsoil. Dispose of excavated materials off site.

3.4 SOIL PREPARATION: (ALL LANDSCAPE AREAS)

A. All areas on the plan to receive soil preparation shall first be cultivated to a light and friable consistency, where upon the following ingredients, per 1000 s.f., shall be uniformly tilled into the top 6"-8" of soil, using a rototiller or similar machine, and then thoroughly watered down:

9 c.y. specified soil amendment (3" average depth)
15 lbs. commercial fertilizer
15 lbs. iron sulfate
10 lbs. triple superphosphate (0-45-0)
100 lbs. agricultural gypsum

B. All soil preparation and planting operations shall be conducted under favorable weather conditions only. Soil shall not be worked when excessively dry or wet. Landscape Architect reserves the right to stop any work taking place during a period when conditions are considered detrimental to soil structure or plant growth. Fine grade as specified above.

C. All planting beds shall be approved by Landscape Architect before rototilling (with soil amendments distributed over surface of bed) and after rototilling has been completed. All beds shall be approved for fine grading before planting operations

3.5 SOIL PREPARATION: (ALL LAWN AREAS, SEED, SOD OR HYDRO-SEED)

A. Procedural operations shall be the same for items A through C in paragraph 3.04 above, except for soil amendments.

B. Soil amendments shall consist of the following per 1,000 square feet:

5.25 c.y. specified soil amendment (1.75" average depth)
100 lbs. dolomite lime
100 lbs. agricultural gypsum
15 lbs. commercial fertilizer

C. Finish grade shall be ½" below all adjoining paved surfaces.

D. Refer to Section 02930 specifications if hydro-seeding is required.

3.6 ORDER OF PLANTING

A. In mixed planting areas, trees shall be planted first, followed by the larger shrubs, low shrubs, and then ground covers

3.7 PLANTING (TREES AND SHRUBS)

A. Planting shall be done only when conditions favorable for planting exist. Under no circumstances will planting during freezing weather or in frozen ground be permitted.

1. Plants shall not be placed in any areas that are below the finished grade as shown on the plans or as directed by the Landscape Architect.

2. Planting shall be performed in accordance with the details shown on the plans and in accordance with most suitable techniques.

B. Before excavation, plants to be installed shall be placed as indicated on planting plan. The Landscape Architect shall check locations of all plants in the field and shall indicate the exact position before actual planting operation proceeds.

C. Set trees and shrubs in center of pits, plumb and straight. Except in lawn areas, plant at such a level that after settlement, the crown of the plant will be flush with finish grading and forming a shallow trough directly over the ball of the earth and slightly smaller than the pit to facilitate watering.

D. Set plants in backfill mixture to such depth that the top of the plant ball will be flush with finished grade. Backfill the remainder of the hole and soak thoroughly. Water the backfill until saturated to the full depth of the hole. Pour Top Dress fertilizer over the surface of plant basin at indicated rates. Water all plants immediately with liquid Alaska Fish Fertilizer at manufacturer's suggested rates. Keep empty containers per paragraph 2.12. Install fertilizer tablets as specified.

E. A mound of earth shall be formed as directed around each tree and shrub so as to produce a shallow basin to retain water, the diameter to exceed the diameter of the root spread. Plants shall be watered in place during and after backfilling. Trees planted in lawn areas shall receive no watering basins, but shall be centered in a 3’-0" diameter circle mulched with bed mulch.

F. Prune plants only at time of planting and according to standard horticultural practice to preserve the natural character of the plant. Pruning to be done under supervision of Landscape Architect. Remove all dead wood, suckers, and broken or badly bruised branches. Use only clean, sharp tools. Paint cuts over 3/4" diameter, covering exposed areas with tree paint.

G. Immediately after planting operations are complete, all beds and pits shall be dressed off so as to achieve a neat and presentable appearance.

H. Planting operations shall be identical for all plants to be transplanted. Refer to plans and directions from Landscape Architect.

3.8 GROUND COVER

A. Spacing: Space plant material in the areas and at the spacing shown, in neat rows, insuring complete coverage of all planting areas under and around trees and shrubs. Triangular spacing is required unless specified otherwise on plans. Pour Top Dress fertilizer around plant surface at indicated rates.

B. Watering: Water plants immediately after planting. No plant shall be out of their container more than thirty (30) minutes before being planted and watered.

C. Apply pre-emergent herbicide to all ground cover and shrub beds at conclusion of specified maintenance period. Do not use Casaron or Norasac Brands.

D. Mulching: Recultivate compacted soil, rake smooth and distribute bed mulch to a 1½"-2" depth on the surface of all ground cover and shrub areas. Remove any bed mulch that falls over the ground covers or shrubs. Do not apply Bed Mulch to wildflower beds, if used.

3.9 SOD INSTALLATION

A. Sod installation shall not begin until the sprinkler system is complete and operating.

B. Soil preparation and fine grading shall be performed as previously specified for lawn areas; however, in addition, 5 lbs./1000 s.f. of 38-0-0 fertilizer shall be raked into the top two (2) inches of soil.

C. The area shall then be rolled in two directions, the second to be done at right angles to the first rolling, until a smooth, uniform grade has been produced. The finish grade before sod installation shall be one (1) inch below adjacent pavements. The lawn bed shall be inspected and approved by the Landscape Architect prior to sodding.

D. Sod shall be unrolled in place, with careful attention to staggering pieces and tight joints. Immediately after placement, soak with water. Roll sod after second watering.

3.10 SEED BED PREPARATION AND PLANTING (FOR SEEDING OF NON-HYDRO-SEED AREAS)

A. The Contractor shall notify the Landscape Architect not less than 24 hours in advance of any seed bed preparation, and shall not begin the work until areas prepared or designated for seeding have been approved. Seeding shall not be done during windy weather or when the ground is frozen. Seed and fertilizer shall be placed at the rate and mixture specified.

B. Seed bed preparation, fine grading, and fertilizing shall be the same as for sod installation specified in Paragraph 3.09 above, except that 38-0-0 shall be applied after germination. Seed mix shall be applied at a rate of 6 lbs./1000 s.f. Seed mix shall consist of the following blend:

C. Upon completion of seeding operations a mulch of finely ground peat moss shall be uniformly applied at the rate of 2 cubic yards per 1000 s.f. to obtain a ½" - ¾" depth.

D. Erect a temporary protective barrier of acceptable materials around all lawn areas and post warning signs, where necessary, to prevent damage or harmful effects to the lawn areas.

E. Prior to acceptance, the lawn shall be mowed a minimum of one cutting after the grass has attained a height of at least 2 inches. The cutting height shall not be less than 1 inch or exceed 2 inches in height with all cuttings removed. Acceptance of lawn planting as herein specified shall be based on a uniform stand of

grass and uniform grade at the time of final inspection. Areas that are bare or have a poor stand of grass and areas not having a uniform grade throughout shall be reseeded and regraded until Landscape Architect gives final approval. The acceptance of seeded lawn areas shall not be contingent upon final inspection, but contingent upon a healthy, vigorous, established stand of grass. Completion of final inspection shall not free Contractor from responsibility for healthy, vigorous grass.

3.11 RESPONSIBILITY DURING CONSTRUCTION

A. The Contractor shall insure adequate and proper care of all plant material, and work done on this project until the contract is completed and accepted. Adequate and proper care shall include keeping all plant material in a healthy, growing condition.

B. The Contractor shall have sole responsibility for keeping the planted areas free from insect infestation, weeds and grass, litter, and other debris, along with retaining the finished grades in a neat uniform condition.

3.12 CLEANUP AND PROTECTION

A. During landscape work, keep pavements clean and work area in an orderly condition as determined by Landscape Architect/Owner. Failure to comply will result in a stop work order issued.

B. Protect landscape work and materials from damage due to landscape operations, operations by other Contractors, and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

C. Remove debris, soil and fertilizer from all paved surfaces, curbs and walks.

D. At completion of each area of work, remove all debris, equipment and surplus materials.

E. All material removed shall be disposed of off-site by the Contractor.

3.13 PRE-MAINTENANCE

A. Pre-maintenance as herein specified shall immediately follow completion of each planting operation and shall continue through the General Inspection and until acceptance of the planting project.

B. Ground cover plants shall be kept in a healthy, vigorous growing condition by watering, replanting, weeding, and cultivation of the entire area of the bed.

C. Trees and shrubs shall be watered, weeded, cultivated and replaced immediately if not in a healthy growing condition.

D. Smooth grade all earth surfaces removing weeds, debris, and breaking clods and leave in an acceptable condition.

E. It is the Contractor's responsibility to protect all areas from damage during the installation and maintenance periods. This shall include damage caused by theft, vandalism or adverse weather conditions.

3.14 PUNCH LIST FIELD VISIT

A. A punch list field visit shall be requested by the Contractor when installation as set forth on drawings and specifications is substantially complete. Landscape Architect shall be given forty eight (48) hours notification prior to inspection.

B. Completion of general inspection, punch list items and acceptance of the contract work by the Owner's representative and the Landscape Architect shall release the Contractor from maintenance under paragraph PRE-MAINTENANCE above, and shall mark the start of the 60 day maintenance period under paragraph MAINTENANCE below.

3.15 MAINTENANCE AND PLANT ESTABLISHMENT PERIOD

A. Maintenance as required under paragraph PRE-MAINTENANCE above shall extend for 60 consecutive calendar days following general inspection and acceptance of contract work. Additional maintenance activities for this 60 day period shall include:

1. Protect all areas against damage, including erosion and trespass, and provide all necessary safeguards. Maintain and keep in good repair all temporary barriers erected to prevent trespass.

2. Keep all walks and paved areas clean. Keep site free from debris resulting from landscape work and maintenance.

3. Repair all damaged planted areas and replace plants immediately upon discovery of damage or loss. Straighten and tighten tree stakes and guys as needed.

4. Check all barriers and temporary fencing daily during the work week and repair or replace immediately as needed.

5. Maintain adequate moisture in soil to ensure vigorous growth. This includes non-irrigated areas.

6. Keep contract areas free from weeds by cultivating, hoeing, or hand pulling. Use of chemical week killers will not relieve the Contractor of the responsibility for keeping areas free from weeds over 1 inch in height at all times.

7. Water, fertilize, and mow lawn areas in accordance with normal nursery practice and in accordance with these specifications.

   a. Water lawn three times daily for ten (10) days. Following the 10 day period, watering shall be done in accordance with the Owner's watering schedule.

b. Lawn shall be fertilized with an accepted organic fertilizer every 30 days.

c. Lawn shall be kept at a height of between two (2) and three (3) inches at all times. Catch and remove all lawn cuttings after each mowing.

8. Immediately prior to completion of maintenance period, fertilize all trees and shrubs with liquid Alaska Fish Fertilizer a second time per paragraph D, Section 3.07.

9. During the 60 day maintenance and plant establishment period, Contractor is responsible for protecting all landscape areas as outlined in item "1". Any plants not in a healthy, vigorous, thriving condition at the end of the 60 day maintenance period shall be replaced, based on the Landscape Architect's judgment. This shall include plants damaged by theft, vandalism or adverse weather conditions.

3.16 FINAL PROJECT CLOSE-OUT

A. The final project close-out of work for acceptance of the work will be made at the conclusion of the 60 day maintenance and plant establishment period, upon successful completion of all punch list items and upon 4 days notice to the Landscape Architect requesting this site visit. At this visit, all plants must be in a healthy growing condition, weeds not in evidence, pruning complete, staking and tying secure, sprinkler risers vertical, and sprinklers performing as per manufacturer's description. Acceptance shall follow upon meeting these requirements. Acceptance of the final site visit shall mark the start of all workmanship and plant guarantees

3.17 CLEAN-UP

A. Upon completion of the work under this section, Contractor shall remove from the premises all surplus materials, tools, equipment, rubbish, and debris; wash all dirt and fertilizer from pavements, curbs, walls and other structures resulting from his/her work and leave the work in clean, neat and workmanlike conditions satisfactory to the Landscape Architect.

3.18 GUARNANTEE

A. The Contractor shall furnish to the Owner any guarantee or warranty furnished as a normal trade practice in connection with his purchase of any equipment, materials, or items which are to be incorporated into the project.

B. All plant materials shall be guaranteed to be in a living, healthy, and disease free condition from the date of acceptance to the completion of one full year, or one full growing season, whichever is longer. One full growing season shall be considered for the purpose of this contract as the period from April 1st to October 1st of any given year. Any plant material replaced during the guarantee period will again be thus guaranteed. Contractor shall not be held responsible for theft, vandalism or adverse weather conditions beyond the 60 day maintenance period.

END OF SECTION

SECTION 32 92 19

HYDROSEEDING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Hydroseeding shall occur on all areas shown and those areas outside clearing limits disturbed by construction.

1.2 PLANTING SEASON

A. Hydroseeding shall be done between August 15 and September 30 or between March 15 and May 15. In areas receiving automatic irrigation, hydroseeding may occur between May 15 and August 15. Actual planting shall be performed only when weather and soil conditions are suitable and in accordance with locally accepted practice and/or approved by the Landscape Architect. Hydroseeding shall not be attempted when wind velocities would prevent uniform application or when winds would drift the material outside the areas to be seeded.

1.3 APPLICATION QUALIFICATION

A. Hydroseeding shall be performed by an experienced applicator.

1.4 GUARANTEE

A. The guarantee of all lawn areas under this contract shall be for one full year from the completion date of final acceptance. Although not responsible for maintenance of the lawn during the guarantee period, the Contractor should, for his/her own interest, assure him/herself that minimum care is being given to the lawn as he/she is liable for its health during the guarantee period. At the conclusion of the guarantee period, the Landscape Architect will make another inspection to determine the condition of lawns. All areas of lawn not in a healthy growing condition, as determined by the Landscape Architect, shall be reseeded with seed as originally planted. Such replacement shall be made in the same manner as specified from the original plantings, and at no extra cost to the Owner. The guarantee on lawns shall be limited to one replacement. The Contractor is not responsible for vandalism.

PART 2 - PRODUCTS

2.1 SEED

A. Standard Seed Mix (percentage by weight)

Creeping Red Fescue	45%
Perennial Rye Grass	45%
Highland Colonial Bentgrass	10%

1. The above seed mixture shall be applied at the rate of 240 pounds per acre.

B. Analysis:

1. A complete analysis of the seed shall be submitted by the Contractor prior to planting, including the percent of pure seed, germination, other crop seed, inert and weed seed, and the germination test date to the Landscape Architect. All crop seed in excess of one percent must be itemized.

C. Seed Law:

1. All seeds shall conform to the requirements of the Washington State Seed Law and, where applicable, the Federal Seed Act.

D. Noxious Weed Seed:

1. All seed shall be free of seeds listed as primary noxious by the Washington State Seed Law. Seeds shall not contain seeds of weeds listed as secondary noxious by the Washington State Seed Law, singly or collectively in excess of the labeling tolerance specified by the Washington State Seed Law.

E. Rejection:

1. When seeds furnished under this specification fail to meet the requirements within tolerance as provided by the Washington State Seed Law, the lot shall be rejected.

F. Preparation for Delivery:

1. Seeds shall be packed in clean, dry, solid containers of uniform weight. Seed shall be labeled as required by law.

2.2 FERTILIZER

A. Commercial fertilization mix 10-20-20 applied at the rate of 10 pounds per 1000 s.f.

2.3 WATER

A. Water shall be free from oil, acid, alkali, salt and other substances harmful to growth of grass, and shall be from a source approved prior to use.

2.4 WOOD-CELLULOSE FIBER MULCH

A. Wood-cellulose fiber mulch for use with hydraulic application of grass seed and fertilizer shall consist of specially prepared wood-cellulose fiber processed to contain no growth - no germination - inhibiting factors and dyed an appropriate color to facilitate visual metering of application of materials. Apply mulch at the rate of 2,000 pounds per acre.

2.5 SOIL STABILIZER

A. Soil stabilizer shall be capable of penetrating soil surface and binding soil particles; shall contain an adhesive to hold seed and wood-cellulose fibers together and bond them to the soil; and shall be made from naturally occurring and biodegradable materials. Apply soil stabilizer at the rate of 50 pounds per acre.

PART 3 - EXECUTION

3.1 PREPARATION OF GROUND SURFACES

A. Contractor shall fine grade all areas prior to hydroseeding. Verify with Landscape Architect prior to seeding. Refer to plant section 32 92 00 for those areas to receive additional preparation.

B. Remove all stones and debris over 1 inch in diameter.

C. Cultivate ground surfaces and grade smooth.

D. Compact lightly to eliminate all soft spots, hills and valleys

E. Finish grade shall be ½" below all adjoining curbs, roads, walks and other paved surfaces.

3.2 HYDROSEEDING

A. Seed shall be broadcast with approved hydraulic seeding equipment, in combination with wood-cellulose fiber mulch, soil stabilizer and fertilizer distributed uniformly over designated areas. Half of seed shall be sown with sower moving in one direction, the other half with sower moving at right angles to first sowing. Seed shall not be broadcast during windy weather. Hydroseeding operator shall remove all seed mulch in its entirety from adjoining paving, structures and plants.

3.3 INSPECTION

A. Areas not fully germinated with a uniform stand of grass or areas damaged through any other cause shall be reseeded as herein specified at the Contractor's expense.

3.4 RESEEDING

A. Reseed and fertilize with 3-1-2 mix ratio all areas failing to show an uniform stand of grass after germination of seed, or damage through any cause before final inspection as specified by the Contractor at no additional cost to the Owner.

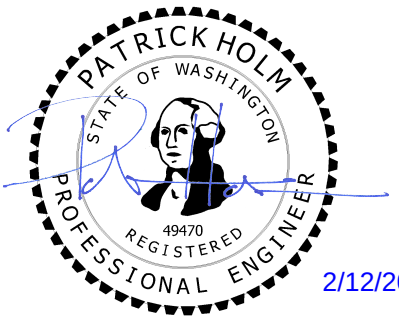
3.5 MEASUREMENT AND PAYMENT

A. The lump sum contract amount for the contract item “Landscaping” shall include all compensation for providing the labor, equipment and materials necessary to perform the work as indicated on the plans, and specified herein, for all of the materials including but not limited to: soil stabilizers, fertilizer, mulch and seed.

B. The lump sum contract amount for the contract item “Landscaping” shall be full compensation to furnish, install and maintain all the hydroseeding as shown on the plans and specified herein.

END OF SECTION

MASON TRANSIT AUTHORITY
MTA – BELFAIR PARK AND RIDE PROJECT



2/12/2020

DIVISION 33
UTILITIES

SECTION 33 41 00

STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Site-storm sewerage drainage piping, fittings, and accessories and bedding.
2. Pressure drainage piping fittings, and accessories and bedding.
3. Cleaning and testing storm sewerage drainage piping.

1.2 REFERENCES

A. Reference the following standards:

1. Mason County Design and Construction Standards.
2. Department of Ecology 2019 Stormwater Management Manual for Western Washington.
3. WSDOT-APWA 2020 Standard Specifications for Road, Bridge, and Municipal Construction.
4. Mason County Standard Details.

1.3 PROJECT CONDITIONS

A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Owner no fewer than two business days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without Owner's written permission.

1.4 PERMITS

A. All permits are to be obtained by Contractor at his/her expense.

1.5 DIMENSIONS AND LAYOUTS

A. The Contractor will be responsible for furnishing, setting and marking all line and location stakes. When work-requiring control is being performed, all necessary related equipment, supplies and instruments shall be on site. A qualified layout engineer, surveyor, or technical specialist must be assigned to the Contractor's crew for

this work. This equipment and personnel must be available, at no additional cost to the Owner, for the purpose of verifying layout and certifying the accuracy of work on the site.

B. The Contractor is responsible for review of all County and Owner's records relative to the existing underground utilities. The Contractor is responsible for avoiding damage to the facilities indicated in the project documents and records available to the contractor and shall restore all such facilities at Contractor's own expense.

C. The Contractor is to notify the Owner immediately if underground utilities not shown on the records are encountered.

D. The Contractor is responsible for preserving all benchmarks and stakes and the replacement of any that are displaced.

1.6 SUBMITTALS

A. Submit cut sheets or shop drawings for all materials, relating to pipe installation.

PART 2 - PRODUCTS

2.1 DRAIN PIPE

A. Drain pipe shall be as referenced in the drawings. Drain pipe shall conform to the requirements of Section 7-04 Storm Sewers in WSDOT Specifications for Roads Bridges and Municipal Construction 2020.

2.2 TRACER TAPE

A. Utility pipe tracer tape shall be detectable below ground surface, color coded, with utility name printed on tape. Conductive warning tape is required over drainage pipe. Tape shall be manufacturer’s standard permanent, bright-colored, continuous printed plastic tape, aluminum backed, intended for direct-burial service. Tape shall be not less than 6” wide x 4 mils thick.

PART 3 - EXECUTION

3.1 COORDINATION WITH OTHER WORK

A. Verify location from the records of Mason County and Owner.

B. Before installation, Contractor shall make proper provisions for site storm lines to avoid interferences with installation of other work and/or other contractors. Any changes caused by Contractor’s neglect to coordinate work shall be made by Contractor at Contractor’s expense.

C. Site storm drain drawings and Specifications shall be compared with drawings and Specifications of other trades and any discrepancies between the documents reported to the Owner prior to installation of work.

3.2 TRENCHING AND PIPE LAYING

A. Excavation and preparation of the trench shall be in accordance with Section 31 20 00 – Earth Moving. All trenching shall conform to the Washington Administrative Code (WAC) 296-155 and WISHA requirements for Excavation, Trenching and Shoring.

B. Excavation shall be made to alignment, elevation, grade and slope as indicated on the drawings.

3.3 BEDDING AND BACKFILLING

A. Pipe bedding shall be in accordance Section 9-03.12(3) of the WSDOT-APWA. Backfill shall meet the requirements of Section 9-03.14(1) of the WSDOT-APWA.

3.4 CLEANING AND TESTING

A. Storm pipe shall be cleaned and tested after backfilling by either exfiltration test per Section 7-17.3(2)B of WSDOT-APWA or low pressure air method per section 7-17.3(2)F at the option of the Contractor, except where the ground water table is such that the engineer my required the infiltration test per Section 7-17.3(2)C.

3.5 PERMANENT CONNECTION TO EXISTING MAINS

A. Where new pipe is to be connected to an existing public main, work shall be coordinated with Mason County.

3.6 TEMPORARY BYPASS

A. Provide temporary bypass or system to allow for new construction without interruption of storm drain service at no additional expense to the Owner.

END OF SECTION

SECTION 33 44 13

CATCH BASINS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Catch Basins

1.2 REFERENCES

A. Reference the following standards:

1. Mason County Design and Construction Standards.
2. Department of Ecology 2019 Stormwater Management Manual for Western Washington.
3. WSDOT-APWA 2020 Standard Specifications for Road, Bridge, and Municipal Construction.
4. Mason County Standard Details.

1.3 SUBMITTALS

A. Submit cut sheets or shop drawings for all materials, relating to catch basins, frames, and grates.

PART 2 - PRODUCTS

2.1 CATCH BASIN TYPE 1

A. Catch Basin Type 1 shall be per WSDOT Standard Detail B-5.20-02.

2.2 FRAME

A. Frame shall be per WSDOT Standard Detail B-5.20-02.

2.3 GRATE

A. Grate shall be per WSDOT Standard Detail B-5.20-02 and plans.

2.4 SOLID METAL COVER

A. Solid metal cover shall be per WSDOT Standard Detail B-5.20-02.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Excavation and preparation shall be in accordance with Section 31 20 00 – Earth Moving. All excavation shall conform to the Washington Administrative Code (WAC) 296-155 and WISHA requirements for Excavation, Trenching and Shoring.

B. Excavation shall be made to alignment, elevation, grade and slope as indicated on the drawings.

3.2 INSTALLATION

A. Structure shall be installed in accordance with County requirements and the drawings.

END OF SECTION

SECTION 33 49 13

MANHOLES FRAMES AND COVERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manholes
2. Frames
3. Covers
4. Adjustment rings

1.2 REFERENCES

A. Reference the following standards:

1. Mason County Design and Construction Standards.
2. WSDOT-APWA 2020 Standard Specifications for Road, Bridge, and Municipal Construction.
3. Mason County Standard Details.

1.3 SUBMITTALS

A. Submit cut sheets or shop drawings for all materials, relating to catch basins, frames, and grates.

PART 2 - PRODUCTS

2.1 FRAME, COVER AND ADJUSTMENT RINGS

A. Frame, cover, and adjustment rings shall be per Specification Section 33 44 13.

PART 3 - EXECUTION

3.1 COORDINATION WITH OTHER WORK

A. Before installation, Contractor shall make proper provisions for site storm lines to avoid interferences with installation of other work and/or other contractors. Any changes caused by Contractor's neglect to coordinate work shall be made by Contractor at Contractor's expense.

B. Site storm drain drawings and Specifications shall be compared with drawings and Specifications of other trades and any discrepancies between the documents reported to the Owner prior to installation of work.

3.2 EXCAVATION

A. Excavation and preparation shall be in accordance with Section 31 20 00 – Earth Moving. All excavation shall conform to the Washington Administrative Code (WAC) 296-155 and WISHA requirements for Excavation, Trenching and Shoring.

B. Excavation shall be made to alignment, elevation, grade and slope as indicated on the drawings.

3.3 INSTALLATION

A. Structure shall be installed in accordance with County requirements and the drawings.

END OF SECTION

MASON TRANSIT AUTHORITY
MTA – BELFAIR PARK AND RIDE PROJECT

Contract Plans

T. 23 N., R. 01 W., S. 21, W.M.

BELFAIR
PARK AND RIDE DEVELOPMENT

BELFAIR, WASHINGTON
MASON COUNTY

OWNER/APPLICANT

MASON TRANSIT AUTHORITY
601 WEST FRANKLIN ST
SHELTON, WA 98584
(360) 426-9434
CONTACT: DANETTE BRANNIN, GENERAL MANAGER

CONSULTANTS

SCJ ALLIANCE
8730 TALLON LANE NE. STE 200
LACEY, WA 98516
(360) 352-1465
CONTACT: PATRICK HOLM, P.E.

SURVEY:
MTN2COAST, LLC
1506 FAIRVIEW ST SE
OLYMPIA, WA 98501
(360) 239-1497
CONTACT: BLAIR PRIGGE, PL.S., E.I.T.

UTILITIES

POWER: PUD3
(360) 432-5268
CONTACT: TOM JOHNSON

PHONE:
CENTURYLINK
(360) 478-5930
CONTACT: ROYCE KLEIN

STORMWATER:
MASON COUNTY
(360) 427-9670 EXT 769
CONTACT: LORETTA SWANSON

DATUM

HORIZONTAL – WASHINGTON STATE PLANE COORDINATES, SOUTH ZONE, NAD 83/2011 BASED ON TIES TO WSDOT MON 4599.

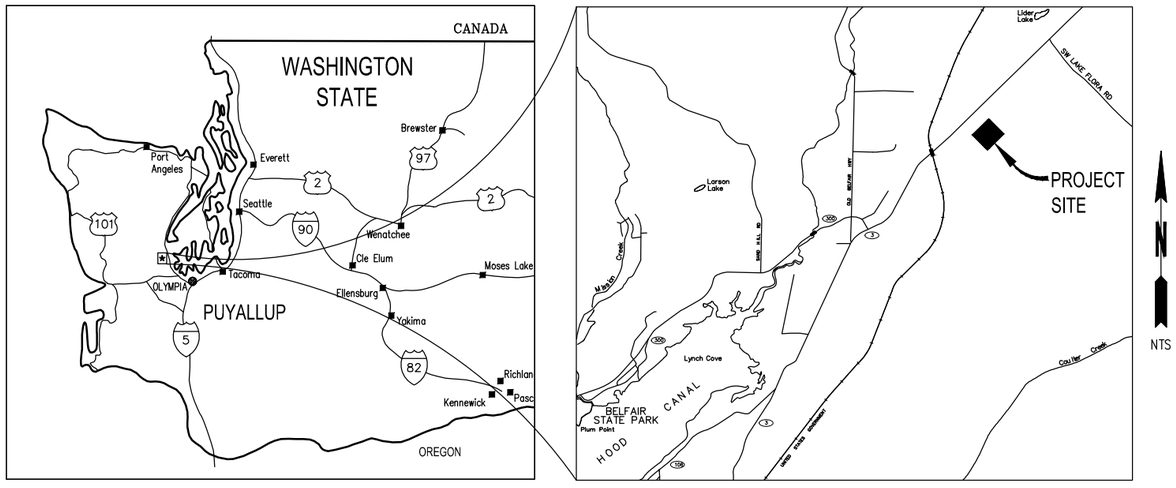
VERTICAL – NAVD 88 BASED ON TIES TO WSDOT MONUMENT 4599, ELEVATION 298.73.

SURVEY NOTES

1. INSTRUMENT USED: SOKKIA SRX 3 TOTAL STATION AND TOPCON GR5 GPS.
2. THIS SURVEY MEETS OR EXCEEDS THE STANDARDS OF WAC 332-130-090
3. SURVEY COMPLETED 9/28/2017
4. ALL MONUMENTS SHOWN AS FOUND VISITED 9/2017.

UTILITY NOTE

UTILITIES SHOWN HEREON ARE FROM MAPPING VISIBLE SURFACE APPURTENANCES, AND MAPPING UTILITY PAINT MARKS FROM A UTILITY LOCATING SERVICE. BURIED UTILITIES ARE ONLY SHOWN AS APPROXIMATE AND SHOULD BE VERIFIED BEFORE CONSTRUCTION.



NOTES

1. WORK FOR THIS PROJECT SHALL MEET OR EXCEED THE PROJECT SPECIFICATIONS AND THE 2018 WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION WHICH ARE HEREBY REFERENCED AS A PART OF THESE PLANS.

2. THE DESIGN SHOWN IS BASED UPON THE ENGINEER'S UNDERSTANDING OF THE EXISTING CONDITIONS. THE EXISTING CONDITIONS SHOWN ON THIS PLAN SET ARE BASED UPON SURVEY, PREPARED BY MTN 2 COAST LLC. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING FIELD CONDITIONS PRIOR TO BIDDING THE PROPOSED WORK IMPROVEMENTS. IF CONFLICTS ARE DISCOVERED, THE CONTRACTOR SHALL NOTIFY THE OWNER OR ENGINEER PRIOR TO INSTALLATION OF ANY PORTION OF THE WORK WHICH WOULD BE AFFECTED.

   CAUTION – NOTICE TO CONTRACTOR

   THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON THE PROJECT SURVEY AND OTHER RECORDS OF UTILITIES. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR SHALL CALL 811 A MINIMUM OF 48 HOURS PRIOR TO PLANNED EXCAVATION. TO REQUEST UTILITY LOCATES, CALL OR 811.

SHEET INDEX (FOR REFERENCE ONLY)

SHEET NO.	DRAWING NO.	DESCRIPTION
1	CV-1	COVER SHEET
2	AL-1	HORIZONTAL ALIGNMENT
3	EC-1	REMOVAL AND TESC PLAN
4	EC-2	REMOVAL AND TESC DETAIL
5	SP-1	SITE PLAN AND HORIZONTAL CONTROL PLAN
6	SP-2	SITE PLAN DETAILS
7	SP-3	SITE PLAN DETAILS
8	SP-4	RAMP GRADING DETAILS
9	SP-5	RAMP GRADING DETAILS
10	SP-6	RAMP GRADING DETAILS
11	SD-1	GRADING AND DRAINAGE PLAN
12	SD-2	GRADING AND DRAINAGE DETAILS
13	SD-3	DRAINAGE DETAILS
14	PP-1	PLAN, PROFILE, AND PAVING
15	PM-1	PAVEMENT MARKING
16	XS-1	TYPICAL SECTION
17	LS-1	LANDSCAPE PLAN
18	LS-2	LANDSCAPE DETAILS
19	LS-3	LANDSCAPE DETAILS & NOTES
20	IR-1	IRRIGATION PLAN
21	IR-2	IRRIGATION PLAN
22	IR-3	IRRIGATION DETAILS & NOTES
23	IL-1	LIGHTING AND SECURITY PLAN
24	IL-2	LIGHTING AND SECURITY DETAILS
25	WA-1	WATER SYSTEM PLAN
26	WA-2	WATER DETAILS
27	WA-3	WATER DETAILS
28	SS-1	ON-SITE SEPTIC SYSTEM SITE PLAN
29	SS-2	ON-SITE SEPTIC SYSTEM SITE PLAN
30	SS-3	ON-SITE SEPTIC SYSTEM DETAILS

BUILDING PERMIT

SHEET NO.	DRAWING NO.	DESCRIPTION
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32	A1.0	REFERENCE FLOOR PLAN
33	A2.0	FLOOR PLAN
34	A2.1	PARTIAL ENLARGED PLANS
35	A3.0	ROOF PLAN
36	A4.0	EXTERIOR ELEVATIONS
37	A5.0	BUILDING SECTIONS
38	A5.1	WALL SECTIONS (1-3)
39	A5.2	WALL SECTIONS (4-7)
40	A5.3	WALL SECTIONS (8-10)
41	A6.0	REFLECTED CEILING PLAN
42	A7.0	DOOR & WINDOW TYPES, FINISH & DOOR SCHEDULES
43	A7.1	INTERIOR ELEVATIONS
44	AG0.0	WALL TYPES AND EQUIPMENT MOUNTING HEIGHTS
45	AG1.0	DETAILS
46	AG2.0	DETAILS
47	AG3.0	DETAILS
48	AG4.0	DETAILS
49	AG4.1	DETAILS
50	AG5.0	DETAILS
51	E0.1	ELECTRICAL NOTES & LEGEND
52	E1.0	POWER SITE PLAN
53	E2.1	LIGHTING PLANS
54	E2.2	LIGHTING SCHEDULES
55	E3.1	POWER & SIGNAL PLANS
56	E5.1	ELECTRICAL DISTRIBUTION
57	E5.2	EQUIPMENT SCHEDULES
58	M0.1	MECHANICAL LEGEND AND NOTES
59	M0.2	MECHANICAL SCHEDULES
60	M0.3	MECHANICAL SCHEDULES
61	M0.4	MECHANICAL SCHEDULES
62	M2.1	PLUMBING FOUNDATION PLAN
63	M3.1	PLUMBING FLOOR PLAN
64	M3.2	PLUMBING DETAILS
65	M4.1	HVAC FLOOR PLAN
66	M4.2	HVAC DETAILS
67	M4.3	HVAC DETAILS
68	S0.1	GENERAL NOTES
69	S0.2	GENERAL NOTES
70	S0.3	GENERAL NOTES
71	S0.4	GENERAL NOTES
72	S1.0	FOUNDATION PLAN
73	S1.1	CANOPY FOUNDATION PLAN
74	S2.0	GRADE LEVEL FRAMING PLAN
75	S3.0	ROOF FRAMING PLAN
76	S3.1	CANOPY ROOF FRAMING PLAN
77	S4.0	FOUNDATION DETAILS
78	S4.1	FOUNDATION DETAILS
79	S5.0	WALL FRAMING DETAILS
80	S5.1	WALL FRAMING DETAILS
81	S5.2	WALL FRAMING DETAILS
82	S6.0	ROOF FRAMING DETAILS
83	S7.0	MISC. STEEL FRAMING
84	S8.0	CANOPY FRAMING DETAILS

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-CV-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 49670 — REGISTERED PROFESSIONAL ENGINEER
02/12/2020

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
SCJALLIANCE.COM

PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

COVER SHEET

DRAWING No.: CV-1
SHEET No.: 1 OF 84

T. 23 N., R. 01 W., S. 21, W.M.

LEGEND

- RIGHT-OF-WAY (R/W)/PROPERTY LINE (P/L)
- CONSTRUCTION CENTERLINE (℄)
- BRASS CAP

0 60 120
SCALE IN FEET

POINT #: 101
N: 789024.70
E: 1072857.14
EL: 329.73
MNBC 3" MON 2631 IN CASE

B 51+64.66, 30.78 LT
POINT #: 10
N: 786968.55
E: 1070245.42
EL: 323.35
MNHT

L=130.411
Δ=12.3914
R=603.000

L=19.736
Δ=10.9785
R=103.000

S45° 19' 45.62"E
117.54'

S39° 44' 49.53"E
101.12'

B 56+86.68, 43.61 LT
POINT #: 12
N: 786613.45
E: 1070627.15
EL: 336.81
MNHT

S42° 56' 15.18"E
292.16'

B 58+12.16 =
C 56+00.00
N: 786489.51
E: 1070682.90

PRIVATE ROADWAY

LOG YARD ROAD

50+00 51+00 52+00 53+00 54+00 55+00 56+00 57+00 58+00 59+00 B-LINE

L=27.842
Δ=3.1905
R=500.000

S43° 54' 59.21"E
204.05'

S56° 18' 28.34"E
28.27'

A 15+33.05, 9.29 LT
POINT #: 11
N: 786710.21
E: 1070439.14
EL: 330.74
MNPK

A 15+00.00 =
B 55+00.00
N: 786722.27
E: 1070475.07

B 57+95.66, 4.85 RT
POINT #: 16
N: 786500.65
E: 1070665.91
EL: 333.88
MNHT

B-LINE

POINT #: 13
N: 786328.51
E: 1070737.40
EL: 340.73
MNHT

POINT #: 17
N: 786185.86
E: 1070774.76
EL: 341.89
MNHT

POINT #: 14
N: 785993.83
E: 1070846.82
EL: 348.35
MNHT

POINT #: 115
N: 785769.55
E: 1070751.75
EL: 345.88
MNHT

WSDOT ROW

SR-3
13+00 14+00 15+00 16+00 17+00

WSDOT ROW

N46° 12' 00.57"E
582.23'

C-LINE
50+18 51+00 52+00 53+00 54+00 55+00

POINT #: 100
N: 784761.40
E: 1068256.30
EL: 298.73
MNBC 3" MON 4599

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-AL-1-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 49053 — REGISTERED PROFESSIONAL ENGINEER
02/12/2020

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
SCJALLIANCE.COM

PROJECT NAME:
MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

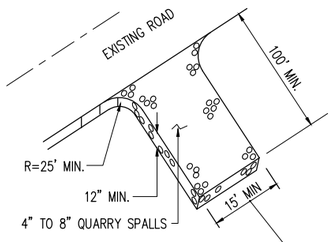
HORIZONTAL ALIGNMENT

DRAWING No.: AL-1
SHEET No.: 2 OF 84

T. 23 N., R. 01 W., S. 21, W.M.

LEGEND

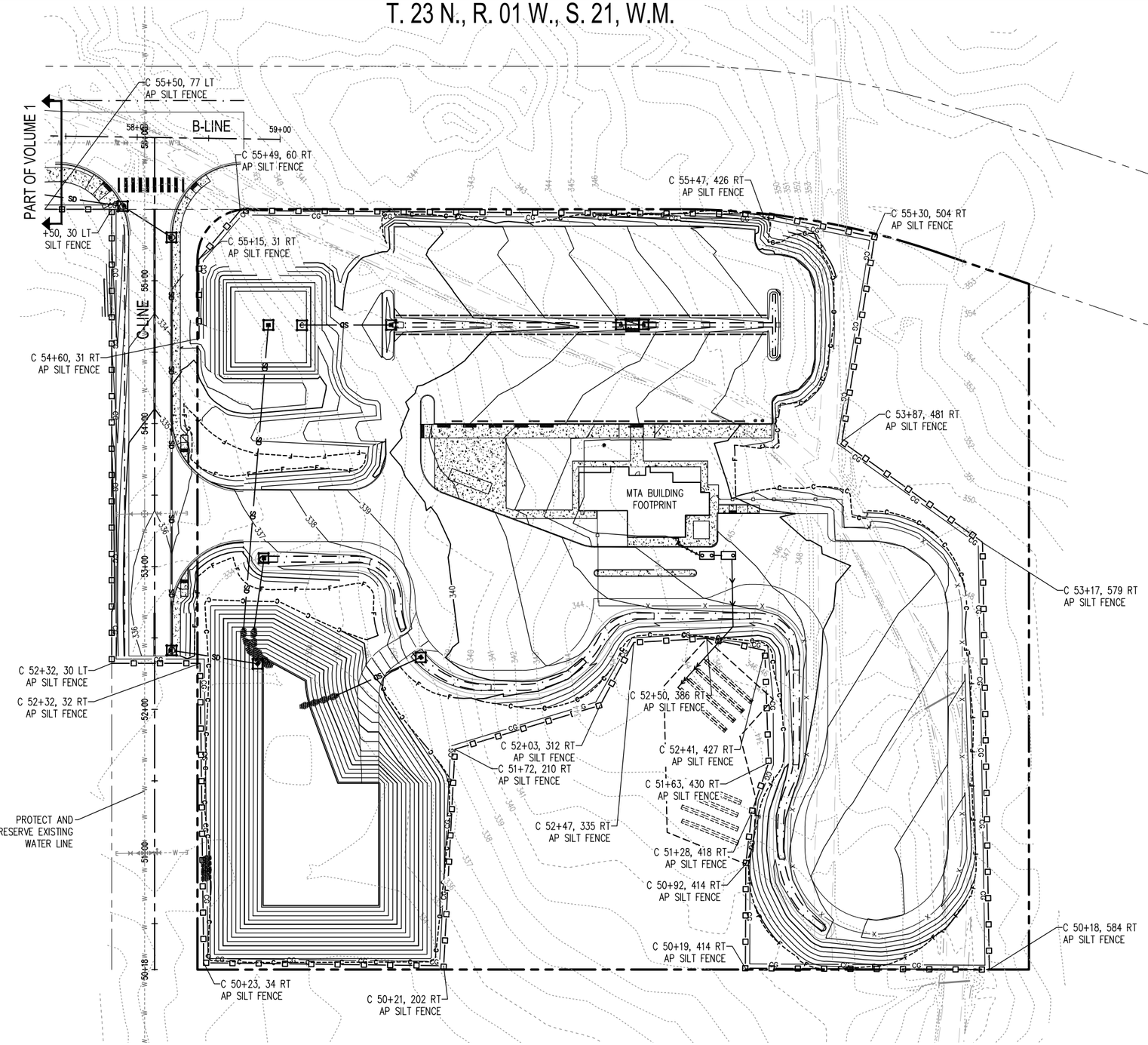
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPERTY LINE
- SILT FENCE (SEE DETAIL ON SHEET EC-2)
- CUT LINE
- FILL LINE
- CLEARING AND GRUBBING LINE
- SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.
- STORM DRAIN INLET PROTECTION (SEE DETAIL ON SHEET EC-2)
- STORM DRAIN INLET PROTECTION AT CULVERT END (SEE DETAIL ON SHEET EC-2)
- 5'x6'x1' DEEP HAND PLACED QUARRY SPALLS
- EXISTING WATER LINE



NOTE:
INSTALL CONSTRUCTION ENTRANCE AT LOCATION WHERE ACCESS OFF OF A PAVED ROADWAY BEGINS.

CONSTRUCTION ENTRANCE
NTS

NOTE
PREVIOUSLY INSTALLED AND MAINTAINED TESC WORK ON-SITE. CONTRACTOR SHALL INHERIT RESPONSIBILITY FOR EXISTING TESC MEASURES AND INSTALL ADDITIONAL AS REQUIRED. COMPLY AND COORDINATE WITH LOG YARD ROAD ROUNDABOUT CONTRACTOR TO VERIFY SYSTEM COMPLIANCE WITH ALL CODES.



△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-EC-1-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 24800 — REGISTERED PROFESSIONAL ENGINEER — 02/12/2020

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
SCJALLIANCE.COM

PROJECT NAME:

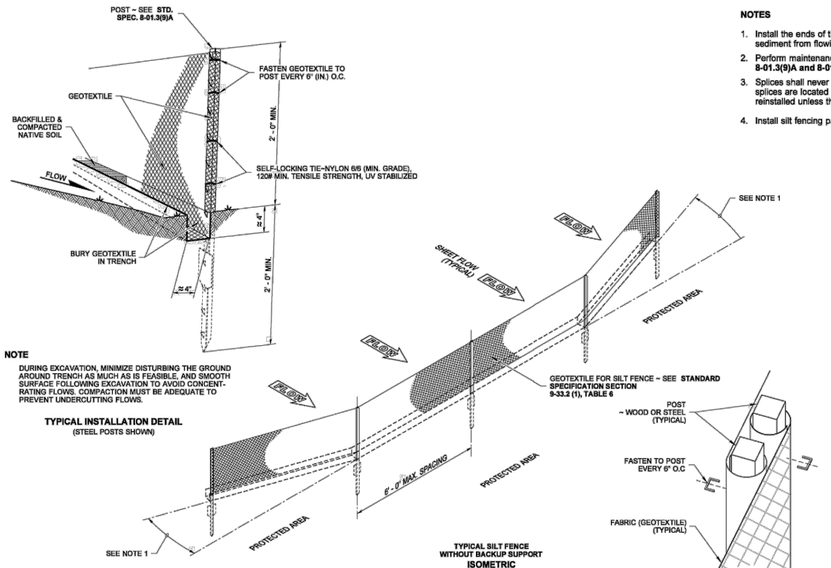
MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND ROUTE DEVELOPMENT

REMOVAL AND TESC PLAN

DRAWING No.: EC-1
SHEET No.: 3 OF 84

DRAWN BY: BILL BERENS

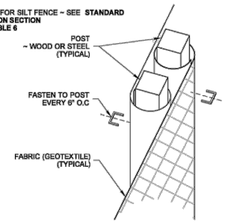


NOTE

DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

TYPICAL SILT FENCE WITHOUT BACKUP SUPPORT ISOMETRIC
(STEEL POSTS SHOWN)



SPLICED FENCE SECTIONS SHALL BE CLOSE ENOUGH TOGETHER TO PREVENT SILT LADEN WATER FROM ESCAPING THROUGH THE FENCE AT THE OVERLAP.

SPLICE DETAIL
(WOOD POSTS SHOWN)

NOTES

1. Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
2. Perform maintenance in accordance with **Standard Specifications 8-01.3(9)A and 8-01.3(15)**.
3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.
4. Install silt fencing parallel to mapped contour lines.

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT
SANDRA L. SALISBURY
CERTIFICATE NO. 000860

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

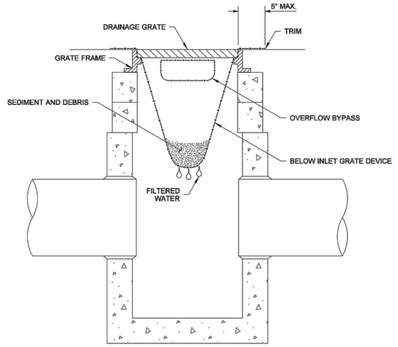
SILT FENCE

STANDARD PLAN I-30.15-02

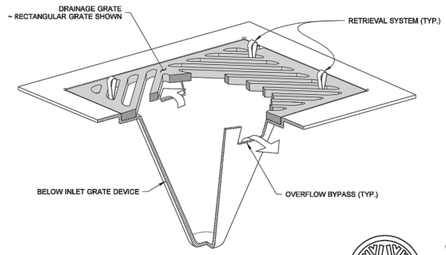
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Pasco Bakotich III STATE DESIGN ENGINEER — *3/22/13* DATE
Washington State Department of Transportation

DRAWN BY: LISA OYFORD



SECTION VIEW
NOT TO SCALE



ISOMETRIC VIEW

NOTES

1. Size the Below Inlet Grate Device (BIGD) for the storm water structure it will service.
2. The BIGD shall have a built-in high-flow relief system (overflow bypass).
3. The retrieval system must allow removal of the BIGD without spilling the collected material.
4. Perform maintenance in accordance with Standard Specification 8-01.3(15).

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT
MARK W. MAURER
CERTIFICATE NO. 000598

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

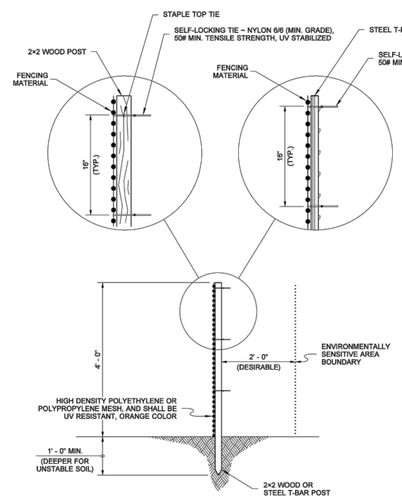
STORM DRAIN INLET PROTECTION

STANDARD PLAN I-40.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Pasco Bakotich III STATE DESIGN ENGINEER — *09-20-07* DATE
Washington State Department of Transportation

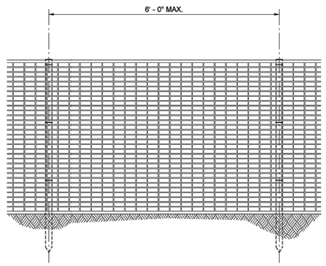
DRAWN BY: BILL BERENS



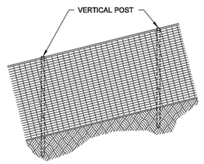
TYPICAL SECTION

NOTE

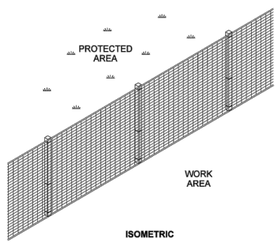
1. Post shall have sufficient strength and durability to support the fence through the life of the project.



ELEVATION



ELEVATION
FENCE ON SLOPE



ISOMETRIC

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT
MARK W. MAURER
CERTIFICATE NO. 000598

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

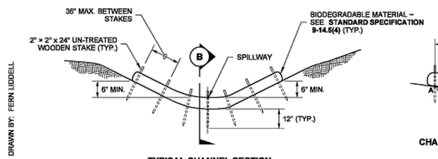
HIGH VISIBILITY FENCE

STANDARD PLAN I-10.10-01

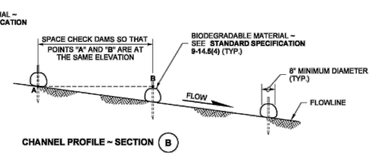
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Pasco Bakotich III STATE DESIGN ENGINEER — *08-11-09* DATE
Washington State Department of Transportation

DRAWN BY: FERN LIDDELL



TYPICAL CHANNEL SECTION



CHANNEL PROFILE – SECTION (B)

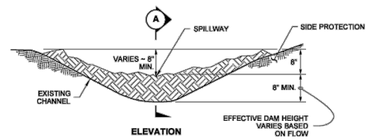
BIODEGRADABLE CHECK DAM

BIODEGRADABLE CHECK DAM NOTE

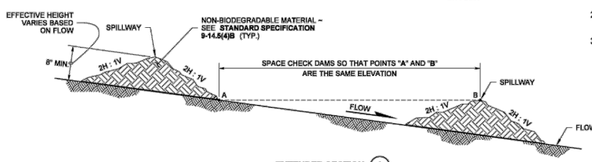
1. Biodegradable Check Dams may need additional or modified staking to prevent undercutting or scouring.

GENERAL NOTES

1. Check Dams shall meet the requirements of **Standard Specifications 8-01.3(6) and 9-14.5(4).**
2. In channels, install the sloped ends of the Check Dam a minimum of 6" higher than the spillway to ensure water flows over the dam and not around it.
3. Perform maintenance in accordance with **Standard Specification 8-01.3(15).**
4. Remove Check Dams in accordance with **Standard Specification 8-01.3(16).**



ELEVATION



EXTENDED SECTION (A)

NON-BIODEGRADABLE CHECK DAM

NON-BIODEGRADABLE CHECK DAM NOTES

1. Non-Biodegradable Manufactured Check Dam devices approved for use under **Standard Specification 9-14.5(4)** shall be installed per manufacturer's recommendations and shall perform in accordance with **Standard Specification 8-01.3(6).**
2. Rock Check Dams shall be placed outside of the clear zone or behind traffic barrier.
3. To ensure adequate damming time, Rock Check Dams used as sediment control may need to be enhanced with plastic that meets the requirements of **Standard Specification 9-14.5(3)** or fabric that meets the geotextile requirements of **Standard Specification 9-33.2(1), Table 6.**

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT
Sandra L. Salisbury
SANDRA L. SALISBURY
LICENSE NO. 860
DATE: June 6, 2013

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

CHECK DAMS ON CHANNELS

STANDARD PLAN I-50.20-01

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Pasco Bakotich III STATE DESIGN ENGINEER — *6/10/13* DATE
Washington State Department of Transportation

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-EC-2-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 19621 REGISTERED PROFESSIONAL ENGINEER — 02/12/2020

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
SCJALLIANCE.COM

PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

REMOVAL AND TESC DETAIL

DRAWING No.: EC-2

SHEET No.: 4 OF 84

Feb 13, 2020 9:13:12am – User: nick.mayfield
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05-EC-2-B.DWG

LEGEND

- PROPERTY LINE
- ACCESSIBLE PARKING (SEE DETAIL ON SHEET SP-2)
- WHEEL STOP PER DETAIL (SEE DETAIL ON SHEET SP-2)
- CEMENT CONCRETE TYPE C-1 CURB (SEE DETAIL ON SHEET SP-2)
- CEMENT CONCRETE TRAFFIC CURB AND GUTTER (SEE DETAIL ON SHEET SP-2)
- SIGN
- (X) STALL COUNT
- CHAIN LINK FENCE TYPE 3 PER WSDOT STD PLAN L-20.10
- STRUCTURAL CANTILEVER SLIDE GATE (SEE DETAIL ON SHEET SP-3)
- CONCRETE SIDEWALK (SEE DETAIL ON SHEET SP-2)
- DETECTABLE WARNING PATTERN
- ASPHALT PAVING (SEE DETAIL ON SHEET SP-2)
- HEAVY DUTY ASPHALT PAVING (SEE DETAIL ON SHEET SP-2)

NOTES

1. INSTALL STOP SIGN (SEE DETAIL ON SHEET SP-3)
2. INSTALL DO NOT ENTER SIGN (SEE DETAIL ON SHEET SP-3)
3. INSTALL ACCESSIBLE PARKING SIGN AND VAN ACCESSIBLE SIGN (SEE DETAIL ON SHEET SP-3)
4. INSTALL ACCESSIBLE PARKING SIGN (SEE DETAIL ON SHEET SP-3)

STALL COUNT SUMMARY

PARK AND RIDE LOT	
STANDARD STALLS:	99
ACCESSIBLE STALLS:	5
TOTAL STALLS:	104

BUS / STAFF PARKING LOT	
STANDARD STALLS:	8
ACCESSIBLE STALLS:	1
BUS STALLS:	8
TOTAL STALLS:	17

Point Table

Point #	Northing	Easting
1	786180.69	1070892.84
2	786141.57	1070926.89
3	786136.43	1070921.55
4	786122.29	1070921.28
5	786117.25	1070926.13
6	786081.88	1070925.42
7	786048.61	1070890.74
9	785744.49	1070708.13
10	785827.45	1070650.16
13	785838.79	1070668.91
14	785843.55	1070683.14
15	785898.41	1070747.26
16	785816.65	1070638.90
17	785858.55	1070827.06
18	785929.25	1070828.53
19	786010.03	1070752.41
20	786015.05	1070748.98
21	786010.17	1070745.34
22	785990.90	1070713.94
23	786068.79	1070689.07
24	786045.80	1070591.95
25	786063.84	1070574.64
28	786249.05	1070521.75
29	786273.97	1070547.73
30	786219.81	1070599.67

Point Table

Point #	Northing	Easting
31	786219.07	1070635.01
32	786227.04	1070643.33
33	786233.61	1070650.19
34	786216.30	1070666.80
35	786209.72	1070659.94
36	786191.12	1070577.31
37	786134.56	1070576.13
38	786081.61	1070704.60
39	786036.34	1070780.63
40	786103.62	1070761.68
43	785950.17	1070808.46
44	785957.24	1070808.61
45	785967.26	1070819.06
46	786049.33	1070855.40
47	786049.52	1070848.28
48	786017.61	1070779.10
50	786039.12	1070837.46
51	786294.90	1070578.23
52	786301.47	1070585.08
53	786364.51	1070592.30
54	786244.38	1070661.41
55	786371.37	1070585.72
56	786324.86	1070753.93
57	786032.16	1070830.20
58	786128.33	1070668.11

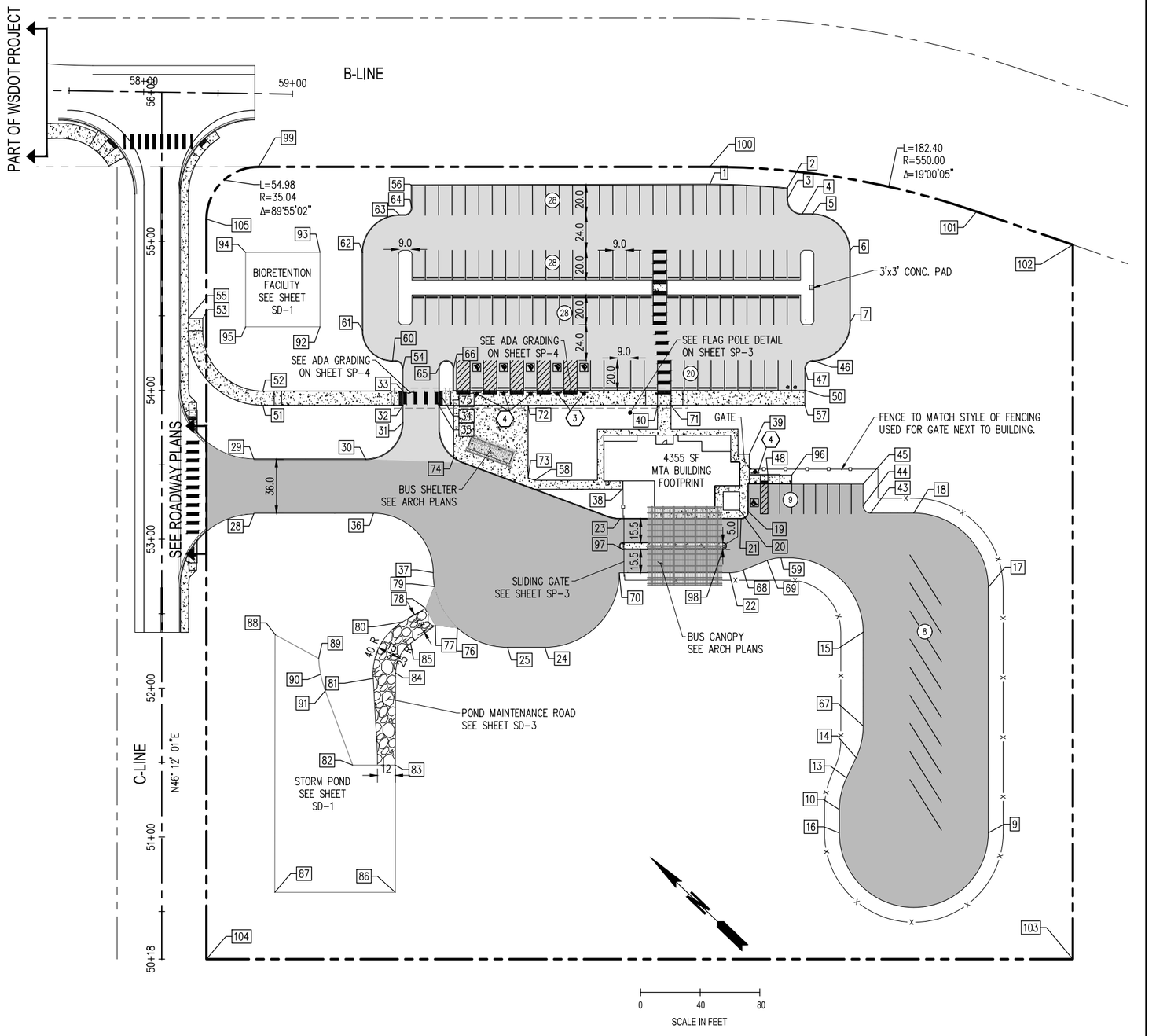
Point Table

Point #	Northing	Easting
59	785972.85	1070745.14
60	786252.86	1070660.20
61	786281.14	1070660.77
62	786317.50	1070698.60
63	786316.78	1070733.96
64	786314.47	1070743.11
65	786227.09	1070678.05
66	786219.87	1070684.97
67	785854.89	1070701.89
68	785985.44	1070721.66
69	785978.30	1070737.42
70	786044.34	1070662.64
71	786097.12	1070767.91
72	786166.41	1070701.48
73	786132.63	1070666.25
74	786177.90	1070641.22
75	786202.49	1070666.87
76	786097.33	1070560.73
77	786109.07	1070551.67
78	786121.59	1070555.45
79	786127.53	1070570.04
80	786126.55	1070538.08
81	786114.49	1070497.07
82	786084.18	1070445.52
83	786063.50	1070465.35

Point Table

Point #	Northing	Easting
84	786106.15	1070510.01
85	786112.68	1070531.53
86	786004.34	1070403.64
87	786062.77	1070347.60
88	786182.08	1070472.73
89	786150.20	1070481.39
90	786141.88	1070474.59
91	786132.03	1070468.81
92	786303.70	1070642.80
93	786338.34	1070678.85
94	786374.39	1070644.21
95	786339.75	1070608.16
96	786006.06	1070790.17
97	786053.16	1070675.66
98	786004.82	1070722.06
99	786407.84	1070691.66
100	786189.00	1070901.50
101	786039.00	1071003.81
102	785976.85	1071032.53
103	785644.80	1070686.27
104	786064.86	1070283.44
105	786408.86	1070642.16

T. 23 N., R. 01 W., S. 21, W.M.



△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-SP-1-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 24801 — REGISTERED PROFESSIONAL ENGINEER — 02/12/2020

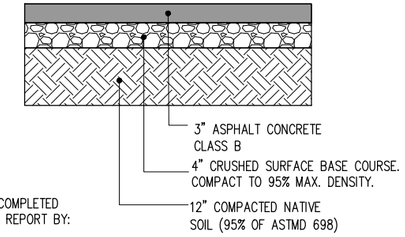
SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
SCJALLIANCE.COM

PROJECT NAME:

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

SITE PLAN AND HORIZONTAL CONTROL PLAN

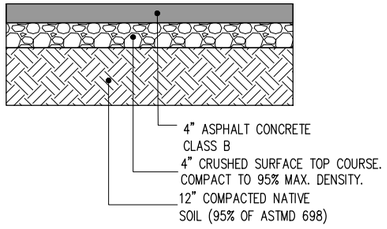
DRAWING No.: SP-1
SHEET No.: 5 OF 84



NOTE:
ALL PAVING SHALL BE COMPLETED
PER THE GEOTECHNICAL REPORT BY:
LANDAU ASSOCIATES,
DATED: SEPTEMBER 20, 2016

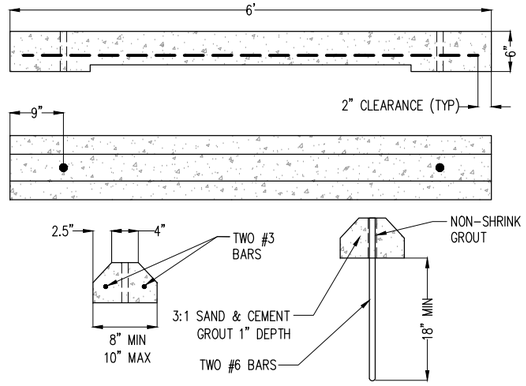
STANDARD DUTY ASPHALT PAVING

NTS



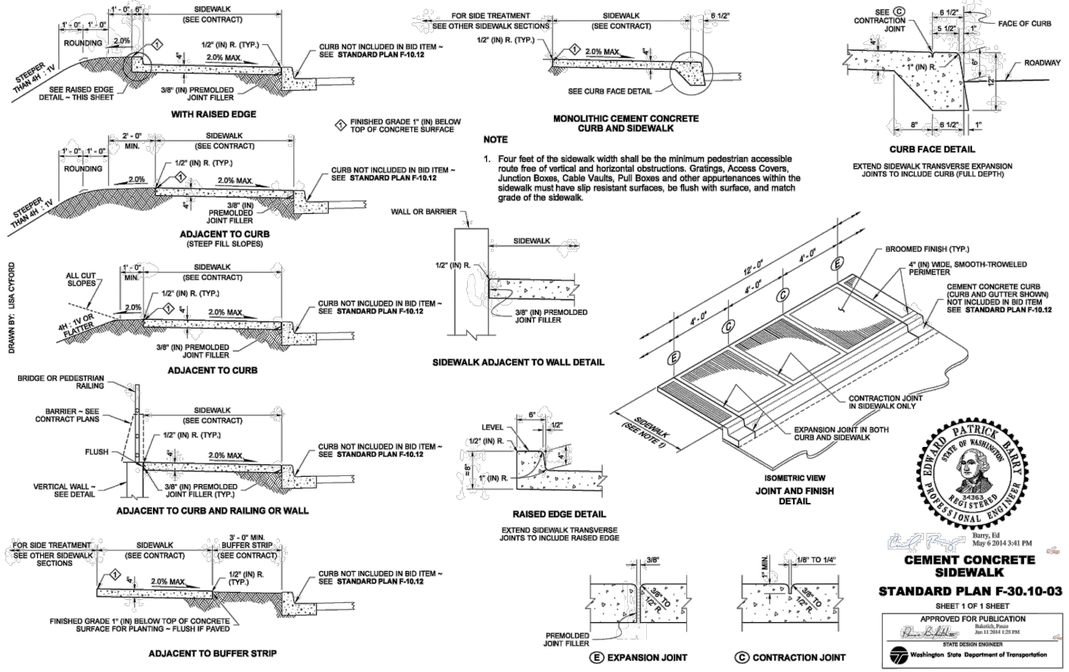
HEAVY DUTY ASPHALT PAVING

NTS



PRECAST CEMENT CONCRETE (RAISED) WHEELSTOP

NTS



DRAWN BY: LISA CYFORD

EDWARD PATRICK BARRY
STATE OF WASHINGTON
#43363
REGISTERED
PROFESSIONAL ENGINEER

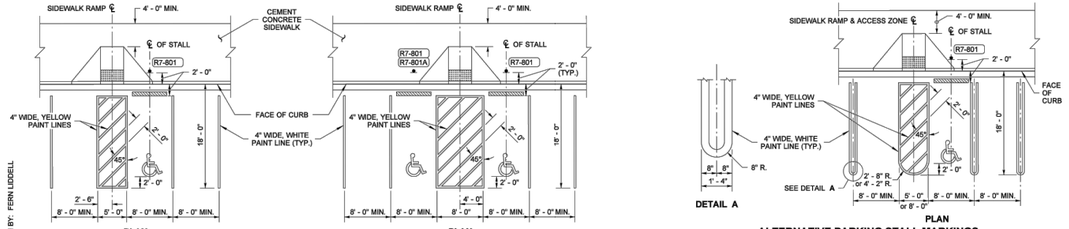
Barry, Ed
May 6 2014 3:41 PM

CEMENT CONCRETE SIDEWALK

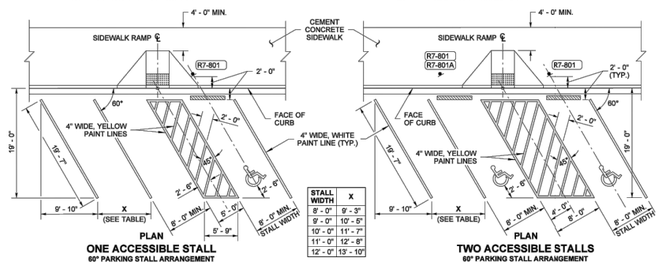
STANDARD PLAN F-30.10-03

SHEET 1 OF 1 SHEET

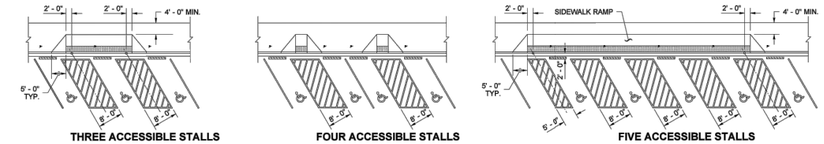
APPROVED FOR PUBLICATION
Bakotich, Pasco
Jun 11 2014 1:23 PM
STATE DESIGN ENGINEER
Washington State Department of Transportation



DRAWN BY: FERN LEDELL



STALL WIDTH	X
8' - 0"	9' - 3"
9' - 0"	10' - 5"
10' - 0"	11' - 7"
11' - 0"	12' - 8"
12' - 0"	13' - 10"



NOTES

1. Three, four and five accessible stall arrangements may be either 60° (angled) or 90° (perpendicular) parking arrangements. See Contract.
2. An Access Parking Space Symbol is required for each accessible parking stall. A blue background and white border are required when the symbol is installed on a cement concrete surface.
3. All accessible stalls shall have wheel stops. Place wheel stops in other stalls when specified in the contract. Wheel stops shall be approximately 6" high and a minimum of 6' long.
4. Refer to the Standard Plans for sidewalk ramp, detectable warning pattern, and curb details.

LEGEND

- R7-801 Reserved Parking Sign and post with R7-801A Plaque, if indicated (See Sign Fabrication Manual)
- Access Parking Space Symbol
- Manufactured wheel stop
- Detectable Warning Pattern

THEODORE J. TREPANIER
STATE OF WASHINGTON
21599
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES AUGUST 9, 2009

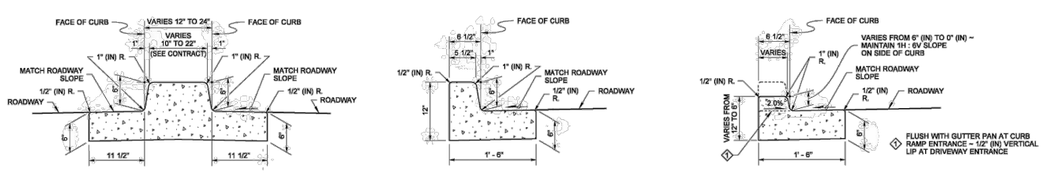
ELECTRONIC SIGNATURE AGREEMENT. ELECTRONIC SIGNATURE AGREEMENT ON FILE WITH THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION FOR THIS PROJECT.

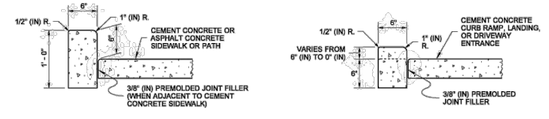
PARKING SPACE LAYOUTS

STANDARD PLAN M-17.10-02

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Pasco Bakotich III 07-03-08
STATE DESIGN ENGINEER DATE
Washington State Department of Transportation

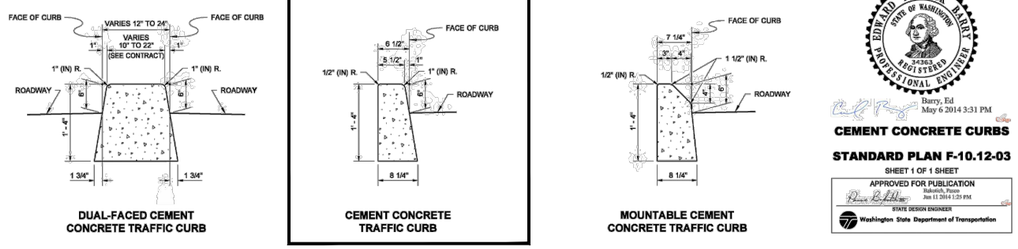




NOTE

1. See **Standard Plan F-30.10** for Curb Expansion and Contraction Joint spacing and see **Standard Specification Sections 8-04 and 9-04** for additional requirements.

DRAWN BY: FERN LEDELL



EDWARD PATRICK BARRY
STATE OF WASHINGTON
#43363
REGISTERED
PROFESSIONAL ENGINEER

Barry, Ed
May 6 2014 3:31 PM

CEMENT CONCRETE CURBS

STANDARD PLAN F-10.12-03

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Bakotich, Pasco
Jun 11 2014 1:23 PM
STATE DESIGN ENGINEER
Washington State Department of Transportation

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
ISSUE DATE: 02/12/2020
DRAWN BY: N. MAYFIELD
JOB No.: 0738.05
CHECKED BY: P. HOLM
DRAWING FILE No.: 0738.05-SP-2-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM
STATE OF WASHINGTON
21601
REGISTERED
PROFESSIONAL ENGINEER
02/12/2020

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
SCJALLIANCE.COM

PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

SITE PLAN DETAILS

DRAWING No.: SP-2

SHEET No.: 6 OF 84

Feb 13, 2020 - 9:13:38am - User: rick.mayfield
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CAD\BELFAIR\0738.05-SP-2-B.DWG

R1-1
(30" X 30")
W/R
1

R7-801
(12" X 18")
R/B/W

R7-801
(12" X 18")
R/B/W
4

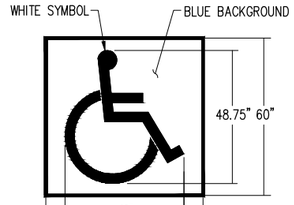
R7-801A
(12" X 6")
3

R5-1
(30" X 30")
R/W
2

R3-2002
(36" X 60")
W/B
5

SIGNING DETAIL
NTS

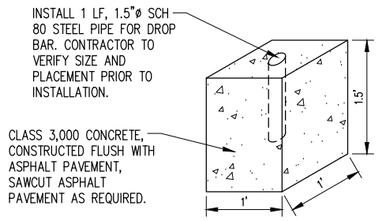
SIGN NOTE:
ALL SIGNS SHALL BE 2" SOLID GROUTED STEEL AND MANUFACTURED AND INSTALLED PER 2016 WSDOT STANDARD SPECIFICATIONS IN ACCORDANCE WITH THE STATE OF WASHINGTON SIGN FABRICATION MANUAL AND/OR THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, 2009 EDITION. ALL SIGN SUPPORTS SHALL BE PER WSDOT STANDARD PLAN G-24.50.



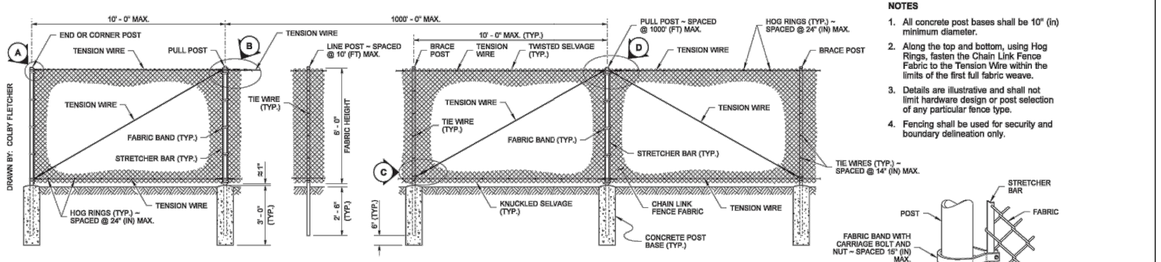
ACCESSIBLE PARKING SYMBOL
LOCATE AT EDGE OF PARKING SPACE

NOTES:
1. SEE SITE PLAN FOR COMPLETE LAYOUT.
2. THESE DETAILS ARE FOR REFERENCE AND DIMENSION CONTROL ONLY.
3. ALL DIMENSIONS ARE TO CENTER OF STRIPE UNLESS OTHERWISE INDICATED.

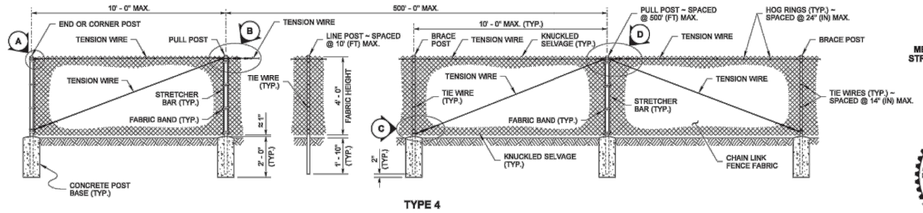
STRIPING AND SYMBOL (PAINT)
NTS



DROP BAR LATCH PAD
NTS

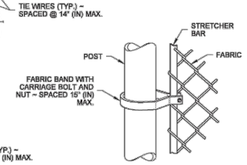


TYPE 3



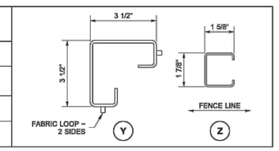
TYPE 4

NOTES
1. All concrete post bases shall be 10" (in) minimum diameter.
2. Along the top and bottom, using Hog Rings, fasten the Chain Link Fence Fabric to the Tension Wire within the limits of the first full fabric weave.
3. Details are illustrative and shall not limit hardware design or post selection of any particular fence type.
4. Fencing shall be used for security and boundary delineation only.



METHOD OF FASTENING STRETCHER BAR TO POST

POST AND RAIL SPECIFICATIONS				
POST	PIPE		ROLL FORMED	
	NOM. SIZE (SCH. 40) I.D.		SECTION	WEIGHT (lb/ft)
END, CORNER, OR PULL POST	2 1/2" DIAM.	Y		5.10
LINE OR BRACE POST	2" DIAM.	Z		1.85



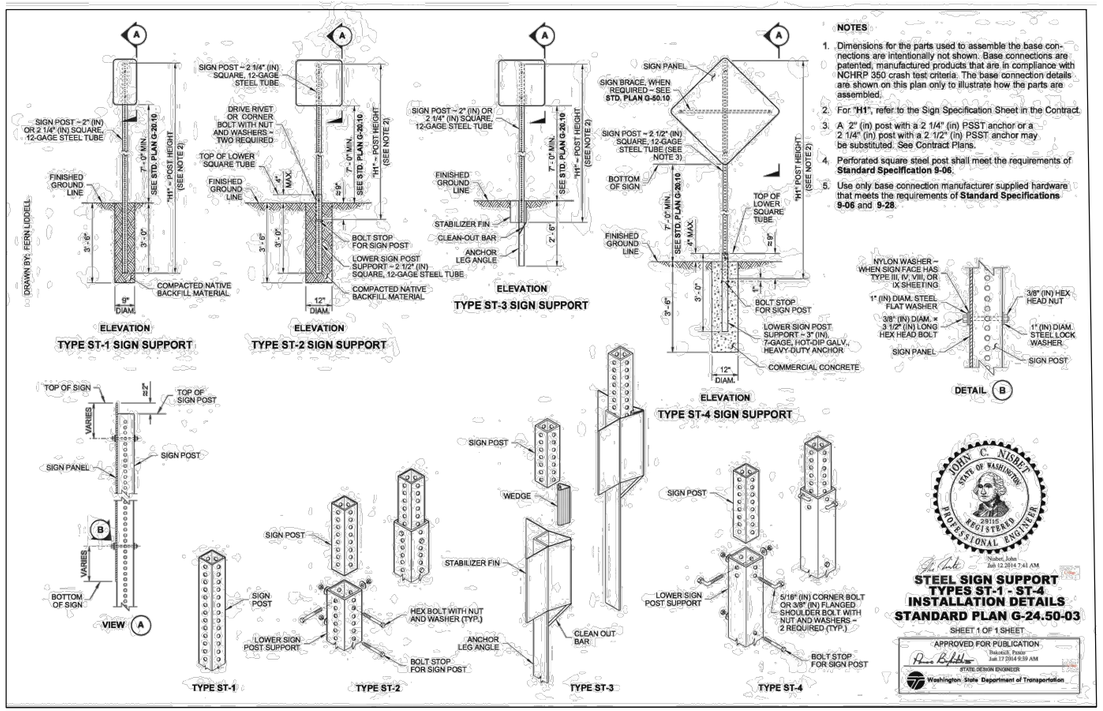
Barry, Ed
Jul 14 2015 11:14 AM

CHAIN LINK FENCE TYPES 3 AND 4

STANDARD PLAN L-20.10-03

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Carpenter, Jeff
Jul 14 2015 11:24 AM
STATE DESIGN ENGINEER
Washington State Department of Transportation



NOTES
1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are shown on this plan only to illustrate how the parts are assembled.
2. For "H1", refer to the Sign Specification Sheet in the Contract.
3. A 2" (in) post with a 2 1/4" (in) PSST anchor or a 2 1/4" (in) post with a 2 1/2" (in) PSST anchor may be substituted. See Contract Plans.
4. Perforated square steel post shall meet the requirements of **Standard Specification 9-06.**
5. Use only base connection manufacturer supplied hardware that meets the requirements of **Standard Specifications 9-06** and **9-28.**

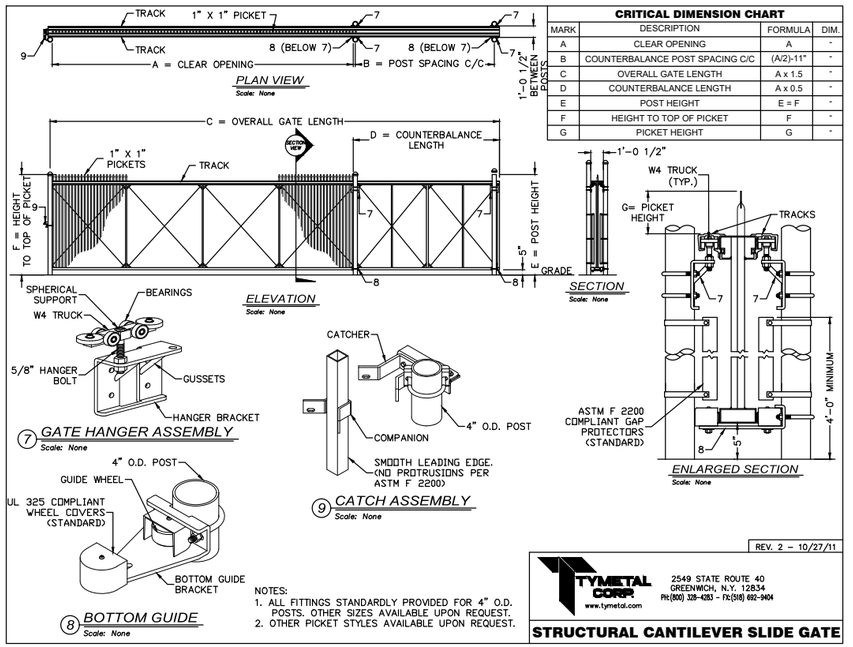
JOHN C. NISBET
STATE OF WASHINGTON
19115
REGISTERED
PROFESSIONAL ENGINEER
Nisbet, John
Jun 12 2014 7:41 AM

STEEL SIGN SUPPORT TYPES ST-1 - ST-4 INSTALLATION DETAILS

STANDARD PLAN G-24.50-03

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Travis B., Pender
Jun 17 2014 9:59 AM
STATE DESIGN ENGINEER
Washington State Department of Transportation



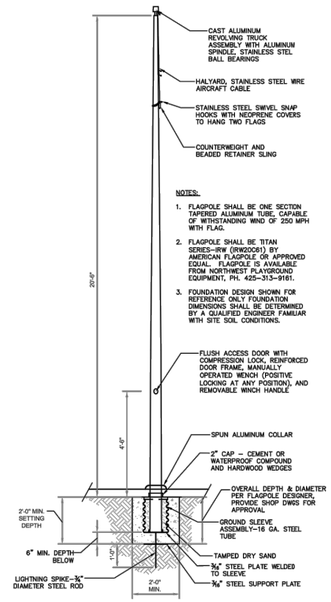
CRITICAL DIMENSION CHART			
MARK	DESCRIPTION	FORMULA	DIM.
A	CLEAR OPENING	A	-
B	COUNTERBALANCE POST SPACING C/C	(A/2)-11"	-
C	OVERALL GATE LENGTH	A x 1.5	-
D	COUNTERBALANCE LENGTH	A x 0.5	-
E	POST HEIGHT	E = F	-
F	HEIGHT TO TOP OF PICKET	F	-
G	PICKET HEIGHT	G	-

NOTES:
1. ALL FITTINGS STANDARDLY PROVIDED FOR 4" O.D. POSTS. OTHER SIZES AVAILABLE UPON REQUEST.
2. OTHER PICKET STYLES AVAILABLE UPON REQUEST.

REV. 2 – 10/27/11

TYMETAL CORP.
www.tymetal.com
2549 STATE ROUTE 40
GREENWICH, N.Y. 12834
PH:(800) 328-4253 ~ FX:(518) 692-9404

STRUCTURAL CANTILEVER SLIDE GATE



FLAGPOLE INSTALLATION

DETAIL~FILE

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-SP-3-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM
STATE OF WASHINGTON
40670
REGISTERED
PROFESSIONAL ENGINEER
02/12/2020

SCJ ALLIANCE
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8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
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SCJALLIANCE.COM

PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

SITE PLAN DETAILS

DRAWING No.: SP-3

SHEET No.: 7 OF 84

Feb 13, 2020 - 9:13:46am - User: nick.mayfield
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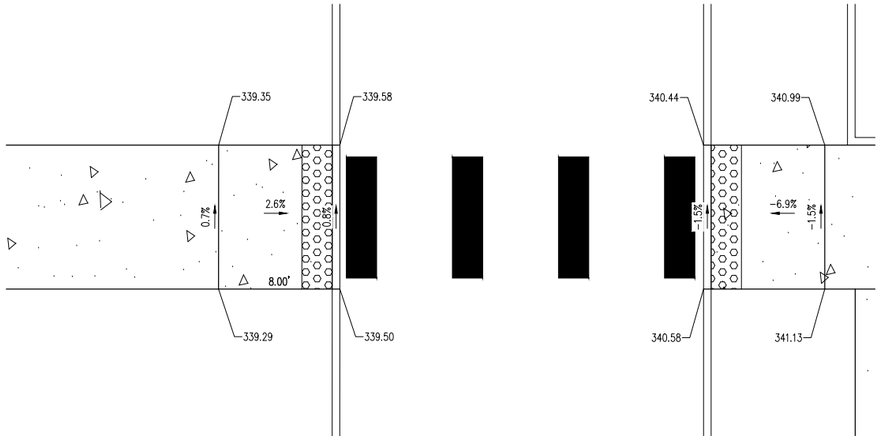

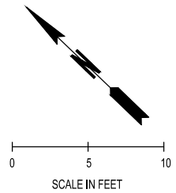

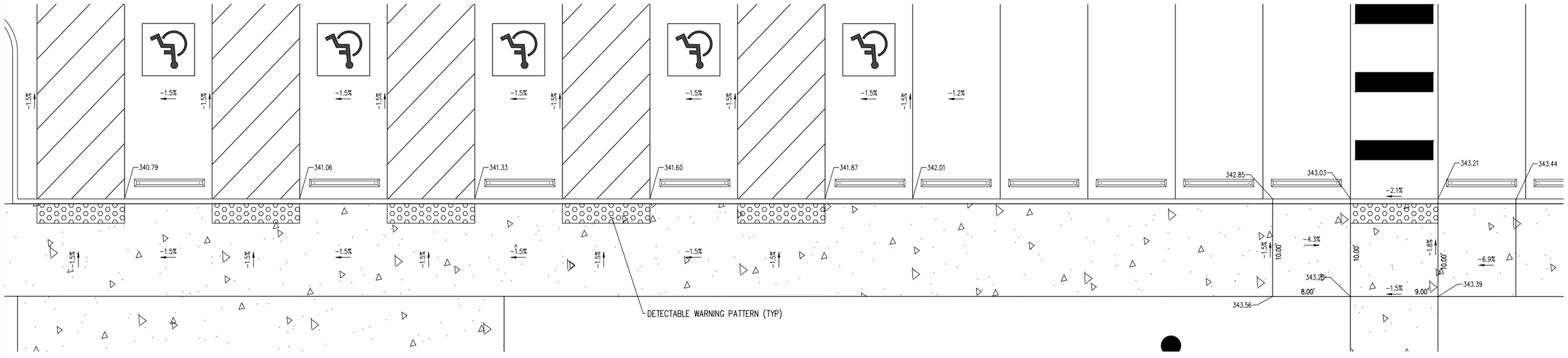

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-SP-4-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 40503 — REGISTERED PROFESSIONAL ENGINEER
02/12/2020

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PROJECT NAME:

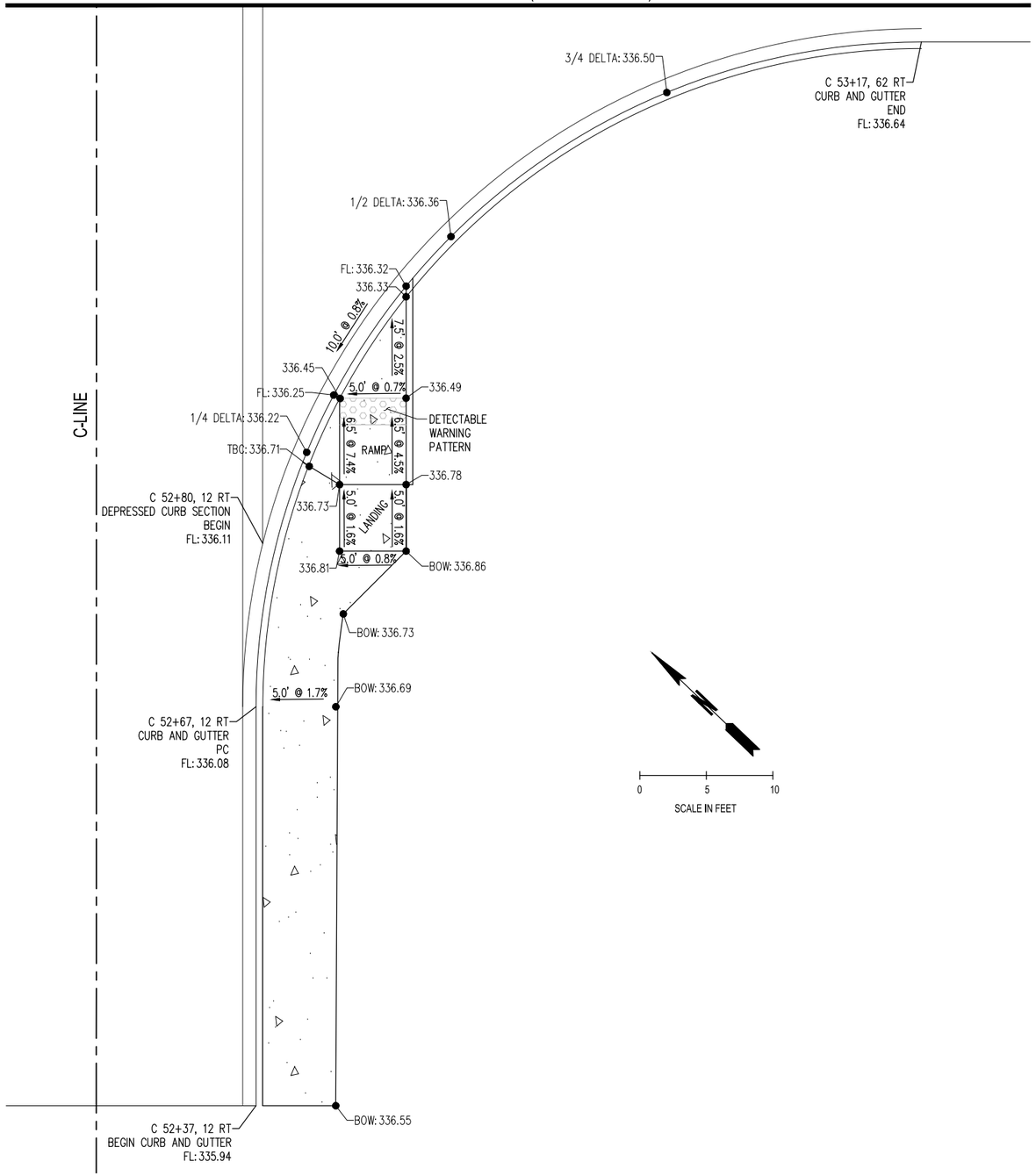
MTA

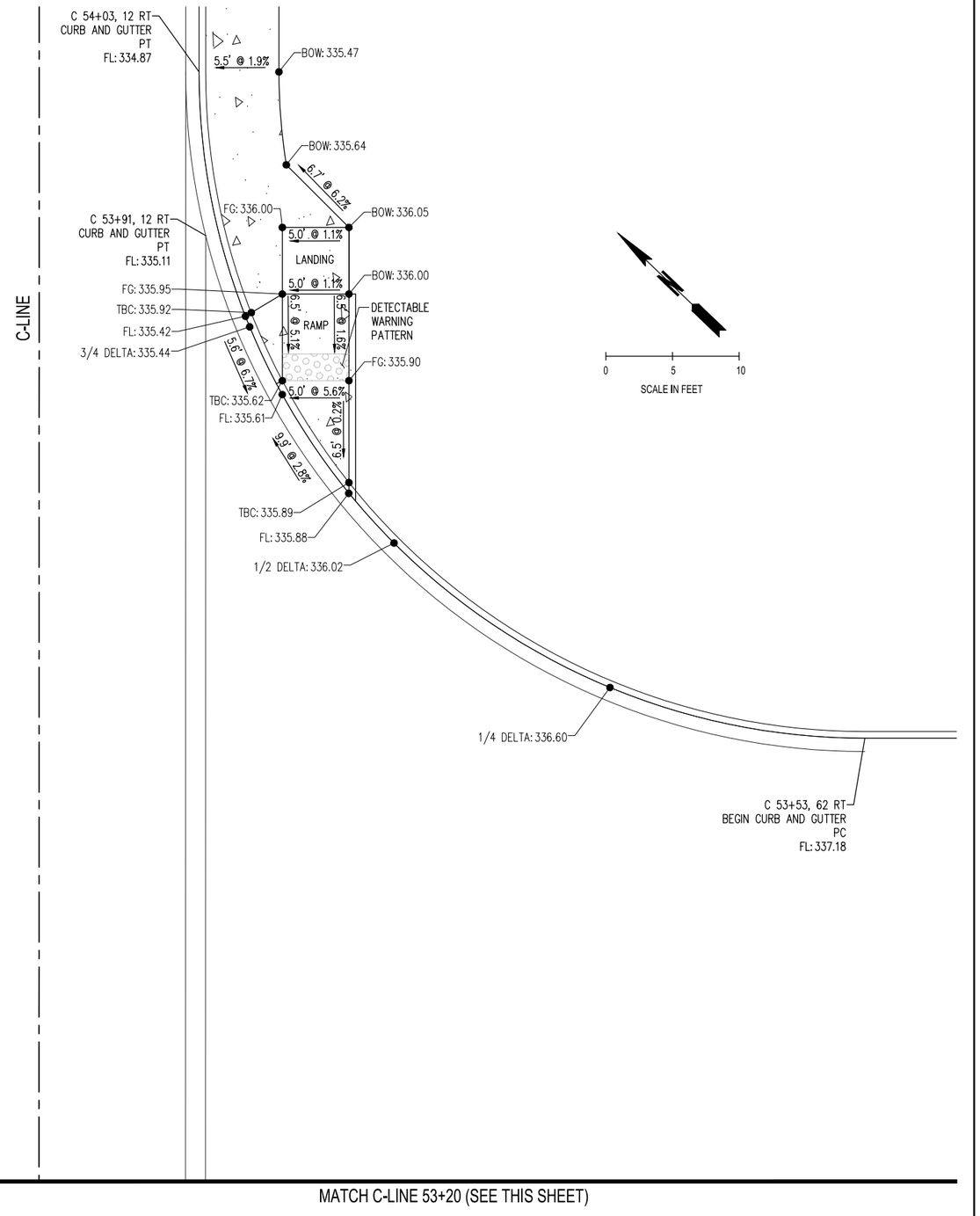
MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

RAMP GRADING DETAILS

DRAWING No.: SP-4
SHEET No.: 8 OF 84

MATCH C-LINE 53+20 (SEE THIS SHEET)





MATCH C-LINE 53+20 (SEE THIS SHEET)

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-SP-5-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 24620 — REGISTERED PROFESSIONAL ENGINEER
02/12/2020

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PROJECT NAME:

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MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

RAMP GRADING DETAILS

DRAWING No.: SP-5
SHEET No.: 9 OF 84

T. 23 N., R. 01 W., S. 21, W.M.

B-LINE

C-LINE

C 55+82, 69 LT
END CURB AND GUTTER
PC
FL: 332.20

TBC: 333.21

8.6' @ 4.8%

FL: 332.80

DETECTABLE WARNING PATTERN (TYP)

12' @ 4.5%

RAMP

8' @ 0.6%

FL: 332.85

6.5' @ 6.3%

BOW: 333.39

LANDING

8.5' @ 6.0%

5' @ 0.8%

BOW: 332.98

TBC: 333.36

RAMP

BOW: 333.03

6.5' @ 7.9%

12' @ 4.5%

BOW: 333.54

C 55+32, 18 LT
BEGIN CURB AND GUTTER
PC
FL: 333.01

0 5 10
SCALE IN FEET

C 55+82, 62 RT
CURB AND GUTTER
PC
FL: 335.28

TBC: 334.45

8.5' @ 7.6%

5.5' @ 1.5%

333.80

RAMP

8.5' @ 7.5%

BOW: 334.53

DETECTABLE WARNING PATTERN (TYP)

FL: 333.70

6' @ 1.7%

LANDING

5.3' @ 1.7%

BOW: 333.89

6.5' @ 5.1%

RAMP

5.8' @ 5.3%

BOW: 333.80

TBC: 334.03

5.5' @ 1.5%

BOW: 334.11

C 55+32, 12 RT
CURB AND GUTTER
PC
FL: 333.13

0 5 10
SCALE IN FEET

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-SP-6-B

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PATRICK HOLM — STATE OF WASHINGTON — 24620 — REGISTERED PROFESSIONAL ENGINEER — 02/12/2020

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CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
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PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

RAMP GRADING DETAILS

DRAWING No.: SP-6

SHEET No.: 10 OF 84

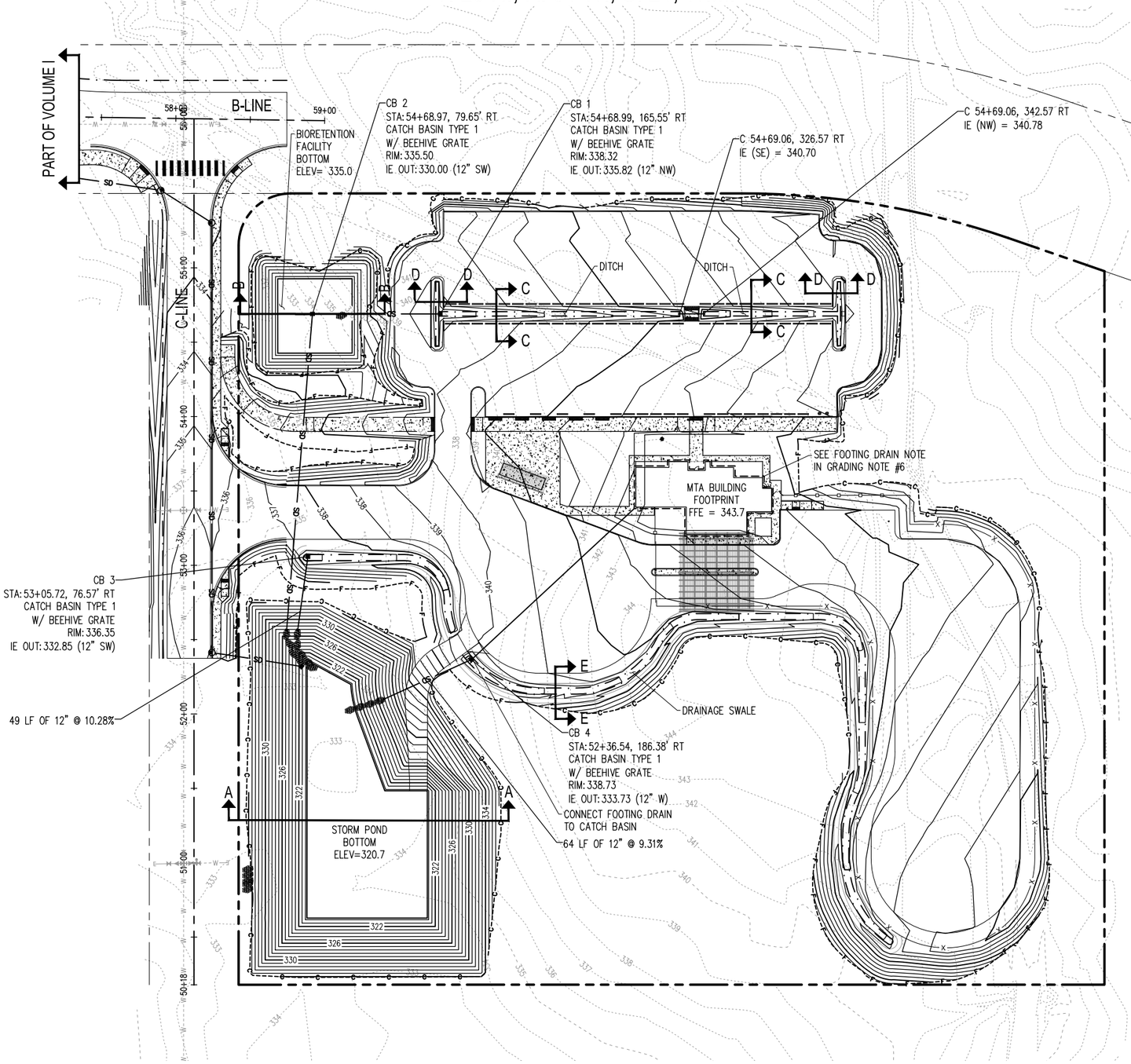
T. 23 N., R. 01 W., S. 21, W.M.

LEGEND

- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- GRADE BREAK
- DITCH
- XXX.XX — SPOT ELEVATION
- 0.00% — SLOPE LABEL
- SD — STORM LINE (HDPE)
- CATCH BASIN TYPE 1 W/ BEEHIVE GRATE

GRADING NOTES:

1. SEE "SD" SHEETS FOR STORM WATER INLET, PIPE AND DETENTION SYSTEM DETAILS.
2. EXISTING CONTOURS ARE BASED ON SEPTEMBER 2017 TOPOGRAPHIC SURVEY BY MTN2COAST, LLC
3. SPOT ELEVATIONS REPRESENT FINISHED GRADE AT FLOW LINE UNLESS OTHERWISE NOTED.
4. ALL LANDSCAPE AREAS SHALL BE STABILIZED.
5. CONTRACTOR SHALL ENSURE THERE IS POSITIVE DRAINAGE AWAY FROM BUILDING AT ALL TIMES.
6. SEE SHEET SD-2 FOR FOOTING DRAIN DETAIL



LOG YARD ROAD ROUNDABOUT CONTRACTOR ROUGH GRADED SITE TO SUBGRADE AND CONSTRUCTED STORMWATER PONDS. EXCESS EARTHWORK HAS BEEN STOCKPILED ON-SITE. CONTRACTOR SHALL COMPLETE GRADING AND REMOVE ANY EXCESS MATERIAL.

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-SD-1-B

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8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
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PROJECT NAME:

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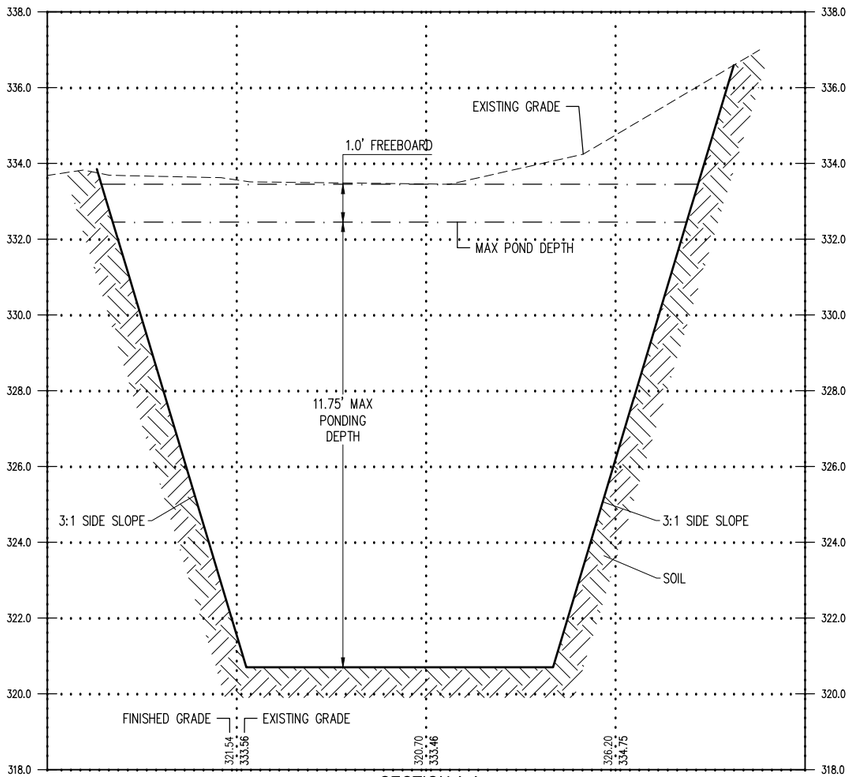
MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

GRADING AND DRAINAGE PLAN

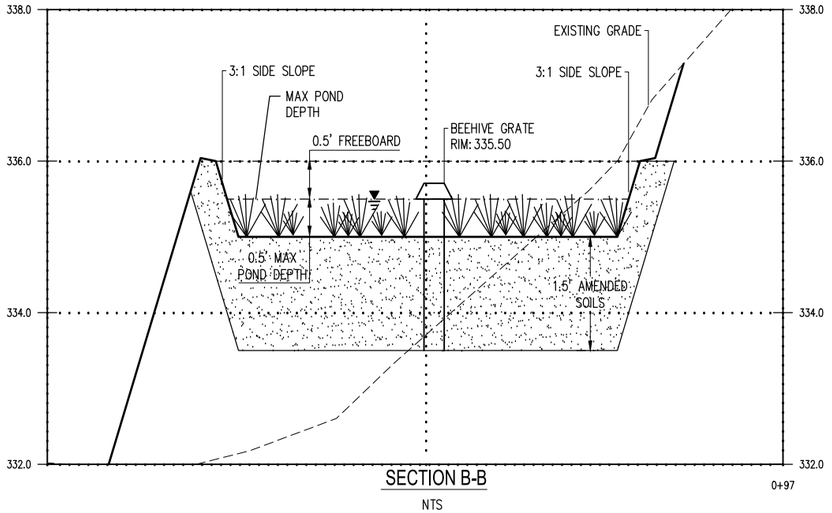
DRAWING No.: SD-1

SHEET No.: 11 OF 84

T. 23 N., R. 01 W., S. 21, W.M.

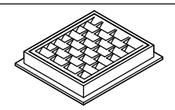


SECTION A-A
NTS



SECTION B-B
NTS

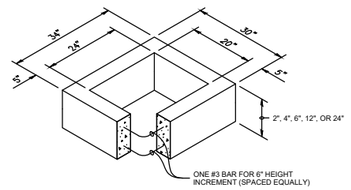
DRAWN BY: LISA CYFORD



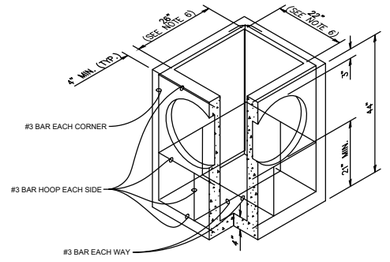
FRAME AND VANED GRATE

PIPE ALLOWANCES	
PIPE MATERIAL	MAXIMUM INSIDE DIAMETER
REINFORCED OR PLAIN CONCRETE	12"
ALL METAL PIPE	15"
CPSSP* (STD. SPEC. 9-05.20)	12"
SOLID WALL PVC (STD. SPEC. 9-05.12(1))	15"
PROFILE WALL PVC (STD. SPEC. 9-05.12(2))	15"

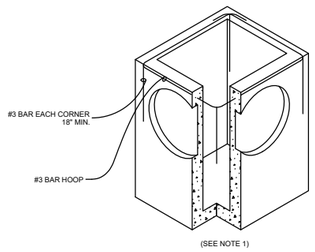
* CORRUGATED POLYETHYLENE STORM SEWER PIPE



RECTANGULAR ADJUSTMENT SECTION



PRECAST BASE SECTION



(SEE NOTE 1)

ALTERNATIVE PRECAST BASE SECTION

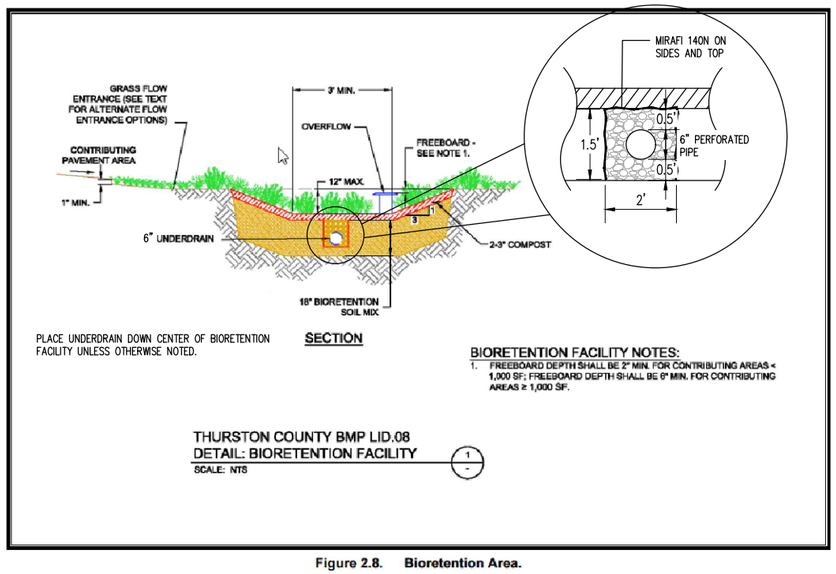
NOTES

1. As acceptable alternatives to the rebar shown in the PRECAST BASE SECTION, fibers (placed according to the Standard Specifications), or wire mesh having a minimum area of 0.12 square inches per foot shall be used with the minimum required rebar shown in the ALTERNATIVE PRECAST BASE SECTION. Wire mesh shall not be placed in the knockouts.
2. The knockout diameter shall not be greater than 20". Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum. Provide a 1.5" minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Standard Specification 9-04.3.
3. The maximum depth from the finished grade to the lowest pipe invert shall be 5'.
4. The frame and grate may be installed with the flange down, or integrally cast into the adjustment section with flange up.
5. The Precast Base Section may have a rounded floor, and the walls may be sloped at a rate of 1:24 or steeper.
6. The opening shall be measured at the top of the Precast Base Section.
7. All pickup holes shall be grouted full after the basin has been placed.

CATCH BASIN TYPE 1

SHEET 1 OF 1 SHEET

06-16-11



PLACE UNDERDRAIN DOWN CENTER OF BIORETENTION FACILITY UNLESS OTHERWISE NOTED.

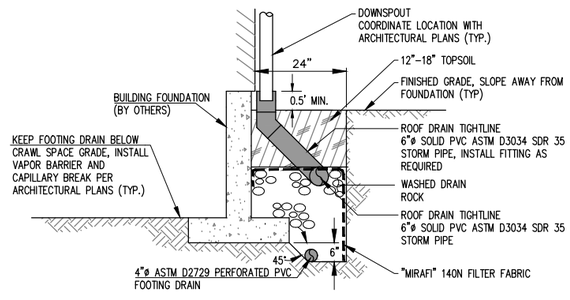
SECTION

BIORETENTION FACILITY NOTES:

1. FREEBOARD DEPTH SHALL BE 2" MIN. FOR CONTRIBUTING AREAS < 1,000 SF; FREEBOARD DEPTH SHALL BE 6" MIN. FOR CONTRIBUTING AREAS ≥ 1,000 SF.

THURSTON COUNTY BMP LID.08
DETAIL: BIORETENTION FACILITY
SCALE: NTS

Figure 2.8. Bioretention Area.



FOOTING DRAIN DETAIL
NTS

Feb 13, 2020 - 9:14:42am - User: nick.mayfield
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CAD\BELFAIR\0738.05--SD--2-B.DWG

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-SD-2-B

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PATRICK HOLM — STATE OF WASHINGTON — 24605 — REGISTERED PROFESSIONAL ENGINEER — 02/12/2020

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
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SCJALLIANCE.COM

PROJECT NAME:

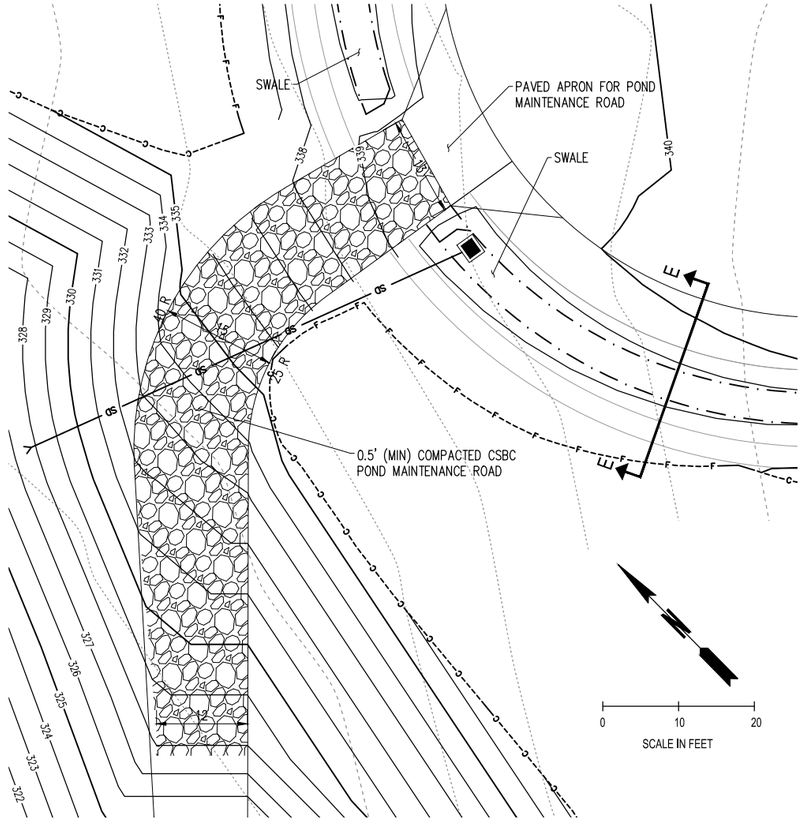
MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

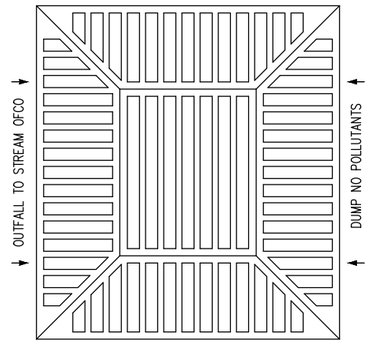
GRADING AND DRAINAGE DETAILS

DRAWING No.: SD-2
SHEET No.: 12 OF 84

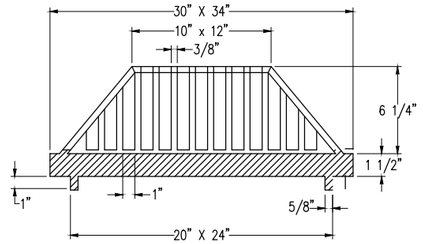
T. 23 N., R. 01 W., S. 21, W.M.



POND MAINTENANCE ACCESS ROAD



PLAN VIEW



SECTION VIEW

SPECIFICATIONS

MANUFACTURER: OLYMPIC FOUNDARY INC.

MATERIAL: DUCTILE IRON ASTM A536, CL 80-55-06

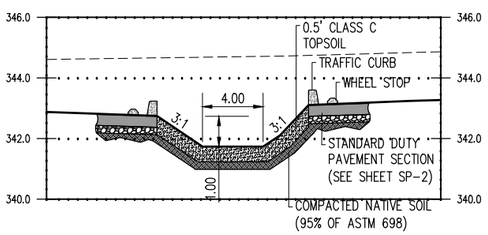
APPROXIMATE WEIGHT: 100 LBS.

RATING: H-20

PART NO. SM60BH

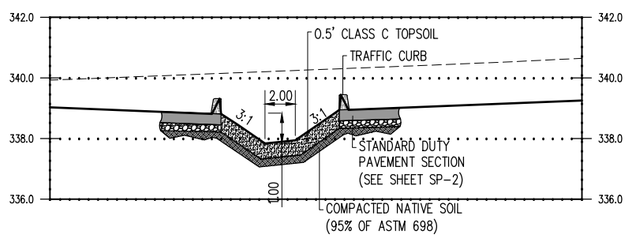
BEEHIVE GRATE FOR USE WITH SM60 30"X34" REV FRAME

NTS



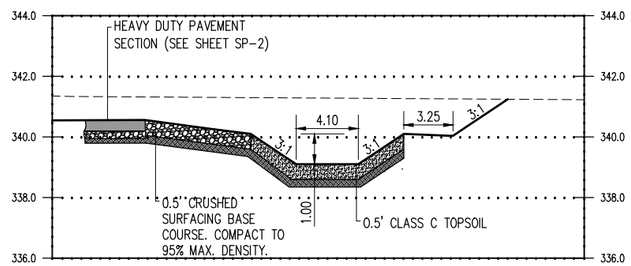
DITCH SECTION C-C

NTS



DITCH SECTION D-D

NTS



DRAINAGE SWALE SECTION E-E

NTS

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-SD-3-B

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PATRICK HOLM — STATE OF WASHINGTON — 40805 — REGISTERED PROFESSIONAL ENGINEER — 02/12/2020

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CONSULTING SERVICES
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P: 360-352-1465 F: 360-352-1509
SCJALLIANCE.COM

PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

DRAINAGE DETAILS

DRAWING No.: SD-3

SHEET No.: 13 OF 84

T. 23 N., R. 01 W., S. 21, W.M.

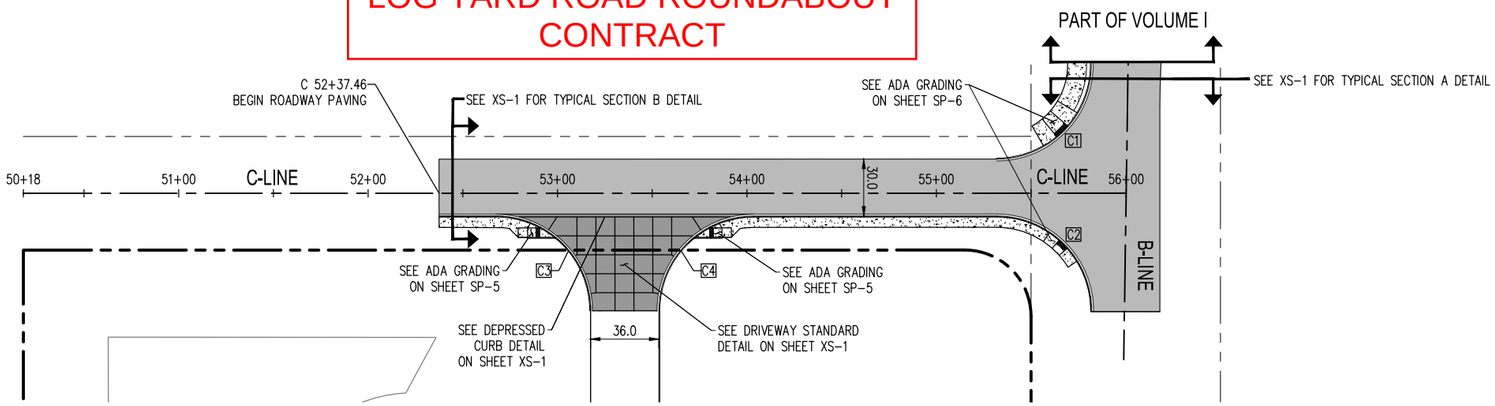
LEGEND

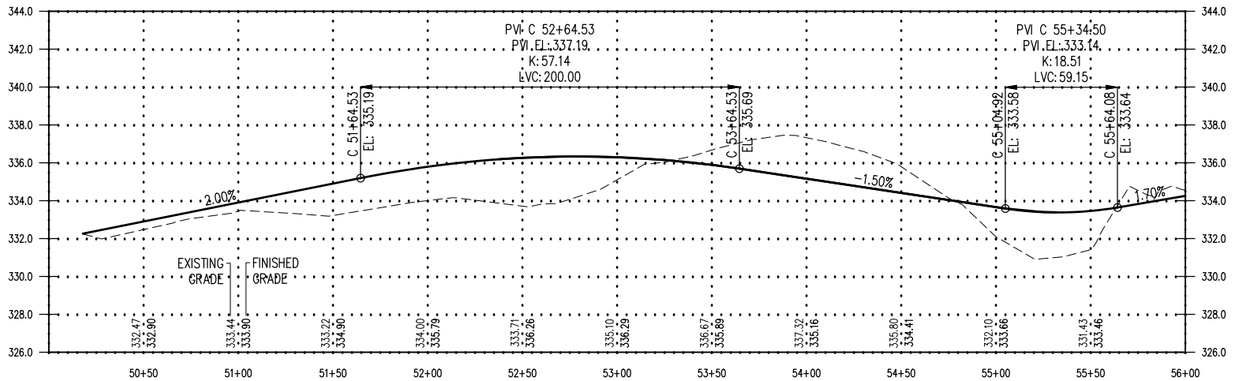
- PROPERTY LINE
- CEMENT CONCRETE TYPE C-1 CURB (SEE DETAIL SHEET XS-1)
- CEMENT CONCRETE TRAFFIC CURB AND GUTTER (SEE DETAIL SHEET XS-1)
- SIGN
- CONCRETE SIDEWALK (SEE DETAIL SHEET XS-1)
- DETECTABLE WARNING PATTERN
- HEAVY DUTY ASPHALT PAVING (SEE DETAIL SHEET XS-1)

INTERSECTION CURVE TABLE								ELEVATIONS				
No	BEGIN STA	OFFSET	END STA	OFFSET	RADIUS	LENGTH	DELTA	BEGIN ELEV	1/4 Δ ELEV	1/2 Δ ELEV	3/4 Δ ELEV	END ELEV
C1	B 57+46.24	19.44 RT	C 55+31.83	18.00 LT	50.00	78.54	89°59'52"	332.67	333.05	333.05	332.93	333.03
C2	C 55+32.00	12.00' RT	B 24+17.54	18.00 RT	50.00	78.54	90°00'08"	333.66	333.79	334.09	334.78	335.46
C3	C 52+67.46	12.00 RT	C 53+17.46	62.00 RT	50.00	78.54	90°00'09"	336.08	335.55	336.37	336.51	336.64
C4	C 53+53.46	62.00 RT	C 54+03.46	12.00 RT	50.00	78.54	90°00'14"	337.18	336.57	335.98	335.51	334.87

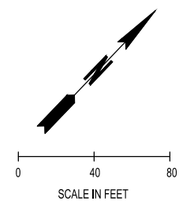
ELEVATIONS PROVIDED ARE TO BOTTOM FACE OF CURB WITHIN CURB LIMITS, OR TO EDGE OF PAVEMENT WHERE NO CURB EXISTS.

FOR REFERENCE ONLY
CONSTRUCTED AS PART OF THE
LOG YARD ROAD ROUNDABOUT
CONTRACT



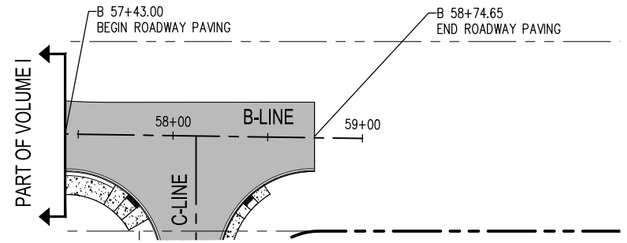


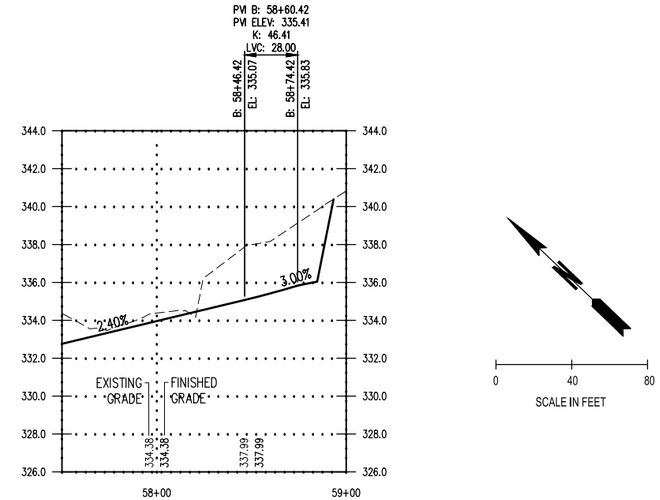
C-LINE



PAVING NOTES:

1. ALL CURB AND GUTTER, STREET GRADES, SIDEWALK GRADES, AND ANY OTHER VERTICAL AND/OR HORIZONTAL ALIGNMENT SHALL BE STAKED BY AN ENGINEERING OR SURVEYING FIRM CAPABLE OF PERFORMING SUCH WORK.
2. INSTALL DETECTABLE WARNING SURFACE PER WSDOT STANDARD PLAN F-45.10 AT ALL PEDESTRIAN CROSSING LOCATIONS.
3. STATION AND OFFSETS ARE TO FACE OF CURB.
4. INSTALL 0.33' COMPACTED DEPTH OF CRUSHED SURFACING BASE COURSE BENEATH DRIVEWAY ENTRANCE CONCRETE.
5. EOP = EDGE OF PAVEMENT





B-LINE

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-PP-1-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 19621 REGISTERED PROFESSIONAL ENGINEER — 02/12/2020

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
SCJALLIANCE.COM

PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND ROAD DEVELOPMENT

PLAN, PROFILE, AND PAVING

DRAWING No.: PP-1

SHEET No.: 14 OF 84

PAVEMENT MARKING LEGEND

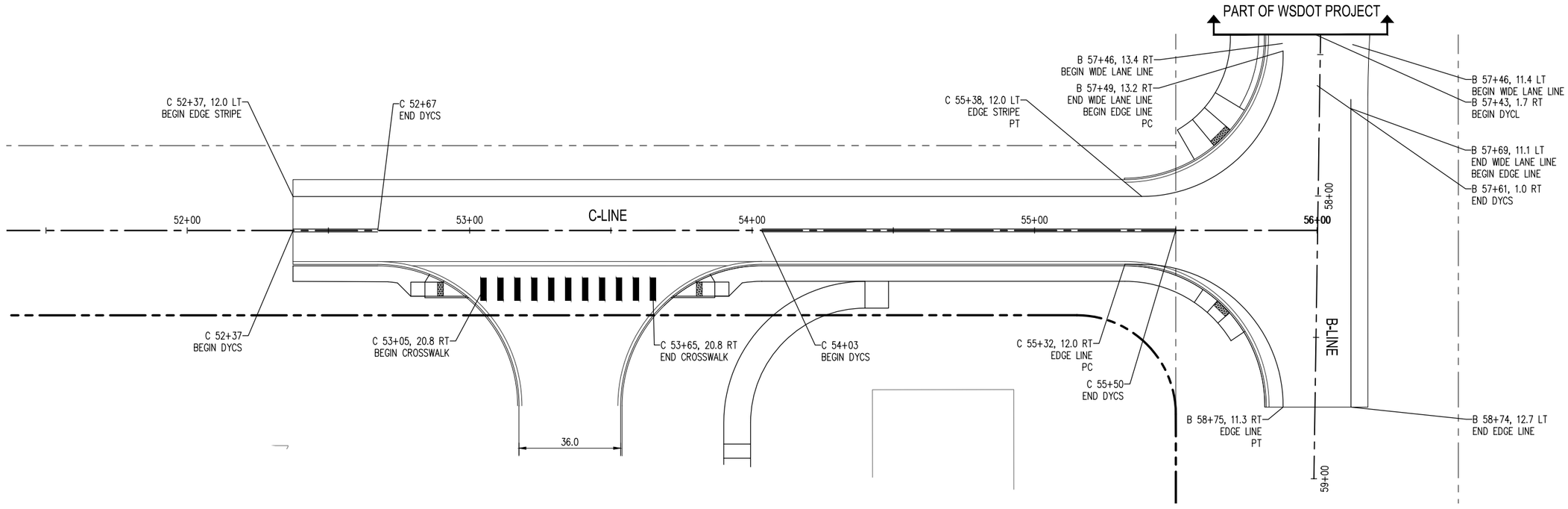
- PLASTIC CROSSWALK LINE (PER WSDOT STANDARD PLAN M-15.10)
- WIDE LANE LINE (PER WSDOT STANDARD PLAN M-20.10)
- EDGE STRIPE (PER WSDOT STANDARD PLAN M-20.10)
- DOUBLE YELLOW CENTER STRIPE (DYCS) (PER WSDOT STANDARD DETAIL M-20.40)

PAVEMENT MARKING NOTES

1. ALL PLASTIC SHALL BE TYPE A THEMOPLASTIC PER WSDOT STANDARD SPECIFICATIONS SEC. 9-34.
2. SEE WSDOT STD PLAN M-20.40 FOR INSTALLATION OF SUPPLEMENTAL RAISED PAVEMENT MARKINGS.
3. ALL EDGE STRIPES ARE WHITE UNLESS OTHERWISE NOTED.
4. CENTER TRAFFIC ARROWS IN MIDDLE OF DESIGNATED LANE.
5. ALL STRIPING SHALL BE RPM'S EXCEPT FOR BIKE LANE/GORE STRIPE

0 20 40
SCALE IN FEET

FOR REFERENCE ONLY
CONSTRUCTED AS PART OF THE
LOG YARD ROAD ROUNDABOUT
CONTRACT



△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-PM-1-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 46001 — REGISTERED PROFESSIONAL ENGINEER — 02/12/2020

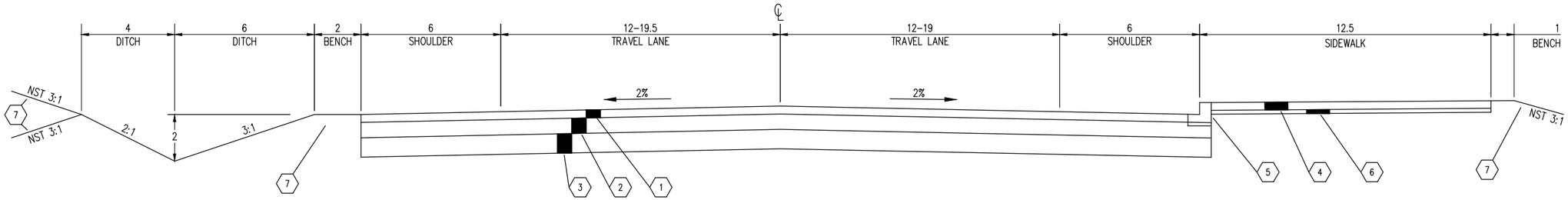
SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
SCJALLIANCE.COM

PROJECT NAME:

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

PAVEMENT MARKING

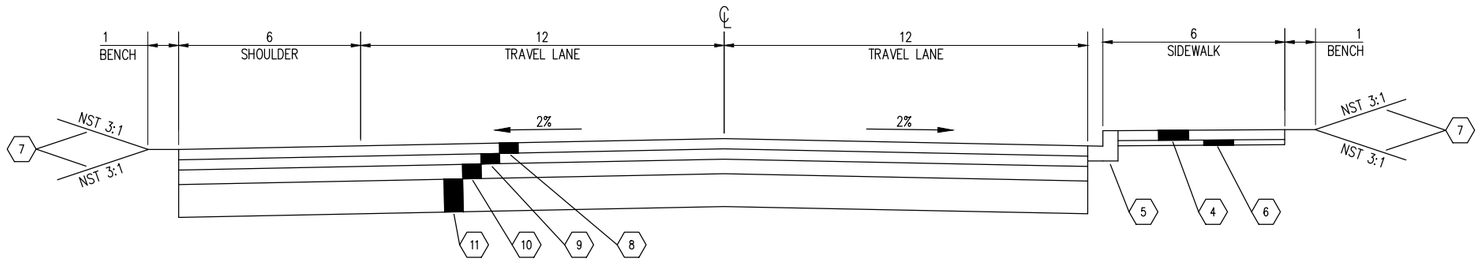
DRAWING No.: PM-1
SHEET No.: 15 OF 84



B-LINE TYPICAL ROADWAY SECTION A

NTS

B 57+43 TO B 58+74.65



C-LINE TYPICAL ROADWAY SECTION B

NTS

C 52+37 TO C 55+31

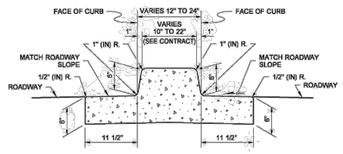
ROADWAY SECTION KEY NOTES:

1. 0.15' HMA CL. 1/2" PG. 64-22
2. 0.55' HMA CLASS 1/2" PG. 64-22
3. 0.70' CRUSHED SURFACING BASE COURSE (CSBC)
4. CEMENT CONCRETE SIDEWALK (PER WSDOT STANDARD PLAN F-30.10)
5. CEMENT CONCRETE TRAFFIC CURB AND GUTTER (PER WSDOT STANDARD PLAN F-10.12)
6. 0.17' CRUSHED SURFACING BASE COURSE (CSBC)
7. SEEDING, FERTILIZING, AND MULCHING
8. 0.15 HMA CLASS 1/2" PG. 64-22
9. 0.18' HMA CL. 1/2" PG. 64-22
10. 0.33' CRUSHED SURFACING TOP COURSE (CSTC)
11. 0.83' CRUSHED SURFACING BASE COURSE (CSBC)

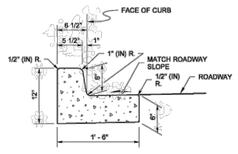
GENERAL NOTES:

1. ALL SURFACING AND PAVING DEPTHS ARE COMPACTED DEPTHS.
2. COURSES SHALL NOT EXCEED DEPTH SPECIFIED IN THE STANDARD SPECIFICATIONS.
3. EXTEND FULL DEPTH PAVEMENT SECTION IN INTERSECTION AREA TO PAVING LIMITS SHOW ON PP-1.
4. NTS = NOT TO SCALE
5. NST = NO STEEPER THAN

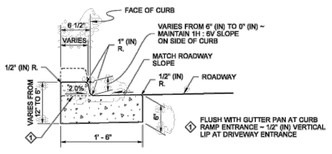
UNLESS OTHERWISE NOTED



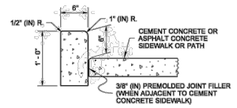
DUAL-FACED CEMENT CONCRETE TRAFFIC CURB AND GUTTER



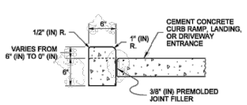
CEMENT CONCRETE TRAFFIC CURB AND GUTTER



DEPRESSED CURB SECTION
AT CURB RAMPS AND DRIVEWAY ENTRANCES



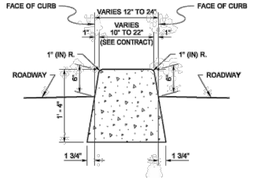
CEMENT CONCRETE PEDESTRIAN CURB



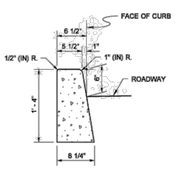
CEMENT CONCRETE PEDESTRIAN CURB
AT CURB RAMPS, LANDINGS, AND DRIVEWAY ENTRANCES

NOTE

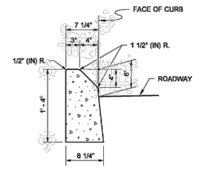
1. See **Standard Plan F-30.10** for Curb Expansion and Contraction Joint spacing and see **Standard Specification Sections 8-04 and 9-04** for additional requirements.



DUAL-FACED CEMENT CONCRETE TRAFFIC CURB



CEMENT CONCRETE TRAFFIC CURB



MOUNTABLE CEMENT CONCRETE TRAFFIC CURB

DRAWN BY: FERN LIDDELL

EDWARD PATRICK BARRY — STATE OF WASHINGTON — 34363 — REGISTERED PROFESSIONAL ENGINEER

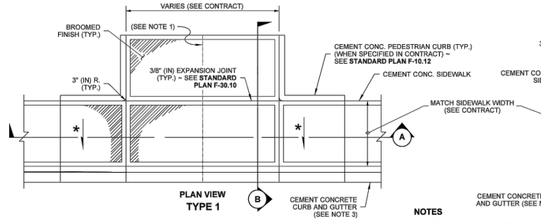
Barry, Ed
May 6 2014 3:51 PM

CEMENT CONCRETE CURBS

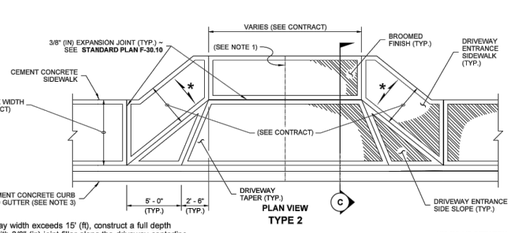
STANDARD PLAN F-10.12-03

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Bidrick, Peter
Jun 11 2014 1:23 PM
STATE DESIGN ENGINEER
Washington State Department of Transportation



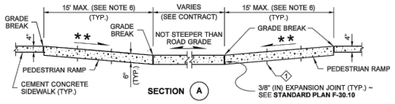
PLAN VIEW
TYPE 1

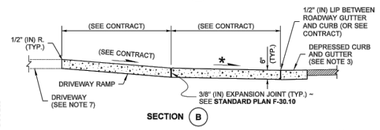


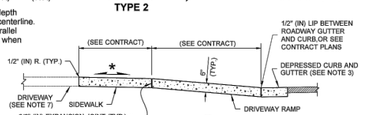
PLAN VIEW
TYPE 2

NOTES

1. When the driveway width exceeds 15' (ft), construct a full depth expansion joint with 3/8" (in) joint filler along the driveway centerline. See **Standard Plan F-30.10**. Construct expansion joints parallel with the centerline as required at 15' (ft) maximum spacing when driveway widths exceed 30' (ft).
2. See **Standard Plan F-30.10** for sidewalk details.
3. Curb and Gutter shown; see the Contract Plans for the curb design specified. See **Standard Plan F-10.12** for Curb Details.
4. Avoid placing drainage structures, junction boxes or other obstructions in front of driveway entrances.
5. Where "GRADE BREAK" is called out, the entire length of the line between the two adjacent surface planes shall be flush.
6. The Pedestrian Ramp length is not required to exceed15 feet (unless otherwise shown in the Contract Plans). When applying the 15-foot max. length (measured from back of sidewalk) the running slope of the pedestrian ramp is allowed to exceed 8.3%. Use a single constant slope from bottom of ramp to top of ramp to match into the sidewalk over a horizontal distance of 15 feet.
7. Beyond limits shown. Pay item does not include driveway. See Contract Plans.

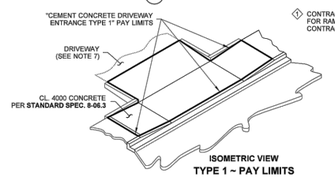






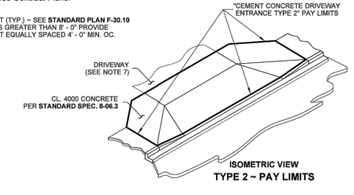
LEGEND

- SLOPE IN EITHER DIRECTION
- * 1.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (2% MAX.)
- ** 7.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (8.3% MAX.) (SEE NOTE 6)



ISOMETRIC VIEW
TYPE 1 ~ PAY LIMITS

1 CONTRACTION JOINT (TYP.) ~ SEE **STANDARD PLAN F-30.10** FOR RAMP LENGTHS GREATER THAN 8' - 0" PROVIDE CONTRACTION JOINT EQUALLY SPACED 4' - 0" MIN. OC.



ISOMETRIC VIEW
TYPE 2 ~ PAY LIMITS

DRAWN BY: FERN LIDDELL

R. SCOTT ZELLER — STATE OF WASHINGTON — 28880 — REGISTERED PROFESSIONAL ENGINEER

Zeller, Scott
Jul 12 2016 4:26 PM

CEMENT CONCRETE DRIVEWAY ENTRANCE TYPES 1, 2, 3, & 4

STANDARD PLAN F-80.10-04

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Carpenter, Jeff
Jul 13 2016 3:37 PM
STATE DESIGN ENGINEER
Washington State Department of Transportation

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-XS-1-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 24805 — REGISTERED PROFESSIONAL ENGINEER
02/12/2020

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
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SCJALLIANCE.COM

PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

TYPICAL SECTION

DRAWING No.: XS-1

SHEET No.: 16 OF 84

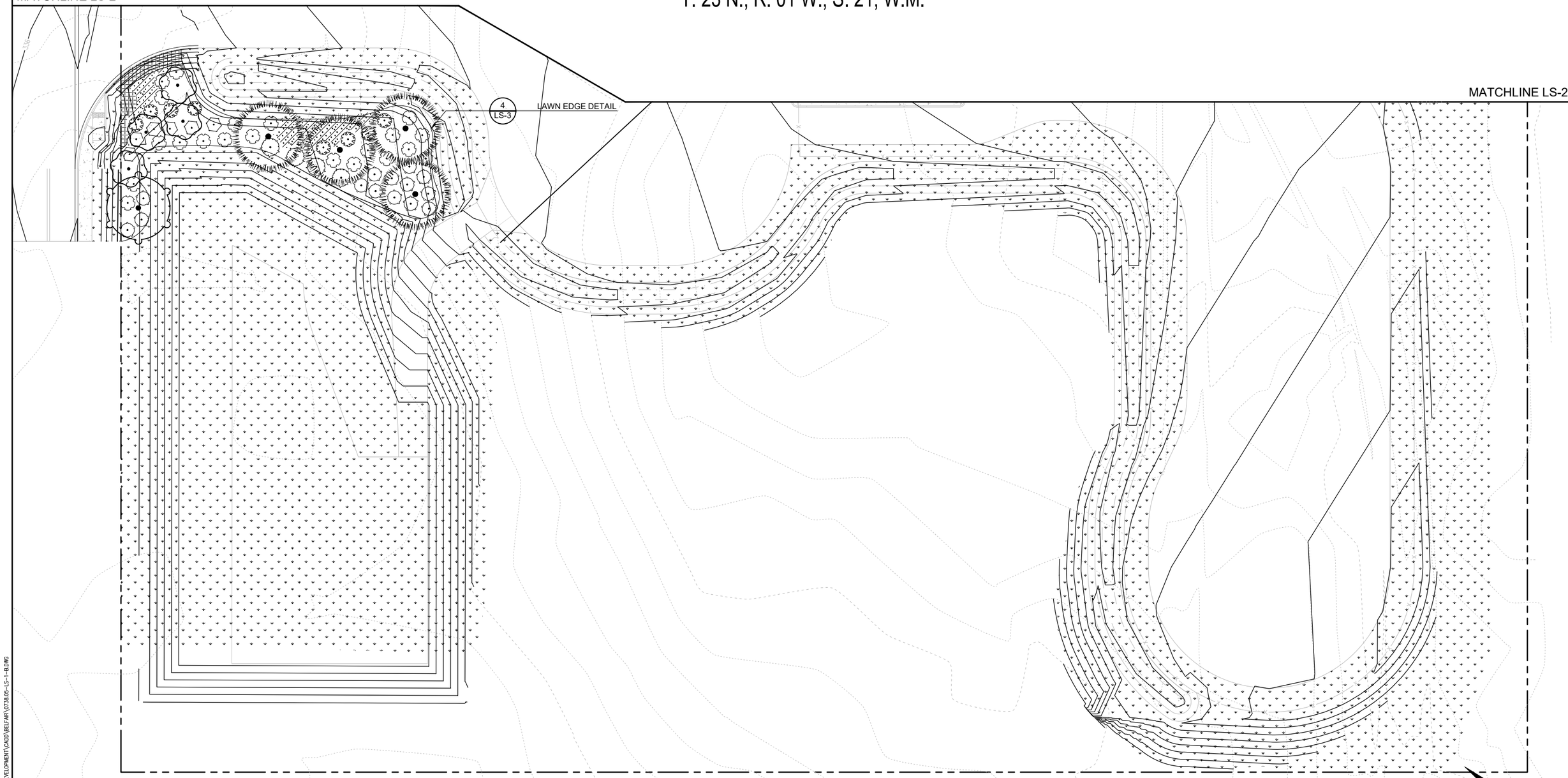
Feb 13, 2020 9:15:26am – User: nick.mayfield
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05-XS-1-B.DWG

MATCHLINE LS-2

T. 23 N., R. 01 W., S. 21, W.M.

MATCHLINE LS-2

4 LS-3 LAWN EDGE DETAIL



0 20 40

SCALE IN FEET

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: K. JANKOVSKY
DRAWN BY: K. JANKOVSKY
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-LS-1-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

STATE OF WASHINGTON · MARK S. GARRETT · 22760 · LANDSCAPE ARCHITECT · EXP. 01/06/2021

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
SCJALLIANCE.COM

PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

LANDSCAPE PLAN

DRAWING No.: LS-1

SHEET No.: 17 OF 84

Feb 13, 2020 9:15:36am – User: nick.mayfield
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T. 23 N., R. 01 W., S. 21, W.M.

4 LS-3 LAWN EDGE DETAIL

4 LS-3 LAWN EDGE DETAIL

4 LS-3 LAWN EDGE DETAIL

MATCHLINE LS-1

MATCHLINE LS-1

0 20 40

SCALE IN FEET

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: K. JANKOVSKY
DRAWN BY: K. JANKOVSKY
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-LS-1-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

STATE OF WASHINGTON MARK S. GARFF NO. 188 EXP. 01/05/2021 LANDSCAPE ARCHITECT

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
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PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

LANDSCAPE DETAILS

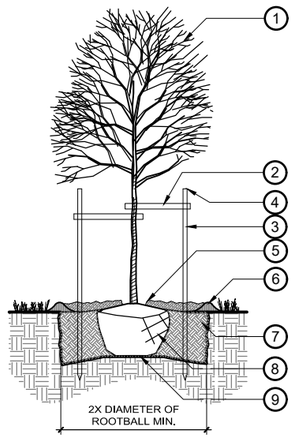
DRAWING No.: LS-2

SHEET No.: 18 OF 84

Feb 13, 2020 9:15:39am – User: nick.mayfield
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05-LS-1-B.DWG

GENERAL LANDSCAPE NOTES:

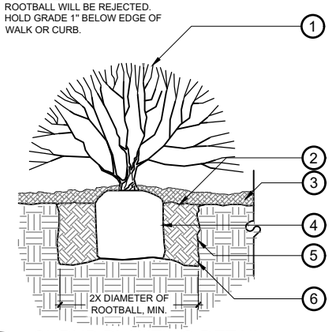
1. THE LANDSCAPE ARCHITECTURAL PLANS ARE TO BE USED IN CONJUNCTION WITH THE CIVIL, IRRIGATION, MECHANICAL, ELECTRICAL, AND ARCHITECTURAL SITE PLANS TO FORM COMPLETE INFORMATION REGARDING THE SITE.
2. THE INFORMATION ON THIS SHEET IS INCOMPLETE UNLESS ACCOMPANIED BY THE CORRESPONDING SPECIFICATION SECTION(S) DEVELOPED FOR THIS PROJECT. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
3. LANDSCAPE CONSTRUCTION SHALL CONFORM TO ALL APPLICABLE STATE AND LOCAL CODES AND SPECIFICATIONS.
4. ALL MATERIAL AND WORKMANSHIP SHALL BE MAINTAINED AND GUARANTEED FOR A PERIOD OF 12 MONTHS FOLLOWING THE SUBSTANTIAL COMPLETION DATE.
5. LANDSCAPE CONTRACTOR SHALL EXAMINE THE SITE CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED. NOTIFY THE GENERAL CONTRACTOR IN WRITING OF UNSATISFACTORY CONDITIONS. DO NOT PROCEED UNTIL CONDITIONS HAVE BEEN CORRECTED.
6. BEFORE COMMENCING WORK, LANDSCAPE CONTRACTOR SHALL CONTACT APPROPRIATE UTILITY COMPANIES FOR UTILITY LOCATIONS, AND COORDINATE WITH GENERAL CONTRACTOR IN REGARD TO LOCATION OF PROPOSED UTILITIES, IRRIGATION SLEEVES, CONDUITS, ETC.
7. VERIFY THAT SUBGRADE PREPARATION HAS BEEN COMPLETED TO ACCEPTABLE TOLERANCES PRIOR TO BEGINNING ANY WORK.
8. ALL TREE AND SHRUB LOCATIONS ARE TO BE STAKED ON SITE FOR APPROVAL BY OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.
8. ROOT BARRIER SHALL BE INCORPORATED ADJACENT AND PARALLEL TO PAVING, CURB AND SIDEWALK, A MINIMUM OF 15 LINEAR FEET (7.5' ON EITHER SIDE OF TRUNK), 24" DEEP, WHERE ANY TREE IS WITHIN 8' OF PAVING, CURB OR SIDEWALK. ROOT BARRIER SHALL BE DEEPROOT UB-24 AS AVAILABLE FROM EWING IRRIGATION PRODUCTS, 2901 S TACOMA WAY, TACOMA, WA 98409 (253) 476-9530 OR APPROVED EQUAL.
9. PLANTING AREAS SHALL BE MULCHED WITH 3 INCHES OF APPROVED DARK FINE MULCH. FINISH GRADE OF MULCH SHALL NOT BE ABOVE OR MORE THAN 1/2 INCH BELOW ADJOINING SURFACE.
10. ALL B&B PLANT MATERIAL SHALL HAVE ALL WIRE, TWINE, OR OTHER CONTAINMENT MATERIAL, EXCEPT FOR 100% HEMP BURLAP, REMOVED FROM THE TRUNK AND ROOT BALL OF THE PLANT PRIOR TO PLANTING. REMOVE THE TOP 2/3 OF THE HEMP BURLAP AFTER PLACING PLANT IN THE PIT.
11. PLANTING SOIL FOR ALL PLANTING AREAS:
    a. SPREADING OF PLANTING SOIL SHALL BE COMPLETED BY THE LANDSCAPE CONTRACTOR AND SUPERVISED BY THE GENERAL CONTRACTOR SO THAT GRADES ARE MET AS NOTED ON THE GRADING PLANS. PLANTING SOIL DEPTH SHALL BE A MINIMUM OF SIX (6) INCHES IN ALL LANDSCAPE BEDS.
    b. ALL PLANTING SOIL SHALL BE EXISTING SITE SOIL AMENDED PER THE SOIL LABORATORY'S RECOMMENDATIONS OR USE IMPORTED TOPSOIL PER SPECIFICATIONS IF EXISTING SITE SOIL CANNOT BE AMENDED.
    c. APPLY 2 INCHES OF APPROVED PLANTING SOIL OVER PREPARED SUBGRADE AND TILL INTO TOP 2-4 INCHES OF SUBSOIL. INSTALL REMAINING PLANTING SOIL TO A MINIMUM OF 4 INCHES SO THE TOTAL MINIMUM DEPTH OF NEW PLANTING SOIL IN NO LESS THAN 6 INCHES. ROLL AND RAKE SMOOTH. ENSURE NO ROCKS OR OTHER DEBRIS EXCEEDING 3 INCHES IN DIAMETER REMAIN.
    d. TOPSOIL SHALL BE PLACED IN ALL PARKING AREA PLANTER ISLANDS TO A DEPTH OF THREE (3) FEET. THE TOP SIX (6) INCHES OF TOPSOIL SHALL BE AMENDED WITH THE ADDITION OF TWO (2) INCHES COMPOST.
13. MULCH ENTIRE LANDSCAPE AREA TO A DEPTH OF 3 INCHES WITH DARK FINE MULCH.
14. ALL LANDSCAPING SHALL BE PLANTED AND MAINTAINED IN A LIVING CONDITION BY THE CONTRACTOR UNTIL FINAL OWNER ACCEPTANCE.
15. PLANT SYMBOLS SHALL DICTATE COUNT.
16. REFER TO PROJECT SPECIFICATIONS FOR MORE DETAILED INSTRUCTIONS.



1. PRUNE DAMAGED OR DEAD WOOD. DO NOT CUT CENTER LEADER.
2. FIGURE 8 RUBBER TREE TIE "GRO-STRAIGHT OR APPROVED EQUAL, 2 EACH TREE, ATTACH SO TREE IS ALLOWED SOME MOVEMENT BUT NO RUBBING
3. (2) B.V.C. BRAND POLES OR APPROVED EQUAL- 2" DIA. SIZE STAKES PLACE OUTSIDE OF ROOTBALL 2 STAKES REQ'D FOR ALL TREES OVER 11/2" IN CALIPER.
4. HEIGHT OF STAKE SHALL BE 5' HT. ABOVE FINISHED GRADE
5. 3" DARK FINE MULCH. HOLD BACK 4" FROM TRUNK OF TREE
6. 4" HEIGHT WATER SAUCER
7. PREPARED BACKFILL SOIL MIX
8. REMOVE ALL BURLAP, WIRE, TAPE, AND WOODEN BOXES BEFORE PLANTING
9. SET ROOTBALL ON UNDISTURBED SUBGRADE-DO NOT OVER- EXCAVATE

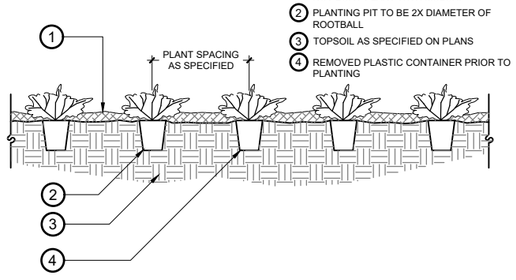
1 TREE PLANTING DETAIL
NTS — PG-MT-01

NOTE:
1. ANY BROKEN OR CRUMBLING ROOTBALL WILL BE REJECTED.
2. HOLD GRADE 1" BELOW EDGE OF WALK OR CURB.



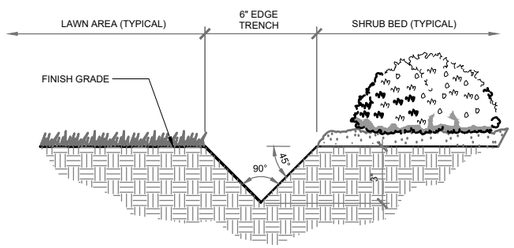
1. PRUNE ALL DAMAGED OR DEAD WOOD IMMEDIATELY PRIOR TO PLANTING.
2. DIG PLANT PIT TWICE AS WIDE AS THE CONTAINER OR MORE
3. APPLY MULCH AS SPECIFIED ON PLANS
4. REMOVE CONTAINER
5. ROUGHEN SIDES OF PLANT PIT. SCORE SIDES OF ROOTBALL OF ROOBOUND PLANTS ONLY.
6. FILL PLANT PIT WITH SPECIFIED PREPARED BACKFILL SOIL MIX

2 SHRUB PLANTING DETAIL
NTS — PG-MT-06



1. APPLY 3" DEPTH MULCH AS SPECIFIED ON PLANS.NOTE: MULCH DEPTH AROUND PLANT BASE MAY BE THINNER. DO NOT BURY PLANT WITH MULCH.
2. PLANTING PIT TO BE 2X DIAMETER OF ROOTBALL
3. TOPSOIL AS SPECIFIED ON PLANS
4. REMOVED PLASTIC CONTAINER PRIOR TO PLANTING

3 GROUNDCOVER PLANTING DETAIL
NTS — PG-MT-03



4 LAWN EDGE DETAIL
3" = 1'-0" — P-CO-BEL1-15

T. 23 N., R. 01 W., S. 21, W.M.

PLANT SCHEDULE

TREES	QTY	BOTANICAL NAME	CAL
	13	AMELANCHIER X GRANDIFLORA `COLE`S SELECT` SERVICEBERRY	2" CAL
	8	CERCIDIPHYLLUM JAPONICUM KATSURA TREE	2.5" CAL.
	5	CERCIS CANADENSIS EASTERN REDBUD	2" CAL
	12	PSEUDOTSUGA MENZIESII DOUGLAS FIR	15 GAL
	16	THUJA PLICATA WESTERN RED CEDAR	15 GAL

SHRUBS	QTY	BOTANICAL NAME	SIZE
	75	CEANOTHUS X `PUGET BLUE` CALIFORNIA LILAC	5 GAL
	12	CHOISYA TERNATA `SUNDANCE` GOLDEN MEXICAN MOCK ORANGE	5 GAL
	49	CORNUS SERICEA `BAILEYI` RED TWIG DOGWOOD	2 GAL
	28	DRIMYS LANCEOLATA PEPPER TREE	5 GAL
	17	HOLODISCUS DISCOLOR OCEAN-SPRAY	5 GAL
	44	LONICERA NITIDA `RED TIPS` RED TIPS BOX HONEYSUCKLE	5 GAL
	28	MYRICA CALIFORNICA `BUXIFOLIA` PACIFIC WAX MYRTLE	5 GAL
	18	OSMANTHUS DELAVAYI DELAVAYI OSMANTHUS	5 GAL
	63	RHAPHIOLEPIS INDICA INDIAN HAWTHORN	5 GAL
	29	ROSA NUTKANA NOOTKA ROSE	2 GAL

GRASSES	QTY	BOTANICAL NAME	CONT	SPACING
	89	BOUTELOUA GRACILIS `BLONDE AMBITION` BLUE GRAMA	1 GAL	30" o.c.
	243	CALAMAGROSTIS X ACUTIFLORA `KARL FOERSTER` FEATHER REED GRASS	1 GAL	36" o.c.
	81	HELICTOTRICHON SEMPERVIRENS BLUE OAT GRASS	1 GAL	30" o.c.

GROUND COVERS	QTY	BOTANICAL NAME	CONT	SPACING
	632	ARCTOSTAPHYLOS UVA-URSI KINNIKINNICK	4"POT	18" o.c.
	231	CALLUNA VULGARIS `FIREFLY` HEATHER	1 GAL	24" o.c.
	88	GAULTHERIA SHALLON SALAL	1 GAL	30" o.c.
	108	GERANIUM X CANTABRIGIENSE `BIOKOVO` BIOKOVO CRANESBILL	1 GAL	30" o.c.
	99,284 SF	HYDROSEED & TOPSOIL MIX SEE NOTES BELOW	HYDROSEED	

DETENTION BASIN	QTY	BOTANICAL NAME	CONT	SPACING
	183	CAREX TESTACEA NEW ZEALAND SEDGE	2 GAL	24" o.c.
	126	CORNUS SERICEA `FLAVIRAMEA` YELLOW TWIG DOGWOOD	2 GAL	36" o.c.
	373	JUNCUS PATENS `ELK BLUE` SPREADING RUSH	4"POT	18" o.c.
	375	SCIRPUS MICROCARPUS SMALL-FRUITED BULRUSH	4"POT	18" o.c.

TOPSOIL NOTES FOR HYDROSEED AREAS ONLY:
- TOPSOIL TO BE 60% SAND AND 40% COMPOST.
- LEVEL EXCAVATED AREAS AS REQUIRED.
- MINIMUM DEPTH TO BE 2"

HYDROSEED TOPSOIL NOTES:
HYDROSEED MIX TO CONSIST OF THE FOLLOWING.
- 45% CREEPING RED FESCUE
- 45% PERENNIAL RYEGRASS
- 10% HIGHLAND COLONIAL BENTGRASS

AVAILABLE FROM DIRECT SEED SALES, (425) 466-1350
WWW.DIRECTSEEDSALES.COM

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: K. JANKOVSKY
DRAWN BY: K. JANKOVSKY
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-LS-1-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

STATE OF WASHINGTON — MARK S. GARFF — 20 688 EXP. 01/05/2021 — LANDSCAPE ARCHITECT

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
SCJALLIANCE.COM

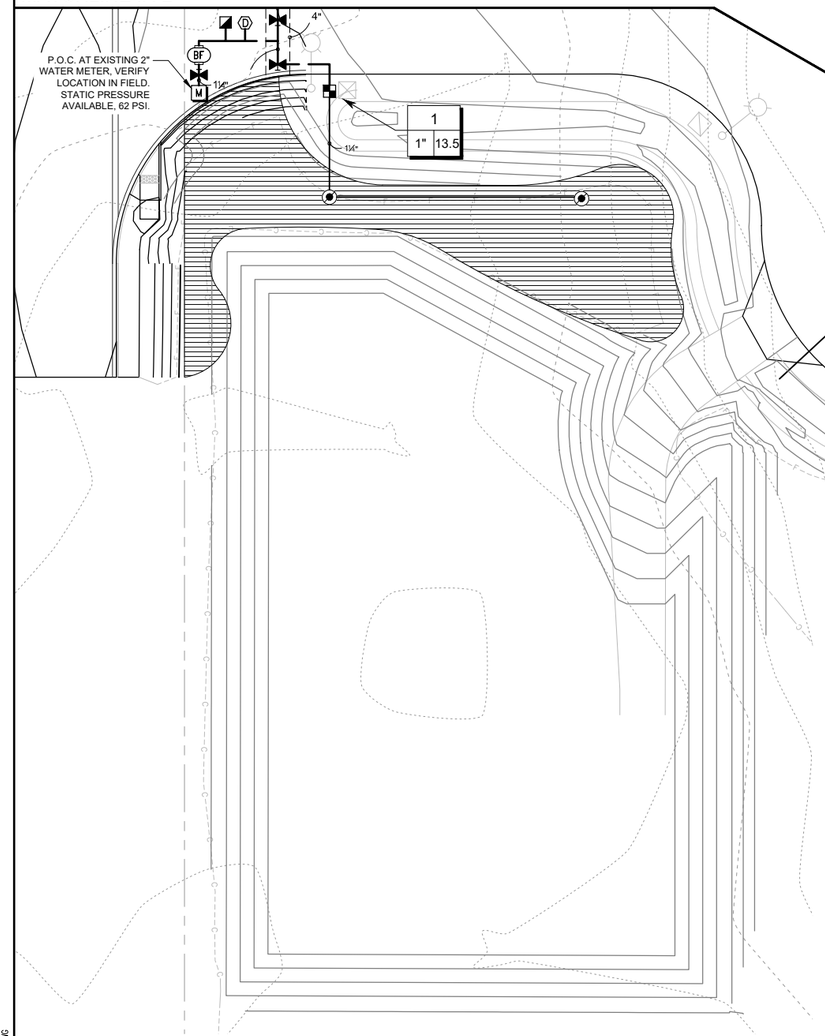
PROJECT NAME:

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

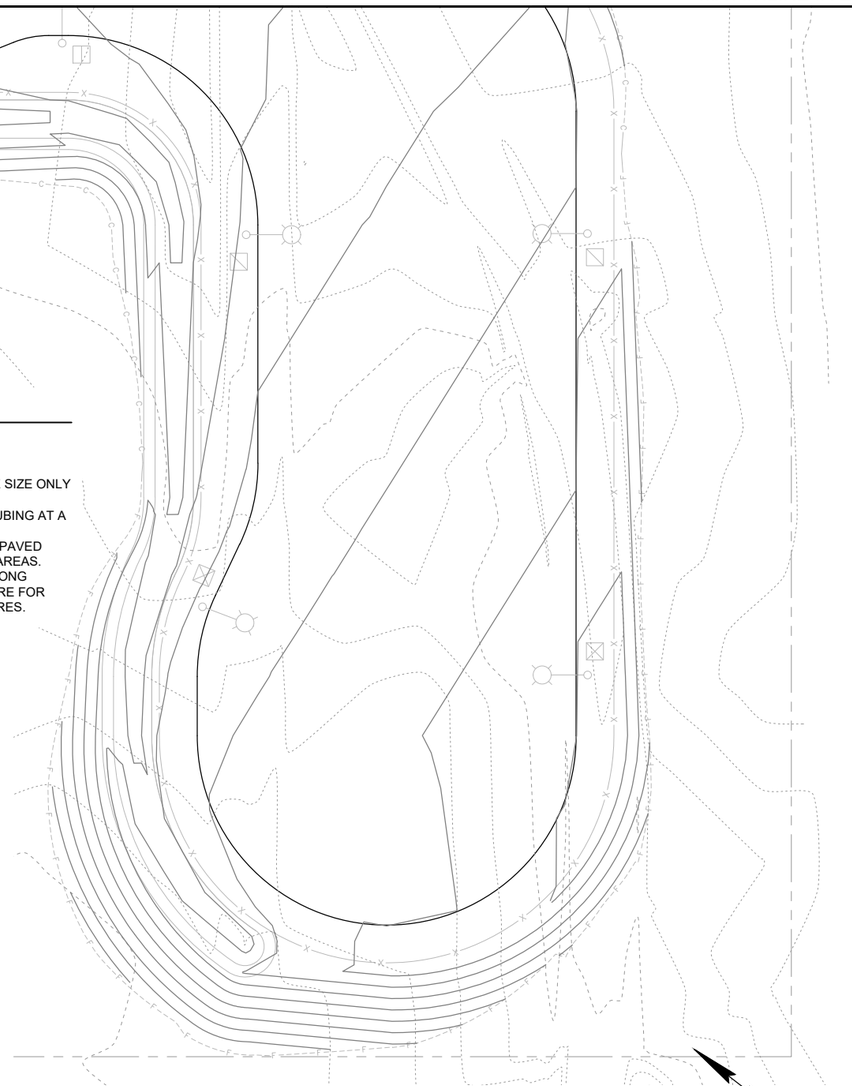
LANDSCAPE DETAILS & NOTES

DRAWING No.: LS-3
SHEET No.: 19 OF 84

MATCHLINE IR-2



MATCHLINE IR-2



IRRIGATION SHEET NOTES

1. SEE DETAILS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.
2. PLAN IS DIAGRAMMATIC. ALL PIPING, LATERALS, AND WIRE TO BE LOCATED IN BED OR LAWN AREAS WHERE APPROPRIATE.
3. PIPE SIZES ARE TO REMAIN CONSTANT BETWEEN PIPE SIZE CALL-OUTS. PIPES ARE LABELED TO SMALLEST PIPE SIZE ONLY (¾").
4. ALL DRIP TUBING SHALL BE INSTALLED BELOW THE FINISH SOIL GRADE UNLESS NOTED OTHERWISE. INSTALL TUBING AT A CONSISTENT DEPTH OF 2" BELOW TOP OF TOPSOIL.
5. ALL PIPES AND SLEEVES UNDER PAVED AREAS SHALL BE 24" DEEP. ALL MAINLINE SHALL BE 18" DEEP IN ALL UNPAVED AREAS, 24" IN PAVED ARES. ALL LATERALS SHALL BE 12" DEEP IN ALL UNPAVED AREAS AND 24" DEEP IN PAVED AREAS.
6. LOCATE ALL MAINLINES WITHIN THE PROJECT LIMITS. INSTALL #14-AWG DIRECT BURIAL LOW VOLTAGE WIRE ALONG MAINLINE; TAPE AND BUNDLE WIRE EVER 20' FT. PROVIDE RED COLOR WIRE FOR SIGNAL AND WHITE COLOR WIRE FOR COMMON. PROVIDE A MINIMUM OF ONE SPARE WIRE FOR EVERY 10 VALVES FOR A MAXIMUM OF FIVE SPARE WIRES.
7. ALL WORK SHALL BE PERFORMED TO THE SATISFACTION OF THE LANDSCAPE ARCHITECT/OWNER.

VALVE SCHEDULE

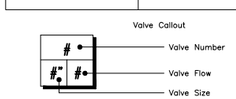
NUMBER	MODEL	SIZE	TYPE	GPM	PSI	PSI @ POC	PRECIP
1	HUNTER ICZ-101-40	1"	AREA FOR DRIPLINE	13.55	33.62	39.86	0.29 in/h
2	HUNTER ICZ-101-40	1"	AREA FOR DRIPLINE	11.35	29.62	38.24	0.29 in/h
3	HUNTER PGV-101-MB	1"	BUBBLER	3.50	32.53	38.29	1.70 in/h
4	HUNTER ICZ-101-40	1"	AREA FOR DRIPLINE	10.10	28.50	36.49	0.29 in/h
5	HUNTER PGV-101-MB	1"	BUBBLER	3.00	31.70	37.35	1.70 in/h
6	HUNTER ICZ-101-40	1"	AREA FOR DRIPLINE	6.99	24.99	31.16	0.29 in/h
7	HUNTER ICZ-101-40	1"	AREA FOR DRIPLINE	7.55	25.64	31.90	0.29 in/h
8	HUNTER ICZ-101-40	1"	AREA FOR DRIPLINE	7.43	24.96	30.88	0.29 in/h
9	HUNTER ICZ-101-40	1"	AREA FOR DRIPLINE	8.16	25.92	31.75	0.29 in/h
10	HUNTER ICZ-101-40	1"	AREA FOR DRIPLINE	12.94	34.02	40.44	0.29 in/h

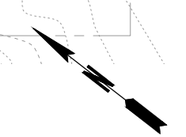
IRRIGATION SCHEDULE

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION
	HUNTER ICZ-101-40 DRIP CONTROL ZONE KIT. 1" ICV GLOBE VALVE WITH 1" HY100 FILTER SYSTEM. PRESSURE REGULATION: 40PSI. FLOW RANGE: 2 GPM TO 20 GPM. 150 MESH STAINLESS STEEL SCREEN.
	TECHLINE START CONNECTION LATERAL TO DRIP ZONE TUBING WITH SWING JOINT ASSEMBLY
	AREA TO RECEIVE DRIPLINE NETAFIM TLDL-04-18 TECHLINE PRESSURE COMPENSATING LANDSCAPE DRIPLINE. 0.4 GPH EMITTERS AT 18" O.C. DRIPLINE LATERALS SPACED AT 18" APART, WITH EMITTERS OFFSET FOR TRIANGULAR PATTERN. SURFACE AND SUB SURFACE INSTALLATIONS. UV RESISTANT.

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION
	RAIN BIRD 3-RC 3/4" BRASS QUICK-COUPLING VALVE, WITH CORROSION-RESISTANT STAINLESS STEEL SPRING, THERMOPLASTIC RUBBER COVER, AND 1-PIECE BODY.
	MATCO-NORCA 759 BRASS SHUT OFF BALL VALVE, 1/2" TO 4". TWO PIECE BODY, BLOW-OUT PROOF STEM, CHROME PLATED SOLID BRASS BALL, THREADED, WITH PTFE SEATS. SAME SIZE AS MAINLINE PIPE.
D	DRAIN VALVE WILKINS #200 3/4" ANGLE VALVE FOR MAUAL DRAIN VALVE ASSEMBLY WITH KEY EXTENSION
BF	FEBCO 850 1-1/4" DOUBLE CHECK BACKFLOW PREVENTION.

M	WATER METER 2" STATIC PRESSURE AVAILBLE IS 62 PSI @ INTERSECTION OF LOG YARD ROAD. VERIFY IN FIELD.
	IRRIGATION LATERAL LINE: INSTALL 12" BELOW GRADE, 24" BELOW PAVED SURFACES.
	IRRIGATION MAINLINE: INSTALL 18" BELOW GRADE, 24" BELOW PAVED SURFACES.
	PIPE SLEEVE: INSTALL AT 24" DEPTH





0 20 40

SCALE IN FEET

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: K. JANKOVSKY
DRAWN BY: K. JANKOVSKY
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-IR-1-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

STATE OF WASHINGTON MARK S. GARFF LANDSCAPE ARCHITECT NO. 488 EXP. 01/05/2021

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
SCJALLIANCE.COM

PROJECT NAME:

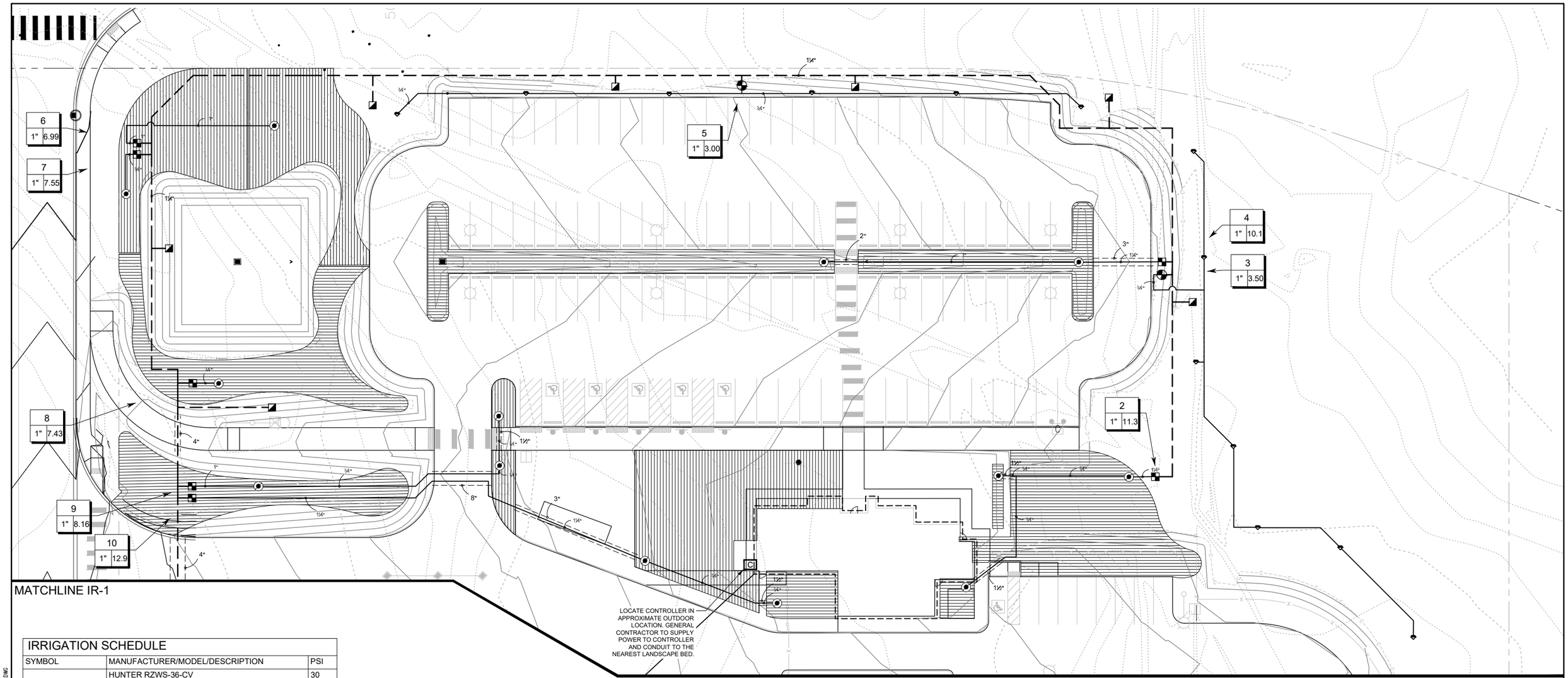
MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

IRRIGATION PLAN

DRAWING No.: IR-1

SHEET No.: 20 OF 84



MATCHLINE IR-1

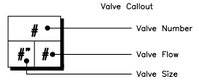
IRRIGATION SCHEDULE

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	PSI
0.25 0.50	HUNTER RZWS-36-CV 36" LONG RZWS WITH INSTALLED .25GPM OR .50GPM BUBBLER OPTIONS, CHECK VALVE, 1/2" SWING JOINT FOR CONNECTION TO 1/2" PIPE	30
SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	
	HUNTER ICZ-101-40 DRIP CONTROL ZONE KIT. 1" ICV GLOBE VALVE WITH 1" HY100 FILTER SYSTEM. PRESSURE REGULATION: 40PSI. FLOW RANGE: 2 GPM TO 20 GPM. 150 MESH STAINLESS STEEL SCREEN.	
	TECHLINE START CONNECTION LATERAL TO DRIP ZONE TUBING WITH SWING JOINT ASSEMBLY	
	AREA TO RECEIVE DRIPLINE NETAFIM TLDL-04-18 TECHLINE PRESSURE COMPENSATING LANDSCAPE DRIPLINE. 0.4 GPH EMITTERS AT 18" O.C. DRIPLINE LATERALS SPACED AT 18" APART, WITH EMITTERS OFFSET FOR TRIANGULAR PATTERN. SURFACE AND SUB SURFACE INSTALLATIONS. UV RESISTANT.	

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	
	HUNTER PGV-101-MB 1" PLASTIC ELECTRIC REMOTE CONTROL VALVE, FOR RESIDENTIAL/LIGHT COMMERCIAL USE. MALE THREAD X 1" BARB INLET/OUTLET. GLOBE CONFIGURATION, WITH FLOW CONTROL.	
	RAIN BIRD 3-RC 3/4" BRASS QUICK-COUPLING VALVE, WITH CORROSION-RESISTANT STAINLESS STEEL SPRING, THERMOPLASTIC RUBBER COVER, AND 1-PIECE BODY.	
C	HUNTER IC-1200-PL MODULAR CONTROLLER, 12 STATIONS, OUTDOOR MODEL, PLASTIC CABINET. COMMERCIAL USE. WITH ONE ICM-600 MODULE INCLUDED.	
	IRRIGATION LATERAL LINE: INSTALL 12" BELOW GRADE, 24" BELOW PAVED SURFACES.	

	IRRIGATION MAINLINE: INSTALL 18" BELOW GRADE, 24" BELOW PAVED SURFACES.	
	PIPE SLEEVE: INSTALL AT 24" DEPTH	

Valve Callout



IRRIGATION SHEET NOTES

1. SEE DETAILS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.
2. PLAN IS DIAGRAMMATIC. ALL PIPING, LATERALS, AND WIRE TO BE LOCATED IN BED OR LAWN AREAS WHERE APPROPRIATE.
3. PIPE SIZES ARE TO REMAIN CONSTANT BETWEEN PIPE SIZE CALL-OUTS. PIPES ARE LABELED TO SMALLEST PIPE SIZE ONLY (¾").
4. ALL DRIP TUBING SHALL BE INSTALLED BELOW THE FINISH SOIL GRADE UNLESS NOTED OTHERWISE. INSTALL TUBING AT A CONSISTENT DEPTH OF 2" BELOW TOP OF TOPSOIL.
5. ALL PIPES AND SLEEVES UNDER PAVED AREAS SHALL BE 24" DEEP. ALL MAINLINE SHALL BE 18" DEEP IN ALL UNPAVED AREAS, 24" IN PAVED ARES. ALL LATERALS SHALL BE 12" DEEP IN ALL UNPAVED AREAS AND 24" DEEP IN PAVED AREAS.
6. LOCATE ALL MAINLINES WITHIN THE PROJECT LIMITS. INSTALL #14-AWG DIRECT BURIAL LOW VOLTAGE WIRE ALONG MAINLINE; TAPE AND BUNDLE WIRE EVER 20' FT. PROVIDE RED COLOR WIRE FOR SIGNAL AND WHITE COLOR WIRE FOR COMMON. PROVIDE A MINIMUM OF ONE SPARE WIRE FOR EVERY 10 VALVES FOR A MAXIMUM OF FIVE SPARE WIRES.
7. ALL WORK SHALL BE PERFORMED TO THE SATISFACTION OF THE LANDSCAPE ARCHITECT/OWNER.

MATCHLINE IR-1

0 20 40
SCALE IN FEET

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: IVSKY
ISSUE DATE: 02/12/2020
DRAWN BY: CY
JOB No.: 0738.05
CHECKED BY: P. HOLM
DRAWING FILE No.: 0738.05-IR-1-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

STATE OF WASHINGTON MARK S. GARFF NO. 888 EXP. 01/05/2021 LANDSCAPE ARCHITECT

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
SCJALLIANCE.COM

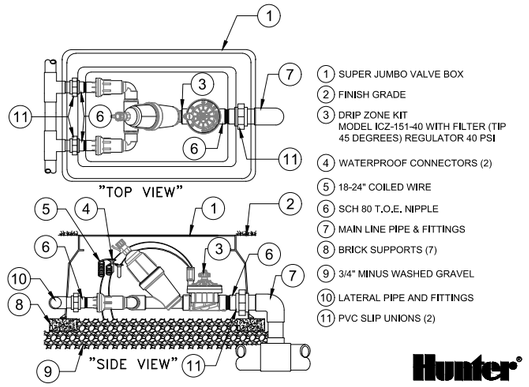
PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

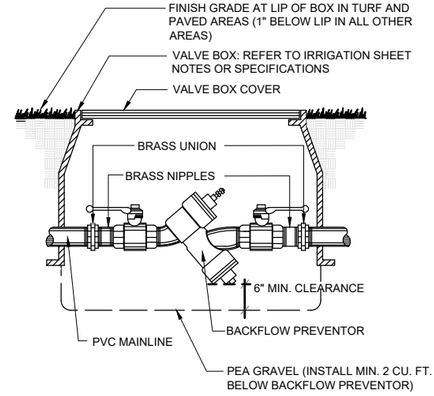
IRRIGATION PLAN

DRAWING No.: IR-2
SHEET No.: 21 OF 84



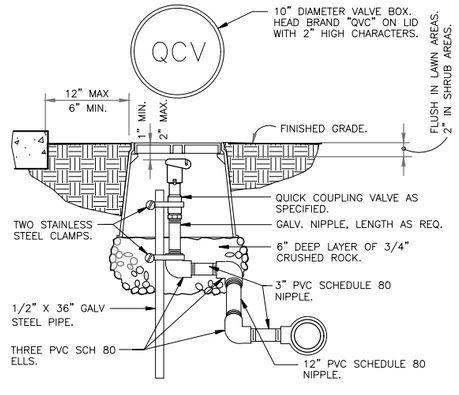
1 ICZ-151-40 DRIP CONTROL KIT WITH UNIONS

1" = 1'-0" P-CO-BEL1-13



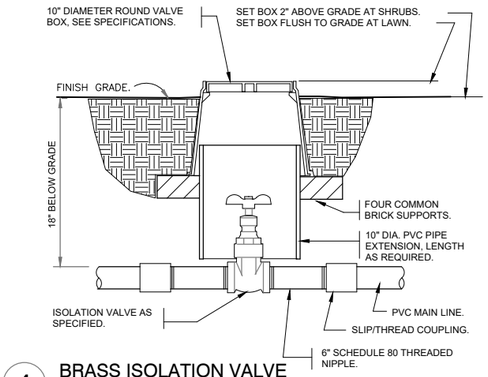
2 DOUBLE CHECK VALVE (DCVA)

NTS P-CO-BEL1-09



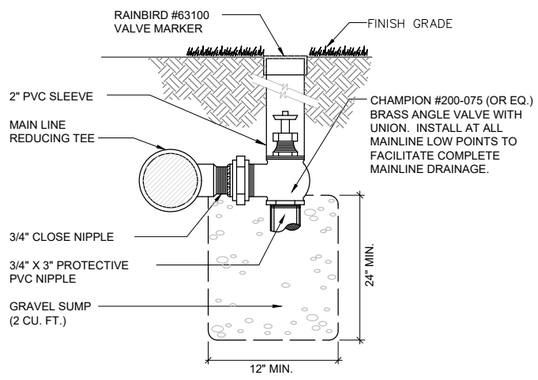
3 QUICK COUPLING VALVE IN BOX

1 1/2" = 1'-0" P-CO-BEL1-16



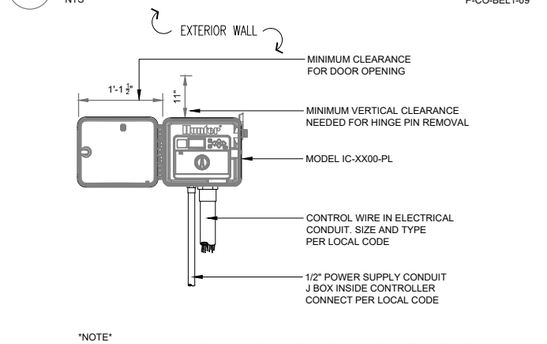
4 BRASS ISOLATION VALVE

1 1/2" = 1'-0" P-CO-BEL1-32



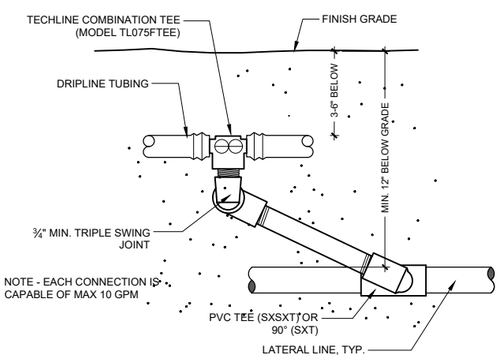
5 MANUAL DRAIN VALVE DETAIL

NTS P-CO-BEL1-07



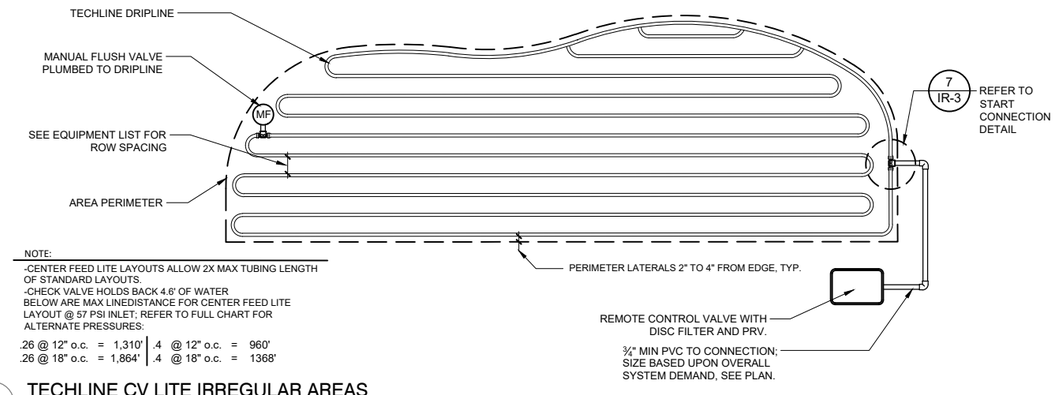
6 I-CORE CONTROLLER

1" = 1'-0" P-CO-BEL1-20



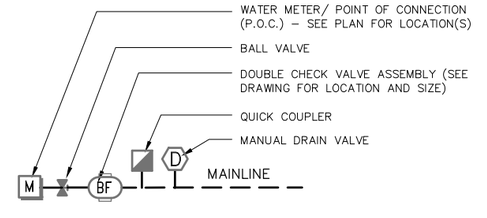
7 TECHLINE START CONNECTION (SWING JOINT RISER)

N.T.S. P-CO-BEL1-12



8 TECHLINE CV LITE IRREGULAR AREAS

N.T.S. P-CO-BEL1-03



9 POINT OF CONNECTION (POC) DETAIL

N.T.S. P-CO-BEL1-10

IRRIGATION SPECIFICATIONS

1. THIS PLAN IS DIAGRAMMATIC; ALL PIPING, VALVES, ETC. SHALL BE INSTALLED IN SHRUB BEDS WHERE POSSIBLE AND SHALL FOLLOW THE PLAN AS CLOSE AS IS PRACTICAL.
2. LOCATE ALL MAINLINES WITHIN THE PROJECT LIMITS.
3. PIPE SIZES ARE CONSTANT BETWEEN PIPE SIZE CALL-OUTS. ALL LATERAL PIPES SHALL BE INSTALLED AT 12" DEPTH AND 24" DEPTH UNDER PAVED AREAS. MAIINLINE PIPE SHALL BE INSTALLED AT 18" BELOW GRADE AND 24" BELOW PAVED AREAS.
4. REFER TO DETAILS FOR ADDITIONAL INFORMATION.
5. ALL PIPING AND WIRING UNDER PAVED AREAS SHALL BE HOUSED IN CLASS 200 PVC SLEEVES INSTALLED AT A 24" DEPTH. SIZE SLEEVES AS NEEDED TO ACCOMMODATE PIPE AND WIRES, UNLESS OTHERWISE SPECIFIED ON DRAWING.
6. CONTRACTOR SHALL MAKE FIELD ADJUSTMENTS AS NEEDED TO OBTAIN FULL COVERAGE. LANDSCAPE ARCHITECT RESERVES THE RIGHT TO MAKE NOZZLE CHANGES AS NEEDED AT NO ADDITIONAL COST. ADJUST HEAD POSITIONS AND ADD OR DELETE HEADS AS NEEDED DEPENDING ON ACTUAL FIELD CONDITIONS.
7. ALL MANUAL, GATE AND ELECTRICAL VALVES AND OTHER UNDERGROUND EQUIPMENT SHALL BE HOUSED IN NELSON, AMETEK OR EQUAL RECTANGULAR VALVE BOXES.
8. NO IN-LINE WIRE SPLICES ALLOWED. SUPPLY VALVE BOXES AT ALL ELECTRICAL JUNCTIONS. TAPE AND BUNDLE WIRES EVERY 25 LINEAR FEET.
9. CONTRACTOR IS RESPONSIBLE FOR COMPLETE SYSTEM DRAINAGE. INSTALL MANUAL DRAINS AT ALL MAINLINE LOW POINT(S) AND WHERE INDICATED ON PLAN. CONTRACTOR SHALL PROVIDE ADJUSTABLE CHECK VALVES ON ANY IRRIGATION HEAD THAT EXPERIENCES LOW HEAD DRAINAGE.
10. ALL THREADED PIPE CONNECTIONS SHALL BE MADE USING TEFLON TAPE WRAPPED AT LEAST THREE TIMES AROUND PIPE THREADS.
11. ALL GATE AND ELECTRIC VALVES SHALL BE INSTALLED WITH UNIONS ON THE DOWNSTREAM END OF THE VALVE (REFER TO DETAILS).
12. ALL PIPE SHALL HAVE A FIRM UNIFORM BEARING FOR THE ENTIRE LENGTH OF EACH LINE, FREE OF ROCKS OR DEBRIS. ALL TRENCHES CONTAINING PIPE AND/OR WIRES SHALL BE BACKFILLED WITH CLEAN TOPSOIL, FREE OF ALL LUMBER, RUBBISH AND ROCKS OVER 1" IN SIZE, OR CLEAN SAND IF CLEAN TOPSOIL IS NOT AVAILABLE.
13. CONTRACTOR SHALL PROVIDE OWNER WITH ONE SET OF AS-BUILT RECORD DRAWINGS SHOWING EXACT ACTUAL LOCATIONS OF ALL SPRINKLER EQUIPMENT. CONTRACTOR SHALL ORIENT OWNER WITH COMPLETE SYSTEM AND CONTROLLER OPERATIONS, AND WINTERIZATION PROCEDURES.
14. CONTRACTOR SHALL SUPPLY AND INSTALL ALL EQUIPMENT SHOWN ON THE PLANS AND INDICATED IN THE SPECIFICATIONS TO ACHIEVE PROPER OPERATION OF SAID EQUIPMENT. ALL EQUIPMENT INSTALLATIONS, ELECTRICAL AND PLUMBING CONNECTIONS SHALL BE IN CONFORMANCE WITH ALL APPLICABLE CODES AND ORDINANCES, THESE SPECIFICATIONS, AND THE MANUFACTURERS RECOMMENDATIONS WHETHER INDICATED ON THE DRAWINGS OR NOT.
15. CONTRACTOR SHALL INCLUDE IN HIS BID ONE FALL WINTERIZATION AND ONE SPRING ACTIVATION OF IRRIGATION SYSTEM. THESE ACTIVITIES SHALL BE INCLUDED AS PART OF OWNER ORIENTATION PROCEDURES. ANY DAMAGE TO THE IRRIGATION SYSTEM OR THE LANDSCAPE AS A RESULT OF FAILURE TO COMPLY WITH THESE REQUIREMENTS SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
16. CONTRACTOR SHALL GUARANTEE IN WRITING ON HIS COMPANY LETTERHEAD ALL MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE FULL YEAR FOLLOWING ACCEPTANCE OF SYSTEM INSTALLATION.
17. BACKFLOW PREVENTOR SHALL BE INSPECTED AND TESTED BY A CERTIFIED BACKFLOW DEVICE INSPECTOR. PROVIDE OWNER WITH ONE COPY OF APPROVAL CERTIFICATE.

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: K. JANKOVSKY
DRAWN BY: K. JANKOVSKY
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-IR-1-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

STATE OF WASHINGTON MARK S. GARFF LANDSCAPE ARCHITECT NO. 888 EXP. 01/05/2021

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
SCJALLIANCE.COM

PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

IRRIGATION DETAILS & NOTES

DRAWING No.: IR-3
SHEET No.: 22 OF 84

T. 23 N., R. 01 W., S. 21, W.M.

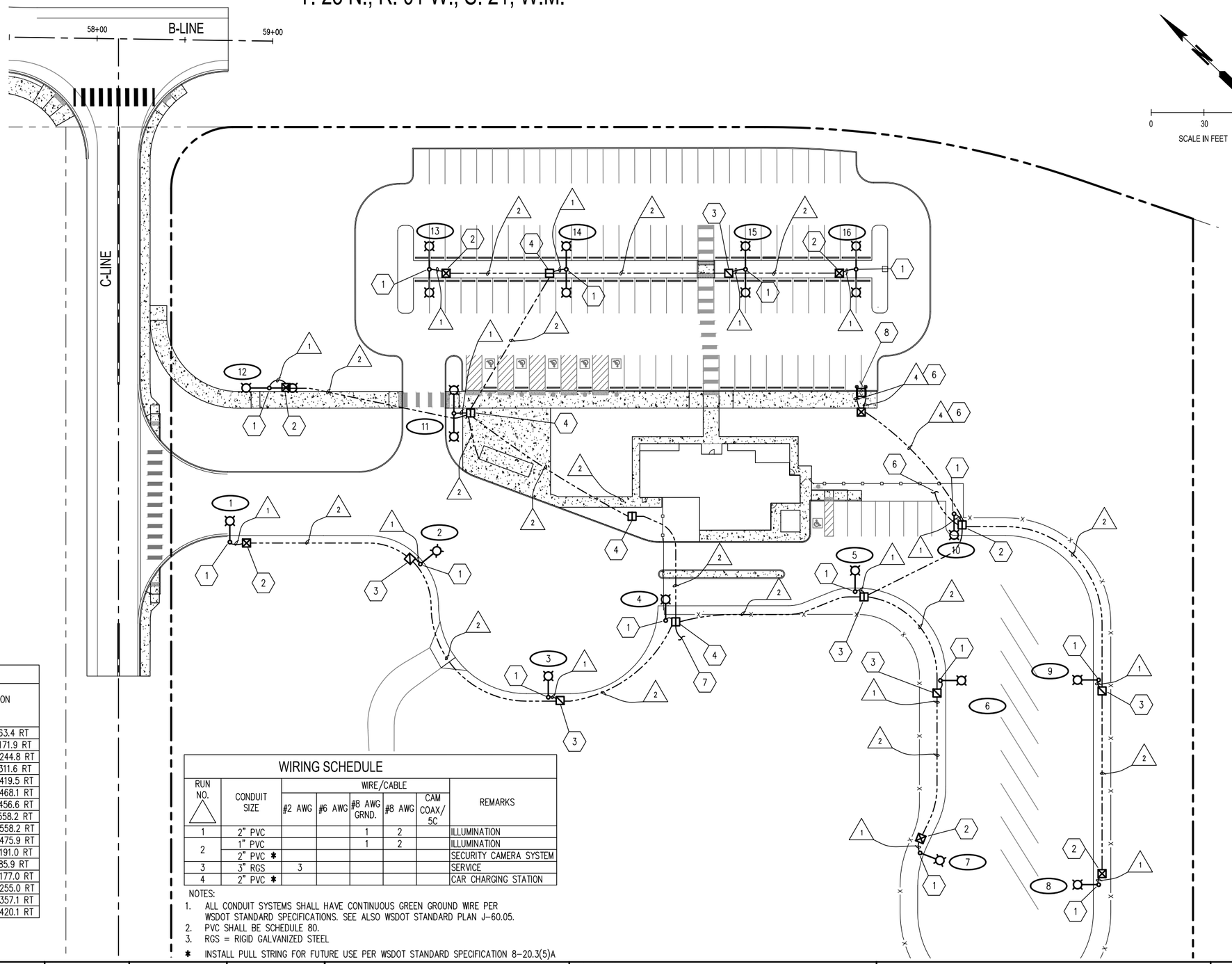
LEGEND

NEW

- TYPE 1 JUNCTION BOX, J-40.10
- TYPE 2 JUNCTION BOX, J-40.10
- TYPE 8 JUNCTION BOX, J-40.30
- TRANSFORMER
- SECURITY CAMERA EQUIPMENT CABINET
- CAR CHARGING STATION
- ILLUMINATION SERVICE CABINET
- ILLUMINATION CONDUIT
- SECURITY CAMERA CONDUIT
- SINGLE ARM LIGHT STANDARD
- DOUBLE ARM LIGHT STANDARD
- (X) WIRE NOTE
- (X) CONSTRUCTION NOTE
- (X) LUMINAIRE NUMBER

CONSTRUCTION NOTES

1. INSTALL TYPE B FOUNDATION (METHOD 1) PER WSDOT STANDARD PLAN J-28.30. INSTALL NEW LIGHT STANDARD AND ASSOCIATED HARDWARE PER APPLICABLE WSDOT J-SERIES STANDARD PLANS. SEE LIGHTING SCHEDULE THIS SHEET. LIGHT STANDARD PLACEMENT CASE L PER STD. PLAN J-28.26.
2. INSTALL TYPE 1 JUNCTION BOX WITH LOCKING LID PER WSDOT STANDARD PLAN J-40.10.
3. INSTALL TYPE 2 JUNCTION BOX WITH LOCKING LID PER WSDOT STANDARD PLAN J-40.10.
4. INSTALL TYPE 8 JUNCTION BOX WITH LOCKING LID PER WSDOT STANDARD PLAN J-40.30.
5. SECURITY CAMERA(S) TO BE INSTALLED BY HOOD CANAL COMMUNICATIONS.
6. SEE ELECTRICAL PLANS.
7. SEE ELECTRICAL PLANS FOR SLIDING GATE CONTROL PANEL AND POWER CONNECTION.
8. CAR CHARGING STATION. CONTRACTOR TO COORDINATE WITH MTA/CHARGE POINT TO INSTALL CAR CHARGING STATION EQUIPMENT.



LIGHTING SCHEDULE

LUM NO.	SERVICE NO.	CIRCUIT NO.	TYPE DISTRIBUTION WATTAGE	MTG. HT. (H1)	MAST ARM LENGTH (FT)	MAST ARM TYPE	BASE STYLE	LOCATION
1	1	A	LED-MC III-72 ✱	25	12	SINGLE - 1	FIXED	C 53+13.7, 63.4 RT
2	1	A	LED-MC III-72 ✱	25	12	SINGLE - 1	FIXED	C 53+01.2, 171.9 RT
3	1	A	LED-MC III-72 ✱	25	12	SINGLE - 1	FIXED	C 52+25.5, 244.8 RT
4	1	A	LED-MC III-72 ✱	25	12	SINGLE - 1	FIXED	C 52+69.1, 311.6 RT
5	1	A	LED-MC III-72 ✱	25	12	SINGLE - 1	FIXED	C 52+85.5, 419.5 RT
6	1	A	LED-MC III-72 ✱	25	12	SINGLE - 1	FIXED	C 52+20.6, 468.1 RT
7	1	A	LED-MC III-72 ✱	25	12	SINGLE - 1	FIXED	C 51+36.8, 456.6 RT
8	1	A	LED-MC III-72 ✱	25	12	SINGLE - 1	FIXED	C 51+18.7, 558.2 RT
9	1	A	LED-MC III-72 ✱	25	12	SINGLE - 1	FIXED	C 52+35.2, 558.2 RT
10	1	A	LED-MC III-72 ✱	25	12	SINGLE - 1	FIXED	C 53+29.8, 475.9 RT
11	1	A	LED-V-72 ✱	25	12	DOUBLE - 1	FIXED	C 53+87.0, 191.0 RT
12	1	A	LED-V-72 ✱	25	12	DOUBLE - 1	FIXED	C 54+01.5, 85.9 RT
13	1	A	LED-V-72 ✱	25	12	DOUBLE - 1	FIXED	C 54+69.0, 177.0 RT
14	1	A	LED-V-72 ✱	25	12	DOUBLE - 1	FIXED	C 54+69.0, 255.0 RT
15	1	A	LED-V-72 ✱	25	12	DOUBLE - 1	FIXED	C 54+69.0, 357.1 RT
16	1	A	LED-V-72 ✱	25	12	DOUBLE - 1	FIXED	C 54+69.0, 420.1 RT

✱SEE SPECIAL PROVISIONS

WIRING SCHEDULE

RUN NO.	CONDUIT SIZE	WIRE/CABLE					REMARKS
		#2 AWG	#6 AWG	#8 AWG GRND.	#8 AWG	CAM COAX/ 5C	
1	2" PVC			1	2		ILLUMINATION
2	1" PVC			1	2		ILLUMINATION
	2" PVC ✱						SECURITY CAMERA SYSTEM
3	3" RGS	3					SERVICE
4	2" PVC ✱						CAR CHARGING STATION

NOTES:
1. ALL CONDUIT SYSTEMS SHALL HAVE CONTINUOUS GREEN GROUND WIRE PER WSDOT STANDARD SPECIFICATIONS. SEE ALSO WSDOT STANDARD PLAN J-60.05.
2. PVC SHALL BE SCHEDULE 80.
3. RGS = RIGID GALVANIZED STEEL

✱ INSTALL PULL STRING FOR FUTURE USE PER WSDOT STANDARD SPECIFICATION 8-20.3(5)A

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-IL-1-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER — 02/12/2020

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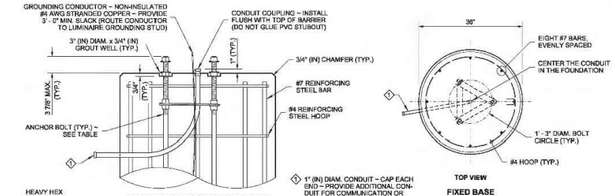
PROJECT NAME:

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

LIGHTING AND SECURITY PLAN

DRAWING No.: IL-1
SHEET No.: 23 OF 84

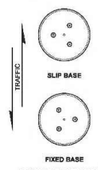
T 23 N., R. 01 W., S. 21 W M



ANCHOR BOLT TABLE			
LUMINAIRE HEIGHT (FT) (Ht)	MAST ARM TYPE	MAST ARM LENGTH (FT)	ANCHOR BOLT DIAMETER (IN) "D"
20' TO 50'	SINGLE	8' TO 16'	1"
20' TO 50'	DOUBLE	8' TO 8'	1"
20' TO 45'	DOUBLE	10' TO 16'	1"
45' TO 50'	DOUBLE	10' TO 16'	1 1/8"

NOTES

1. See **Standard Plan J-28.40** for Luminaire Pole base mounting details.
2. The Strap Templates shall be held in place by nuts, 6" (in) from the top of the foundation and 3" (in) from the bottom of the anchor bolts. Eighteen heavy duty hex nuts and six round washers are required for a slip base assembly. Eighteen heavy duty hex nuts and six plate washers are required for a fixed base assembly.
3. Use Steel Light Standard Foundation **Type A** on level ground or slopes not exceeding 4H : 1V. Use **Type B** for slopes steeper than 4H : 1V, but not exceeding 2H : 1V. Slopes steeper than 2H : 1V shall require a special design.
4. These foundations are designed for a minimum of 2000 PSF **(TYPE A)** or 1500 PSF **(TYPE B)** allowable lateral bearing pressure for the soil. A special foundation shall be required for soil with allowable lateral bearing pressure lower than 1500 PSF.
5. The Luminaire Pole height shall not exceed 50' (ft) (Ht).
6. Slip bases shall not be installed on 50' (ft) (Ht) poles with Double Mast Arms, nor on poles weighing more than 1000 lbs.
7. Slip bases are required on poles installed inside the Design Clear Zone, and on poles installed behind traffic barrier that are within the traffic barrier deflection zone.
8. Foundations constructed within Media Filter Drains shall be increased in depth by the depth of the Media Filter Drain.
9. Exposed portions of the foundation shall be formed to create a Class 2 surface finish. All forming shall be removed upon completion of foundation construction.
10. For excavation, concrete placement, and backfill options, see METHOD 1 and METHOD 2 on Sheet 2 of 2.
11. The anchor bolts shall be high-strength steel, manufactured from ASTM F1554 Grade 105, with heavy hex nuts and hardened washers. Galvanize the anchor bolts according to ASTM F2329.
12. The foundation shall be grounded in accordance with the requirements of **Standard Specification 8-20.3(4).**
13. See **Standard Plans C-8b** and **C-85.14** for steel light standards on traffic barrier.



ANCHOR BOLT LAYOUT

RICHARD P. ZELDENRUST STATE OF WASHINGTON 20147 PROFESSIONAL ENGINEER

Zeldenrust, Richard Jun 10 2014 10:37 AM

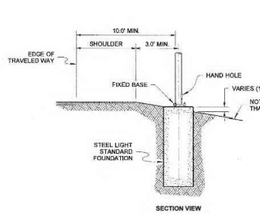
STEEL LIGHT STANDARD FOUNDATION TYPES A & B

STANDARD PLAN J-28.30-03

SHEET 1 OF 2 SHEETS

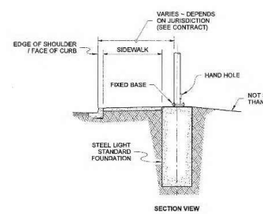
APPROVED FOR PUBLICATION
Habrich, Penny Jun 11 2014 1:33 PM
STATE DESIGN ENGINEER
Washington State Department of Transportation

DRAWN BY: BILL BERENS



CASE I

POSTED SPEED LIMIT LESS THAN 35 MPH

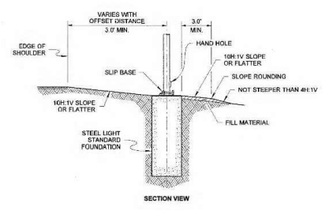


CASE J

POSTED SPEED LIMIT LESS THAN 35 MPH

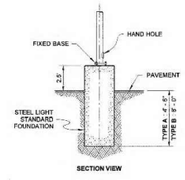
NOTES

1. See **Standard Plan J-28.30** for foundation details and construction methods.
2. See **Standard Plan J-28.50** for pole base and hand hole details.



CASE K

ROADWAYS WITH 10H:1V OR FLATTER SIDE SLOPES



CASE L

PARKING LOTS

RICHARD P. ZELDENRUST STATE OF WASHINGTON 20147 PROFESSIONAL ENGINEER REGISTERED

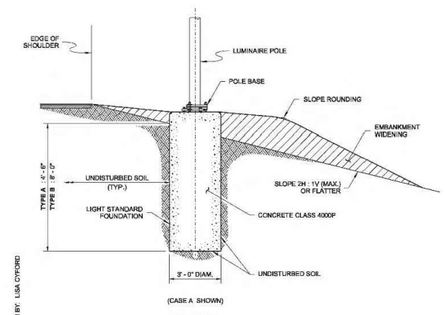
Zeldenrust, Richard Jun 10 2014 10:37 AM

STEEL LIGHT STANDARD PLACEMENT MISCELLANEOUS

STANDARD PLAN J-28.26-01

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Habrich, Penny Jun 11 2014 1:33 PM
STATE DESIGN ENGINEER
Washington State Department of Transportation



METHOD 1

NO SUBSURFACE FORM

This option is used only when the existing soil in the hole will remain standing and the cement concrete can be placed without causing the soil to collapse. Concrete shall be cast directly against undisturbed soil.

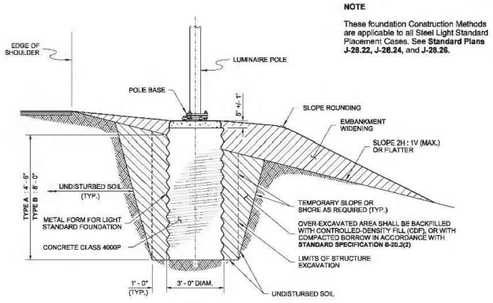
Auger the hole for the foundation. Use a paper or cardboard form to achieve a smooth finish on the final exposed cement concrete. Support the form as necessary to remain plumb.

See **Standard Plans J-28.24** and **J-28.26** for maximum heights of exposed foundation when no embankment widening is to be installed.

Place the concrete foundation.

After concrete has cured, remove the paper or cardboard form portion.

Construct the embankment widening (if required).



METHOD 2

METAL (SUBSURFACE) FORM REQUIRED

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" (in) diameter corrugated metal (pipe) form. The corrugated metal form shall not extend more than 5" (in) +/- 1" (in) below any portion of the foundation that will remain exposed upon final grading. Continue forming to full height using a paper or cardboard form to achieve a smooth finish on final exposed cement concrete. Support the form as necessary to remain plumb.

See **Standard Plans J-28.24** and **J-28.26** for maximum heights of exposed foundation when no embankment widening is to be installed.

Place the concrete foundation.

After concrete has cured, remove the paper or cardboard form portion.

Backfill with controlled-density fill or compacted borrow in accordance with **Standard Specification 8-20.3(2).**

Construct the embankment widening (if required).

CONSTRUCTION METHODS

NOTE

These foundation Construction Methods are applicable to all Steel Light Standard Placement Cases. See **Standard Plans J-28.22, J-28.24,** and **J-28.26.**

RICHARD P. ZELDENRUST STATE OF WASHINGTON 20147 PROFESSIONAL ENGINEER REGISTERED

Zeldenrust, Richard Jun 10 2014 10:38 AM

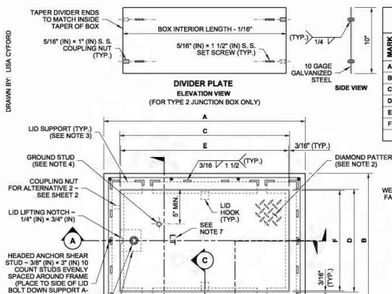
STEEL LIGHT STANDARD FOUNDATION TYPES A & B

STANDARD PLAN J-28.30-03

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION
Habrich, Penny Jun 11 2014 1:33 PM
STATE DESIGN ENGINEER
Washington State Department of Transportation

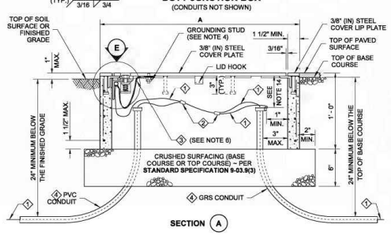
DRAWN BY: LISA CYFORD



JUNCTION BOX DIMENSION TABLE			
MARK	ITEM	BOX TYPE 1	BOX TYPE 2
A	OUTSIDE LENGTH OF JUNCTION BOX	22"	33"
B	OUTSIDE WIDTH OF JUNCTION BOX	17"	22 1/2"
C	INSIDE LENGTH OF JUNCTION BOX	18" – 19"	28" – 29"
D	INSIDE WIDTH OF JUNCTION BOX	13" – 14"	17" – 18"
E	LID LENGTH	17 5/8"	28 5/8"
F	LID WIDTH	12 5/8"	18 1/8"
	CAPACITY – CONDUIT DIAMETER	6"	12"

NOTES

1. All box dimensions are approximate. Exact configurations vary among manufacturers.
2. Minimum lid thickness shown. Junction Boxes installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on the lid and lip cover plate, and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, or shared-use path. The non-slip lid shall be identified with permanent markings on the underside, indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The permanent marking shall be 1/8" (in) line thickness formed with a mild steel weld bead and shall be placed prior to hot-dip galvanizing.
3. Lid support members shall be 3/16" (in) minimum thick steel C, L, or T shape, welded to the frame.
4. A 1/4-20 NC × 3/4" (in) stainless steel ground stud shall be welded to the bottom of the lid; include (2) stainless steel nuts and (2) stainless steel flat washers.
5. Bolts and nuts shall be liberally coated with anti-seize compound.
6. Equipment Bonding Jumper shall be # 8 AWG min. × 4' (ft) of tinned braided copper.
7. The System identification letters shall be 1/8" (in) line thickness formed with a mild steel weld bead. See Cover Marking detail. Grind off diamond pattern before forming letters. For System Identification details, see **Standard Specification 9-29.2(4)**.
8. When required in the Contract, provide a 10" (in) x 27 1/2" (in), 10 gage divider plate, complete, with fasteners, in each Type 2 Junction Box where specified.
9. When required in Contract, provide a 12" (in) deep extension for each Type 2 Junction Box where specified.
10. See the **Standard Specifications** for alternative reinforcement and class of concrete.
11. Headed Anchor Shear Studs must be welded to the Steel Cover Lip Plate and wire tied in two places to the vertical Welded Wire Fabric when in contact with each other. Wire tie all other Headed Anchor Shear Studs to the horizontal Welded Wire Fabric.
12. Lid Bolt Down Attachment Tab provides a method of retrofitting by using a mechanical process in lieu of welding. Attachment Tab shown depicts a typical component arrangement; actual configurations of assembly will vary among manufacturers. See approved manufacturers' shop drawings for specifics.
13. Unless otherwise noted in the plans or approved by the Engineer, Junction Boxes, Cable Vaults, and Pull Boxes shall not be placed within the sidewalks, walkways, shared use paths, traveled ways or paved shoulders. All Junction Boxes, Cable Vaults, and Pull Boxes placed within the traveled way or paved shoulders shall be Heavy-Duty.
14. Distance between the top of the conduit and the bottom of the Junction Box lid shall be 6" (in) min. to 8" (in) max. for final grade of new construction only. See **Standard Specification 8-20.3(5)**. Where adjustments are to be made to existing Junction Boxes, or for interim construction stages during the contract, the limits shall be from 6" (in) min. to 10" (in) max. See **Standard Specification 8-20.3(6)**.



THEODORE JOSEPH BAILEY STATE OF WASHINGTON 24806 REGISTERED PROFESSIONAL ENGINEER

Bailey, Ted Apr 28 2016 9:32 AM

LOCKING LID STANDARD DUTY JUNCTION BOX TYPES 1 & 2

STANDARD PLAN J-40.10-04

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Carpenter, Jeff Apr 28 2016 3:12 PM
STATE DESIGN ENGINEER
Washington State Department of Transportation

Feb 13, 2020 9:16:25am – User: nick.mayfield
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\0738.05–IL–2–B.DWG

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM	ISSUE DATE: 02/12/2020		
DRAWN BY: N. MAYFIELD	JOB No.: 0738.05		
CHECKED BY: P. HOLM	DRAWING FILE No.: 0738.05-IL-2-B		

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM STATE OF WASHINGTON 49670 REGISTERED PROFESSIONAL ENGINEER 02/12/2020

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SCJALLIANCE.COM

PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

LIGHTING AND SECURITY DETAILS

DRAWING No.: IL-2

SHEET No.: 24 OF 84

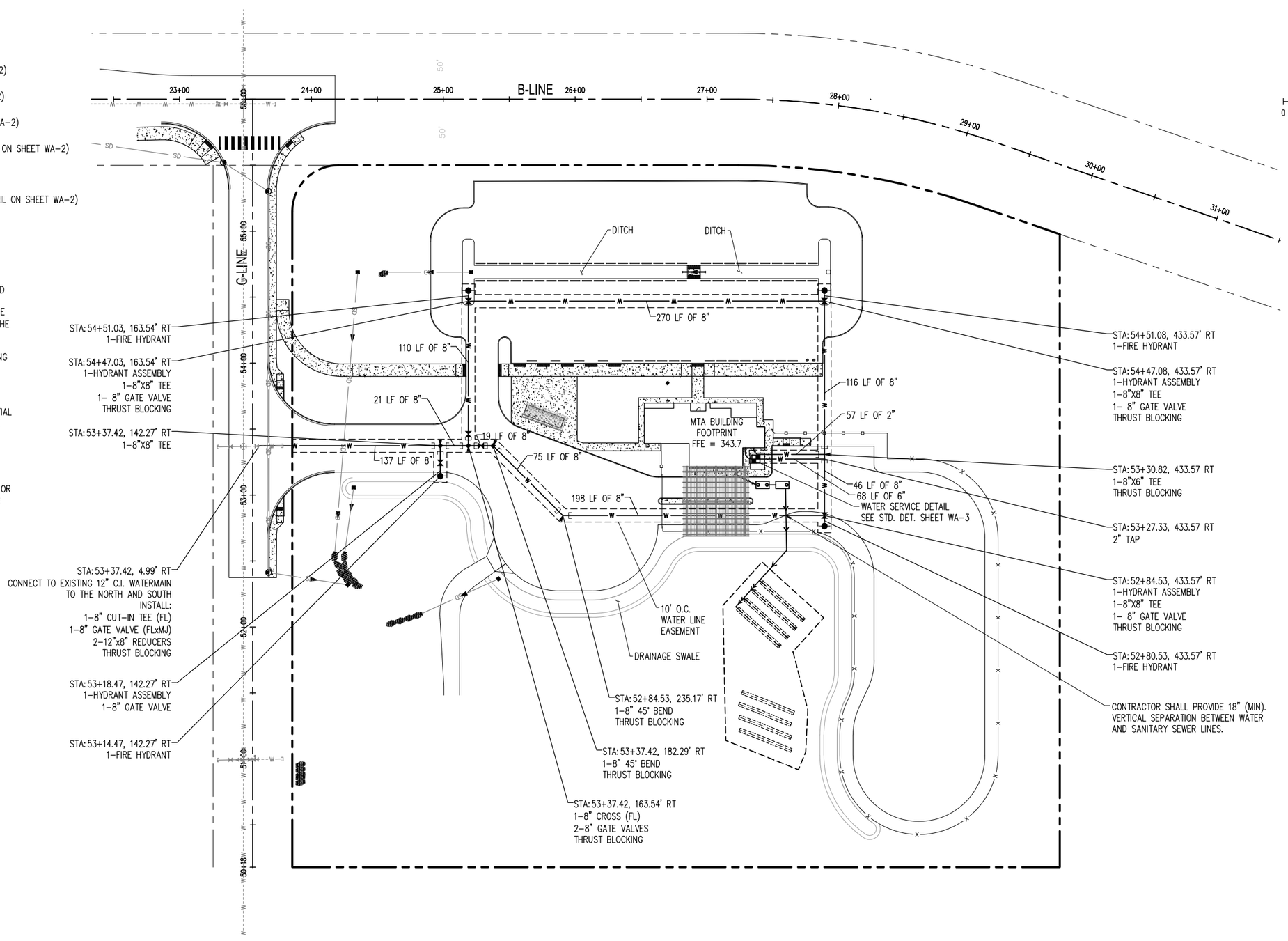
T. 23 N., R. 01 W., S. 21, W.M.

LEGEND

- WATER LINE
- METER (SEE DETAILS ON SHEET WA-2)
- WATER VALVE (SEE DETAILS ON SHEET WA-2)
- FIRE HYDRANT (SEE DETAIL ON SHEET WA-2)
- THRUST BLOCKING (SEE DETAIL ON SHEET WA-2)
- FIRE DEPARTMENT CONNECTION (SEE DETAIL ON SHEET WA-2)
- FITTINGS WITH THRUST BLOCKING
- DCVA — DOUBLE CHECK VALVE ASSEMBLY (SEE DETAIL ON SHEET WA-2)
- WATER LINE EASEMENT

GENERAL NOTES

1. THE LOCATION AND DESCRIPTIONS OF EXISTING UNDERGROUND UTILITIES SHOWN ON THESE CONSTRUCTION DRAWINGS ARE COMPILED FROM AVAILABLE RECORDS, FIELD SURVEYS OF ONE CALL UTILITY LOCATE, AND/OR ABOVE GROUND FEATURES. THE SURVEYOR OR UTILITY COMPANIES DO NOT GUARANTEE THE ACCURACY OR THE COMPLETENESS OF SUCH RECORDS. CONTRACTOR SHALL FIELD VERIFY LOCATIONS OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.
2. CONTRACTOR SHALL FIELD VERIFY LOCATION AND DEPTH OF ALL EXISTING UTILITIES WHERE NEW FACILITIES CROSS. CONTRACTOR SHALL BE RESPONSIBLE FOR EXPOSING POTENTIAL CONFLICTS FAR ENOUGH AHEAD OF CONSTRUCTION TO MAKE NECESSARY GRADE MODIFICATION WITHOUT DELAYING THE WORK. IF GRADE MODIFICATION IS NECESSARY, CONTRACTOR SHALL NOTIFY THE DESIGN ENGINEER, AND THE DESIGN ENGINEER SHALL OBTAIN APPROVAL FROM THE COUNTY ENGINEER PRIOR TO CONSTRUCTION. ALL UTILITY CROSSING SHALL BE POTHOLED AS NECESSARY PRIOR TO EXCAVATING OR BORING TO ALLOW THE CONTRACTOR TO PREVENT GRADE OR ALIGNMENT CONFLICTS.
3. ALL WATER AND/OR SEWER LINE EXTENSIONS SHALL BE DESIGNED AND INSTALLED IN ACCORDANCE WITH THE CITY'S DESIGN STANDARDS.
4. TESTING IS REQUIRED FOR ALL GRAVITY SEWER LINES, AND MANHOLES PER THE CITY OF SHELTON DESIGN AND CONSTRUCTION STANDARD 5.140A AND B.



△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-WA-1-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 19401 — REGISTERED PROFESSIONAL ENGINEER
02/12/2020

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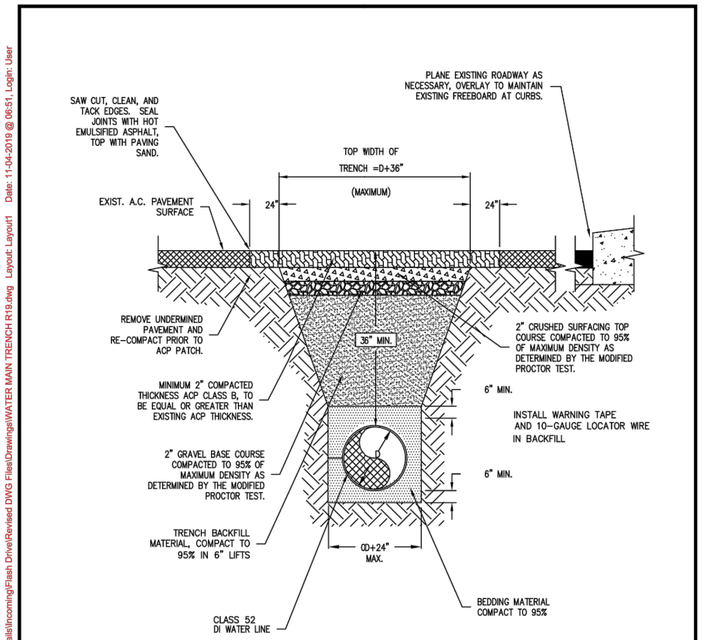
PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

WATER SYSTEM PLAN

DRAWING No.: WA-1
SHEET No.: 25 OF 84



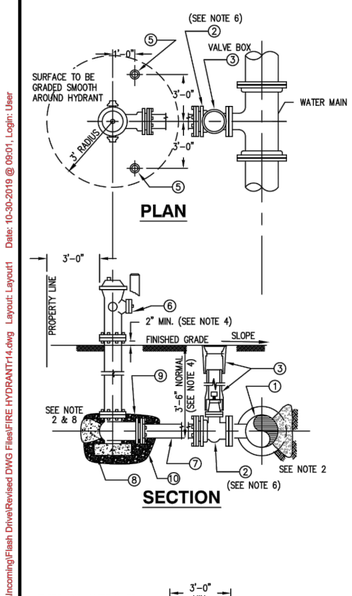
WATERLINE TRENCH DETAIL
NOT TO SCALE

Belfiar Water District
Standard Water Details

Water Main Trench

REVISED: OCTOBER 2019

Water Main Trench
NTS



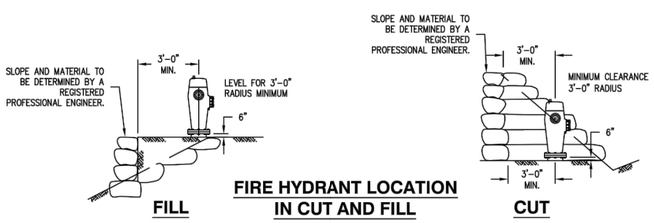
PLAN

SECTION

BILL OF MATERIALS		
No.	NOMENCLATURE	REQUIRED
1	MJ x FL TEE	1
2	VALVE WITH FLG. x M.J. CONNECTIONS, SEE NOTE 6.	1
3	2 PIECE CAST IRON VALVE BOX	1
4	NOT USED	
5	REINFORCED CONCRETE GUARD POST 9"ø x 6" (PRIVATE PROP. ONLY)	2
6	FIRE HYDRANT WITH STORTZ ADAPTER	1
7	PIPE, 6" CL. 52 D.I., FIELD CUT WITH MEGALUG RETAINER GLANDS	1
8	12" x 12" x 4" SOLID CONCRETE BEARING BLOCK (If Required)	1
9	1/4 C.Y. DRAIN ROCK, 1-1/2" – 3/4", NO FINES, 7 C.F. OF 7/8" WASHED ROCK WRAPPED IN GEOTEXTILE FABRIC	
10	6 OZ. GEOTEXTILE FABRIC	

NOTES:
1. ALL MATERIALS AND BRANDS MUST BE APPROVED BY DISTRICT.
2. 6-INCH MEG-A-LUGS ARE TO BE INSTALLED AT VALVE AND HYDRANT M.J. OUTLETS.
3. HYDRANT SHALL HAVE DISTRICT'S STANDARD HOSE THREADS AND OPERATING NUTS.
4. HYDRANT LENGTH AND TRENCH DEPTH SHALL BE SO AS TO PROVIDE FOR HYDRANT SETTING AT CORRECT ELEVATION RELATIVE TO FINISH GRADE.
5. SET HYDRANT VERTICAL. USE LEVEL. COMPACT ALL BACKFILL.
6. VALVE SHALL BE AWWA STANDARD GATE "O" RING PACKING, NON-RISING STEM, 2" OPERATION NUT. RESILIENT WEDGE GATE.
7. TOP OF GUARD POST TO BE LEVEL WITH TOP OF HYDRANT.
8. WHEN GUARD POSTS ARE USED, THE TOP OF THE POST WILL BE LEVEL WITH THE HYDRANT.
9. FOR CENTER STEM HYDRANTS THE CONCRETE BLOCK WILL BE BELOW THE DRAIN HOLES AND DRAIN ROCK. TAKE CARE TO NOT PLUG DRAIN HOLES OR CONTAMINATE DRAIN ROCK.
9. ALL HYDRANTS SHALL BE FURNISHED WITH STORZ COUPLINGS.
10. ALL HYDRANTS AND BENDS SHALL BE SECURED WITH MEGA-LUGS.
11. STENCIL THE DISTANCE FROM THE FOOT VALVE ON THE HYDRANT BARREL WITH 1-1/2" LETTERS.

NOTE: ANY HYDRANT RUN OVER ONE FULL LENGTH OF PIPE, SHALL HAVE A RESTRAINED JOINT GASKET EQUAL TO FIELD LOK GASKETS.

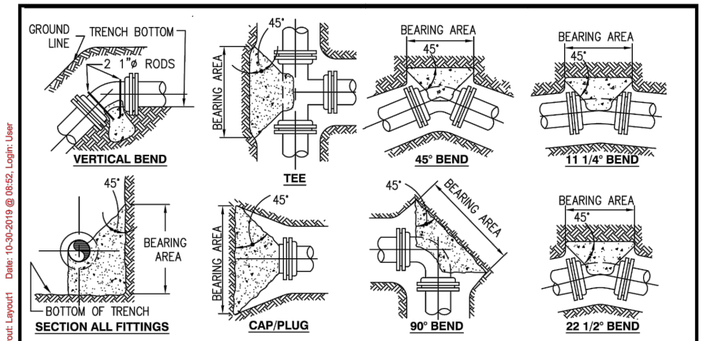


Belfiar Water District
Standard Water Details

Fire Hydrant Assembly

REVISED: OCTOBER 2019

Fire Hydrant Assembly
NTS



THRUST BLOCK REQUIREMENTS BEARING AREA REQUIRED IN SQUARE FEET														
		TEE/CAP OR PLUG			90 Degree BEND			45 Degree BEND			22.5 Degree BEND			11.25 Degree BEND		
PIPE SIZE	PIPE SIZE	200	225	250	200	225	250	200	225	250	200	225	250	200	225	250
nominal	outside dia.	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi
4	4.80	1.8	2.0	2.3	2.6	2.9	3.2	1.4	1.6	1.7	0.7	0.8	0.9	0.4	0.4	0.4
6	6.90	3.7	4.2	4.7	5.3	5.9	6.6	2.9	3.2	3.6	1.5	1.6	1.8	0.7	0.8	0.9
8	9.05	6.4	7.2	8.0	9.1	10.2	11.4	4.9	5.5	6.2	2.5	2.8	3.1	1.3	1.4	1.6
12	13.20	13.7	15.4	17.1	19.4	21.8	24.2	10.5	11.8	13.1	5.3	6.0	6.7	2.7	3.0	3.4
16	17.40	23.8	26.8	29.7	33.6	37.8	42.0	18.2	20.5	22.7	9.3	10.4	11.6	4.7	5.2	5.8
18	19.50	29.9	33.6	37.3	42.2	47.5	52.8	22.9	25.7	28.6	11.7	13.1	14.6	5.9	6.6	7.3
24	25.80	52.3	58.8	65.3	73.9	83.2	92.4	40.0	45.0	50.0	20.4	22.9	25.5	10.2	11.5	12.8

NOTES:
1. ALL CONCRETE BLOCKING SHALL BE POURED AGAINST DRY, UNDISTURBED SUBGRADE. TABLE IS BASED ON 2000 POUNDS PER SQUARE FOOT ALLOWABLE SOIL BEARING. WEAKER SOIL WILL REQUIRE INCREASED BEARING AREA. SEE SOIL BEARING LOAD CHART.
2. KEEP CONCRETE CLEAR OF JOINTS AND ACCESSORIES. USE FORMING AS NECESSARY.
3. HORIZONTAL ANCHOR BLOCKING CONFIGURATIONS FOR FITTINGS NOT SHOWN SHALL HAVE PRIOR APPROVAL.
4. THE SQUARE FOOT AREAS REQUIRED FOR BEARING ARE CALCULATED BY THE FOLLOWING FORMULAS:
   FORMULA AT TEE & CAP OR PLUG:
   T=PA
   TI K=BEARING AREA REQUIRED IN SQUARE FEET
   FORMULA AT ALL PIPE BENDS:
   T = 2PA (SIN 1/2△) WHERE △= THE DEGREE BEND OF THE FITTING.
   T K=BEARING AREA REQUIRED IN SQUARE FEET
   WHERE:
   T=THRUST IN POUNDS
   P=TEST PRESSURE IN PSI
   A=CROSS-SECTIONAL AREA OF PIPE IN SQUARE INCHES
   K=ASSUMED 2000 PSF SOIL BEARING PRESSURE
5. WRAP FITTINGS WITH VISQUEEN PRIOR TO BLOCK POUR.

SAFE BEARING LOADS IN LBS/SQ. FT.
THE SAFE SOIL BEARING LOADS SHOWN BELOW ARE FOR HORIZONTAL THRUSTS WHEN THE DEPTH OF COVER OVER PIPE EXCEEDS 3 FEET.

SOIL	SAFE BEARING LOAD LBS/SQ. FT.
MUCK, PEAT, ETC	0
SOFT CLAY, SILT	1,000
SAND, SANDY SILT	2,000
SAND AND GRAVEL	3,000
SAND AND GRAVEL CEMENTED W/CLAY	4,000
HARD SHALE	10,000

IN MUCK OR PEAT, ALL THRUST SHALL BE RESTRAINED BY PILES OR TIE RODS TO SOLID FOUNDATIONS OR BY REMOVAL OF MUCK OR PEAT AND REPLACEMENT WITH BALLAST OF SUFFICIENT STABILITY TO RESIST THRUSTS.

Belfiar Water District
Standard Water Details

Thrust Blocking

REVISED: OCTOBER 2019

Thrust Blocking
NTS

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-WA-2-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 19801 — REGISTERED PROFESSIONAL ENGINEER — 02/12/2020

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PROJECT NAME:

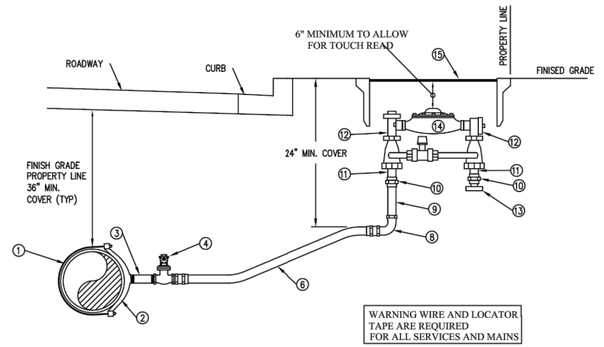
MTA

MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

WATER DETAILS

DRAWING No.: WA-2

SHEET No.: 26 OF 84



MATERIAL LIST FOR 1 1/2" OR 2" WATER SERVICE

1. EXISTING WATER MAIN
2. 2" (IP THREAD) DOUBLE STRAP SADDLE EQUAL TO ROMAC STYLE 202S
3. 2" BRASS NIPPLE, 3" LONG
4. CORP. STOP, FORD FB1100 OR EQUAL
5. 2" MIPT X CTS GRIP JOINT EQUAL TO FORD C8477G
6. 2" POLY, MAINTAIN 36" COVER FROM WATER MAIN TO WITHIN 48" OF METER BOX
7. 2" FIPT x CTS. GRIP JOINT EQUAL TO FORD C14-77
8. 2" BRASS STREET ELL
9. 2" BRASS NIPPLE, 6" LONG
10. 2" BRASS UNION
11. 2" BRASS NIPPLE, 3" LONG
12. 2" METER SETTER WITH HIGH BYPASS EQUAL TO FORD SERIES 80. VERT. IN, VERT. OUT. FLANGED BALL VALVE WITH LOCK WINGS AND CHECK VALVE.
13. SCHEDULE 40 2" PVC THREADED PLUG. REMOVED WHEN CONNECTION MADE TO CUSTOMER LINE
14. WATER METER – TO BE SUPPLIED BY THE DISTRICT
15. METER BOX SHALL BE EQUAL TO FOG TITE # 2 WITH TRAFFIC COVER AND HINGED INSPECTION LID. PROVIDE TOUCH READ PIT LID. PLACE BACK OF METER BOX FLUSH WITH PROPERTY LINE.

NOTE: ALL FITTINGS TO BE BRASS.
IF USING 1 1/2" METER MUST USE TWO FORD A-67'S
OR APPROVED EQUAL.

Belfiar Water District
Standard Water Details

1 1/2" or 2" Water Service

REVISED: OCTOBER 2019

Air/Vac Assembly
NTS

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Feb 13, 2020 9:16:52am – User: nick.mayfield
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△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: P. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: P. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-WA-2-B

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

PATRICK HOLM — STATE OF WASHINGTON — 19861 — REGISTERED PROFESSIONAL ENGINEER
02/12/2020

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PROJECT NAME:

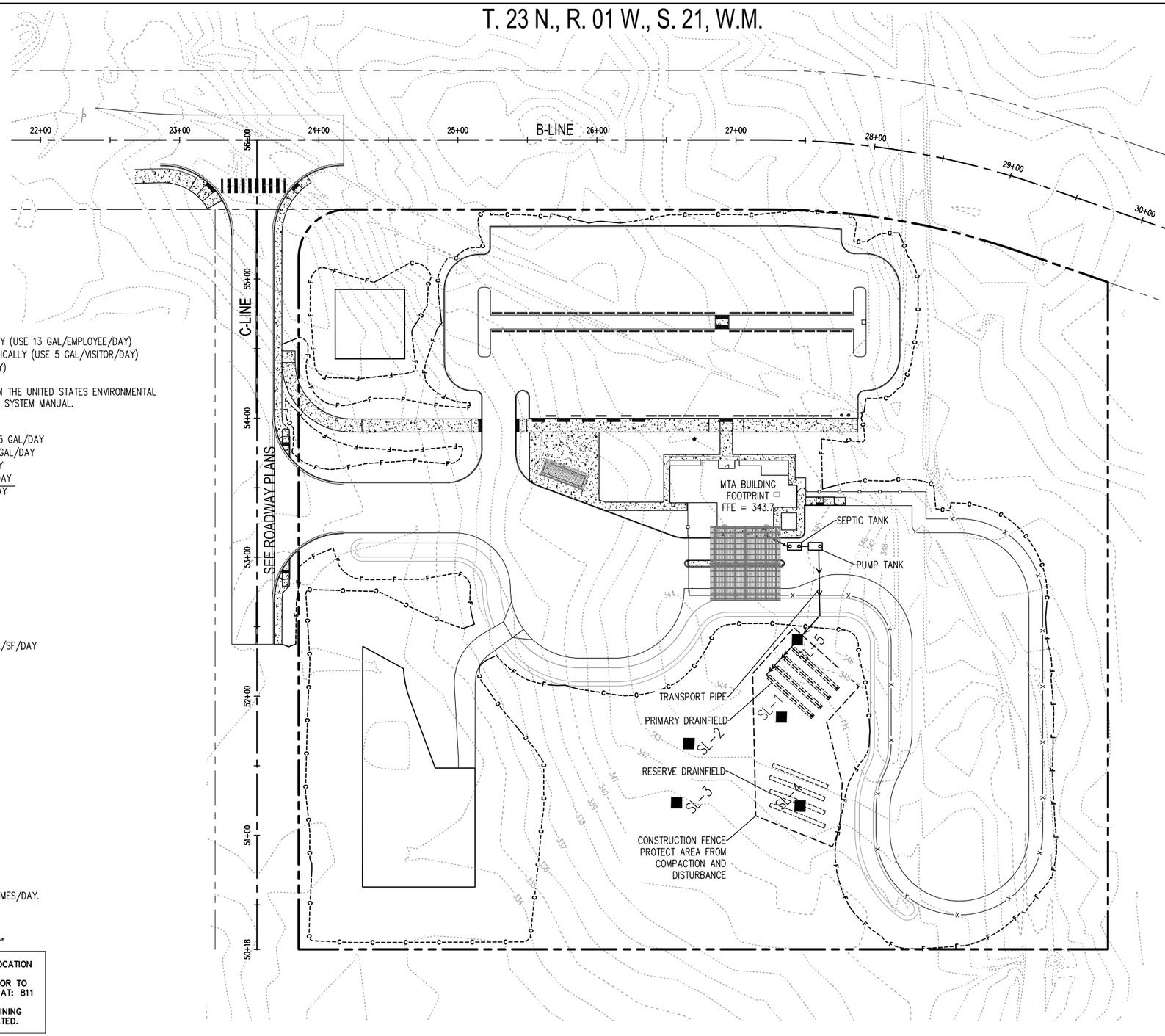
MASON TRANSIT AUTHORITY
BELFAIR
PARK AND RIDE DEVELOPMENT

WATER DETAILS

DRAWING No.: WA-3

SHEET No.: 27 OF 84

T. 23 N., R. 01 W., S. 21, W.M.



SEPTIC DESIGN DATA

DESIGN INFO:

5 FULL TIME EMPLOYEES WORKING AN 8 HOUR WORKDAY (USE 13 GAL/EMPLOYEE/DAY)
10 VISITING EMPLOYEES THAT USE THE FACILITY PERIODICALLY (USE 5 GAL/VISITOR/DAY)
55 PEOPLE FOR MEETING SPACE (USE 3 GAL/SEAT/DAY)

GAL/UNIT/DAY FLOWS ARE BASED ON TABLE 3-4 FROM THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY ON-SITE WASTEWATER TREATMENT SYSTEM MANUAL.

DESIGN FLOW:

5 FULL TIME EMPLOYEES X 13 GAL/PERSON/DAY = 65 GAL/DAY
10 VISITING EMPLOYEES X 5 GAL/PERSON/DAY = 50 GAL/DAY
55 SEATS X 3 GAL/PERSON/DAY = 165 GAL/DAY
TOTAL: 280 GAL/DAY
USE: 300 GAL/DAY

SEPTIC TANK SIZING:

3 X DESIGN FLOW
3 X 300 GAL/DAY = 900 GAL/DAY
USE: 1,500 GALLON SEPTIC TANK

PUMP CHAMBER SIZING:

= EMERGENCY STORAGE + DAILY PEAK + SUMP
= (0.75 X 300) + 300 + 750
= 1,275
USE: 1,500 GALLON PUMP TANK

APPLICATION RATE:

USING TYPE 4 SOILS APPLICATION RATE USED: 0.6 GAL/SF/DAY

TREATMENT LEVEL: E

DRAINFIELD AREA:

300 GAL/DAY = 500 SF
0.6

USING 3 FT WIDE TRENCH

500 SF = 167 LF
3 FT

DOSE:

2 TIMES PER DAY
300 GAL/DAY = 150 GALLONS PER DOSE
2 PER DAY

PUMP RUNS AT ABOUT 37 GAL/MINUTE

300 GAL / 37 GAL/MIN = 8.11 MINUTES

TO DOSE THE DRAIN FIELD YOU WILL NEED THE PUMP TO RUN 2 TIMES/DAY.

EACH DOSE WILL BE ABOUT 4.05 MINUTES

TIMER SHALL BE SET FOR 4 MIN. "ON" AND 11 HRS. 56 MINS. "OFF"

**THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES.
THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT: 811 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.
THE CONTRACTOR WILL ALSO BE RESPONSIBLE FOR MAINTAINING ALL LOCATE MARKS ONCE THE UTILITIES HAVE BEEN LOCATED.**

ELEVATIONS

FINISHED FLOOR EL.: 343.7
PLUMBING STUB I.E.: 340.7 (COORDINATE WITH CONTRACTOR)
SEPTIC TANK I.E.: INLET 340.2; OUTLET 339.0
PUMP TANK: INLET I.E. 338.8; PUMP OFF EL. 334.8

NOTES

1. ALL CONSTRUCTION TO MEET CURRENT MASON COUNTY HEALTH DEPARTMENT REGULATIONS.
2. SITE FEATURES AND DRAINFIELD AREA TOPOGRAPHY BASED ON SURVEY INFORMATION PROVIDED BY MTN2COAST.
3. DIRECT ROOF AND FOOTING DRAINS AWAY FROM ALL SEWAGE SYSTEM COMPONENTS.
4. NO FOOTING DRAINS OR DRY WELLS SHALL BE INSTALLED WITHIN 30' DOWNSLOPE OF DRAINFIELD AREAS.
5. DO NOT DRIVE, PARK, PAVE OVER, OR REMOVE SOILS FROM DRAINFIELD AREAS.
6. CUTS (EXCAVATIONS) OF LESS THAN 5' IN HEIGHT SHALL NOT BE MADE WITHIN 15' PLUS THE HEIGHT OF CUT DOWNSLOPE OF DRAINFIELD AREAS. CUTS OF 5' OR MORE IN HEIGHT SHALL NOT BE MADE WITHIN 50' DOWNSLOPE OF DRAINFIELD AREAS.
7. NO GARBAGE GRINDER IS ALLOWED.
8. INSTALLER SHALL TEST TANKS TO ENSURE THEY ARE WATER TIGHT AFTER INSTALLATION AND PRIOR TO OF THE SYSTEM FOR USE. TANKS SHALL BE TESTED BY FILLING WITH WATER TO THE BOTTOM OF THE PIPE INVERTS AND ALLOWING THEM TO SIT FOR 24 HOURS. THEN REFILL THE TANKS, ALLOW THEM TO SIT FOR AN ADDITIONAL 24 HOURS AND RE-CHECK LIQUID LEVELS TO VERIFY THEY HAVE NOT DROPPED.

SPECIFICATIONS

1. SEPTIC TANK: 1,500 GAL., CONCRETE, DUAL COMPARTMENT, AND WASHINGTON STATE HEALTH DEPARTMENT APPROVED.
2. EFFLUENT FILTER: POLYLOCK PL-122 OR APPROVED EQUAL.
3. DOSE TANK: 1,500 GAL., CONCRETE, SINGLE COMPARTMENT, AND WASHINGTON STATE HEALTH DEPARTMENT APPROVED.
4. DOSE TANK PUMP: ZOLLER EXPLOSION PROOF X-292 (1/2 HP, 230 VOLT, 1 PHASE) OR EQUIVALENT.
5. PUMP CONTROL PANEL: SJE-RHOMBUS MODEL# IFS11W124X4A8AC27A (INTRINSICALLY SAFE) OR EQUIVALENT. WITH PROGRAMMABLE TIMER, ELAPSED TIME METER, HIGH WATER ALARM, AND CYCLE COUNTER.
   5.1. SET TIMER FOR TWO, 150 GAL. DOSES PER DAY.
6. CHECK VALVE: ZOELLER 2" CAST IRON MODEL# 30-0152.
7. FLOATS: ZOLLER MODEL #10-2062 (3 TOTAL).
8. TIGHTLINE: 4" PVC, SCH 40, 10 L.F.
9. TRANSPORT PIPE: 2" PVC, SCH 70, 12 L.F.
10. MANIFOLD: 2" PVC, SCH 40, 30 L.F.
11. PRIMARY DRAINFIELD: 167 L.F. TOTAL (500 SF) 3' WIDE GRAVEL TRENCHES; 1.5" SCH 40 LATERALS WITH 3/16" DIA. ORIFICES 3' ON-CENTER. DRILL FIRST ORIFICE OF EACH LATERAL 1' FROM BEGINNING OF LATERAL. POINT ALL ORIFICES DOWN.

SOIL LOGS (LOGGED ON 07-26-18)

SL-1	0"-22"	LOAMY MEDIUM SAND
	22"-32"	LOAMY FINE SAND (ROOTS TO 32")
	32"-66"	COMPACTED SILT
	66"	HARDPAN (GROUNDWATER NOT ENCOUNTERED)
SL-2	0"-26"	LIGHT BROWN LOAMY MEDIUM SAND
	26"-45"	LOAMY FINE SAND
	45"-60"	COMPACTED SILT
	60"	HARDPAN (GROUNDWATER NOT ENCOUNTERED)
SL-3	0"-30"	LIGHT BROWN LOAMY MEDIUM SAND
	30"-44"	LOAMY FINE SAND
	44"-68"	COMPACTED SILT
	68"	HARDPAN (GROUNDWATER NOT ENCOUNTERED)
SL-4	0-6"	FOREST DUFF LOAMY SAND
	6"-23"	LIGHT BROWN LOAMY MEDIUM SAND
	23"-45"	LOAMY FINE SAND
	45"-58"	COMPACTED SILT W/ MOTTLING
	58"	HARDPAN (GROUNDWATER NOT ENCOUNTERED)
SL-5	0-24"	LOAMY MEDIUM SAND
	24"-42"	LOAMY FINE SAND
	42"-62"	COMPACTED SILT W/ MOTTLING
	62"	HARDPAN (GROUNDWATER NOT ENCOUNTERED)

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: W. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: W. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-SS-OSS

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

WHITNEY G. HOLM — STATE OF WASHINGTON — 49811 — REGISTERED PROFESSIONAL ENGINEER — 02/12/2020

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SCJALLIANCE.COM

PROJECT NAME:

MASON TRANSIT AUTHORITY
BELFAIR PARK AND RIDE DEVELOPMENT
ON-SITE SEPTIC SYSTEM

SITE PLAN

DRAWING No.: SS-1
SHEET No.: 28 OF 84

T. 23 N., R. 01 W., S. 21, W.M.

0 20 40

SCALE IN FEET

LEGEND

- TIGHTLINE
- TRANSPORT PIPE
- LATERAL TRANSPORT PIPE
- PRIMARY DRAINFIELD TRENCH
- RESERVE DRAINFIELD TRENCH
- CLEANOUT
- PUMP TANK
- SEPTIC TANK

SOIL LOGS (LOGGED ON 07-26-18)

SL-1	0"-22"	LOAMY MEDIUM SAND
	22"-32"	LOAMY FINE SAND (ROOTS TO 32")
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SL-5	0-24"	LOAMY MEDIUM SAND
	24"-42"	LOAMY FINE SAND
	42"-62"	COMPACTED SILT W/ MOTTLING
	62"	HARDPAN (GROUNDWATER NOT ENCOUNTERED)

NOTE: SOIL LOG LOCATIONS ARE APPROXIMATE. CONTRACTOR SHALL NOT USE THE LOCATION OF THE PITS AS HORIZONTAL CONTROL WHEN PLACING THE DRAINFIELD.

MTA BUILDING FOOTPRINT
FFE = 343.7

PUMP TANK CONTROL PANEL

10.00

SEPTIC TANK

PUMP TANK

TRANSPORT PIPE

85.00

SL-5

42 L.F.

42 L.F.

42 L.F.

6.00

30.00 MIN.

PRIMARY DRAINFIELD 167 L.F.

41 L.F.

SL-1

LATERAL UPTURN/ CLEANOUT (TYP.)

SL-2

RESERVE DRAINFIELD 167 L.F.

SL-4

SL-3

CONSTRUCTION FENCE PROTECT AREA FROM COMPACTION AND DISTURBANCE

THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT: 811 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION. THE CONTRACTOR WILL ALSO BE RESPONSIBLE FOR MAINTAINING ALL LOCATE MARKS ONCE THE UTILITIES HAVE BEEN LOCATED.

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: W. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: W. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-SS-OSS-2

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

WHITNEY G. HOLM — STATE OF WASHINGTON — 48811 — REGISTERED PROFESSIONAL ENGINEER — 02/12/2020

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PROJECT NAME:

MTA

MASON TRANSIT AUTHORITY
BELFAIR PARK AND RIDE DEVELOPMENT
ON-SITE SEPTIC SYSTEM

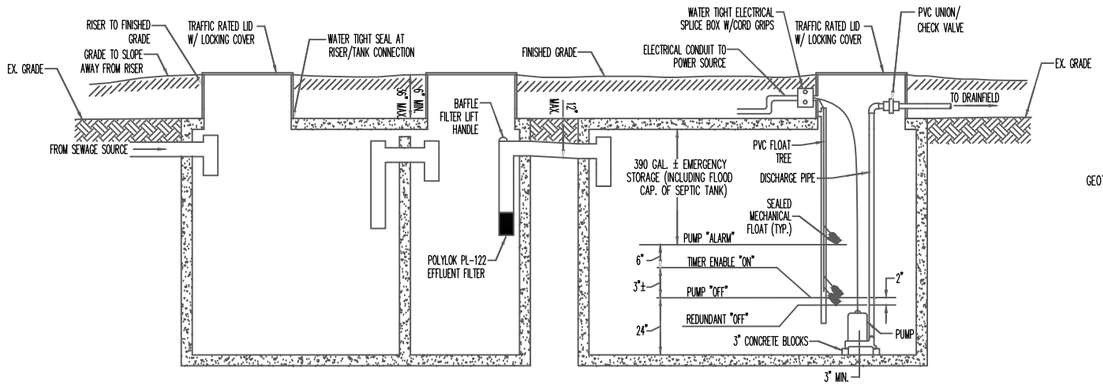
SITE PLAN

DRAWING No.: SS-2

SHEET No.: 29 OF 84

Feb 13, 2020 10:39:18am - User: nick.mayfield
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\SEPTIC SYSTEM DESIGN\0738.05-SS-OSS-2.DWG

T. 23 N., R. 01 W., S. 21, W.M.

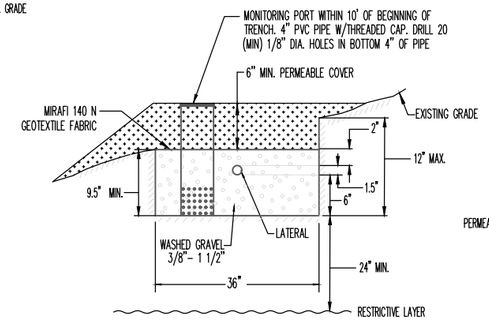


SEPTIC TANK DETAIL

1,500 GAL. TANK = 31.25 GALLONS PER INCH (APPROX.)
(NOT TO SCALE)

PUMP CHAMBER DETAIL

1,500 GAL. TANK = 31.25 GALLONS PER INCH (APPROX.)
(NOT TO SCALE)



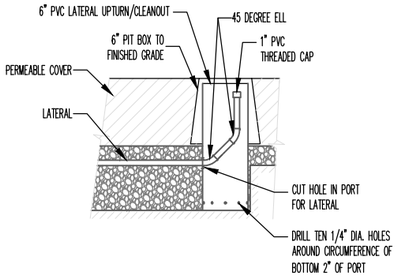
(NOTE: BOTTOM OF TRENCH TO BE CONSTRUCTED LEVEL)

TRENCH DETAIL - CROSS SECTION

(NOT TO SCALE)

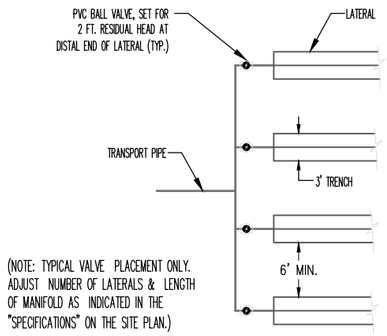
DRAINFIELD NOTES

1. APPROX. 40 CUBIC YARDS OF PERMEABLE COVER REQUIRED. BALANCE OF SOIL TO BE IMPORTED SANDY LOAM OR LOAMY SAND WITH LESS THAN 10% ORGANIC CONTENT.
2. BACKFILL LATERAL TRANSPORT PIPE TRENCH WITH COMPACTED SOIL.
3. BOTTOM OF TRENCH SHALL BE INSTALLED LEVEL.



TRENCH DETAIL - SIDE VIEW

(NOT TO SCALE)



(NOTE: TYPICAL VALVE PLACEMENT ONLY. ADJUST NUMBER OF LATERALS & LENGTH OF MANIFOLD AS INDICATED IN THE "SPECIFICATIONS" ON THE SITE PLAN.)

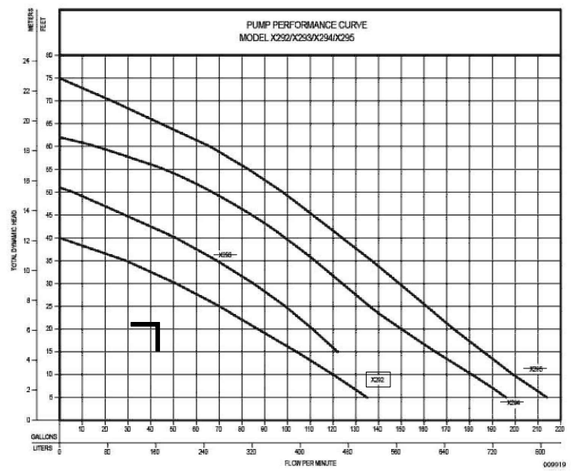
TYPICAL MANIFOLD/VALVE DETAIL

(NOT TO SCALE)

SEPTIC AND PUMP TANK NOTE

THE PUMP TANK ACCESS AND SEPTIC TANK INLET AND OUT MANHOLES SHALL BE EQUIPPED WITH RISERS WITH LOCKING LIDS AT FINISHED GRADE. RISERS SHALL BE GROUT-SEALED TO TANKS FOR WATER TIGHTNESS. ALL UNUSED PORTS AND/OR LIDS, AND THE INLET AND OUTLET PIPES SHALL ALSO BE GROUT-SEALED INTO TANKS FOR WATER TIGHTNESS.

THIS SYSTEM IS DESIGNED FOR WASTEWATER STRENGTHS AND CHARACTERISTICS TYPICAL OF RESIDENTIAL WASTEWATER. IT IS THE OWNER'S/USER'S RESPONSIBILITY TO INSURE THAT THESE LIMITS ARE NOT EXCEEDED.



CALCULATION PAGE

THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT: 811 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION. THE CONTRACTOR WILL ALSO BE RESPONSIBLE FOR MAINTAINING ALL LOCATE MARKS ONCE THE UTILITIES HAVE BEEN LOCATED.

△	REVISIONS	DATE	BY
1	BID SET #1	02/12/20	SCJ

DESIGNED BY: W. HOLM
DRAWN BY: N. MAYFIELD
CHECKED BY: W. HOLM
ISSUE DATE: 02/12/2020
JOB No.: 0738.05
DRAWING FILE No.: 0738.05-DET-OSS

ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE DESIGNATED

WHITNEY G. HOLM — STATE OF WASHINGTON — 40811 — REGISTERED PROFESSIONAL ENGINEER — 02/12/2020

SCJ ALLIANCE
CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
SCJALLIANCE.COM

PROJECT NAME:

MASON TRANSIT AUTHORITY
BELFAIR PARK AND RIDE DEVELOPMENT
ON-SITE SEPTIC SYSTEM

ON-SITE SEPTIC SYSTEM DETAILS

DRAWING No.: SS-3
SHEET No.: 30 OF 84

Feb 13, 2020 - 10:39:23am - User: nick.mayfield
N:\PROJECTS\0738 MASON TRANSIT AUTHORITY\0738.05 MTA PARK AND RIDE DEVELOPMENT\CADD\BELFAIR\SEPTIC SYSTEM DESIGN\0738.05-DET-OSS.DWG

CODE INFORMATION

MASON COUNTY ZONING CODE

PARCEL NUMBER: 123214100000

LAND USE DESIGNATION (BELFAIR UGA): GC - GENERAL COMMERCIAL

SETBACKS: FRONT - 30' ALONG SR-3 EAST OF THE RAILROAD
SIDE - N/A
REAR - N/A

BUILDING HEIGHT: 35 FEET MAX.

BUILDING CODES:
2015 INTERNATIONAL BUILDING CODE (IBC)
2015 INTERNATIONAL MECHANICAL CODE
2015 NATIONAL ELECTRIC CODE (NEC)
2015 INTERNATIONAL FIRE CODE (IFC)
2015 UNIFORM PLUMBING CODE (UPC)
2015 INTERNATIONAL ENERGY CONSERVATION CODE
2009 ACCESSIBLE & USEABLE BUILDINGS AND FACILITIES (ICC/ANSI 117.1)
2015 WASHINGTON STATE AMENDMENTS WAC 51

BUILDING

OCCUPANCY GROUPS
IBC CHAPTER 3
SECTION 303.3 A-3 ASSEMBLY-COMMUNITY HALL
SECTION 304 B -BUSINESS

CONSTRUCTION TYPE
IBC TABLE 503 V-B (FULLY SPRINKLERED)

BUILDING STORIES
ALLOWABLE, IBC TABLE 504.4 & SECTION 504: 2 STORIES
PROPOSED: 1 STORY

BUILDING HEIGHT
ALLOWABLE, IBC TABLE 504.3 & SECTION 504: 60 FT
PROPOSED: 22' - 4" TO PEAK

FLOOR AREA
ALLOWABLE, IBC TABLE 506.2 & SECTION 506: 24,000 SQUARE FEET

PROPOSED TOTAL AREA 3,035 SF

EXTERIOR STEEL BUS CANOPY

NOT OCCUPIED AND STRUCTURE IS OPEN (NOT ENCLOSED)

ENTIRE STRUCTURE IS STEEL AND CONCRETE (NON-Combustible)
COVERED S.F. = 2,550s.f.

FIRE RESISTANCE RATINGS:
IBC SECT. 508.4 SEPARATED OCCUPANCIES
IBC TABLE 601
STRUCTURAL FRAME: 0 HOUR
BEARING WALLS EXTERIOR: 0 HOUR
BEARING WALLS INTERIOR: 0 HOUR
NONBEARING WALLS & PARTITIONS INT: 0 HOUR
FLOOR CONSTRUCTION: 0 HOUR
ROOF CONSTRUCTION: 0 HOUR
IBC TABLE 602
EXTERIOR WALLS (FIRE SEP DIST > 10') 0 HOUR

OCCUPANCY & INCIDENTAL USE SEPARATION
ACCESSORY OCC'S, IBC SECT 508: NO SEPARATION REQUIRED (<10% OF BLDG AREA)

FIRE SPRINKLERS
IBC CHAPTER 9 AUTOMATIC SYSTEM THROUGHOUT

FIRE ALARM AND SMOKE DETECTION
IBC CHAPTER 9 ALL INTERIOR SPACES SHALL BE PROTECTED BY AN AUTOMATIC SMOKE DETECTION AND FIRE ALARM SYSTEM WITH A MUNICIPAL TRIP CIRCUIT.

OCCUPANT LOAD
IBC TABLE 1004.1.2 XXX (AS SHOWN IN LIFE SAFETY FLOOR PLAN)

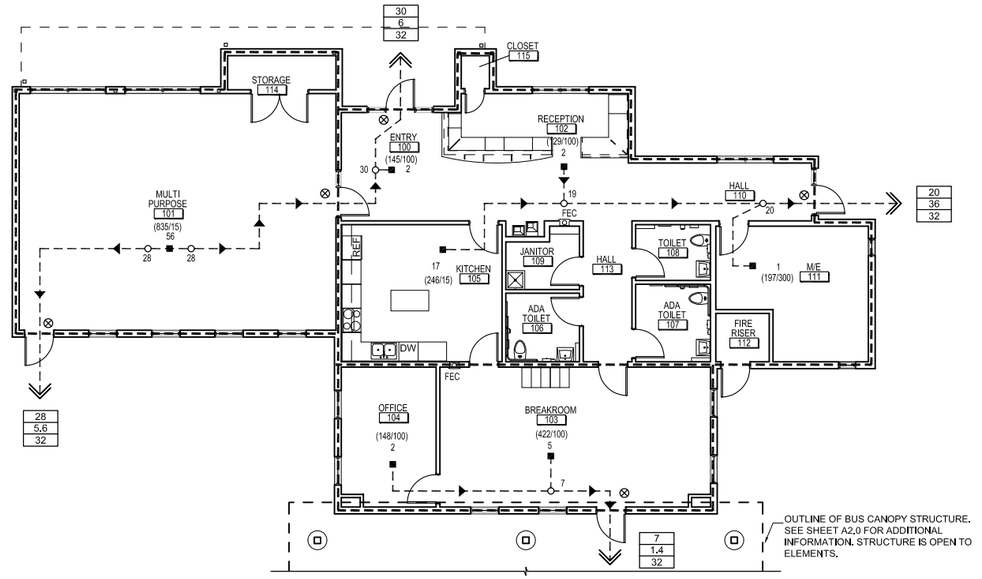
EGRESS:

COMMON PATH OF EGRESS TRAVEL:
IBC TABLE 1006.2.1 75 FEET MAX.
NUMBER OF BUILDING EXITS:
IBC TABLE 1006.3.1 2 EXITS MIN.
EXIT ACCESS TRAVEL DISTANCE:
ALLOWABLE IBC TABLE 1017.2 B = 250 FEET MAX.
CORRIDOR FIRE-RESISTIVE RATING:
IBC TABLE 1020.1 0 HOURS (WITH SPRINKLER SYSTEM)
CORRIDOR MINIMUM WIDTH:
IBC TABLE 1020.2 44 INCHES

BREAKROOM USE:

THE CASEWORK AND APPLIANCES USED IN THE BREAKROOM ARE FOR FOOD WARMING ONLY AND NOT FOR FOOD PREPARATION.

ALL APPLIANCES ARE RESIDENTIAL GRADE AND SHALL BE PROVIDED AND INSTALLED BY THE OWNER.



1 LIFE SAFETY PLAN
SCALE: 1/8" = 1'-0"

NORTH

PLUMBING FIXTURES:

ALL FIXTURE COUNTS ARE PER 2015 IBC, TABLE 2902.1 & WASHINGTON STATE AMENDMENTS PER

TOTAL OCCUPANT LOAD FOR BUILDING:
ASSEMBLY SPACE 37 M / 37 F (Total Occupant Load-Rounded 74 for Unisex Restroom Use)
OFFICE SPACE 6M / 6F (12 for Unisex Restroom Use)
(TOTAL OCCUPANTS 86)

PLUMBING FIXTURE CHART

TOTAL OCCUPANTS 86	TOILETS			LAVATORIES			BATHTUBS/ SHOWERS	DRINKING FOUNTAIN	SERVICE SINK
	MALE	FEMALE	UNISEX	MALE	FEMALE	UNISEX			
REQUIREMENT (A-3 OCCUPANCY)	1/100	1/65	1	1/200		1	-	1/500	1
REQUIREMENT (B-OCCUPANCY)	1/25	1/25	1	1/40		1	-	1/100	INCLUDED ABOVE
REQUIRED			2			2	-	2	1
PROVIDED			3			3	-	2	1

LEGEND

⊗ EXIT LIGHT / EXIT SIGN

FEC NEW FIRE EXTINGUISHER AND CABINET (MAXIMUM TRAVEL DISTANCE 75'-0")

(XX/XX) SQUARE FOOTAGE OF SPACE/ROOM; PER 2015 IBC TABLE 1004.1.2 NUMBER OF OCCUPANTS USING EXIT

■ XX OCCUPANT LOAD

XX / XX / XX TOTAL OCCUPANTS USING EXIT; REQUIRED EXIT WIDTH IN INCHES PER 2015 IBC SECTIONS 1005.3.2 AND 1010.1.1; PROVIDED EXIT WIDTH

EXIT PATH

DIRECTION OF EGRESS TRAVEL

XX OCCUPANT LOAD CHANGE

EXIT ACCESS TRAVEL DISTANCE (PER IBC TABLE 1016.1)

SHEAR WALL

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RHONDA A. GILLOGLY
STATE OF WASHINGTON

MASON TRANSIT AUTHORITY

BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title:

Rev.	Description

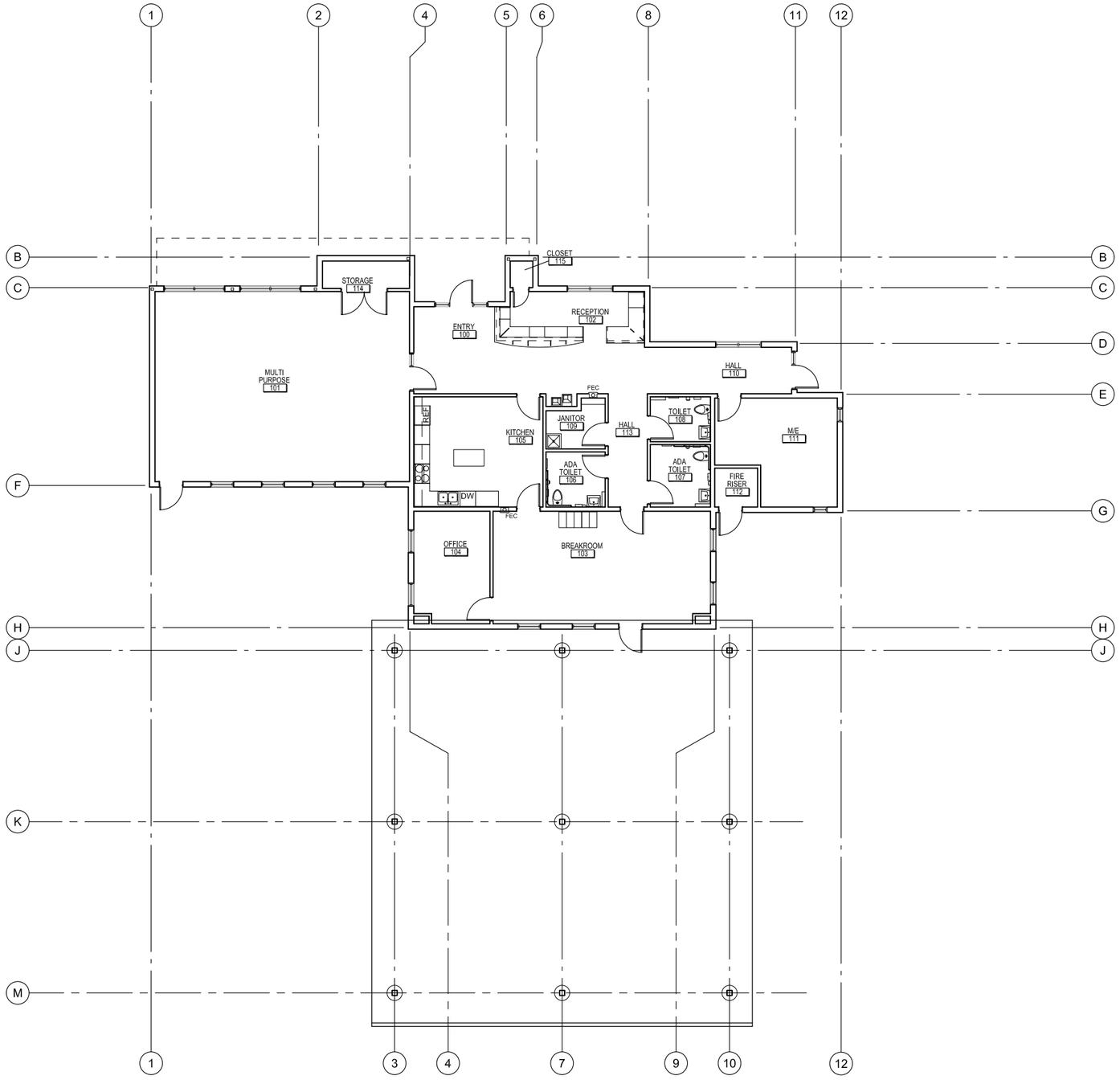
OWNER Project No:
ART Project No: 1710
Drawn By: RG
Approved By: RG
Date: Feb 12, 2020

Sheet Title:
CODE INFORMATION & LIFE SAFETY PLANS

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
G1.0

Bid Set



1 REFERENCE FLOOR PLAN
SCALE: 1/8" = 1'-0"

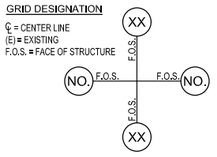
NORTH

ABBREVIATIONS

A/C	AIR CONDITIONING (ER)
AGT	ACOUSTICAL CEILING TILE
AFF	ABOVE FINISH FLOOR
ALT	ALTERNATE (IVE)
CL	CENTERLINE
CLR	CLEAR (ANCE)
CONT	CONTINUOUS
CTR	CENTER
DBL	DOUBLE
DEMO	DEMOLISH (ITION)
DEPT	DEPARTMENT
DIA	DIAMETER
DIM	DIMENSION
DN	DOWN
EA	EACH
ELEV	ELEVATION
EXT	EXTERIOR
FEC	FIRE EXTINGUISHER CABINET
FF	FINISH FLOOR
FIN	FINISH (ED)
FLR	FLOOR
GA	GAUGE
GALV	GALVANIZED
GWB	GYPSUM WALLBOARD
HM	HOLLOW METAL
HVAC	HEATING, VENTILATING, & AIR CONDITIONING
INT	INTERIOR
LAV	LAVATORY
MAX	MAXIMUM
MIN	MINIMUM
MISC	MISCELLANEOUS
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OC	ON CENTER
OFI	OWNER FURNISHED AND INSTALLED
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
OPP	OPPOSITE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
QTY	QUANTITY
R	RADIUS
RD	ROOF DRAIN
REQ'D	REQUIRED
RO	ROUGH OPENING
SC	SOLID CORE
SF	SQUARE FOOT
SIM	SIMILAR
SPEC	SPECIFICATION
SQ	SQUARE
SS	STAINLESS STEEL
STOR	STORAGE
SUSP	SUSPENDED
TS	TUBE STEEL
TYP	TYPICAL
UNO	UNLESS OTHERWISE NOTED
VAR	VARIES (VARIOUS)
VCT	VINYL COMPOSITION TILE
VERT	VERTICAL
W/	WITH
W/O	WITHOUT
WC	WATER CLOSET
WP	WATERPROOF
WR	WATER-RESISTANT
#	NUMBER
<	ANGLE

SYMBOLS - (USED THROUGHOUT)

GRID DESIGNATION
℄ = CENTER LINE
(E) = EXISTING
F.O.S. = FACE OF STRUCTURE



ELEVATION SYMBOL
12" ELEVATION OR HEIGHT ABOVE FINISHED FLOOR

REVISION SYMBOL
REVISION NO.
REVISION CLOUD

CEILING SYMBOL
CEILING HEIGHT
CEILING MATERIAL

ROOM I.D. SYMBOL
ROOM NAME
ROOM NUMBER

WALL TYPE SYMBOL
WALL TYPE NUMBER (REFER TO SHEET AG1.0)

WINDOW TYPE SYMBOL
WINDOW NUMBER

ACCESSORY TYPE SYMBOL
ITEM (REFER TO SHEET AG2.1)

DOOR CLEARANCES
WALL TYP.
DOOR NUMBER
(USE STANDARD DIMENSIONS SHOWN, U.N.O.)

DETAIL SYMBOLS
DETAIL NO. OR LETTER
SHEET DETAIL APPEARS
GENERAL DETAIL DIVISION (I.E. 5 = AG5- SERIES)
DETAIL NUMBER

ELEVATION SYMBOL
ELEV. NO. OR LETTER
SHEET ELEV. APPEARS

SECTION SYMBOL
SECTION NO. OR LETTER
SHEET SECTION APPEARS

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MASON TRANSIT AUTHORITY
BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title:

Rev.	Description

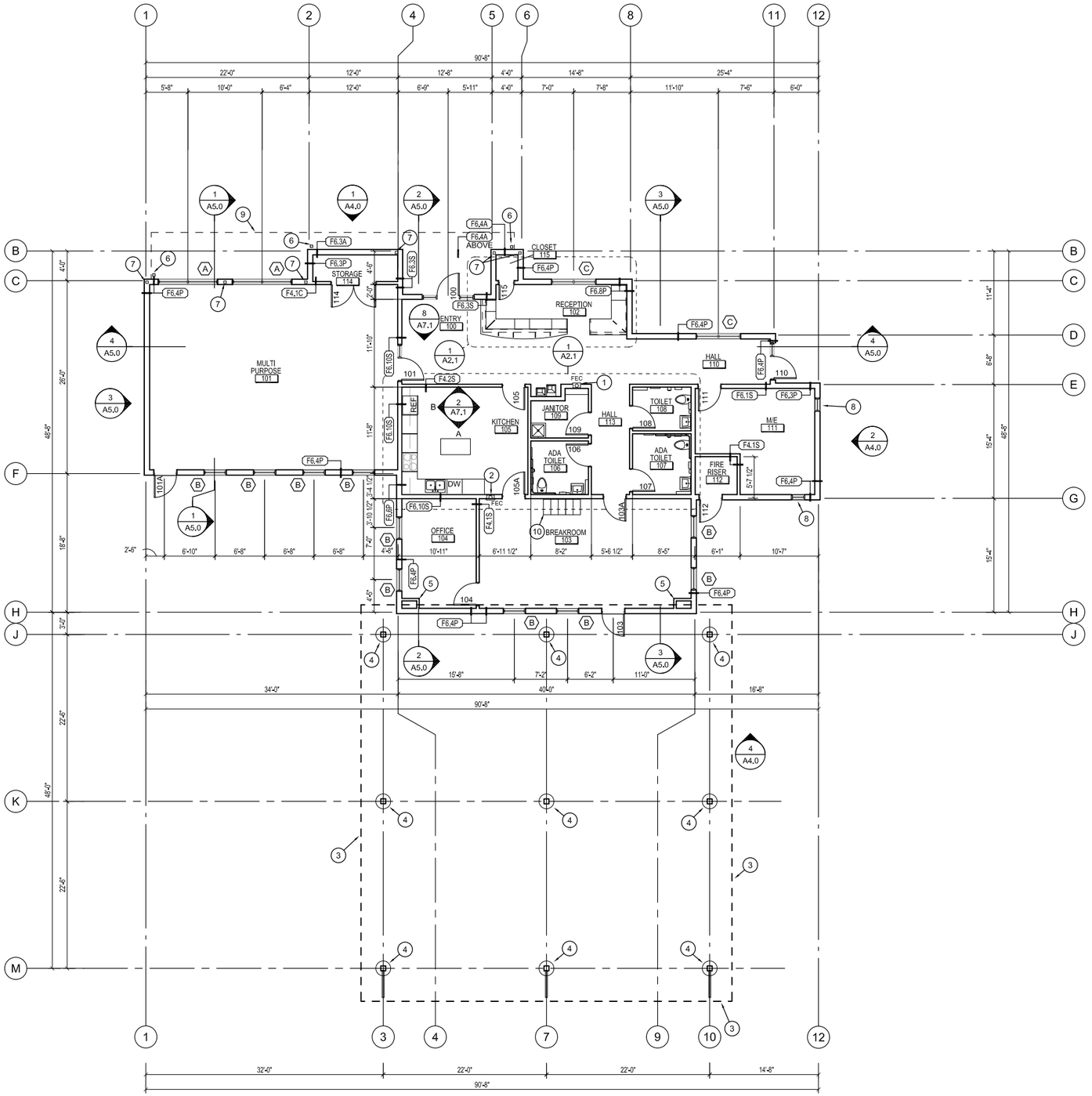
OWNER Project No:
ART Project No: 1710
Drawn By: RG
Approved By: RG
Date: Feb 12, 2020

Sheet Title:
REFERENCE FLOOR PLAN

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
A1.0

Bid Set



1 FLOOR PLAN

SCALE: 1/8" = 1'-0"

NORTH

KEYED NOTES

1. FIRE EXTINGUISHER AND CABINET. SEE DETAIL 306, PARTIAL ENLARGED PLANS AND SHEET AG1.0 FOR INSTALLATION HEIGHT.
2. FIRE EXTINGUISHER AND CABINET. SEE DETAIL 305, PARTIAL ENLARGED PLANS AND SHEET AG1.0 FOR INSTALLATION HEIGHT
3. DASHED LINES REPRESENTS BUS CANOPY STRUCTURE ROOF ABOVE.
4. BUS CANOPY REINFORCED CONCRETE FOOTING WITH TUBE STEEL COLUMN, REFER TO BUILDING SECTIONS ON SHEET A5.0 & STRUCTURAL DRAWINGS. OTHER SHEETS INCLUDE EXTERIOR ELEVATIONS A4.0 &A4.1 AND ROOF PLAN ON SHEET 3.0
5. PIPE CHASE. FORM OUT OF 2X4'S AT 16" O.C. AND COVER WITH 5/8" TYPE 'X' GYPSUM BOARD TO A MINIMUM OF 8" ABOVE THE ADJACENT CEILING. PIPE CHASE SHALL MATCH SIMILAR PIPE CHASE IN OFFICE / BREAKROOM IN OVERALL SIZE. PROVIDE MINIMUM 2" CLEARANCE AROUND PIPES.
6. DOWNSPOUT FROM CANOPY ABOVE.
7. TUBE STEEL COLUMN SUPPORT IN WALL FOR CANOPY SUPPORT: SEE STRUCTURAL DRAWINGS.
8. THRU-WALL MECHANICAL LOUVER. SEE DETAILS 402, 403 & MECHANICAL DRAWINGS.
9. DASHED LINE REPRESENTS STEEL CANOPY ABOVE. SEE ROOF PLAN ON SHEET A3.0
10. CASEWORK LOCKERS. SEE DETAIL 515.

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FLOOR PLAN

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

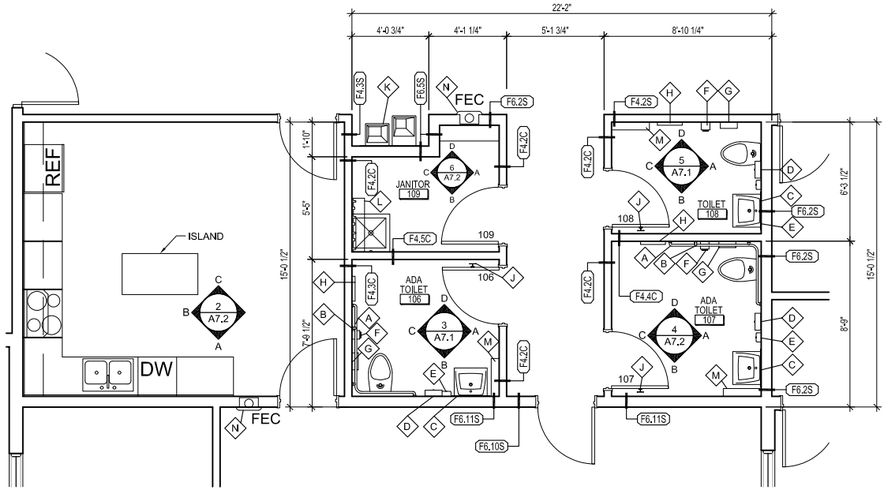
Sheet No:
A2.0

Bid Set

TOILET/JANITOR ACCESSORIES/EQUIPMENT KEY

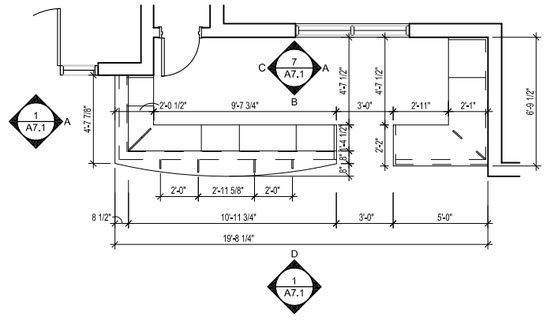
NOTE: SEE SHEET AG1.0 FOR EQUIPMENT MOUNTING HEIGHTS. SEE INTERIOR ELEVATIONS FOR ADDITIONAL INFORMATION

- A — GRAB BAR - L-SHAPED, HORIZONTAL
  BOBRICK B-68137 SERIES OR ARCHITECT APPROVED EQUAL
- B — GRAB BAR - 18" LONG, VERTICAL
  BOBRICK B-68137 SERIES OR ARCHITECT APPROVED EQUAL
- C — MIRROR - 24"Wx36"H
  BOBRICK B-2908 OR ARCHITECT APPROVED EQUAL
- D — PAPER TOWEL DISPENSER - SURFACE MOUNT
  BOBRICK B-359039 OR ARCHITECT APPROVED EQUAL
- E — SOAP DISPENSER
  BOBRICK B-4112 OR ARCHITECT APPROVED EQUAL
- F — TOILET TISSUE DISPENSER - DOUBLE ROLL-SURFACE MOUNT
  BOBRICK B-265 OR ARCHITECT APPROVED EQUAL
- G — SANITARY NAPKIN RECEPTACLE
  BOBRICK B-259 OR ARCHITECT APPROVED EQUAL
- H — TOILET SEAT COVER DISPENSER
  BOBRICK B-301 OR ARCHITECT APPROVED EQUAL
- J — COAT/ROBE HOOK
  BOBRICK B-7671 OR ARCHITECT APPROVED EQUAL
- K — HI-LOW ADA DRINKING FOUNTAIN
  SEE MECHANICAL DRAWINGS
- L — MOP/BROOM HOLDER
  BOBRICK B-239 OR ARCHITECT APPROVED EQUAL
- M — STAINLESS STEEL SHELF
  BOBRICK B-295 X 24" OR ARCHITECT APPROVED EQUAL



1 PARTIAL ENLARGED FLOOR PLAN
SCALE: 1/4" = 1'-0"

NORTH



2 PARTIAL ENLARGED PLAN AT RECEPTION DESK
SCALE: 1/4" = 1'-0"

NORTH

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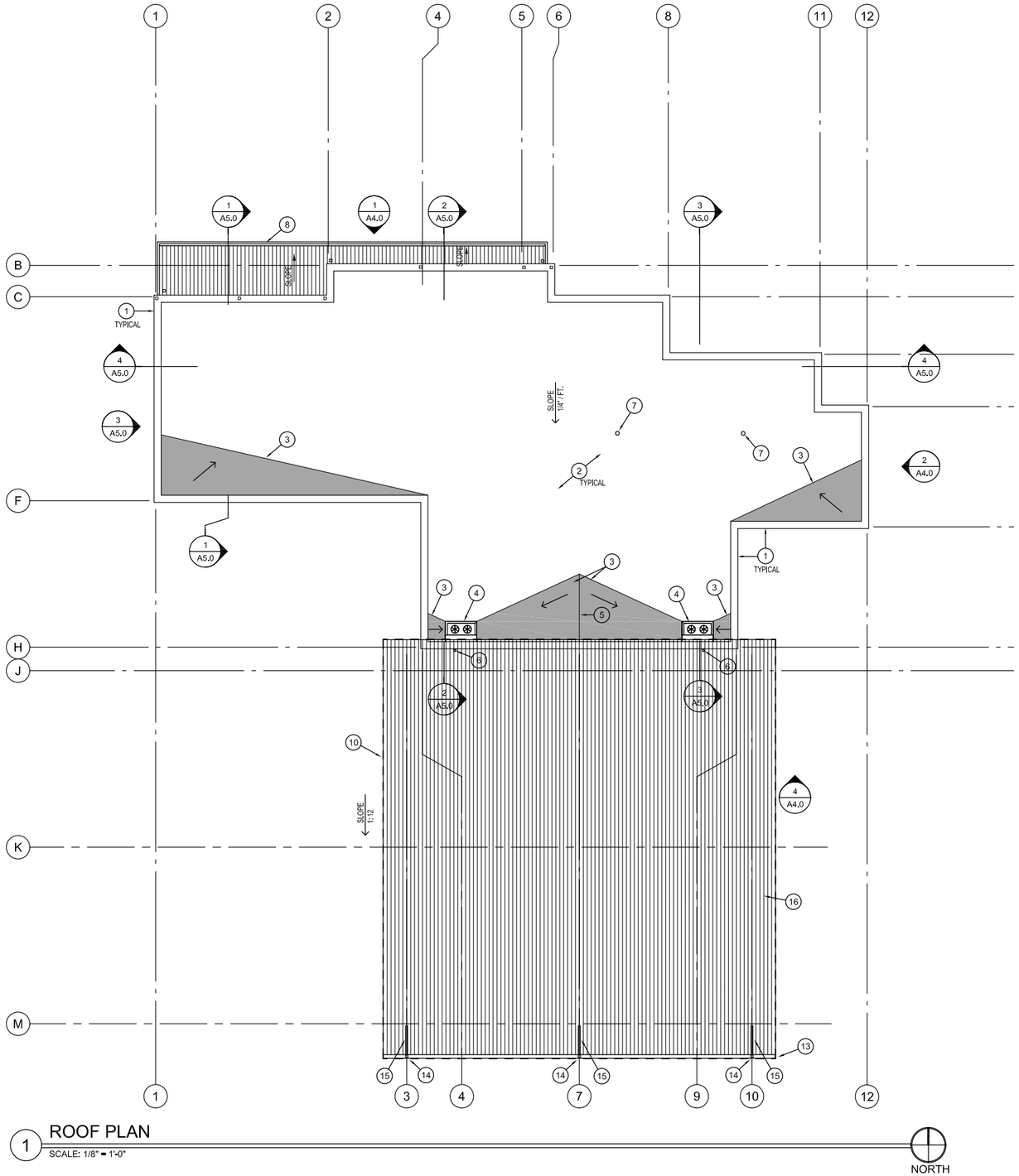
Sheet Title:
PARTIAL ENLARGED PLANS

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
A2.1

Bid Set



1 ROOF PLAN

SCALE: 1/8" = 1'-0"

NORTH

ROOF PLAN KEYED NOTES

1. PARAPET CAP FLASHING
2. SINGLE PLY TPO ROOFING ON 1/4" DENS DECK COVER BOARD ON 6" RIGID ROOF INSULATION OR EQUAL TO R-38 (ON PLYWOOD T&G SHEATHING.) ROOFING SHALL BE INSTALLED PER ROOFING MATERIAL MANUFACTURER'S WRITTEN INSTRUCTIONS AND DETAILS TO MEET WARRANTY REQUIREMENTS. R-VALUE = 42.34.
3. ROOF CRICKET CONSTRUCTED OF ADDITIONAL SLOPING RIGID INSULATION WITH ½" DENS DECK COVER BOARD
4. 3" ROOF DRAIN AND 3" OVERFLOW DRAIN, SEE DETAIL 417.
5. CRICKET RIDGE
6. OVERFLOW DRAIN OUTLET BELOW
7. THRU ROOF VENT PIPE. SEE DETAIL 404. ALSO SEE MECHANICAL DRAWING FOR SIZING.
8. MS-F4 METAL ROOF DECK AEP SPAN HR-36 ROOF PANEL COLOR:WHITE
9. NOT USED
10. BUS CANOPY
11. BUILT IN SHEET METAL GUTTER
12. STAINLESS STEEL LETTERING
13. SHEET METAL GUTTER BY METAL ROOFING MANUFACTURER
14. SHEET METAL DOWNSPOUT CUT INTO SHEET METAL GUTTER
15. SHEET METAL DOWNSPOUT BELOW ROOFING, TYP.
16. METAL ROOF DECK MS-F3 AEP SPAN HR-36 ROOF PANEL COLOR: SLATE GRAY, PROVIDE SHEET METAL EDGE FLASHINGS THAT MATCH AEP SPAN SLATE GRAY COLOR.

GENERAL NOTES

A. ROOF CRICKETS TO SLOPE TO DRAINS AT MANUFACTURER'S RECOMMENDED SLOPES TO ACHIEVE POSITIVE DRAINAGE.

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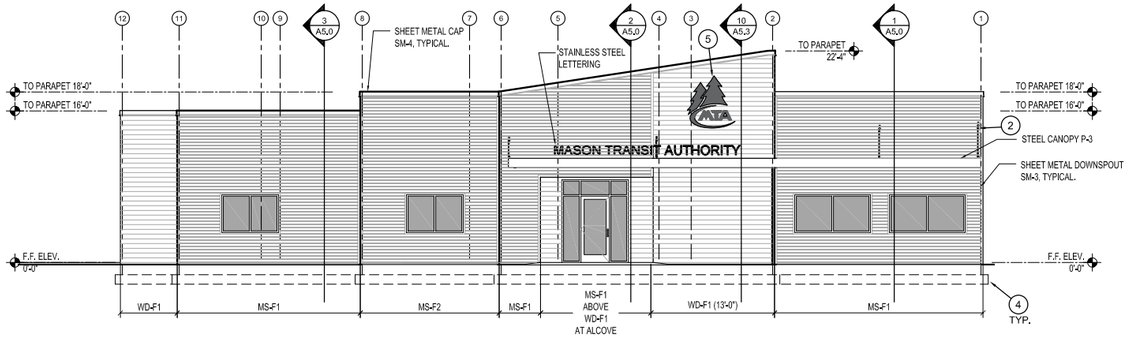
Sheet Title:
ROOF PLAN

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

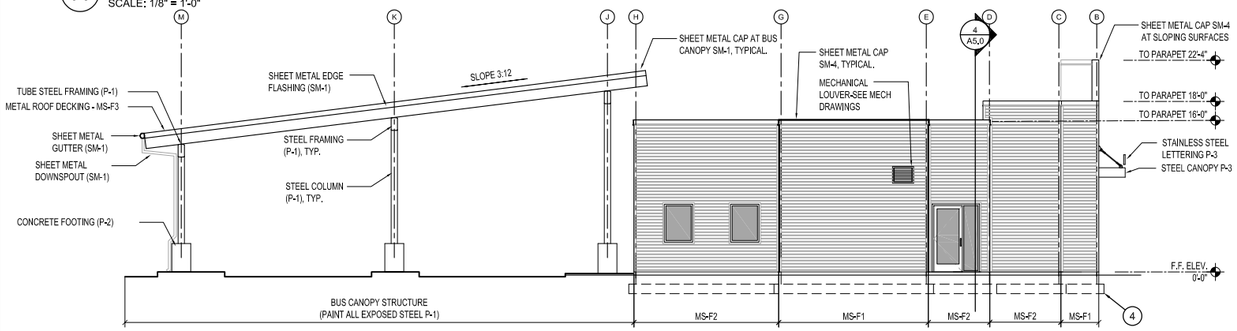
Sheet No:
A3.0

Bid Set



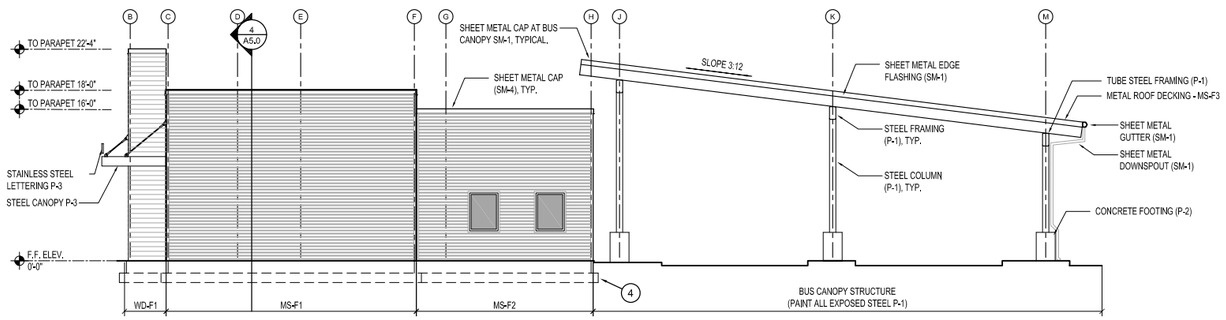
A NORTH ELEVATION

SCALE: 1/8" = 1'-0"



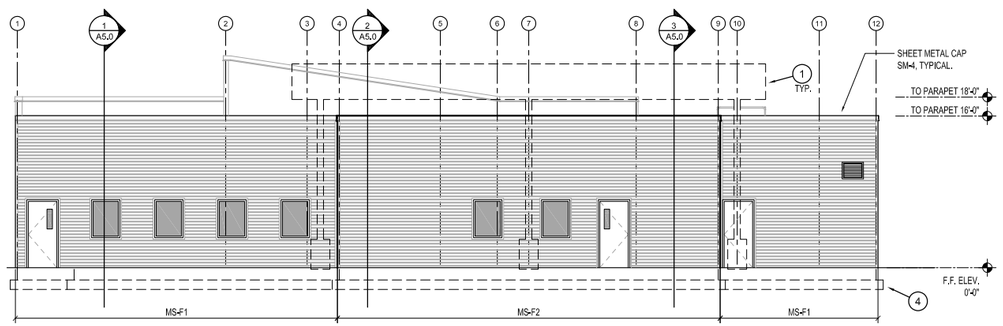
B EAST ELEVATION

SCALE: 1/8" = 1'-0"



C WEST ELEVATION

SCALE: 1/8" = 1'-0"



D WEST ELEVATION

SCALE: 1/8" = 1'-0"

KEYED NOTES

1. DASHED LINES REPRESENT OUTLINE OF BUS CANOPY STRUCTURE
2. CANOPY SUSPENSION STEEL - FINISH P-3
3. THRU WALL CAST IRON SHEEP'S TONGUE EVEN FLOW DRAIN OUTLET
4. REINFORCED CONCRETE FOUNDATION WALL & FOOTING - SEE STRUCTURAL DRAWINGS FOR MORE INFORMATION.
5. CUSTOM FABRICATED METAL MTA LOGO SIGN-SEE DETAIL 422. CENTER ON WIDTH OF WOOD PANELING. VERTICAL LOCATION TO BE DETERMINED IN FIELD

FINISH LEGEND-EXTERIOR

NOTE: PRODUCTS LISTED BELOW ARE BASIS OF DESIGN. OTHER PRODUCTS CAN BE SUBMITTED FOR APPROVED EQUAL BY ARCHITECT / OWNER PRIOR TO BID.

MS-F1	METAL SIDING PANEL	AEP SPAN HR-36	COLOR: COOL SLATE GRAY
MS-F2	METAL SIDING PANEL	AEP SPAN HR-36	COLOR: OLD TOWN GRAY
MS-F3	METAL ROOF PANEL (AT BUS CANOPY)	AEP SPAN HR-36	COLOR: COOL SLATE GRAY
MS-F4	METAL ROOF PANEL (AT FRONT SUSPENDED CANOPY)	AEP SPAN HR-36	COLOR: WHITE

SHEET METAL COLORS

SM-1: MATCH AEP SPAN COLOR COOL SLATE GRAY

SM-2: TO BE SELECTED BY OWNER / ARCHITECT

SM-3: EVERGREEN (TO BE SELECTED BY OWNER / ARCHITECT)

SM-4: BLACK (TO BE SELECTED BY OWNER / ARCHITECT), USE AT ALL CAP FLASHINGS, INTERIOR & EXTERIOR CORNER TRIMS, DOOR, WINDOW, & LOWER TRIMS.

PAINT COLORS AT STEEL

P-1: MATCH AEP SPAN COLOR COOL SLATE GRAY

P-2: YELLOW (TO BE SELECTED BY OWNER / ARCHITECT)

P-3: EVERGREEN (TO BE SELECTED BY OWNER / ARCHITECT)

P-6: MATCH AEP SPAN COLOR OLD TOWN GRAY

WOOD SIDING

WD-F1: 1X6 T&G RED CEDAR SMOOTH SIDING WITH CLEAR SEALER OR CHERRY COLORED STAIN WITH CLEAR SEALER. CONTRACTOR TO PROVIDE SAMPLES FOR REVIEW, COMMENT AND SELECTION BY OWNER / ARCHITECT

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8677 REGISTERED ARCHITECT
RHONDA A. GILLOGLY STATE OF WASHINGTON

MASON TRANSIT AUTHORITY
BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title:

Rev.	Description

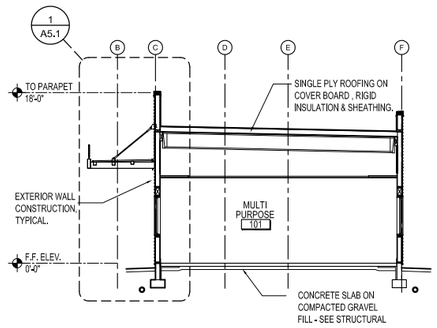
OWNER Project No:
ART Project No: 1710
Drawn By: RG
Approved By: RG
Date: Feb 12, 2020

Sheet Title:
EXTERIOR ELEVATIONS

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

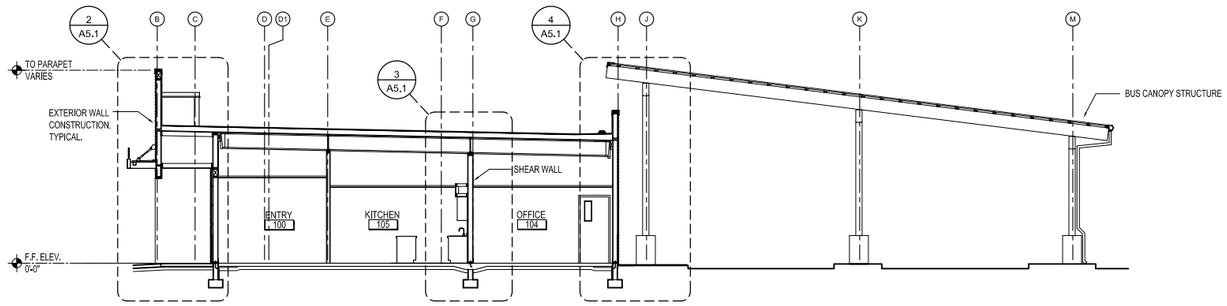
Sheet No:
A4.0

Bid Set



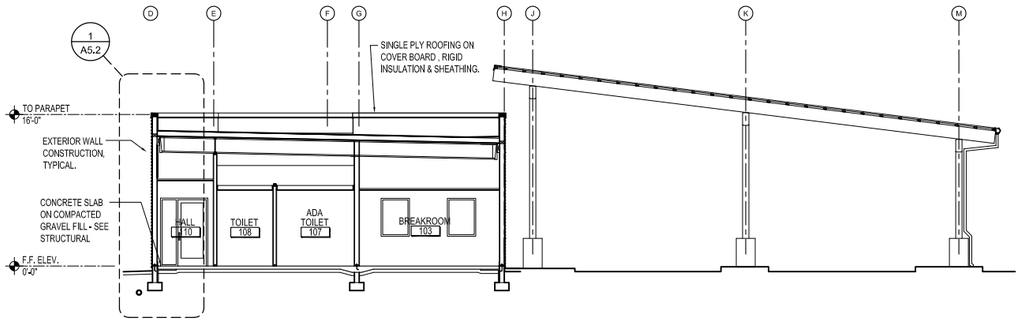
1 BUILDING SECTION

SCALE: 1/8" = 1'-0"



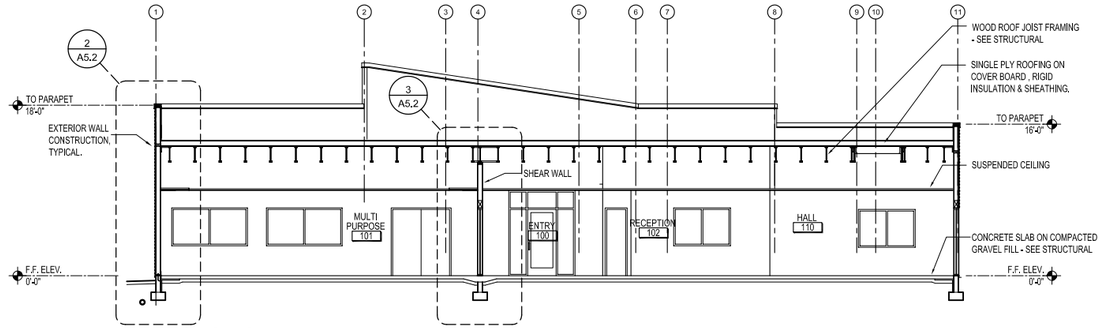
2 BUILDING SECTION

SCALE: 1/8" = 1'-0"



3 BUILDING SECTION

SCALE: 1/8" = 1'-0"



4 BUILDING SECTION

SCALE: 1/8" = 1'-0"

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Project Title:

Rev.	Description

OWNER Project No:
ART Project No: 1710
Drawn By: RG
Approved By: RG
Date: Feb 12, 2020

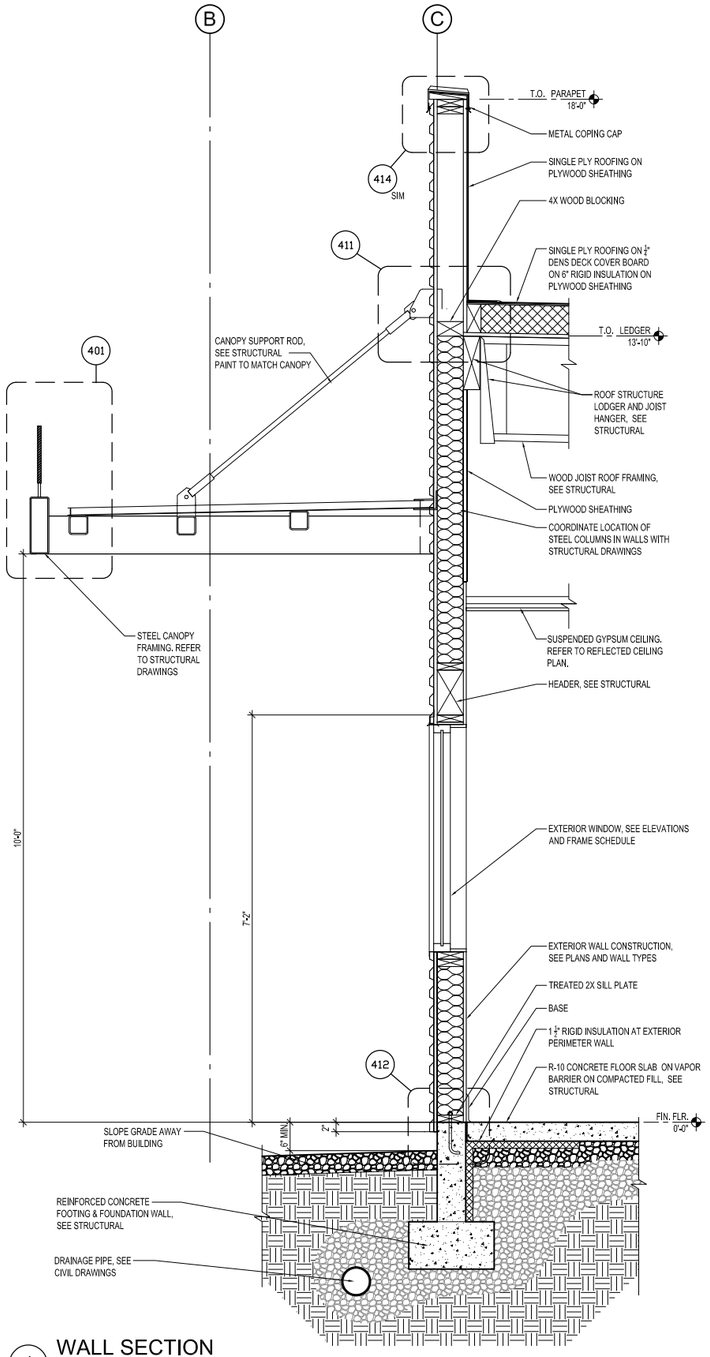
Sheet Title:
BUILDING SECTIONS

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:

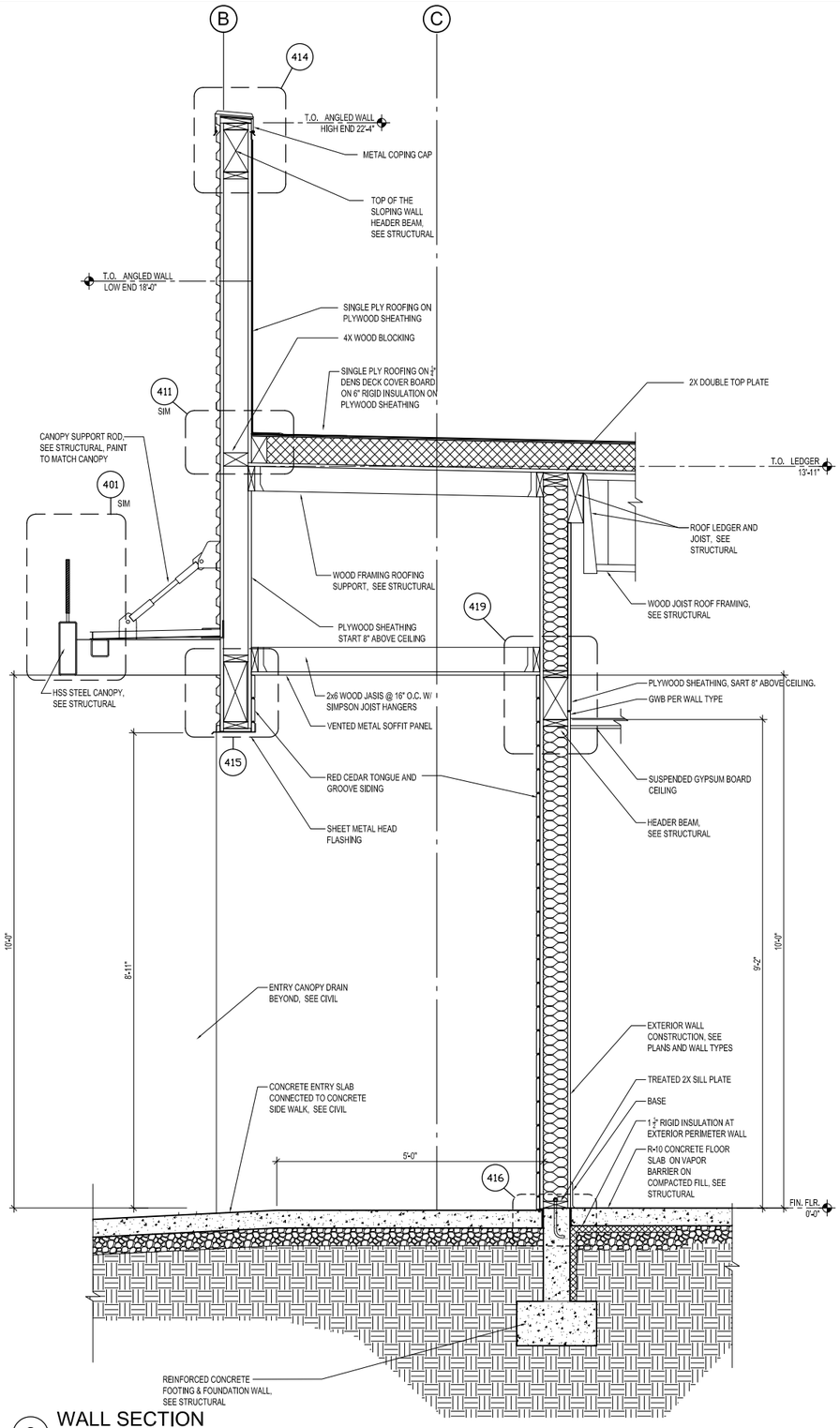
A5.0

Bid Set



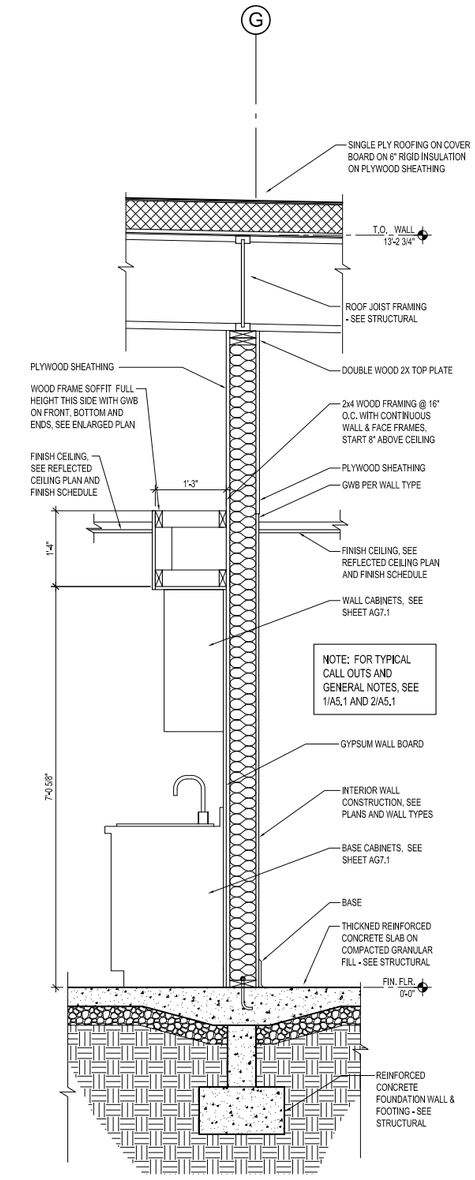
1 WALL SECTION

SCALE: 3/4" = 1'-0"



2 WALL SECTION

SCALE: 3/4" = 1'-0"



3 WALL SECTION

SCALE: 3/4" = 1'-0"

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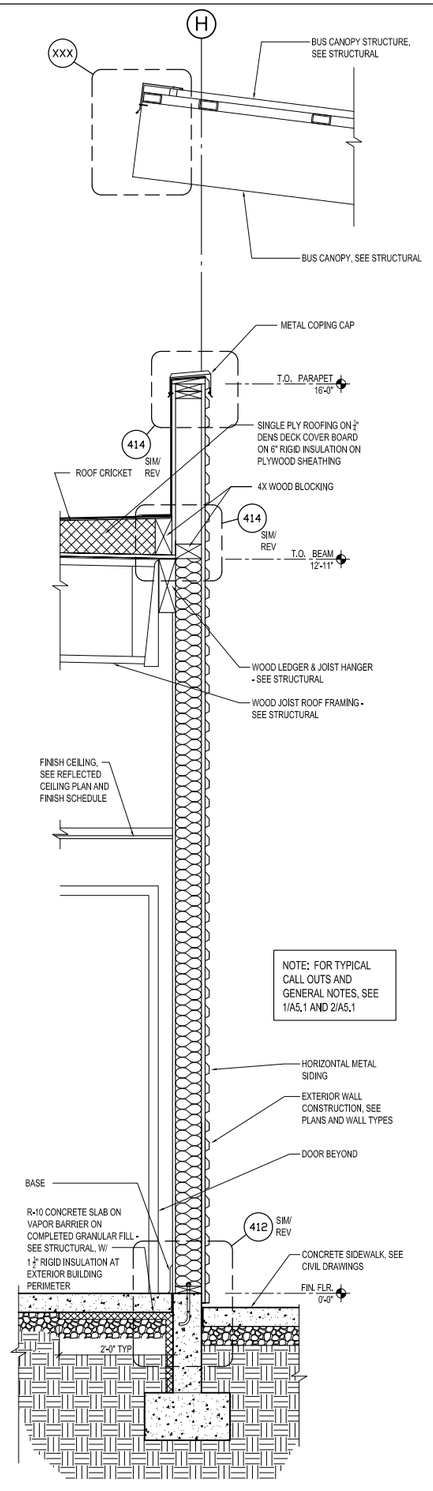
Drawn By: RG
Approved By: RG
Date: Feb 12, 2020

Sheet Title:
WALL SECTIONS (1-3)

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

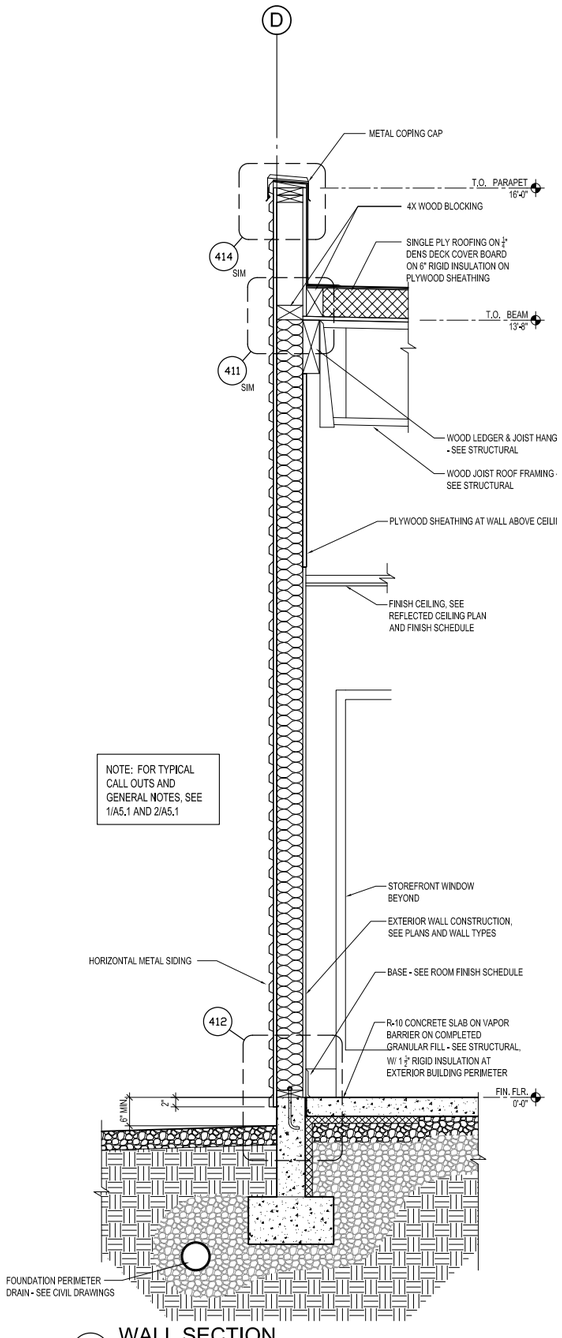
Sheet No:
A5.1

Bid Set



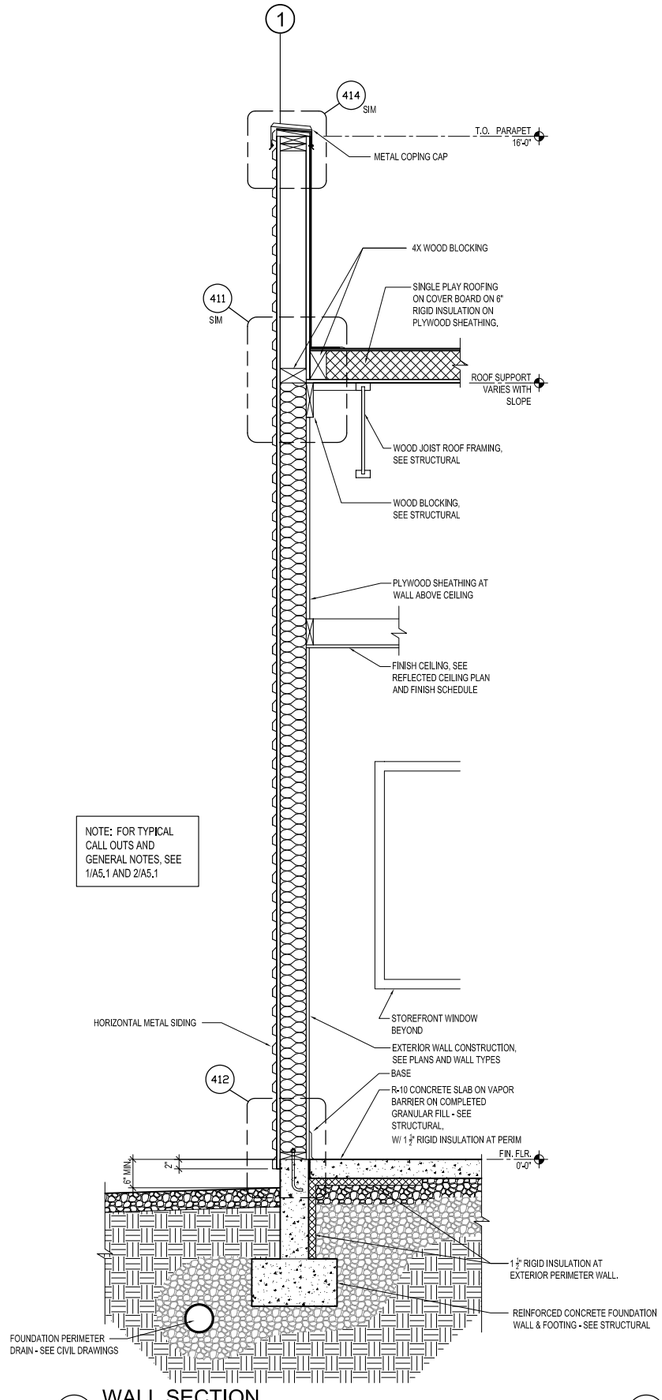
4 WALL SECTION

SCALE: 3/4" = 1'-0"



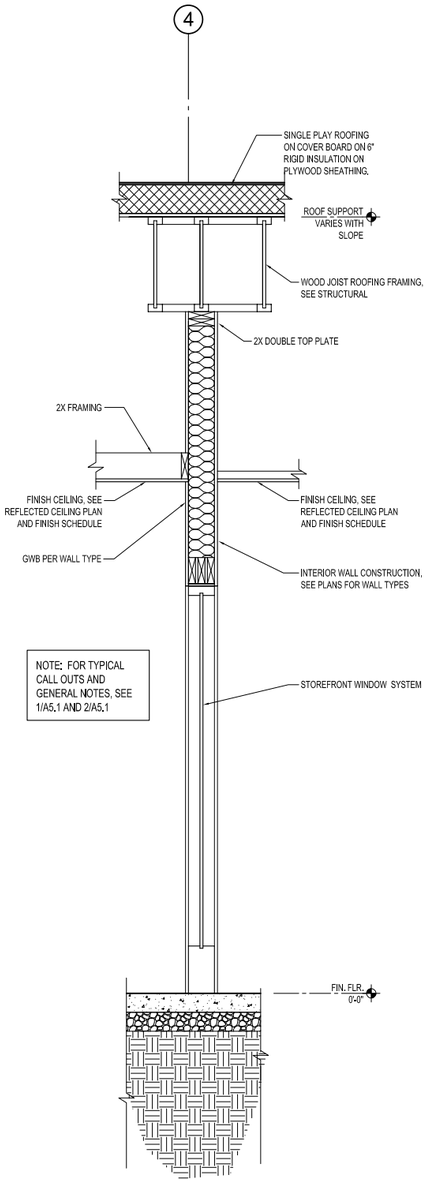
5 WALL SECTION

SCALE: 3/4" = 1'-0"



6 WALL SECTION

SCALE: 3/4" = 1'-0"



7 WALL SECTION

SCALE: 3/4" = 1'-0"

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Project Title:

Rev.	Description

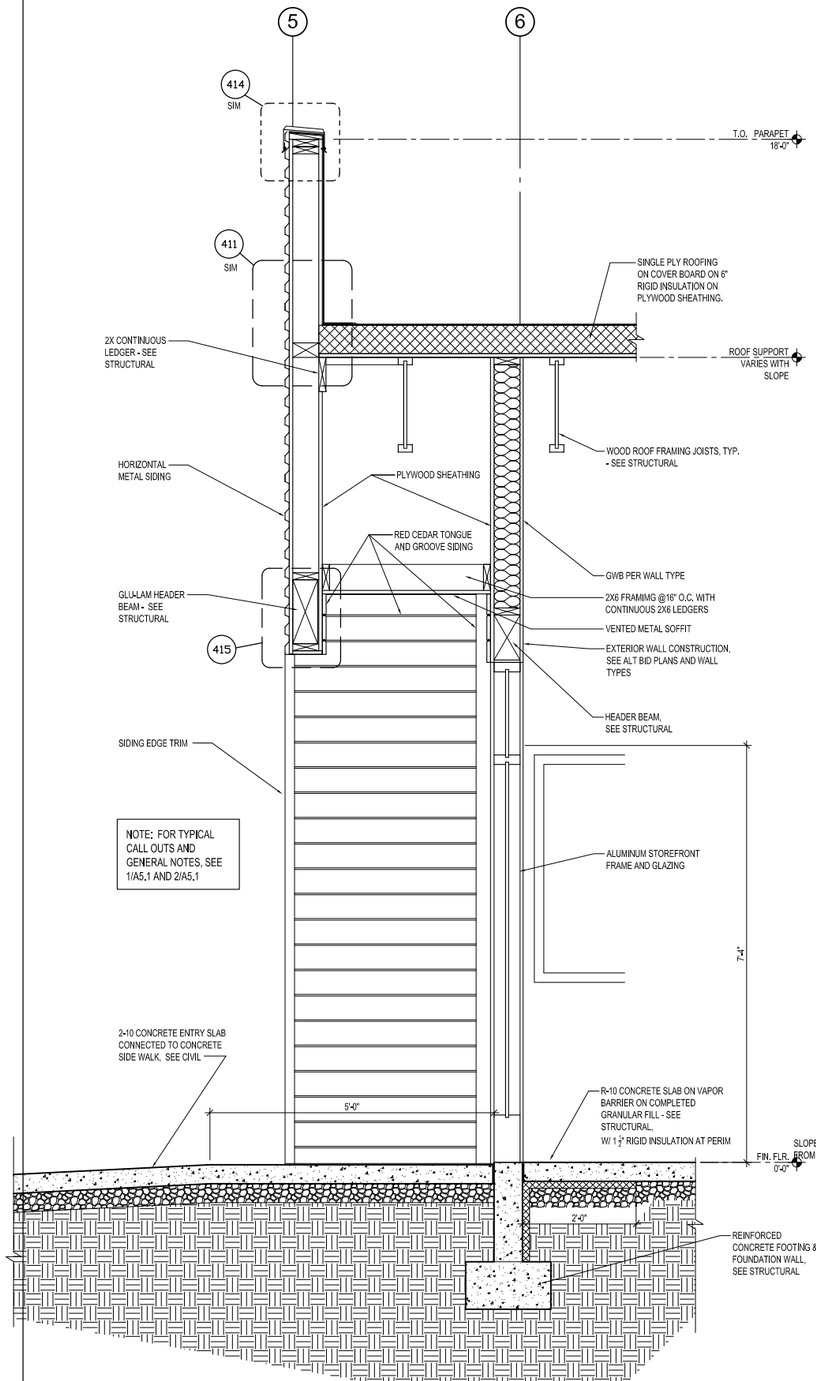
OWNER Project No:
ART Project No: 1710
Drawn By: RG
Approved By: RG
Date: Feb 12, 2020
Sheet Title: (4-7)

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

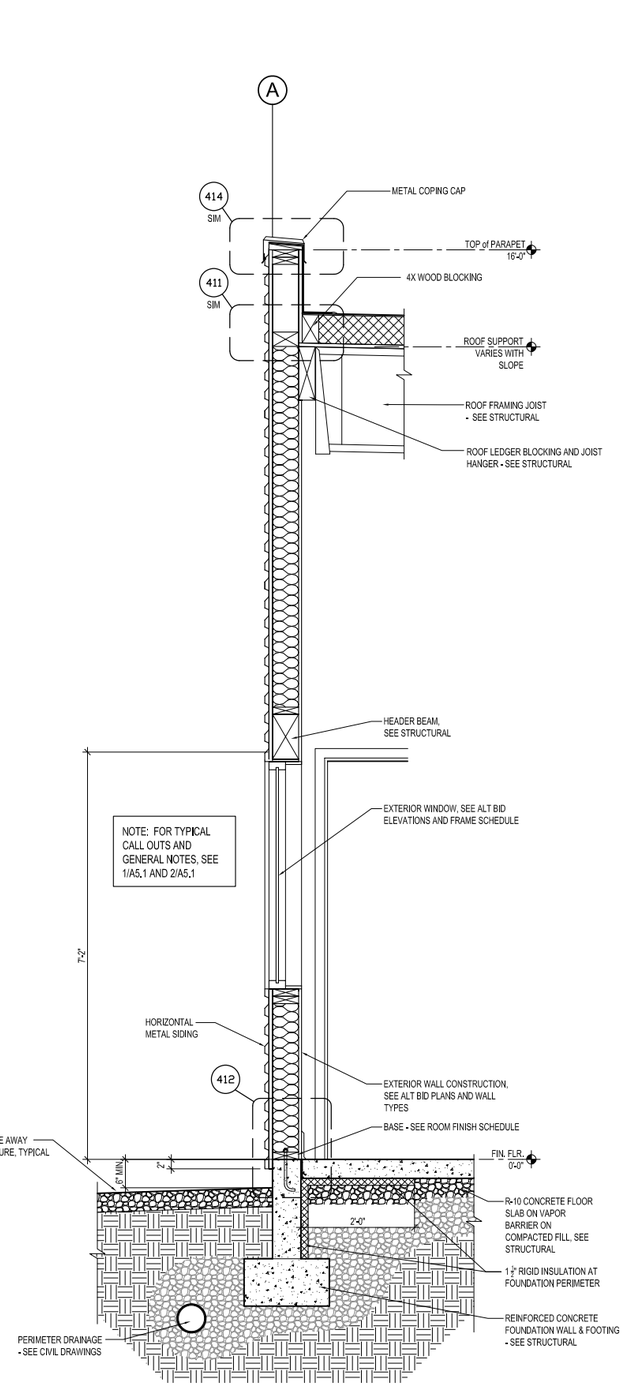
Sheet No:

A5.2

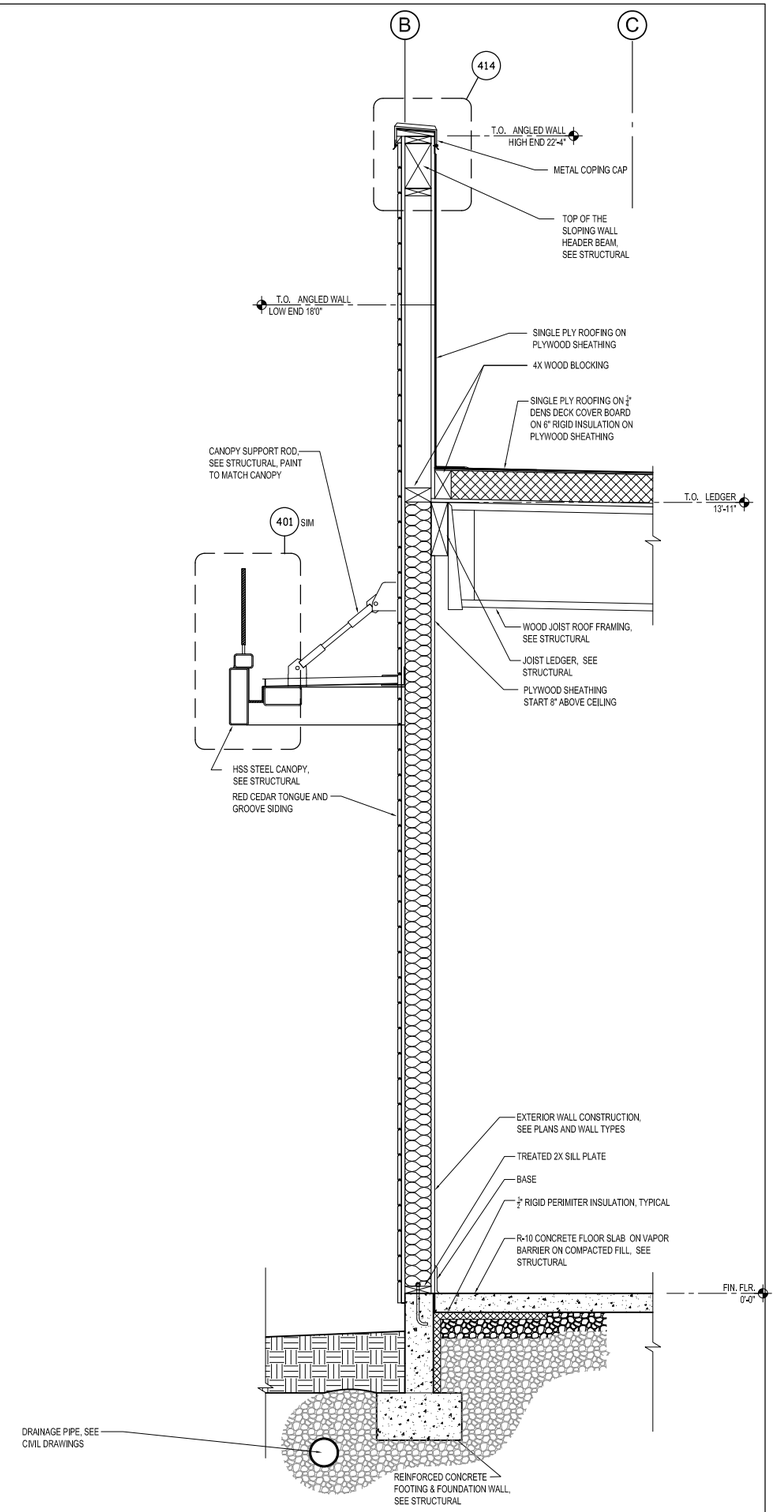
Bid Set



8 WALL SECTION
SCALE: 3/4" = 1'-0"



9 WALL SECTION
SCALE: 3/4" = 1'-0"



10 WALL SECTION
SCALE: 3/4" = 1'-0"

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Project Title:

Rev.	Description

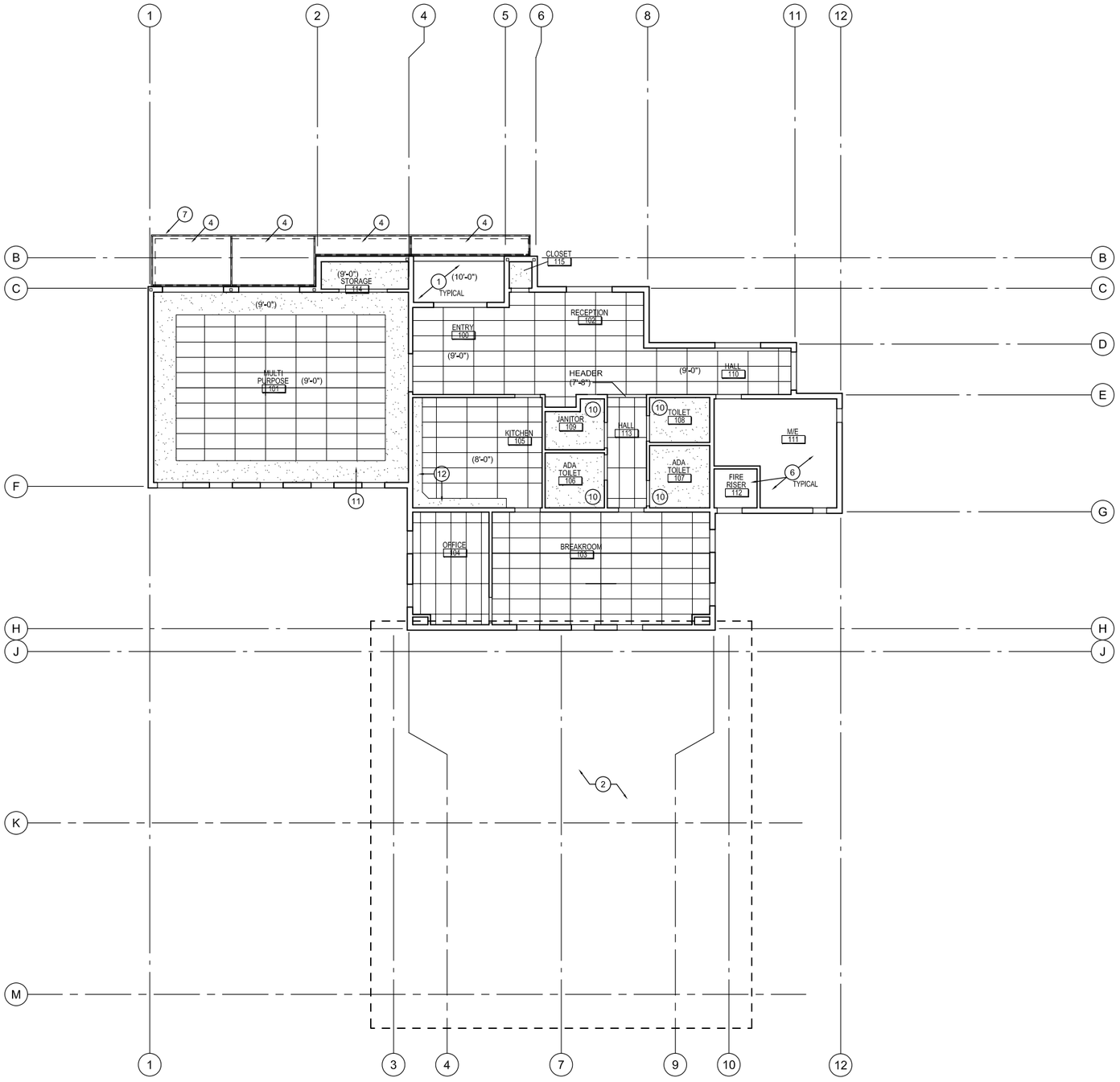
OWNER Project No:
ART Project No: 1710
Drawn By: RG
Approved By: RG
Date: Feb 12, 2020

Sheet Title:
WALL SECTIONS (8-10)

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
A5.3

Bid Set



1 REFLECTED CEILING PLAN

SCALE: 1/8" = 1'-0"

NORTH

GENERAL NOTES:

A. REFER TO MECHANICAL AND ELECTRICAL PLANS FOR LAYOUT OF RESPECTIVE FIXTURES AND EQUIPMENT (I.E. LIGHT FIXTURES, RETURN AND SUPPLY GRILLES, SPRINKLER HEADS, SPEAKERS, SMOKE DETECTION ETC.)

REFLECTED CEILING PLAN KEYED NOTES

1. VENTED METAL SOFFIT (MS.F2)
2. UNDERSIDE OF BUS CANOPY & METAL DECKING - NOT SHOWN FOR CLARITY. PAINT ALL WITH P-1
3. NOT USED
4. UNDERSIDE OF METAL DECKING-PAINT (P-3)
5. BUS CANOPY COLUMN-PAINT (P-1)
6. OPEN TO STRUCTURE
7. DASHED LINE REPRESENTS EDGE OF SUSPENDED METAL CANOPY-PAINT (P-3)
8. NOT USED
9. SUSPENDED GYPSUM SOFFIT (P.
10. 5/8" TYPE SUSPENDED GYPSUM BOARD CEILING. SEE DETAIL 311.
11. SUSPENDED 5/8" TYPE 'X' GYPSUM BOARD PERIMETER CEILING SOFFIT ON METAL FRAMING, SEE DETAIL 311.
12. 2X4 FRAMED SOFFIT @ 16" O.C. WITH CONTINUOUS 2X4 BOX OUT FRAMING MEMBERS COVERED WITH 5/8" TYPE 'X' GYPSUM BOARD, PROVIDE METAL CORNER BEADS AT ALL EDGES.

CEILING LEGEND:

NEW SUSPENDED ACOUSTIC CEILING TILE & GRID. SEE DETAIL 312 AND 316.

NEW SUSPENDED GYPSUM BOARD CEILING (PAINTED)

(9'-0") CEILING HEIGHT - MEASURED ABOVE FINISHED FLOOR (A.F.F.)

HEADER OVER DOOR, WINDOW OR LOUVER OPENING

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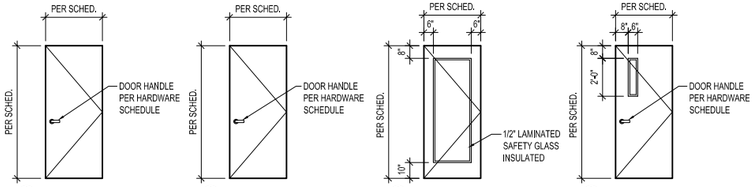
Sheet Title:
REFELCTED CEILING PLAN

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
A6.0

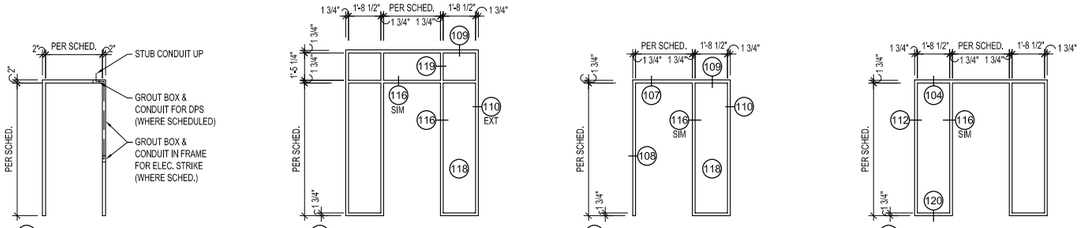
Bid Set



1. 16 GA. HOLLOW MTL. DOOR (INSULATED AT EXTERIOR WALL)
2. SOLID CORE WOOD DOOR
3. ALUMINUM STOREFRONT ENTRANCE WITH ½" INSULATED LAMINATED GLASS
4. 14 GA. HOLLOW METAL. DOOR W/1/2" INSULATED LAMINATED GLASS
5. SOLID CORE WOOD DOOR W/1/4" TEMPERED SAFETY GLASS

DOOR TYPES

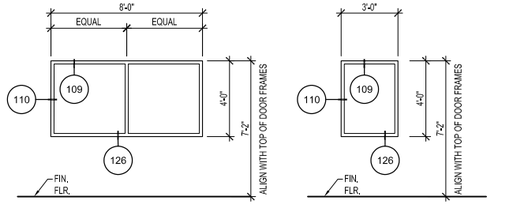
SCALE: 1/4" = 1'-0"



1. 16 GA. HOLLOW MTL. DOOR FRAME
2. ANODIZED ALUMINUM DOOR STOREFRONT FRAME W/ SIDE LIGHTS
   - COORDINATE LOW VOLTAGE CONTROLS W/ HARDWARE SCHEDULE & ADA CONTROLS
   - PROVIDE ½" INSULATED GLAZING
   - LAMINATED
3. ANODIZED ALUMINUM DOOR STOREFRONT FRAME W/ SIDE LIGHTS
   - COORDINATE LOW VOLTAGE CONTROLS W/ HARDWARE SCHEDULE & ADA CONTROLS
   - PROVIDE ½" INSULATED GLAZING
   - LAMINATED
4. ANODIZED ALUMINUM DOOR STOREFRONT FRAME W/ SIDE LIGHTS
   - COORDINATE LOW VOLTAGE CONTROLS W/ HARDWARE SCHEDULE & ADA CONTROLS
   - PROVIDE ½" INSULATED GLAZING
   - LAMINATED

DOOR FRAME TYPES

SCALE: 1/4" = 1'-0"



A. EXTERIOR ANODIZED ALUMINUM WINDOW

B. EXTERIOR ANODIZED ALUMINUM WINDOW

WINDOW TYPES

SCALE: 1/4" = 1'-0"

DOOR SCHEDULE

DOOR						FRAME			HDW GROUP	DETAILS			GLASS TYPE	REFERENCE NOTES
NO.	TYPE	RATING	SIZE	MAT/GA	FIN.	TYPE	MAT/GA	FIN.		HEAD	JAMB	SILL		
100	3	NR	3'X7"X1 3/4"	ALUM	MFR	2	ALUM	MFR	1	116	116	117		1,2
101	3	NR	3'X7"X1 3/4"	ALUM	MFR	3	ALUM	MFR	2	107	108	115		
101A	4	NR	3'X7"X1 3/4"	HMI	P-1	1	HM	P-1	3	121	122	123		1,2
103	4	NR	3'X7"X1 3/4"	HMI	P-6	1	HM	P-6	4	121	122	123		1,2
103A	2	NR	3'X7"X1 3/4"	SC	S-1	1	HM	P-7	5	105	106	-		
104	2	NR	3'X7"X1 3/4"	SC	S-1	1	HM	P-7	6	103	104	-		
105	5	NR	3'X7"X1 3/4"	SC	S-1	1	HM	P-7	7	101	102	-		
105A	5	NR	3'X7"X1 3/4"	SC	S-1	1	HM	P-7	8	105	106	-		
106	5	NR	3'X7"X1 3/4"	SC	S-1	1	HM	P-7	9	103	104	-		
107	5	NR	3'X7"X1 3/4"	SC	S-1	1	HM	P-7	9	103	104	-		
108	5	NR	3'X7"X1 3/4"	SC	S-1	1	HM	P-7	9	103	104	-		
109	5	NR	3'X7"X1 3/4"	SC	S-1	1	HM	P-7	10	103	104	-		
110	2	NR	3'X7"X1 3/4"	ALUM	MFR	3	ALUM	MFR	1	113	114	117		1,2
111	1	NR	3'X7"X1 3/4"	HMI	P-7	1	HM	P-7	11	101	102	-		
112	2	NR	3'X7"X1 3/4"	HMI	P-1	1	HM	P-1	12	121	122	123		
114	2	NR	PR 3'X7"X1 3/4"	SC	S-1	1	HM	P-7	13	103	104	-		
115	2	NR	2'X7"X1 3/4"	SC	S-1	1	HM	P-7	10	103	104	-		

ABBREVIATIONS:

AL	ALUMINUM
HMI	HOLLOW METAL INSULATED
MFR	MANUFACTURE FINISH
NR	NON-RATED
P	PAINT
PR	PAIR
SC	SOLID CORE WOOD
S	STAIN & VARNISH (FACTORY FINISH)

GENERAL NOTES:

A. SEE SPECIFICATIONS FOR SPECIFIC HARDWARE GROUP IDENTIFICATIONS

REFERENCE NOTES:

1. COORDINATE WITH SECURITY WIRING RACEWAY INSTALLATION
2. COORDINATE ADA OPERATING DEVICE WIRING RACEWAY INSTALLATION

FINISH SCHEDULE

ROOM NUMBER	ROOM NAME	FLOOR		BASE MAT.	WALL MATERIAL/FINISH								CEILING			REMARKS
					NORTH		EAST		SOUTH		WEST					
		MAT	FIN		MAT	FIN	MAT	FIN	MAT	FIN	MAT	FIN	MAT	FIN	HT	
100	ENTRY	CONC	PC-1	R-2	GYP	P-4			GYP	P-5	GYP	P-4	1	1	1	P-4 GYP SOFFIT
101	MULTI-PURPOSE	CONC	C-1	R-2	GYP	P-4	GYP	P-4	GYP	P-4	GYP	P-4	GYP	P-4	1	
102	RECEPTION	CONC	PC-1	R-2	GYP	P-4	GYP	P-5	GYP	P-4	GYP	P-4	1	1	1	
103	BREAK ROOM	CONC	C-1	R-2	GYP	P-4	GYP	P-4	GYP	P-4	GYP	P-4	1	1	1	
104	OFFICE	CONC	C-1	R-2	GYP	P-4	GYP	P-4	GYP	P-4	GYP	P-4	1	1	1	P-4 GYP SOFFIT
105	KITCHEN	CONC	PC-1	R-2	GYP	P-4	GYP	P-4	GYP	P-4	GYP	P-4	1	1	1	
106	ADA TOILET	CONC	PC-1	R-1	GYP/CT	MS	GYP/CT	MS	GYP/CT	MS	CYP/CT	MS	GYP	P-4	1	P-4 GYP WALL
107	ADA TOILET	CONC	PC-1	R-1	GYP/CT	MS	GYP/CT	MS	GYP/CT	MS	GYP/CT	MS	GYP	P-4	1	P-4 GYP WALL
108	TOILET	CONC	PC-1	R-1	GYP/ACT	MS	GYP/ACT	MS	GYP/ACT	MS	GYP/ACT	MS	GYP	P-4	1	P-4 GYP WALL
109	JANITOR	RP-1	PC-1	R-1	PLY	FRP-1	PLY	FRP-1	PLY	FRP-1	PLY	FRP-1	GYP	P-4	1	
110	HALL	CONC	PC-1	R-2	T	-	T	-	T	-	T	-	1	1	1	
111	MECH/ELEC	CONC	PC-1	R-2	GYP	P-1	GYP	P-1	GYP	P-1	GYP	P-1	1	1	1	
112	FIRE RISER	CONC	PC-1	R-2	GYP	P-1	GYP	P-1	GYP	P-1	GYP	P-1	1	1	1	
113	HALL	CONC	PC-1	R-2	GYP	P-4	GYP	P-4	GYP	P-4	GYP	P-4	1	1	1	
114	STORAGE	CONC	PC-1	R-2	GYP	P-4	GYP	P-4	GYP	P-4	GYP	P-4	1	1	1	
115	CLOSET	CONC	PC-1	R-2	GYP	P-4	GYP	P-4	GYP	P-4	GYP	P-4	1	1	1	

FINISH SCHEDULE ABBREVIATIONS

CT - CERAMIC TILE

CONC - CONCRETE

FRP - FIBER REINFORCED PANEL

GYP - GYPSUM BOARD

MS - MULTI SURFACE MATERIALS. (CONCRETE BOARD WITH CERAMIC TILE WAINSCOT. PAINTED GYPSUM BOARD ABOVE.)-SEE INTERIOR ELEVATIONS

PC - POLISHED CONCRETE

PLY - PLYWOOD

R - RUBBER BASE

T - TAPED AND MUDDED GYPSUM BOARD JOINTS - NO PAINT

INTERIOR MATERIALS SCHEDULE

NOTE: ALL LISTED MANUFACTURER'S & PRODUCTS ARE 'BASIS OF DESIGN.' CONTRACTOR CAN SUBMIT SUBSTITUTION REQUEST IN ACCORDANCE WITH THE SPECIFICATIONS. PRODUCTS WILL BE REVIEWED BY OWNER/ARCHITECT FOR AN 'APPROVED EQUAL' STATUS.

PAINT
SEE EXTERIOR FINISH SCHEDULE FOR P-1 THROUGH P-3 COLORS
P-4: FIELD WALL COLOR (TO BE SELECTED BY OWNER/ARCHITECT)
P-5: ACCENT WALL COLOR (TO BE SELECTED BY OWNER/ARCHITECT)
P-7: (HOLLOW METAL INTERIOR FRAMES/DOORS TO BE SELECTED BY OWNER/ARCHITECT)

C-1 CARPET
INTERFACE CARPET TILE: TRIBAL WEAVER 6096 NOMADIC-QUARTER TURN

R-X RUBBER BASE
R-1: 6" IN TOILET ROOMS AND JANITOR ROOM ROPPE 150 DARK GREY
R-2: 4" ALL ROOMS EXCEPT AS NOTED ABOVE ROPPE 150 DARK GREY

PC-1 POLISHED CONCRETE - CLEAR SEALER

S-1 STAIN COLOR - MATCH FORMICA COLOR 758-58 BLOSSOM CHERRYWOOD

PL-X PLASTIC LAMINATE
PL-1: FORMICA 758-58 BLOSSOM CHERRYWOOD (RECEPTION CASEWORK ALL SURFACES. INCLUDING INTERIOR OF CABINETS & DRAWERS. BASE CABINETS IN KITCHEN INCLUDING INTERIOR OF CABINETS & DRAWERS. LOCKERS IN BREAKROOM, USE STANDARD "WHITE" PLASTIC LAMINATE ON INTERIOR OF LOCKERS)
PL-2: FORMICA 912-58 STORM (WALL CABINETS IN KITCHEN & BACKSPLASH INCLUDES INTERIOR OF CABINETS.)
PL-3: FORMICA 949 WHITE (SHELVING IN JANITOR)

SF-X SOLID SURFACE
SF-1: FORMICA SOLID SURFACE 715 GOTHIC CORNERSTONE
SF-2: FORMICA SOLID SURFACE 742 BLANCO TERRAZZO

CT-X CERAMIC SUBWAY TILE 4 1/4" X 8 1/4" - SEE INTERIOR ELEVATIONS FOR LAYOUT
CT-1: DALTILE COLOR WHEEL COLLECTION 0812 SUEDE GREY
CT-2: DALTILE COLOR WHEEL COLLECTION 0790 ARTIC WHITE
CT-3: DALTILE COLOR WHEEL COLLECTION 0115 EMERALD

FRP-1 FIBERGLASS REINFORCED PLASTIC PANEL MARLITE P 4030N MEDIUM GREY WITH MATCHING TRIM PIECES. PEBBLED SURFACE.

ACT-1 SUSPENDED ACOUSTICAL CEILING TILE AND GRID
CERTAINTEED SHM-194 "SAND MICRO" TEXTURED MINERAL FIBER WITH REVEAL EDGE. USE 15/16" GRID.

GENERAL FINISH NOTES

THE FOLLOWING NOTES APPLY IN ALL CASES UNLESS NOTED OTHERWISE:

1. REFER TO THE REFLECTED CEILING PLANS FOR CEILING MATERIAL DESIGNATIONS AND HEIGHTS. MANUFACTURER AND FINISHES ARE WITHIN THE SPECIFICATIONS. (PROJECT MANUAL).
2. EXTERIOR DOORS SHALL MEET A U-FACTOR OF 0.30.
3. EXTERIOR WINDOWS SHALL MEET A U-FACTOR OF 0.30 AND BE COMPLIANT WITH NFRC.

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RHONDA A. GILLOGLY
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MASON TRANSIT AUTHORITY
BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title:

Rev.	Description

OWNER Project No:
ART Project No: 1710
Drawn By: RG
Approved By: RG
Date: Feb 12, 2020

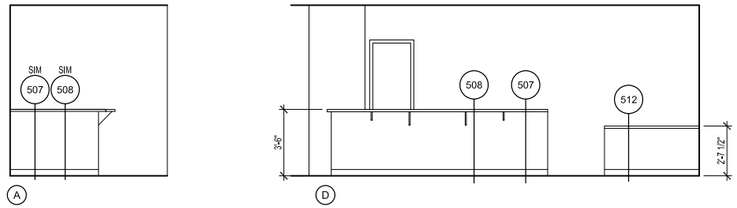
Sheet Title:
DOOR & WINDOW TYPES, FINISH & DOOR SCHEDULES

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:

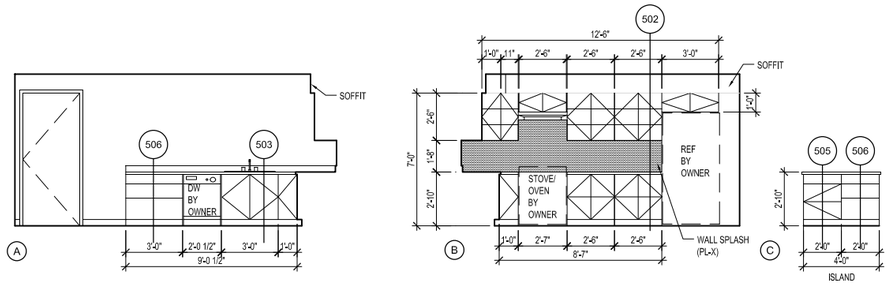
A7.0

Bid Set



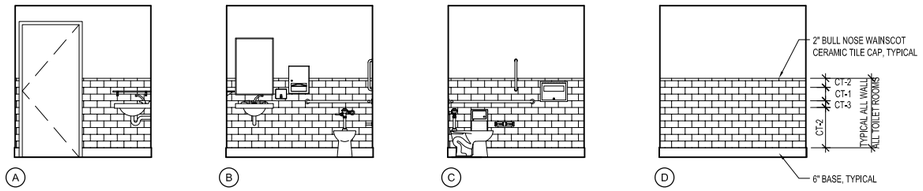
1 RECEPTION 102-HALL SIDE

SCALE: 1/4" = 1'-0"



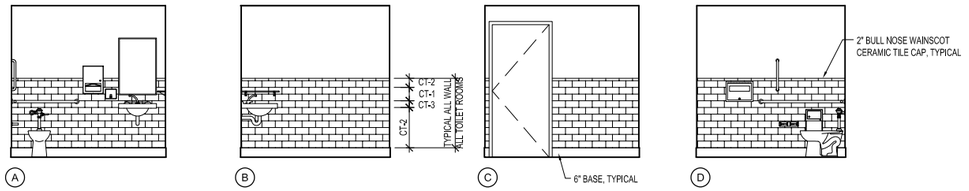
2 KITCHEN 105

SCALE: 1/4" = 1'-0"



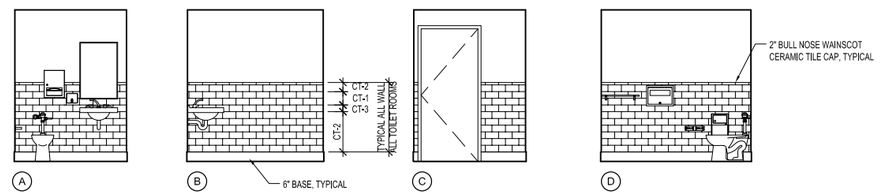
3 ADA TOILET 106

SCALE: 1/4" = 1'-0"



4 ADA TOILET 107

SCALE: 1/4" = 1'-0"

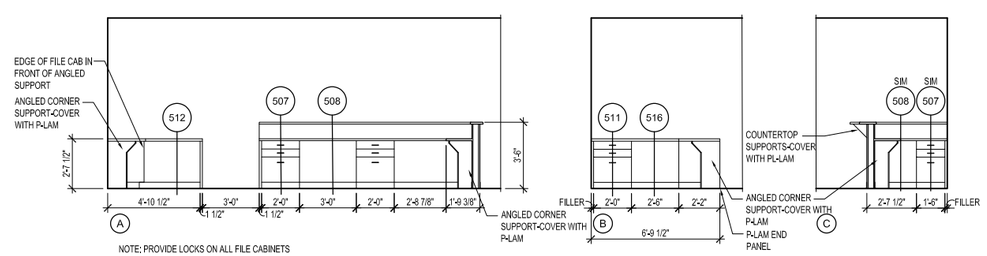


5 TOILET 108

SCALE: 1/4" = 1'-0"

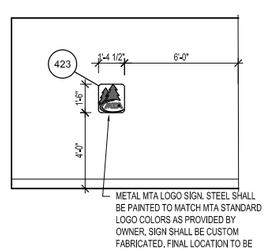
6 JANITOR 109

SCALE: 1/4" = 1'-0"



7 RECEPTION 102-INTERIOR SIDE

SCALE: 1/4" = 1'-0"



8 ENTRY

SCALE: 1/4" = 1'-0"

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DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title:

Rev.	Description

OWNER Project No:
ART Project No: 1710
Drawn By: RG
Approved By: RG
Date: Feb 12, 2020

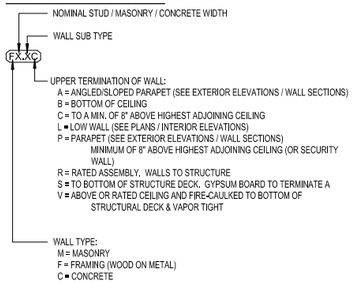
Sheet Title:
INTERIOR ELEVATIONS

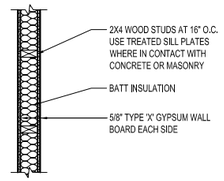
2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
A7.1

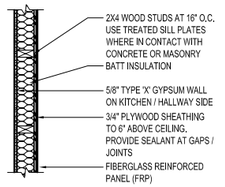
Bid Set

WALL TYPE LEGEND





WALL TYPE :
F4.1



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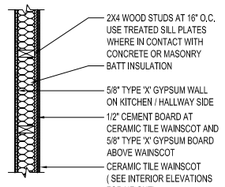

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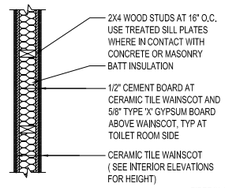
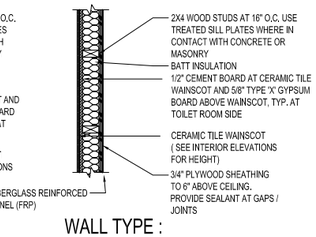


WALL TYPE :
F4.4



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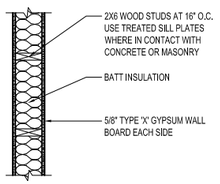
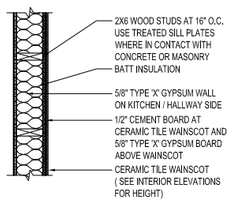
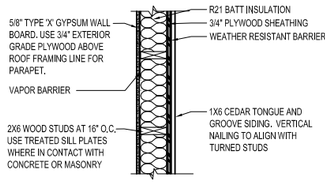
F4.5



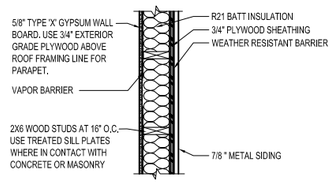
WALL TYPE :
F6.1



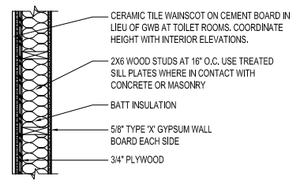
WALL TYPE :
F6.2



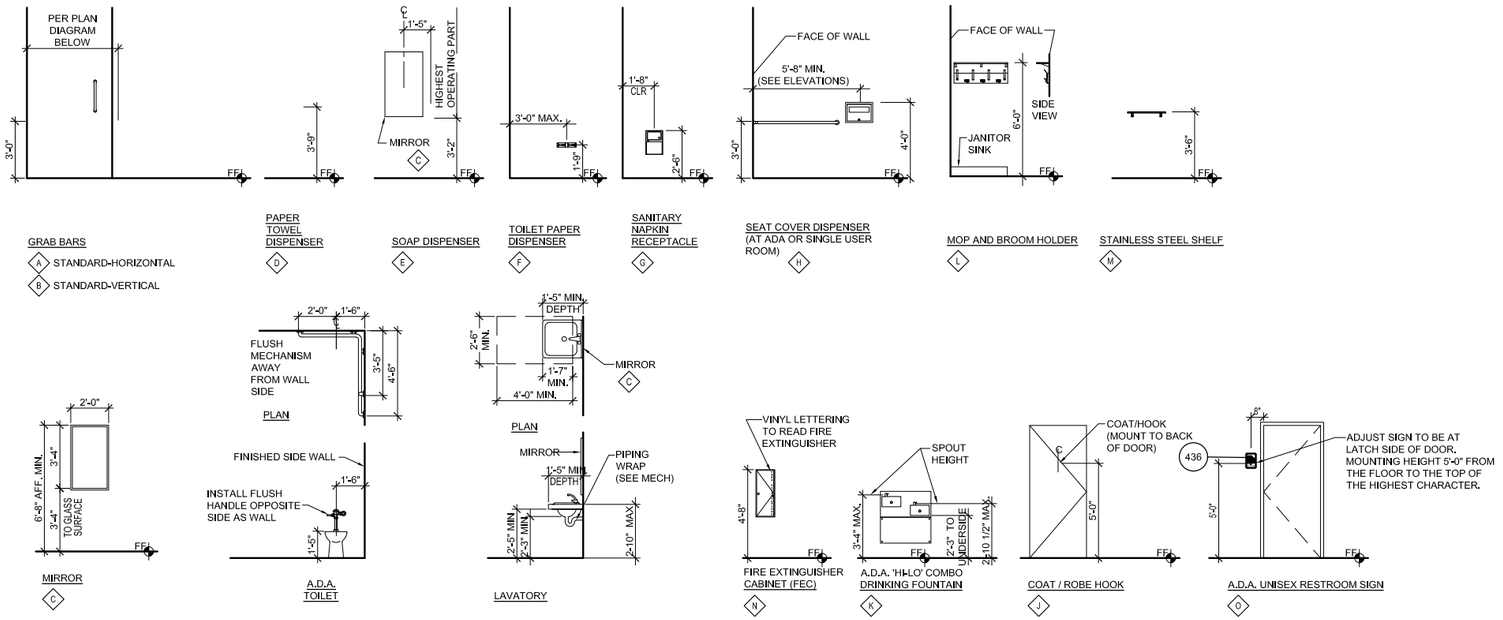
WALL TYPE :
F6.3 R=23.80



WALL TYPE :
F6.4 R=22.54
F6.6 SUBSTITUTE 1-LAYER GWB FOR MOISTURE RESISTANT GWB ON KITCHEN SIDE. R=22.54



WALL TYPE :
F6,10 SHEAR WALL
F6,11 SUBSTITUTE 1-LAYER GWB FOR 1/2" CEMENT BOARD AT TOILET ROOMS BEHIND CERAMIC TILE WAINSCOT WHERE OCCURS USE 5/8" TYPE 'X' ABOVE WAINSCOT.



TYPICAL PLUMBING FIXTURE & ACCESSORIES MOUNTING DIMENSIONS

NOTE: PROVIDE BLOCKING IN WALL AS REQUIRED PER SPECIFICATIONS OR MANUFACTURERS RECOMMENDATIONS

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BELFAIR, WASHINGTON 98528

Project Title:

Rev.	Description

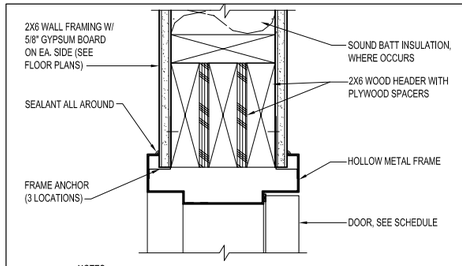
OWNER Project No:
ART Project No: 1710
Drawn By: RG
Approved By: RG
Date: Feb 12, 2020

Sheet Title:
WALL TYPES AND EQUIP. MOUNTING HEIGHTS

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

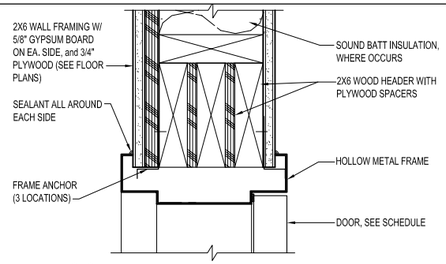
Sheet No:
AG0.0

Bid Set



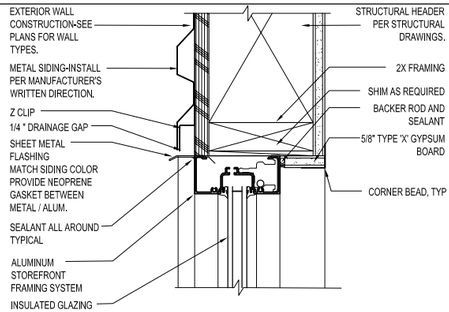
NOTES:
1. SEE DOOR SCHEDULE FOR DOOR THICKNESS AND FINISH.
2. REFER TO SPECS FOR FINISH HARDWARE SCHEDULE
3. PROVIDE A 3° BEVEL AT BOTH SIDES OF DOOR AND PROVIDE A 3/32" CLEARANCE BETWEEN DOOR AND JAMB AT EACH SIDE

101 STANDARD DOOR HEAD DETAIL
SCALE: 3" = 1'-0"

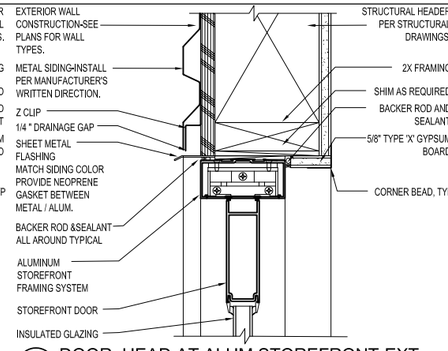


NOTES:
1. SEE DOOR SCHEDULE FOR DOOR THICKNESS AND FINISH.
2. REFER TO SPECS FOR FINISH HARDWARE SCHEDULE
3. PROVIDE A 3° BEVEL AT BOTH SIDES OF DOOR AND PROVIDE A 3/32" CLEARANCE BETWEEN DOOR AND JAMB AT EACH SIDE

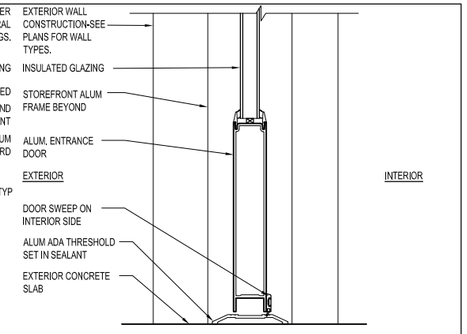
105 STANDARD DOOR HEAD DETL@SHEAR WALL
SCALE: 3" = 1'-0"



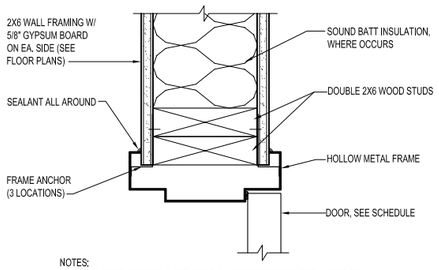
109 GLZ HEAD AT ALUM STOREFRONT-EXT
SCALE: 3" = 1'-0"



113 DOOR HEAD AT ALUM STOREFRONT-EXT
SCALE: 3" = 1'-0"

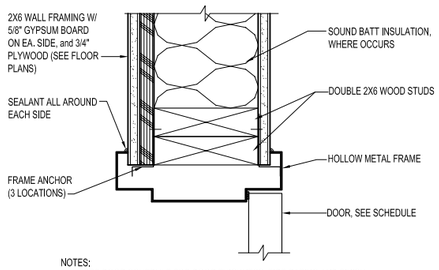


117 DOOR SILL AT ALUM STOREFRONT-EXT
SCALE: 3" = 1'-0"



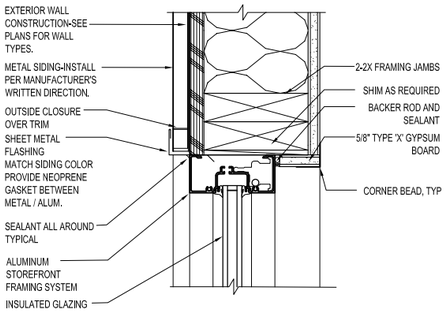
NOTES:
1. SEE DOOR SCHEDULE FOR DOOR THICKNESS, FIRE RATING AND FINISH.
2. REFER TO SPECS FOR FINISH HARDWARE SCHEDULE
3. PROVIDE A 3° BEVEL AT BOTH SIDES OF DOOR AND PROVIDE A 3/32" CLEARANCE BETWEEN DOOR AND JAMB AT EACH SIDE

102 STANDARD DOOR JAMB DETAIL
SCALE: 3" = 1'-0"

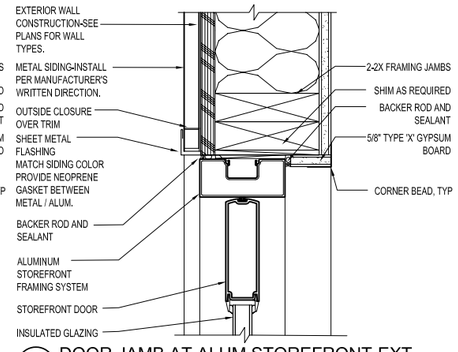


NOTES:
1. SEE DOOR SCHEDULE FOR DOOR THICKNESS, FIRE RATING AND FINISH.
2. REFER TO SPECS FOR FINISH HARDWARE SCHEDULE
3. PROVIDE A 3° BEVEL AT BOTH SIDES OF DOOR AND PROVIDE A 3/32" CLEARANCE BETWEEN DOOR AND JAMB AT EACH SIDE

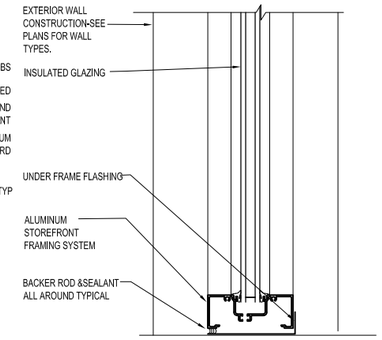
106 STANDARD DOOR JAMB DTL @ SHEAR WALL
SCALE: 3" = 1'-0"



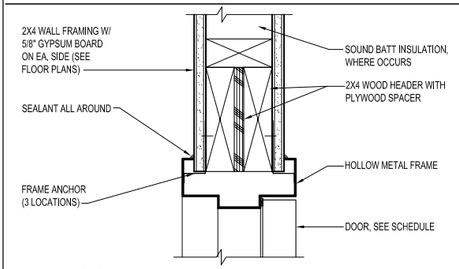
110 GLZ JAMB AT ALUM STOREFRONT-EXT
SCALE: 3" = 1'-0"



114 DOOR JAMB AT ALUM STOREFRONT-EXT
SCALE: 3" = 1'-0"

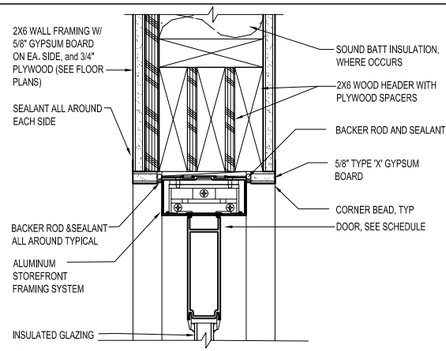


118 GLZ SILL ALUM STOREFRONT-EXT
SCALE: 3" = 1'-0"

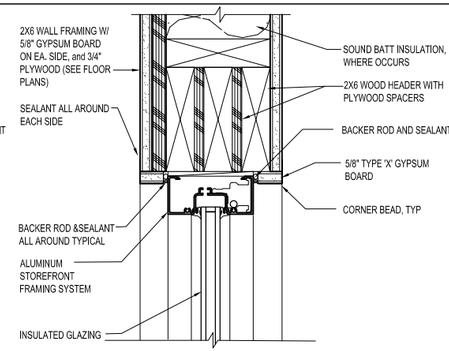


NOTES:
1. SEE DOOR SCHEDULE FOR DOOR THICKNESS AND FINISH.
2. REFER TO SPECS FOR FINISH HARDWARE SCHEDULE
3. PROVIDE A 3° BEVEL AT BOTH SIDES OF DOOR AND PROVIDE A 3/32" CLEARANCE BETWEEN DOOR AND JAMB AT EACH SIDE

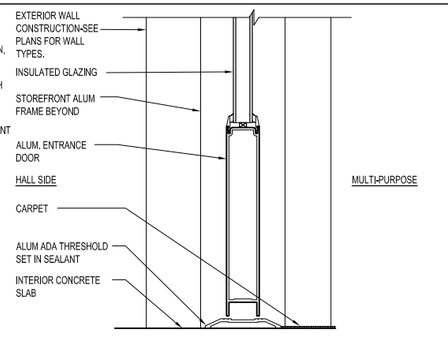
103 STANDARD DOOR HEAD DETAIL
SCALE: 3" = 1'-0"



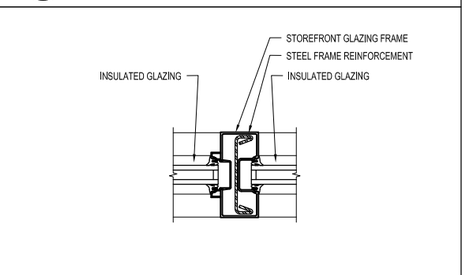
107 DOOR HEAD AT ALUM STOREFRONT-INT.
SCALE: 3" = 1'-0"



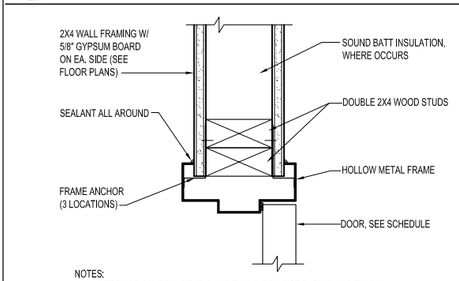
111 GLZ HEAD AT ALUM STOREFRONT-INT.
SCALE: 3" = 1'-0"



115 SILL AT ALUM STOREFRONT DOOR-INT
SCALE: 3" = 1'-0"

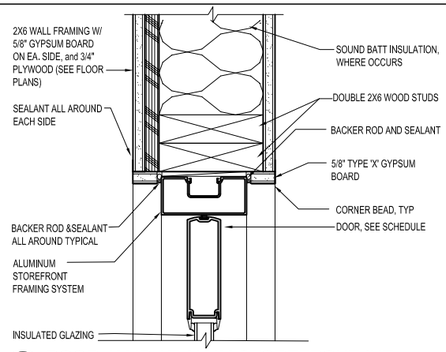


119 GLAZING TO GLAZING AT TRANSOM
SCALE: 3" = 1'-0"

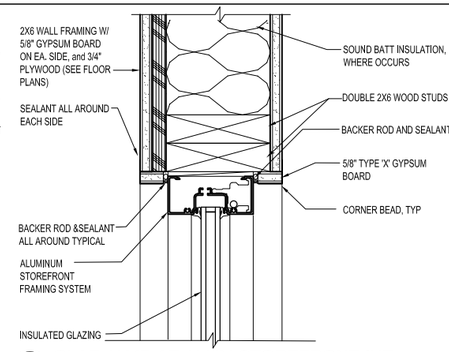


NOTES:
1. SEE DOOR SCHEDULE FOR DOOR THICKNESS, FIRE RATING AND FINISH.
2. REFER TO SPECS FOR FINISH HARDWARE SCHEDULE
3. PROVIDE A 3° BEVEL AT BOTH SIDES OF DOOR AND PROVIDE A 3/32" CLEARANCE BETWEEN DOOR AND JAMB AT EACH SIDE

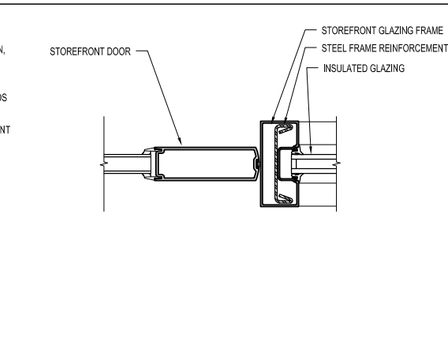
104 STANDARD DOOR JAMB DETAIL
SCALE: 3" = 1'-0"



108 DOOR JAMB AT ALUM STOREFRONT-INT
SCALE: 3" = 1'-0"

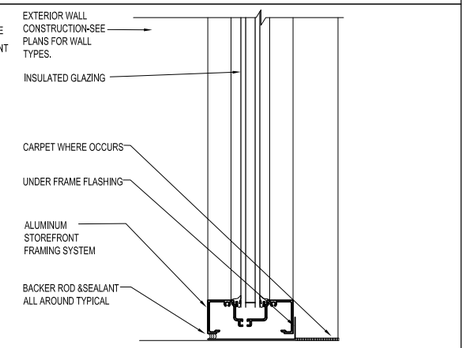


112 GLAZ JAMB AT ALUM STOREFRONT-INT
SCALE: 3" = 1'-0"



116 GLAZ/DR JAMB AT ALUM STOREFRONT
SCALE: 3" = 1'-0"

INTERIOR AND EXTERIOR CONDITION



120 SILL AT ALUM STOREFRONT -INT
SCALE: 3" = 1'-0"

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RHONDA A. GILLOGLY
STATE OF WASHINGTON

MASON TRANSIT AUTHORITY
BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title:

Rev.	Description

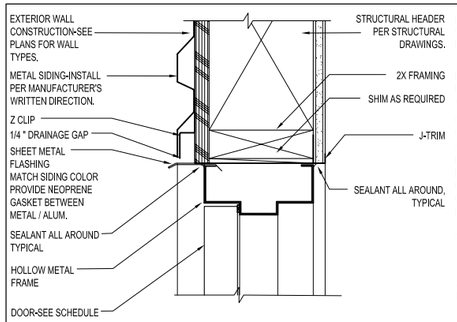
OWNER Project No:
ART Project No: 1710
Drawn By: RG
Approved By: RG
Date: Feb 12, 2020

Sheet Title:
DETAILS
(101-120)

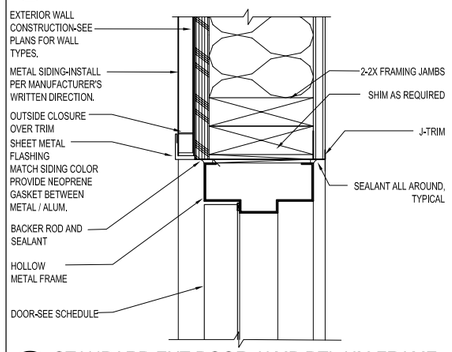
2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
AG1.0

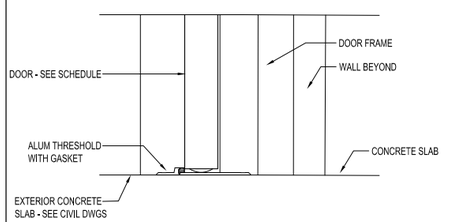
Bid Set



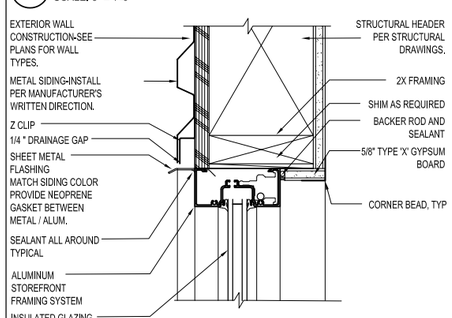
121 STANDARD EXT DOOR HEAD DTL-HM FRAME
SCALE: 3" = 1'-0"



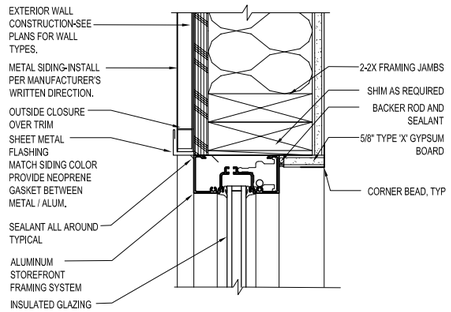
122 STANDARD EXT DOOR JAMB DTL-HM FRAME
SCALE: 3" = 1'-0"



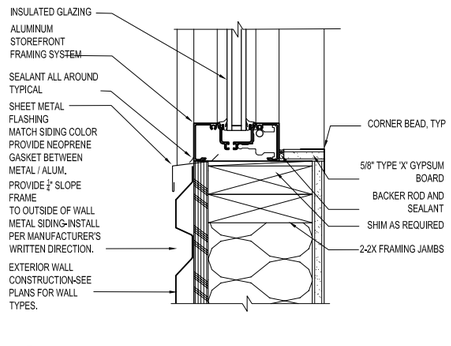
123 STANDARD EXT DOOR SILL DTL-HM FRAME
SCALE: 3" = 1'-0"



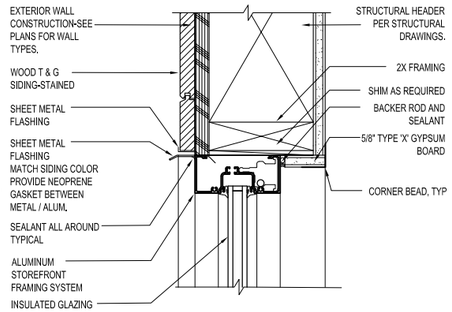
124 STANDARD EXT WINDOW HEAD-ALUM
SCALE: 3" = 1'-0"



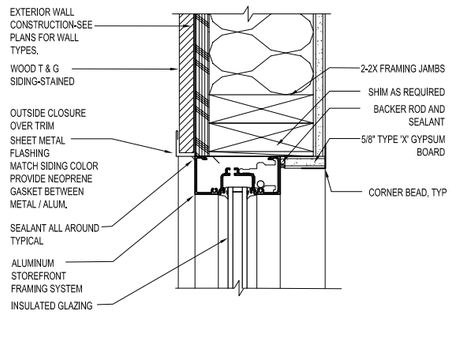
125 STANDARD ALUM EXT WINDOW JAMB
SCALE: 3" = 1'-0"



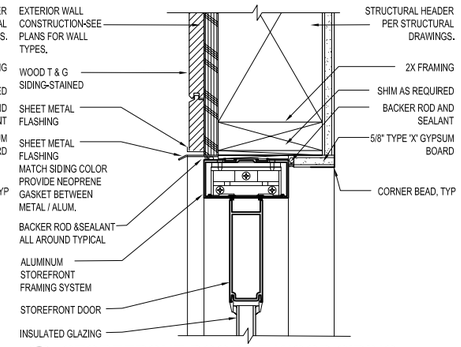
126 STANDARD ALUM EXT WINDOW SILL
SCALE: 3" = 1'-0"



129 ALUM GLAZING HEAD AT WOOD SIDING
SCALE: 3" = 1'-0"



130 ALUM GLAZING JAMB AT WOOD SIDING
SCALE: 3" = 1'-0"



133 STOREFRONT DOOR AT WOOD SIDING
SCALE: 3" = 1'-0"

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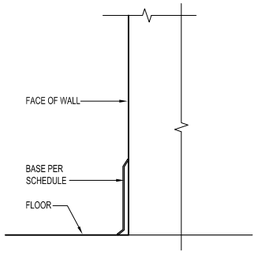
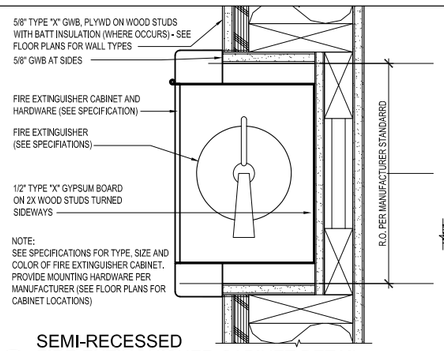
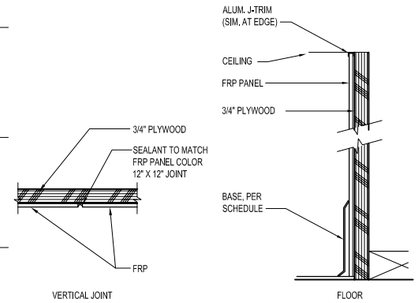
Bid Set



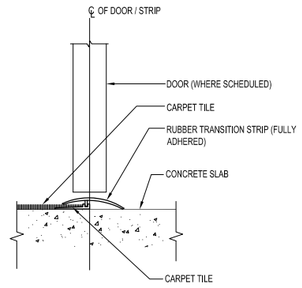
301 TYPICAL RUBBER BASE DETAIL
SCALE: 3" = 1' - 0"



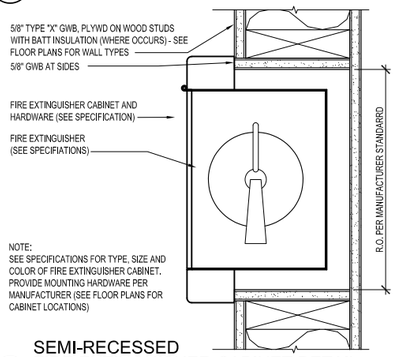
305 SEMI-RECESSED FIRE EXTINGUISHER CABINET DETAIL
SCALE: 3" = 1' - 0"



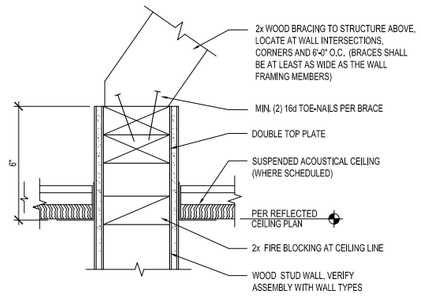
309 FRP JOINT DETAILS
SCALE: 3" = 1'-0"



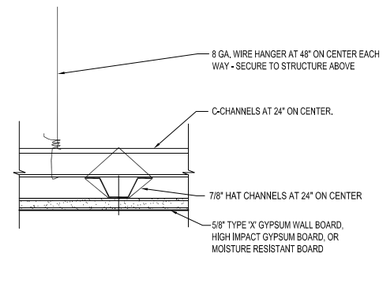
302 TRANSITION AT CARPET / CONC.
SCALE: 3" = 1'-0"



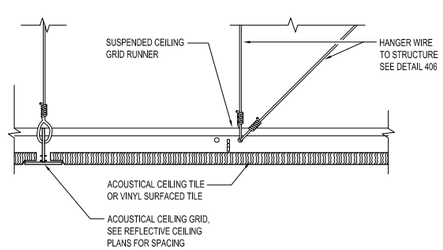
306 SEMI-RECESSED FIRE EXTINGUISHER CABINET DETAIL
SCALE: 3" = 1' - 0"



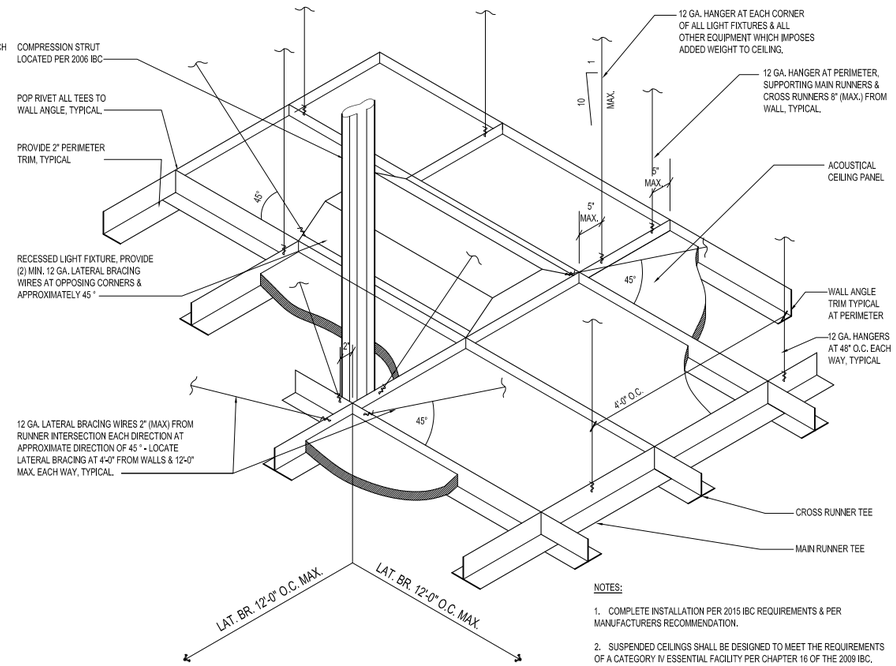
310 WALL BRACING DETAIL
SCALE: 3" = 1'-0"



311 SUSP. GYPSUM BOARD CEILING
SCALE: 3" = 1'-0"



312 SUSP. CEILING DETAIL
SCALE: 3" = 1'-0"



316 SUSPENDED CEILING SEISMIC ISOMETRIC DETAIL
SCALE: N.T.S.

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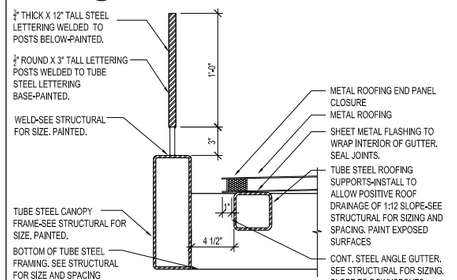
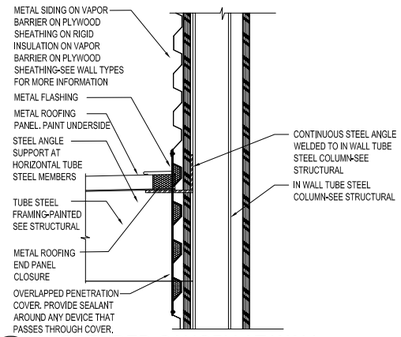
AG3.0

Bid Set

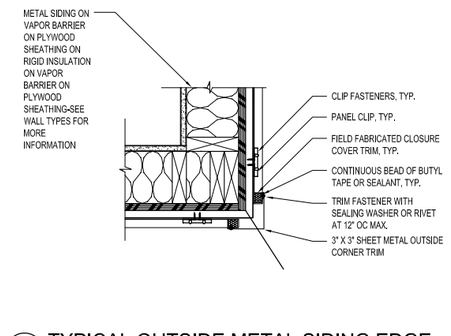
NOTE:
ALL EXPOSED STEEL SHALL BE PRIMED WITH RUST INHIBITIVE PAINT AND PAINTED WITH FINISH COLOR PAINT AS SPECIFIED.



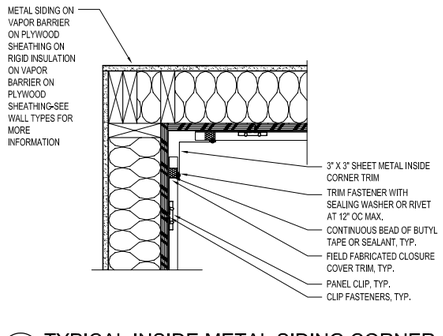
401 SUSPENDED CANOPY EDGE AT LETTERS
SCALE: 1 1/2" = 1'-0"



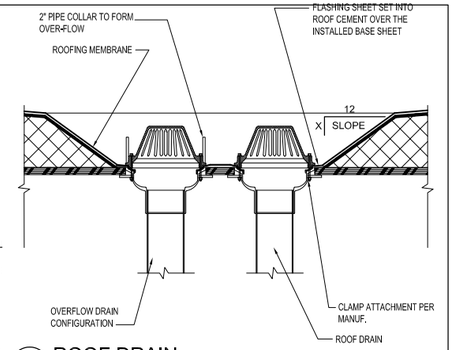
405 SUSPENDED CANOPY AT WALL
SCALE: 1 1/2" = 1'-0"



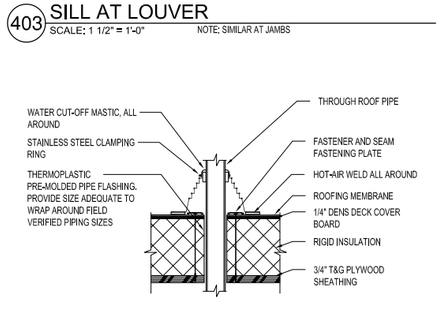
409 TYPICAL OUTSIDE METAL SIDING EDGE
SCALE: 1 1/2" = 1'-0"



413 TYPICAL INSIDE METAL SIDING CORNER
SCALE: 1 1/2" = 1'-0"

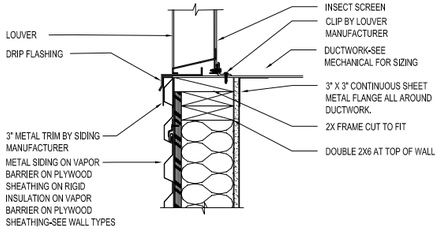


417 ROOF DRAIN
SCALE: 1 1/2" = 1'-0"



415 HEADER AT LOUVER
SCALE: 1 1/2" = 1'-0"

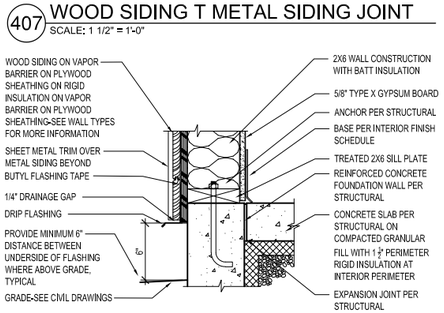
NOTE: SIMILAR AT JAMBS



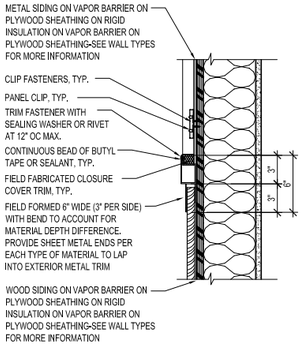
403 SILL AT LOUVER
SCALE: 1 1/2" = 1'-0"

NOTE: SIMILAR AT JAMBS

404 VENT PIPE PENETRATION AT ROOF
SCALE: 1 1/2" = 1'-0"

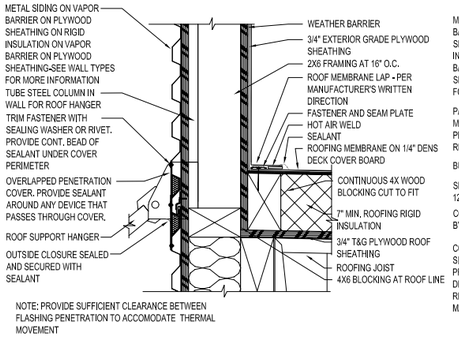


406 METAL SIDING TO WOOD AT CORNER
SCALE: 1 1/2" = 1'-0"

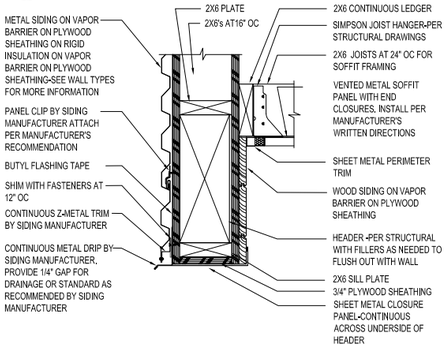


407 WOOD SIDING T METAL SIDING JOINT
SCALE: 1 1/2" = 1'-0"

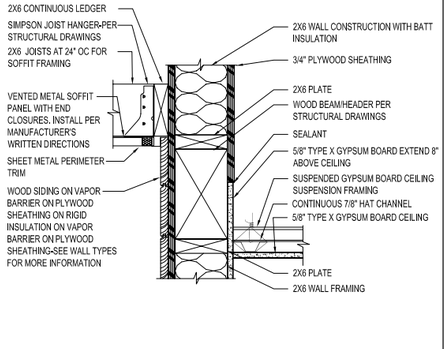
408 WOOD SIDING AT SILL TERMINATION
SCALE: 1 1/2" = 1'-0"



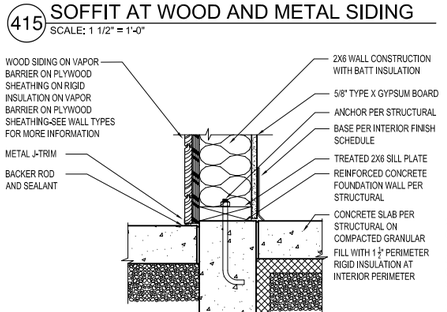
410 TOP OF WALL AT WOOD SIDING
SCALE: 1 1/2" = 1'-0"



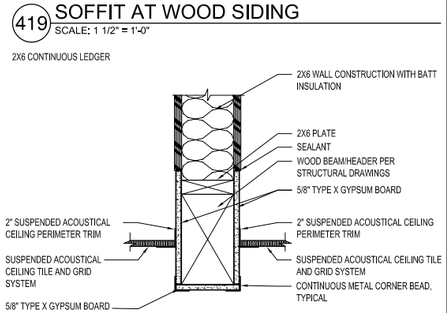
414 TOP OF WALL AT METAL SIDING
SCALE: 1 1/2" = 1'-0"



411 ROOFING DETAIL
SCALE: 1 1/2" = 1'-0"



412 METAL SIDING AT SILL TERMINATION
SCALE: 1 1/2" = 1'-0"



416 WOOD SIDING AT SILL TERMINATION
SCALE: 1 1/2" = 1'-0"

420 INTERIOR HEADER
SCALE: 1 1/2" = 1'-0"

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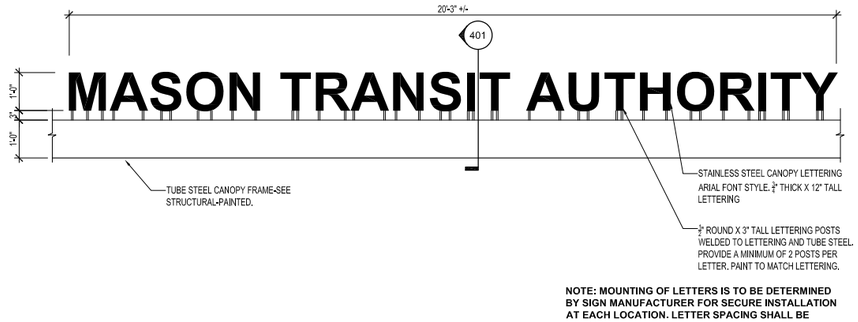
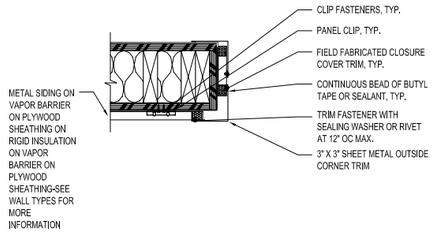


NOTE: MOUNTING OF LETTERS IS TO BE DETERMINED BY SIGN MANUFACTURER FOR SECURE INSTALLATION AT EACH LOCATION. LETTER SPACING SHALL BE UNIFORM.

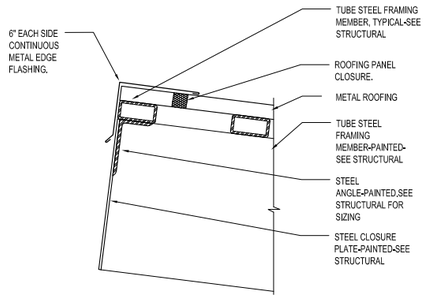
421 CANOPY SIGNAGE DETAIL
SCALE: 1/2" = 1'-0"

422 MTA LOGO SIGN
SCALE: 1/2" = 1'-0"

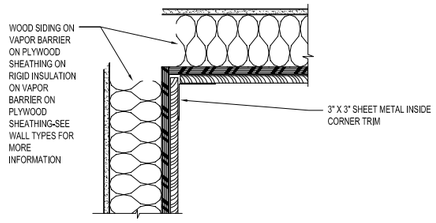
426 SIGN ATTACHMENT AT EXT WALL DTL
SCALE: 1/2" = 1'-0"



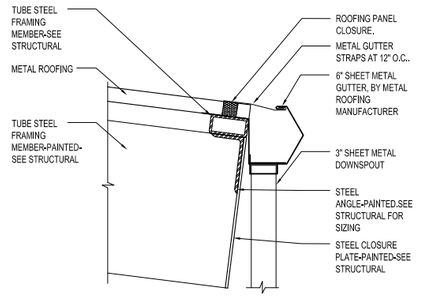
428 METAL SIDING TO ROOFING EDGE
SCALE: 1 1/2" = 1'-0"



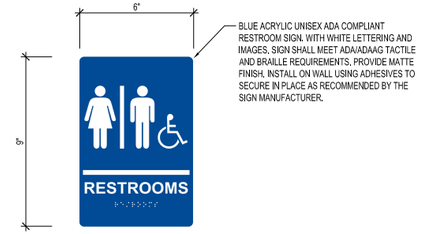
429 CANOPY FASCIA DETAIL
SCALE: 1 1/2" = 1'-0"



432 TYPICAL INSIDE METAL SIDING CORNER
SCALE: 1 1/2" = 1'-0"



433 CANOPY END FASCIA AT GUTTER
SCALE: 1 1/2" = 1'-0"



436 ADA UNISEX RESTROOM SIGN
SCALE: 3" = 1'-0"

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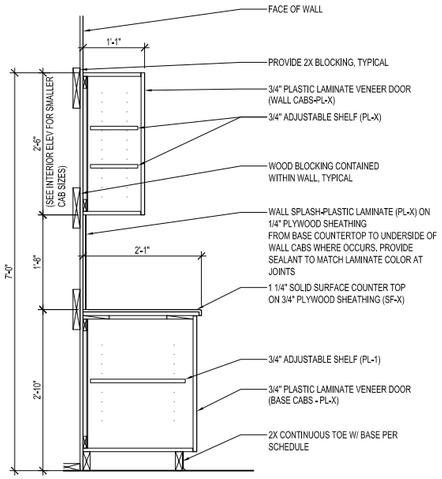
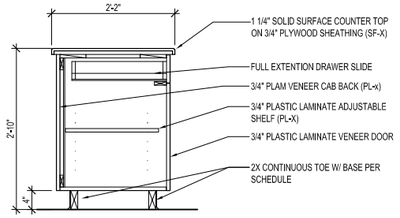
AG4.1

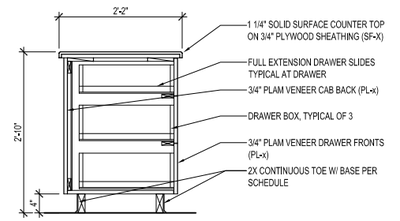
Bid Set



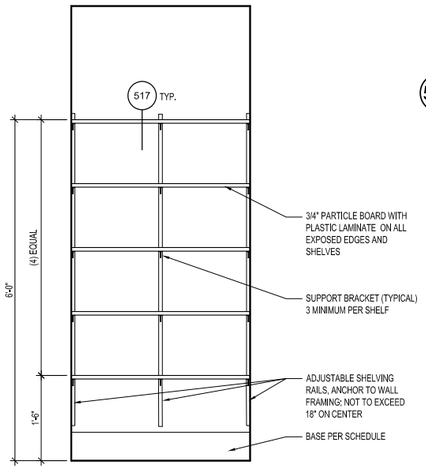
502 TYPICAL BASE & WALL CABINET
SCALE: 3/4" = 1' - 0"



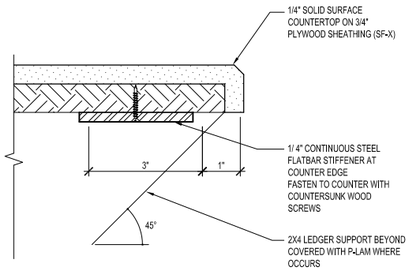
505 SECTION AT ISLAND BASE
SCALE: 3/4" = 1' - 0"



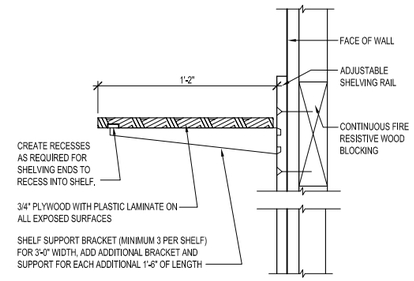
506 SECTION AT ISLAND BASE-DRAWERS
SCALE: 3/4" = 1' - 0"



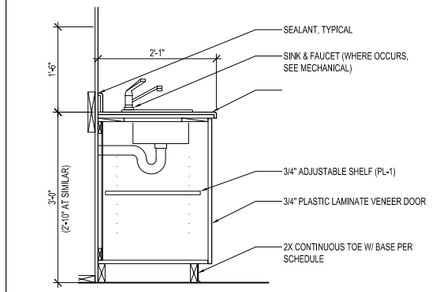
510 ELEVATION AT JANITOR SHELVING
SCALE: 3/4" = 1' - 0"



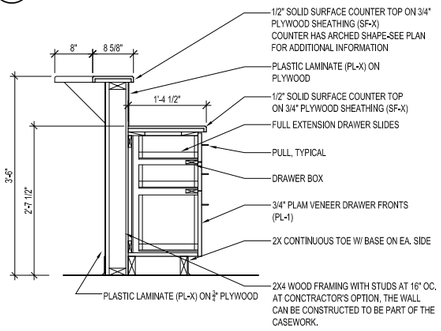
513 COUNTERTOP EDGE DETAIL
SCALE: NOT TO SCALE



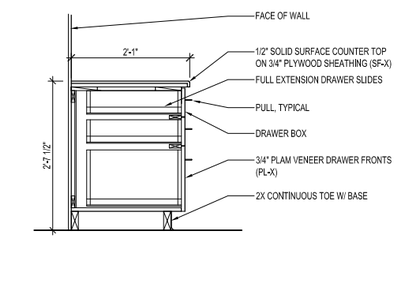
517 ADJUSTABLE SHELF DETAIL
SCALE: NOT TO SCALE



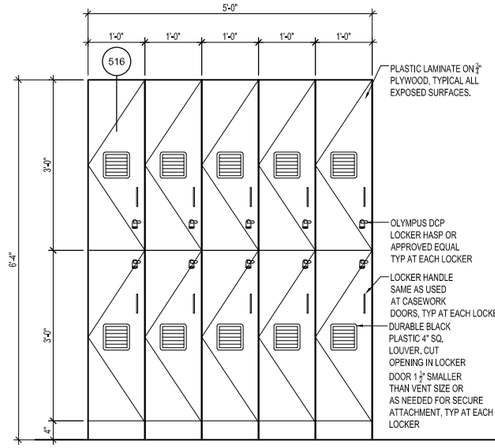
503 BASE CAB AT SINK
SCALE: 3/4" = 1' - 0"



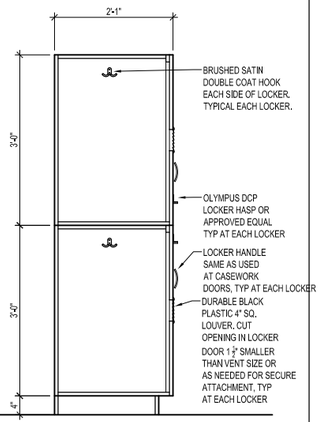
507 SECTION AT RECEPTION -FILE CABINET
SCALE: 3/4" = 1' - 0"



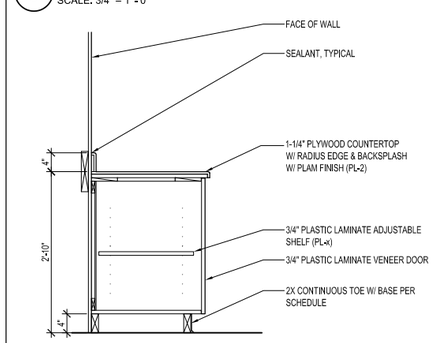
511 SECTION AT RECEPTION -FILE CABINET
SCALE: 3/4" = 1' - 0"



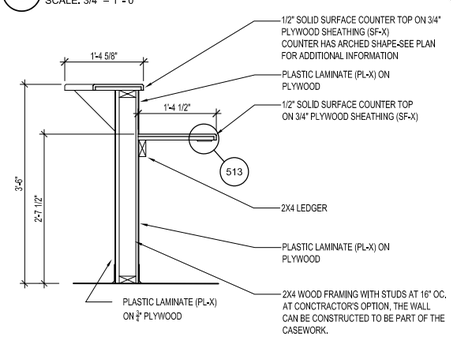
515 LOCKER ELEVATION
SCALE: 3/4" = 1' - 0"



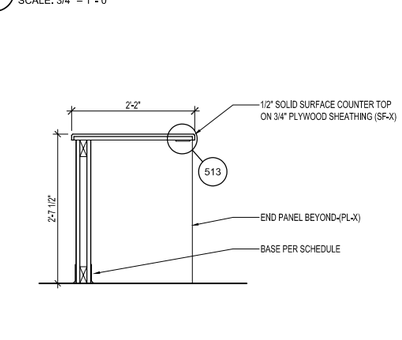
516 LOCKER SECTION
SCALE: 3/4" = 1' - 0"



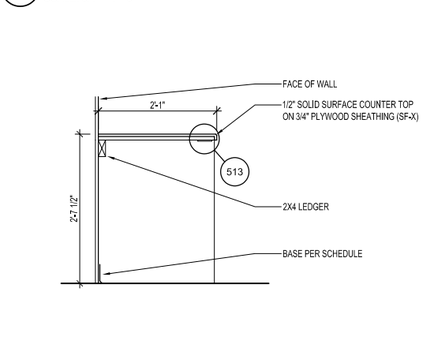
504 BASE CABINET AT DOOR ONLY
SCALE: 3/4" = 1' - 0"



508 SECTION AT RECEPTION DESK-OPEN AREA
SCALE: 3/4" = 1' - 0"



512 SECTION AT RECEPTION DESK-OPEN AREA
SCALE: 3/4" = 1' - 0"



516 SECTION AT RECEPTION DESK-OPEN AREA
SCALE: 3/4" = 1' - 0"

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DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title:

Rev.	Description

OWNER Project No:
ART Project No: 1710
Drawn By: RG
Approved By: RG
Date: Feb 12, 2020
Sheet Title: DETAILS

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
AG5.0

Bid Set

OUTLET MOUNTING HEIGHTS

(MEASURE TO CENTER OF BOX, UNLESS OTHERWISE INDICATED)

COUNTER HEIGHT (*)	+3 INCHES ABOVE SPLASH	FIRE ALARM	
CASEWORK OUTLETS	AS DIRECTED	MANUAL STATIONS	48 INCHES TO TOP
SWITCHES AND DIMMERS	48 INCHES	SIGNALING DEVICES	80 INCHES TO BOTTOM
RECEPTACLES	18 INCHES	REMOTE ALARM LIGHTS	80 INCHES TO BOTTOM
THERMOSTATS	48 INCHES	REMOTE ANNUNCIATOR	60 INCHES TO BOTTOM
OCCUPANCY SENSORS	12 FEET MAXIMUM	GRAPHIC PLAQUES	60 INCHES TO BOTTOM
VOICE (TELEPHONE)	18 INCHES		
DATA (COMPUTER)	18 INCHES	SECURITY	
WALL PHONE	48 INCHES	KEY PAD	54 INCHES TO TOP
		CARD READER	48 INCHES
		CCTV	WITHIN 6 INCHES OF CAMERA MOUNT

ELECTRICAL SYMBOL LEGEND

(SOME SYMBOLS MAY NOT BE USED ON DRAWINGS)

SYMBOL	DESCRIPTION
	GENERAL
#	BUBBLE NOTE TAG SYMBOL: # – IDENTIFYING NUMBER
	SCHEDULED EQUIPMENT CONNECTION (INCLUDE ALL WIRING, DISCONNECTING MEANS, CONTROL AND OTHER REQUIREMENTS SCHEDULED)
#	REVISION CALLOUT
	LIGHTING
	LUMINAIRE (LENGTH TO SCALE ON DRAWINGS)
	LUMINAIRE (TO SCALE ON DRAWINGS)
	SURFACE FIXTURE – ROUND
	SURFACE FIXTURE – WALL
	RECESSED FIXTURE – ROUND
	EXIT FIXTURE – CEILING
	EXIT FIXTURE – WALL
	EXIT FIXTURE WITH DIRECTION ARROWS
	LIGHT FIXTURE ON EMERGENCY LIGHTING CIRCUIT (INVERTER)
N	SUBSCRIPT BY FIXTURE INDICATES NIGHT LIGHT (ON CONTINUOUSLY)
	POLE MOUNTED LIGHT
a,b	INDICATES CONTROL ZONE
	LAY–IN LUMINAIRE
ER	UL924 TRANSFER RELAY
L4	INDICATES LUMINAIRE TYPE (ITALIC TEXT)
	LIGHTING CONTROL
	PHOTOCELL, EXTERIOR
S	SINGLE POLE TOGGLE SWITCH
$	DIGITAL SWITCH STATION
$WP, S3	SWITCH SUBSCRIPTS: 2 DOUBLE POLE 3 THREE WAY 4 FOUR WAY D DIMMER EP EXPLOSION PROOF K KEY OPERATED LV LOW VOLTAGE LVM LOW VOLTAGE MASTER M MANUAL MOTOR STARTER W/OVERLOADS MC MOMENTARY CONTACT P SWITCH W/PILOT LIGHT T TIMER WP WEATHERPROOF a, b, c MULTIGANG SWITCH STATION
$OS	OCCUPANCY SENSOR – WALL SWITCH
PS	DAYLIGHT SENSOR – DUAL ZONE
OS	OCCUPANCY SENSOR
RC	DIGITAL ROOM CONTROLLER
$WP	"WP" INDICATES WEATHERPROOF ENCLOSURE SINGLE POLE TOGGLE SHOWN

SYMBOL	DESCRIPTION
	POWER
	DUPLEX RECEPTACLE (NEMA 5–20R) SUBSCRIPT: IG ISOLATED GROUND WC WATER COOLER REF REFRIGERATOR COP COPIER HWD HOT WATER DISPENSER MWO MICROWAVE OVEN P PEDESTAL WP WEATHERPROOF C CEILING DW DISHWASHER IWB WALL MOUNT PROJECTOR TV VIDEO DISPLAY OUTLET. SEE ARCHITECTURAL DETAILS FOR MOUNTING HEIGHT
	RECESSED FLOOR BOX FOR POWER & SIGNAL
	DISCONNECT SWITCH
	FUSED DISCONNECT SWITCH
J	JUNCTION BOX
	MOTOR CONNECTION
	EQUIPMENT CONNECTION SUBSCRIPT: WH WATER HEATER HD HAND DRYER WC WATER COOLER
	PANELBOARD
	FOURPLEX RECEPTACLE (NEMA 5–20R)
TR	TAMPER RESISTANT DUPLEX RECEPTACLE (NEMA 5–15R)
	SPLIT WIRED FOURPLEX (1) DUPLEX RECEPTACLE UNSWITCHED, (1) DUPLEX RECEPTACLE CONTROLLED BY OCCUPANCY SENSOR OR TIME SWITCH
	GFCI DUPLEX RECEPTACLE (NEMA 5–20R)
*	ASTERISK INDICATES COUNTER HEIGHT OUTLET (DUPLEX RECEPTACLE SHOWN)
R	RANGE RECEPTACLE (NEMA 14–50R)
D	DRYER RECEPTACLE (NEMA 14–30R)
	SPECIAL PURPOSE OUTLET (AS NOTED)
	CEILING MOUNTED RECEPTACLE
ADA	ADA DOOR OPERATOR
	WIRING
	CROSS LINES INDICATE NUMBER OF CONDUCTORS IF MORE THAN TWO WIRE CIRCUIT. LONG DENOTES NEUTRAL. DOT DENOTES GROUND. CONDUIT IS 1/2" AND CONDUCTOR IS #12 AWG UNLESS OTHERWISE NOTED OR SCHEDULED.
	WIRING CONCEALED IN CEILING OR WALL
	WIRING CONCEALED UNDERGROUND OR BELOW FLOOR
	WIRING HOMERUN

SYMBOL	DESCRIPTION
	ONELINE DIAGRAMS
	CIRCUIT BREAKER
	DISCONNECT SWITCH
	FUSE
	TRANSFORMER
	GROUNDED WYE CONNECTION
	DELTA CONNECTION
M	UTILITY COMPANY METER
M	MULTI–FUNCTION CUSTOMER METER
	CURRENT TRANSFORMER (CT)
	GROUND ELECTRODE SYSTEM
SPD	SURGE PROTECTIVE DEVICE
	CONTACT – NORMALLY OPEN
	MOTOR OVERLOAD PROTECTION
	FUSED SWITCH
GFR	GROUND FAULT RELAY
ST	SHUNT TRIP RELAY
	COMMUNICATIONS
TTB	TELECOMMUNICATIONS TERMINAL BOARD
	(2) CAT 6 OUTLET WITH 1.25"C TO ACCESSIBLE SPACE & (2) CAT 6 CABLES TO DISTRIBUTION FRAME
3	QTY OF CAT 6 OUTLETS INDICATED W/ CAT 6 CABLE FOR EACH IF MORE THAN 2 OUTLET TO DISTRIBUTION FRAME, MIN 1.25"C TO ACCESSIBLE SPACE
P	(2) CAT 6 OUTLETS WITH CAT 6 CABLES TO DISTRIBUTION FRAME FOR WALL MOUNTED SHORT THROW PROJECTOR WITH 1.25"C TO ACCESSIBLE SPACE
WAP	WIRELESS ACCESS POINT STATION WITH (2) CAT 6 CABLES TERMINATED IN A BISCUIT STYLE ENCLOSURE WITH (2) CAT 6 OUTLETS
	CCTV STATION – (1) CAT 6 OUTLET WITH CAT 6 CABLE TO DISTRIBUTION FRAME
	FIRE ALARM
K	SMOKE DETECTOR
WF	SPRINKLER WATER FLOW ALARM CONNECTION
TS	SPRINKLER VALVE TAMPER SWITCH CONNECTION
F	MANUAL STATION
F	HORN WITH VISUAL SIGNAL (STROBE)
F WP	WEATHERPROOF HORN WITH VISUAL SIGNAL (STROBE)
F	VISUAL SIGNAL (STROBE)
B	BELL SPRINKLER ALARM,WP

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MASON TRANSIT AUTHORITY
BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title:

Rev.	Description

OWNER Project No:	
ART Project No:	1710
Drawn By:	AD
Approved By:	SJH
Date:	FEB 12, 2020

Sheet Title:

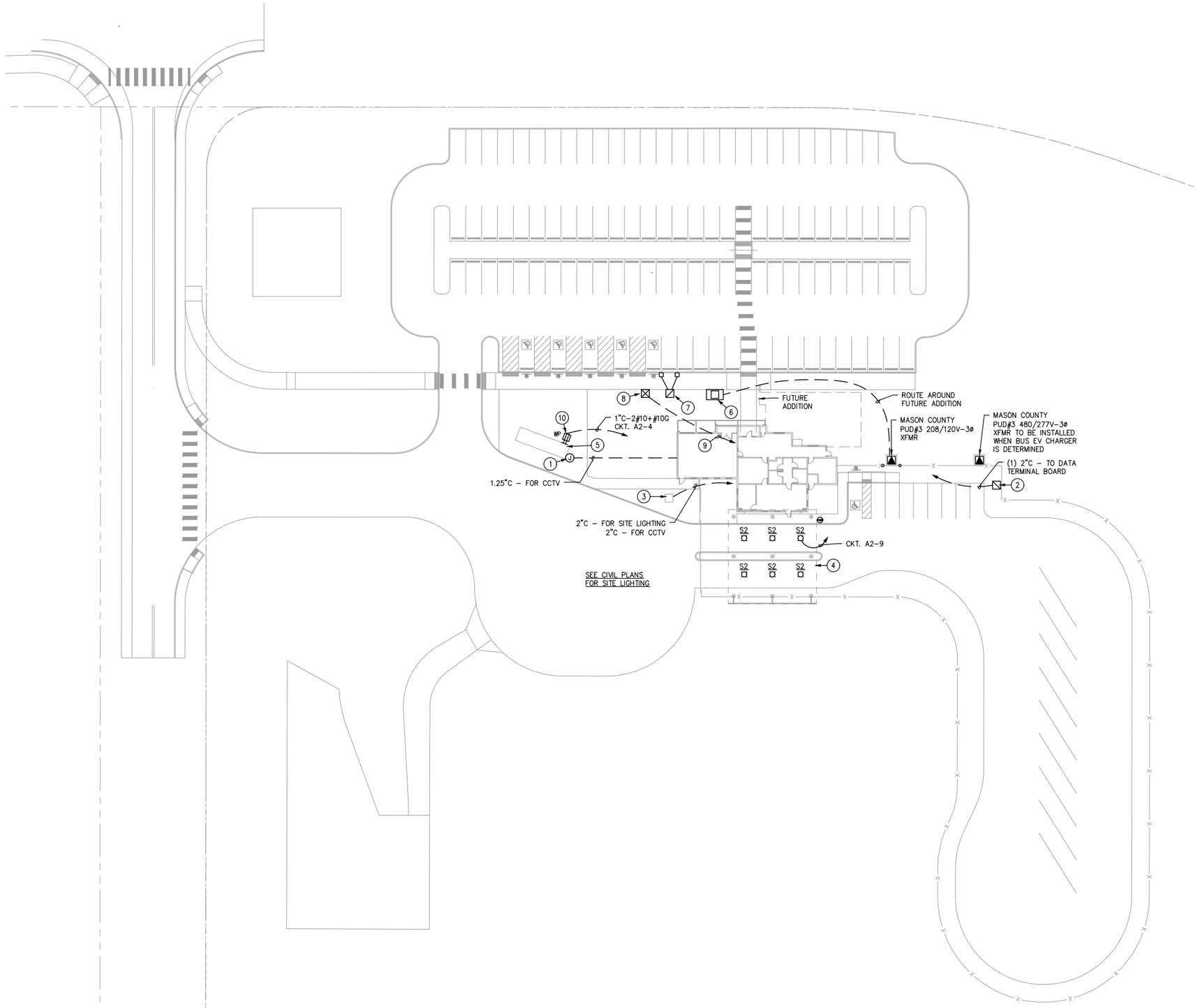
ELECTRICAL NOTES & LEGEND

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:

E0.1

BID SET



1 ELECTRICAL SITE PLAN
SCALE: 1" = 30'-0"

BUBBLE NOTES:

1. 6X6 NEMA 3R J-BOX.
2. WSDOT TYPE 1 J-BOX. VERIFY FINAL LOCATION WITH ENGINEER
3. STUB INTO J-BOX, SEE CIVIL SHEET IL-1.
4. CANOPY LIGHTS TO BE CONTROLLED BY COMBINATION OF PHOTOCELL & TIMECLOCK WITH MANUAL OVERRIDE
5. PRE-FABRICATED SHELTER, COORDINATE CCTV RACEWAY STUB-UP LOCATION WITH SHOP DRAWING; GROUND STRUCTURE PER CODE.
6. CABINET FOR SERVICE METER & PANEL EV FOR EV CHARGERS. SEE DISTRIBUTION DIAGRAM.
7. WSDOT TYPE 2 HANDHOLE.
8. WSDOT TYPE 1 HANDHOLE.
9. 2" PVC TO SIGNAL MOUNTING BOARD IN MECH/ELEC RM.
10. 2-GANG WEATHERPROOF BELL BOX.

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Drawn By: AD
Approved By: SJH
Date: FEB 12, 2020

Sheet Title:
POWER SITE PLAN

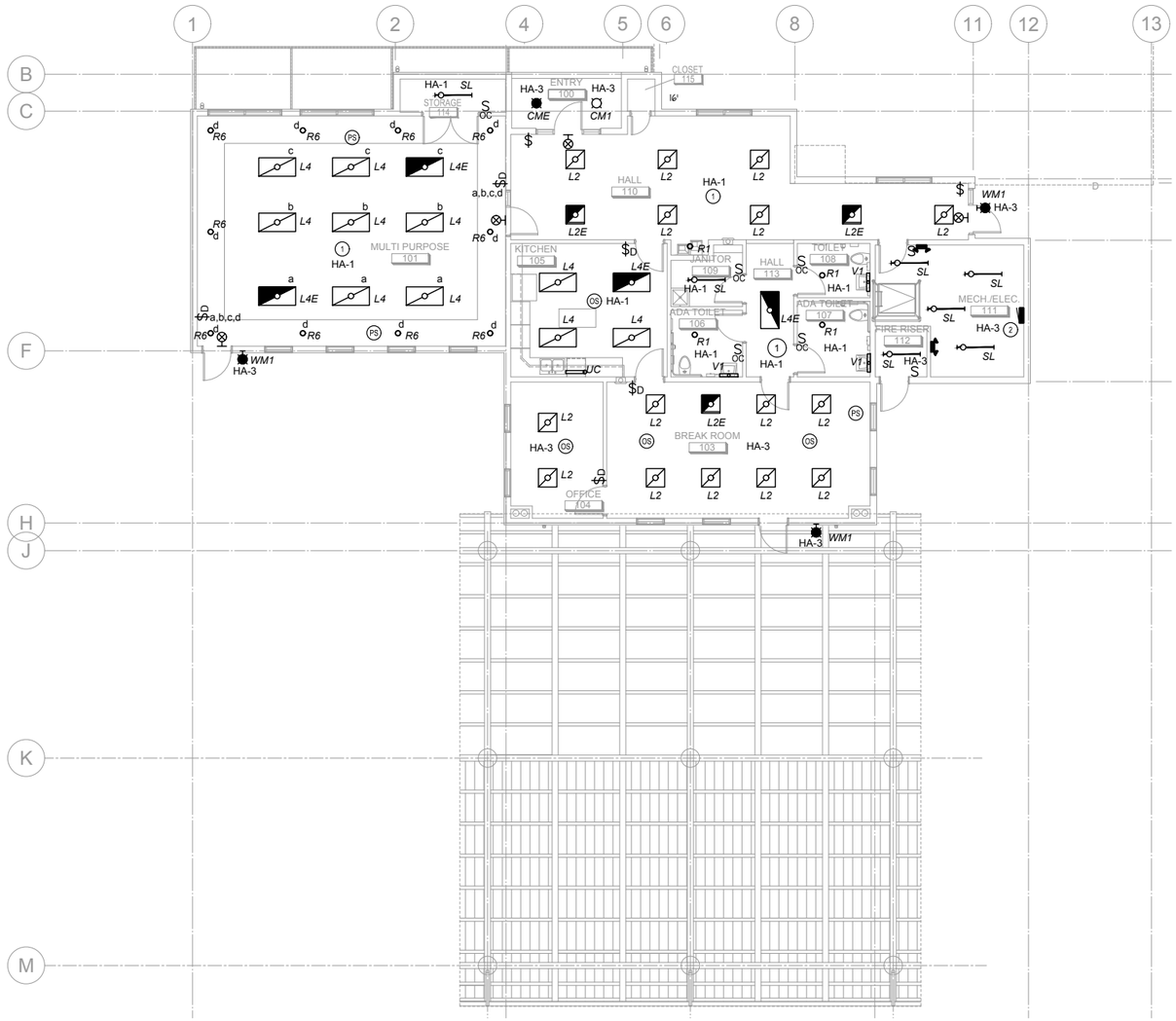
2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
E1.0

BID SET

BUBBLE NOTES:

1. SPACE CONTROLLED BY TIME CLOCK INPUTS FOR AUTOMATIC OFF, LOCAL CONTROL FOR MANUAL ON & DIMMING
2. LOW VOLTAGE LIGHTING CONTROL PANEL WITH RELAYS FOR MULTI-PURPOSE ROOM, HALL 110, HALL 112, CANOPY & PARKING LOT



1 LIGHTING PLAN
SCALE: 1/8" = 1'-0"

Scale 1/8" = 1'0"

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Sheet Title:
LIGHTING PLANS

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
E2.1

BID SET

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	LAMP	VOLTAGE	W/VA	REMARKS
CM1	CEILING MOUNT LED, HIGH IMPACT ACRYLIC LENS, 7392 LUMENS UL LISTED WET LOCATION	STARTEK STAR SLIM PRO	LED 3000K	UNV	64/70	
L4	LAY-IN 2X4 LED, DIRECT / INDIRECT DISTRIBUTION, 6400 LUMENS, RIBBED ACRYLIC SHIELDING 0-10V DIMMING BALLAST	HE WILLIAMS DI SERIES	LED 3500K	UNV	56/60	
L4E	SAME AS TYPE L4 EXCEPT WITH INTEGRAL EMERGENCY DRIVER	HE WILLIAMS DI SERIES	LED 3500K	UNV	56/60	
L2	SIMILAR TO TYPE L4 EXCEPT 2X2 UNIT 3200 LUMENS	HE WILLIAMS DI SERIES	LED 3500K	UNV	30/33	
L2E	SAME AS TYPE L2 EXCEPT WITH INTEGRAL EMERGENCY DRIVER	HE WILLIAMS DI SERIES	LED 3500K	UNV	30/33	
R1	LOW PROFILE 6" ROUND LED SURFACE FIXTURE, 740 LUMENS	HALO SMD6 SEREIS	LED 3500K	UNV	9/10	
R6	6" ROUND LED DOWNLIGHT, WIDE DISTRIBUTION, SEMI-SPECULAR OPEN REFLECTOR, 2000 LUMENS 0-10V DIMMING BALLAST	HE WILLIAMS 6DR	LED 3500K	UNV	19/21	
SL	4-FT LENSED LED STRIPLIGHT 0-10V DIMMING BALLAST	SIGNIFY FLUXSTREAM	LED 3500K	UNV	32/35	
UC	2-FT LED UNDERCABINET FIXTURE WITH ACRYLIC LENS	NEWSTAR MUS2	LED 3500K	UNV	12/13	
V1	DIRECT/INDIRECT 2-FT LED VANITY LIGHT 0-10V DIMMING BALLAST, 1500 LUMENS	HE WILLIAMS WMA	LED 3500K	UNV	20/22	
WM1	WALL MOUNT LED, FORWARD THROW UL LISTED WET LOCATION, 4000 LUMENS WITH INTEGRAL COLD WEATHER EMERGENCY DRIVER FINISH AS SELECTED BY ARCHITECT	ECLIPSE LV SERIES	LED 3000K	UNV	30/33	
S1	48" LONG LED SURFACE MOUNT VANDAL RESISTANT WITH IMPACT RESISTANT ACRYLIC LENS, EXTRUDED ALUMINUM HOUSING, OPERATION TO 0 DEGREE F	ECLIPSE VTP	LED 3000K	UNV	36/39	
S2	SURFACE MOUNT LED CANOPY LIGHT CAST ALUMINUM HOUSING INTEGRAL DRIVER, WET LOCATION, OPERATION TO 0 DEGREE F	HE WILLIAMS VG1	LED 3000K	UNV	69/75	
⊗	LED EXIT SIGN, GREEN LETTERS WHITE THERMOPLASTIC HOUSING INTEGRAL BATTERY WITH SELF DIAGNOSTICS	CHLORIDE CLX	LED	UNV		
⬌	TWIN HEAD LED EMERGENCY LIGHT WITH INTEGRAL BATTERY AND SELF DIAGNOSTICS	CHLORIDE VLTU	LED	UNV		

INTERIOR LIGHTING AND RECEPTACLE CONTROL SCHEDULE

ROOM #	ROOM NAME	MANUAL CONTROL				AUTOMATIC CONTROL								EMERGENCY TRANSFER RELAY	REMARKS
		LINE VOLTAGE SW	LOW VOLTAGE SW	DIMMING	SCENE SW	MANUAL ON	AUTO ON	WALL SW OCC SENSOR	OCC SENSOR	RELAY CNTRL PNL	WALL BOX TIME SWITCH	DYLGT SENSOR	50% RECPT LOAD CNTRL		
100/110	ENTRY/HALL		X	X			X			X				X	
101	MULTI-PURP		X	X	X	X				X				X	
102	STOR						X	X							
103	BREAK		X	X			X		X			X		X	
104	OFFICE		X	X		X			X				X		
105	KITCHEN		X	X			X		X					X	
106	TOILET						X	X							
107	TOILET						X	X							
108	TOILET						X	X							
109	JANITOR						X	X							
111	MECH/ELEC	X													
112	FIRE RISER	X													

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Drawn By: AD
Approved By: SJH
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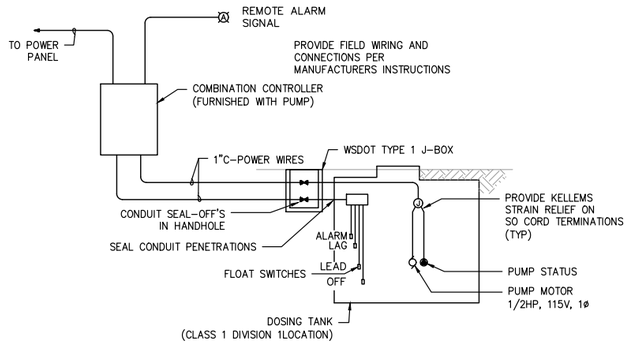
Sheet Title:
LIGHTING SCHEDULES

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
E2.2

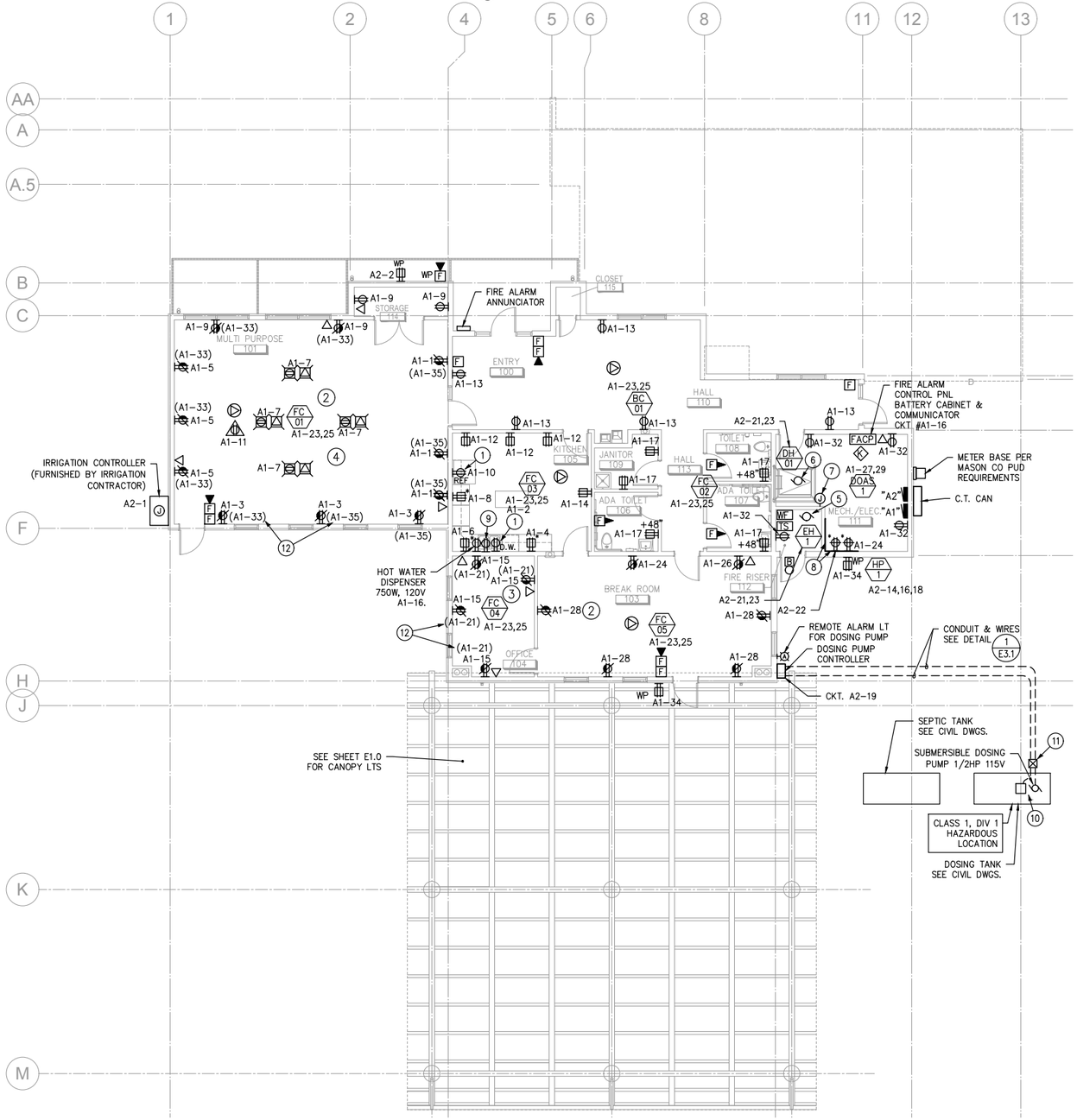
BID SET



1 E3.1 DOSING PUMP POWER & CONTROL RISER
NOT TO SCALE

BUBBLE NOTES:

1. PROVIDE REMOTE GFCI TEST & RESET
2. CONTROLLED RECEPTACLES TO BE AUTOMATICALLY CONTROLLED BY TIMECLOCK
3. CONTROLLED RECEPTACLES TO BE AUTOMATICALLY CONTROLLED BY ROOM OCCUPANCY SENSOR
4. FLOORBOXES PER NEC 210.71, VERIFY ARRANGEMENT PRIOR TO LAYOUT
5. AIR COMPRESSOR FOR SPRINKLER SYSTEM CKT. A1-31.
6. HWCP-1 CKT A1-30.
7. WATER HEATER WH-1 CKT A2-13,15,17.
8. 48" X 96" X 3/4" FIRE RETARDENT PLYWOOD MOUNTING BOARD FOR SIGNAL EQUIPMENT.
9. FOOD DISPENSER 3/4HP, 115V, CKT. A1-18.
10. PUMP LEVEL CONTROLS SEE DETAIL 1/E3.1.
11. WSDOT TYPE 1 J-BOX FOR SEAL-OFF'S.
12. INDICATES CIRCUIT FOR CONTROLLED RECEPTACLES TYPICAL.



POWER & SIGNAL PLAN
1/8" = 1'-0"

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MASON TRANSIT AUTHORITY
BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title:

Rev.	Description

OWNER Project No:
ART Project No: 1710
Drawn By: AD
Approved By: SJH
Date: FEB 12, 2020
Sheet Title: POWER & SIGNAL PLANS
2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)
Sheet No: E3.1
BID SET

NO. PANEL A2
LOCATION:
ENCLOSURE: SURFACE

VOLTAGE: 208/120 VOLT 3–PHASE 4–WIRE
BUSSING: 400 AMPS MAIN LUGS
NEUTRAL: 100%
ASSEMBLY AIC: 22,000

OTHER FEATURES:
- [X] SERVICE ENTRANCE RATED
- [X] FEED–THRU LUGS
- [ ] SURGE PROTECTIVE DEVICE
- [ ] ISOLATED GROUND

DESCRIPTION	VA	BKR	CKT NO				CKT NO	BKR	VA	DESCRIPTION
LTG – RM 101, 105 – 110, 113, 114	1,472	20/1	1	1,652			2	20/1	180	RECEP – OUTSIDE NORTH
LTG – RM 103, 104, 111, 112, EXT	744	20/1	3		924		4	20/1	180	RECEP – BUS SHED
LTG – EXTERIOR POLE LIGHTS	576	20/2	5			576	6	20/1		SPARE
	576		7	576			8	20/3		SPARE
LTG – CANOPY	450	20/1	9		450		10			
IRRIGATION CONTROLLER	180	20/1	11			180	12			
WATER HEATER WH–1	3,000	35/3	13	6,960			14	50/3	3,960	HP–1
	3,000		15		6,960		16		3,960	
	3,000		17			6,960	18		3,960	
DOSING PUMP	1,127	20/1	19	1,127			20			SPACE
WALL HEATER EH–1	750	20/2	21		750		22			SPACE
	750		23			750	24			SPACE
DUCT HEATER DH–01	2,500	30/3	25	2,500			26			SPACE
	2,500		27		2,500		28			SPACE
	2,500		29			2,500	30			SPACE
			31	0			32			SPACE
			33		0		34			SPACE
			35			0	36			SPACE
			37	0			38			SPACE
			39		0		40			SPACE
			41			0	42			
				12,815	11,584	10,966				SECTION PHASE LOADS
				12,815	11,584	10,966				TOTAL PHASE LOAD

	LIGHTING	3,818	VA	125% LIGHTING	4,773	VA
REMARKS:	TOTAL RECEP	360	VA	FIRST 10KVA RECEP	540	VA
				50% RECEP OVER 10KVA	0	VA
	LG MOTOR	11,880	VA	125% LARGEST MOTOR	14,850	VA
	OTHER MOTORS	0	VA	OTHER MOTORS	0	VA
	KITCHEN	0	VA	65% KITCHEN	0	VA
	COMPUTERS	0	VA	COMPUTERS	0	VA
	EV CHARGER	0	VA	EV CHARGER@125%	0	VA
	MISC	19,307	VA	MISC	19,307	VA
	TOTAL CONN	35.37	KVA	TOTAL CALCULATED	39.47	KVA
		98.17	AMPS		109.56	AMPS

NO. A1
LOCATION: MECH/ELEC RM
ENCLOSURE: SURFACE

VOLTAGE: 208/120 VOLT 3–PHASE 4–WIRE
BUSSING: 400 AMPS MAIN BKR
NEUTRAL: 100%
ASSEMBLY AIC: 22,000

OTHER FEATURES:
- [X] SERVICE ENTRANCE RATED
- [X] FEED–THRU LUGS
- [ ] SURGE PROTECTIVE DEVICE
- [ ] ISOLATED GROUND

DESCRIPTION	VA	BKR	CKT NO				CKT NO	BKR	VA	DESCRIPTION
RECEP – MULTI PURPOSE	540	20/1	1	1,740			2	20/1	1,200	RECEP – KITCHEN, DISH WASHER
RECEP – MULTI PURPOSE	540	20/1	3		1,740		4	20/1	1,200	RECEP – KITCHEN
RECEP – MULTI PURPOSE	540	20/1	5			1,740	6	20/1	1,200	RECEP – KITCHEN
RECEP – MULTI PURPOSE	720	20/1	7	1,920			8	20/1	1,200	RECEP – KITCHEN
RECEP –MP & STORAGE 114	720	20/1	9		1,320		10	20/1	600	RECEP – KITCHEN, REFR
RECEP – CEILING MULTI PURPOSE	360	20/1	11			900	12	20/1	540	RECEP – KITCHEN
RECEP – ENTRY/HALL	900	20/1	13	1,080			14	20/1	180	RECEP – KITCHEN
RECEP – OFFICE 104	720	20/1	15		1,470		16	20/1	750	RECEP –HOT WATER DISPENSER
RECEP – JANITOR, TOILETS	900	20/1	17			2,740	18	30/1G*	1,840	FOOD DISPOSER
SPARE		20/1	19	1,080			20	20/1	1,080	RECEP – SIGNAL SYSTEMS
RECEP CONTROLLED	720	20/1	21		1,800		22	20/1	1,080	RECEP – SIGNAL SYSTEMS
CEILING CASSETTE UNITS	566	15/2	23			1,766	24	20/1	1,200	RECEP – BREAK RM
FC–01, 02,03, 04, 05, & BC–01	566		25	1,766			26	20/1	1,200	RECEP – BREAK RM
DOAS–1	1,127	20/2	27		1,847		28	20/1	720	RECEP – BREAK RM
	1,127		29			1,277	30	15/1	150	CIRC PUMP
FIRE SPRINKLER AIR COMPR	1,840	30/1	31	2,560			32	20/1	720	RECEP – MECH/ELEC
RECEP CONTROLLED	900	20/1	33		1,260		34	20/1	360	RECEP – EXTERIOR
RECEP CONTROLLED	900	20/1	35			1,100	36	20/1	200	FACP
SPARE		20/1	37	0			38	30/3		SPD
SPARE		20/1	39		0		40			
SPARE		20/1	41			0	42			
				10,146	9,437	9,523				SECTION 1 PHASE LOADS
				12,815	11,584	10,966				
				22,961	21,021	20,489				TOTAL PHASE LOAD

	LIGHTING	3,818	VA	125% LIGHTING	4,773	VA
REMARKS:	TOTAL RECEP	13,740	VA	FIRST 10KVA RECEP	10,000	VA
* INDICATES GFCI BREAKER				50% RECEP OVER 10KVA	1,870	VA
	LG MOTOR	11,880	VA	125% LARGEST MOTOR	14,850	VA
	OTHER MOTORS	5,376	VA	OTHER MOTORS	5,376	VA
	KITCHEN	0	VA	65% KITCHEN	0	VA
	COMPUTERS	0	VA	COMPUTERS	0	VA
	EV CHARGER	0	VA	EV CHARGER @ 125%	0	VA
	MISC	29,657	VA	MISC	29,657	VA
	TOTAL CONN	64.47	KVA	TOTAL CALCULATED	66.53	KVA
		178.96	AMPS		184.66	AMPS

NO. EV
ENCLOSURE: SURFACE

VOLTAGE: 208/120 VOLT 3–PHASE 4–WIRE
BUSSING: 400 AMPS MAIN BKR
NEUTRAL: 100%
ASSEMBLY AIC: 10,000

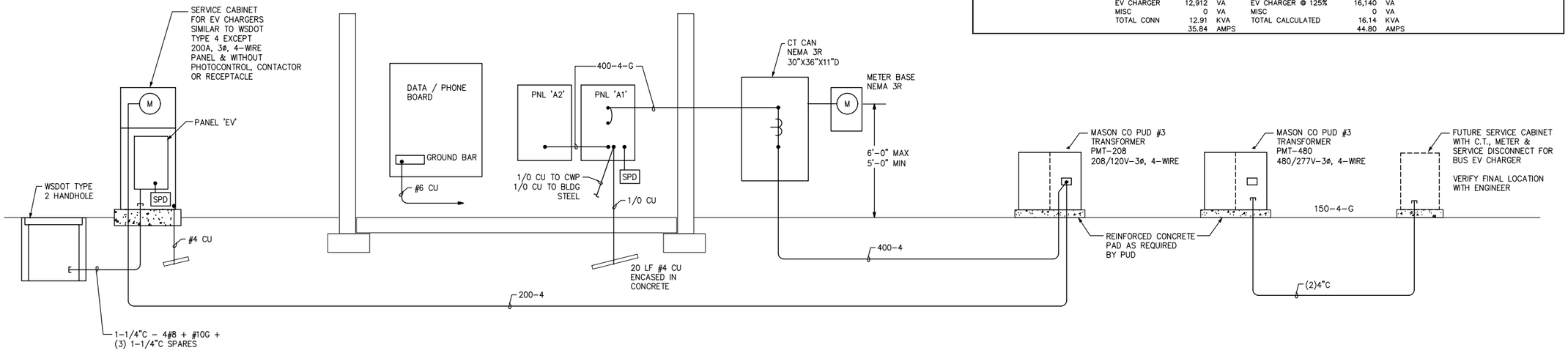
OTHER FEATURES:
- [X] SERVICE ENTRANCE RATED
- [X] FEED–THRU LUGS
- [ ] SURGE PROTECTIVE DEVICE
- [ ] ISOLATED GROUND

DESCRIPTION	VA	BKR	CKT NO				CKT NO	BKR	VA	DESCRIPTION
EV CHARGER	3,228	40/2	1	3,228			2	20/1		
	3,228		3		3,228		4	20/1		
EV CHARGER	3,228	40/2	5			3,228	6	20/1		
	3,228		7	3,228			8	20/1		
		40/2	9		0		10	20/1		
			11			0	12	20/1		
		40/2	13	0			14	20/1		
			15		0		16	20/1		
		40/2	17			0	18	30/1		
			19	0			20	20/1		
		40/2	21		0		22	20/1		
			23			0	24	20/1		
				6,456	3,228	3,228				SECTION 1 PHASE LOADS
				6,456	3,228	3,228				TOTAL PHASE LOAD

	LIGHTING	0	VA	125% LIGHTING	0	VA
REMARKS:	TOTAL RECEP	0	VA	FIRST 10KVA RECEP	0	VA
				50% RECEP OVER 10KVA	0	VA
	LG MOTOR	0	VA	125% LARGEST MOTOR	0	VA
	OTHER MOTORS	0	VA	OTHER MOTORS	0	VA
	KITCHEN	0	VA	65% KITCHEN	0	VA
	COMPUTERS	0	VA	COMPUTERS	0	VA
	EV CHARGER	12,912	VA	EV CHARGER @ 125%	16,140	VA
	MISC	0	VA	MISC	0	VA
	TOTAL CONN	12.91	KVA	TOTAL CALCULATED	16.14	KVA
		35.84	AMPS		44.80	AMPS

FEEDER SCHEDULE – 3ø, 3 OR 4 WIRE + GND

CALL OUT	DESCRIPTION
70–3–G	1"C–3#4 +#8 GND
150–4–G	2"C–4#1/0 KCM +#6 GND
400–4	(2) 2 1/2"C–4#3/0 IN PARALLEL
400–4–G	(2) 2 1/2"C–4#3/0 +#3 GND IN PARALLEL



1 ELECTRICAL DISTRIBUTION DIAGRAM
SCALE: NONE

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MASON TRANSIT AUTHORITY
BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title:

Rev.	Description

OWNER Project No:
ART Project No: 1710
Drawn By: AD
Approved By: SJH
Date: FEB 12, 2020

Sheet Title: ELECTRICAL DISTRIBUTION

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No: E5.1

BID SET

WATER HEATER SCHEDULE

SYMBOL	BASIS OF DESIGN MANUFACTURER AND SERIES NO.	TYPE	AREA SERVED	HEATING CAPACITY INPUT	STORAGE (GAL)	ELECTRICAL		FEEDER	DISCONNECT
						FLA	VOLTS/PH		
WH-1	A.O. SMITH DRE-80	ELECTRIC TANK TYPE	BUILDING HW	9 kW	80	11	480/3	3/4"C-3#12 +#12G	30A/3P

PUMP SCHEDULE

SYMBOL	BASIS OF DESIGN MANUFACTURER AND SERIES NO.	ELECTRICAL				REMARKS
		FEEDER	DISC	MIN. HP	VOLTS/PH	
HWCP-1	BELL & GOSSETT SERIES NBF-10S/LW	3/4"C-2#12 +#12G	15/1 TOGGLE	52 W	115/1	WIRE TO AQUASTAT

VRF INDOOR HEAT PUMP SCHEDULE

SYMBOL	TYPE	AREA SERVED	CFM	UNIT ELECTRICAL			FEEDER	DISCONNECT
				MCA	MOP	VOLT/PH		
FC-01	CEILING CASSETTE	MULTI-PURPOSE - 101	1,230	1.24	15	208/1	3/4"C - 2#12+#12G	15A/2P
FC-02	CONCEALED DUCTED FAN COIL	ENTRY & HALL - 100, 110, 113	600	1.6	15	208/1	3/4"C - 2#12+#12G	15A/2P
FC-03	CEILING CASSETTE	KITCHEN - 105	280	.24	15	208/1	3/4"C - 2#12+#12G	15A/2P
FC-04	CEILING CASSETTE	OFFICE - 104	230	.24	15	208/1	3/4"C - 2#12+#12G	15A/2P
FC-05	CEILING CASSETTE	BREAK ROOM - 103	635	1.6	15	208/1	3/4"C - 2#12+#12G	15A/2P
BC-1	BRANCH CONTROLLER	VRF SYSTEM	-	.52	15	208/1	3/4"C - 2#12+#12G	15A/2P

VRF OUTDOOR HEAT PUMP SCHEDULE

SYMBOL	OUTDOOR FAN	COMPRESSOR	UNIT ELECTRICAL DATA			FEEDER	DISCONNECT
	QTY	QTY	MCA	MOP	VOLTS/PH		
HP-1	1	1	15	25	480/3	3/4"C-3#10 +#10G	30A/3P FUSED

DOAS HEAT RECOVERY UNIT

SYMBOL	AREA SERVED	SUPPLY FAN		EXHAUST FAN		UNIT ELECTRICAL					FEEDER	DISCONNECT
		TYPE	CFM	TYPE	CFM	HP	FLA	MCA	MOP	VOLTS/PH		
DOAS-1	WHOLE BUILDING	DIRECT DRIVE	770	DIRECT DRIVE	500	(2) .5	9.6	10.8	15	208/1	3/4"C - 3#12+#12G	30A/2P FUSED

ELECTRIC HEATER SCHEDULE

SYMBOL	AREA / UNIT SERVED	CFM	ELECTRICAL		FEEDER	DISCONNECT
			WATTS	VOLTS/PH		
DH-01	DOAS-1	765	7500	277/1	3/4"C - 2#8+#10G	60A/2P
EH-1	FIRE SPRINKLER RISER		1500	277/1	3/4"C - 2#12 + #12G	20A/1P

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Project Title:
MASON TRANSIT AUTHORITY
BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Rev.	Description

OWNER Project No:
ART Project No: **1710**
Drawn By: **AD**
Approved By: **SJH**
Date: **FEB 12, 2020**

Sheet Title:
EQUIPMENT SCHEDULES

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
E5.2

BID SET

MECHANICAL GENERAL NOTES

1. MECHANICAL WORK IS NOT LIMITED TO MECHANICAL DRAWINGS AND DIVISION 20, 21, 22, 23, AND 25 SPECIFICATIONS. THERE IS ADDITIONAL MECHANICAL WORK TO BE INCLUDED IN THE BID INDICATED ON OTHER DRAWINGS AND IN OTHER SPECIFICATION DIVISIONS. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL MECHANICAL WORK.
2. MECHANICAL EQUIPMENT 1/2 HP AND LESS SHALL HAVE ANY REQUIRED STARTER/CONTROL RELAY PROVIDED BY THE CONTROL CONTRACTOR (EXCEPT WHERE SPECIFICALLY SHOWN OR SPECIFIED OTHERWISE).
3. FIXTURE LOCATIONS: VERIFY LOCATION OF PLUMBING FIXTURES WITH ARCHITECTURAL DRAWINGS BEFORE BEGINNING WORK. ARCHITECTURAL DRAWINGS GOVERN. PLUMBING FIXTURE HEIGHTS SHALL BE AS SHOWN ON ARCHITECTURAL DRAWINGS.
4. TRAP PRIMERS: ALL FLOOR DRAINS, FUNNEL DRAINS, AND FLOOR RECEPTORS SHALL HAVE TRAP PRIMERS. SOME DRAINS HAVE THE TRAP PRIMER LINE AND ASSOCIATED TRAP PRIMER VALVE SHOWN ON THE PLANS SOME LOCATIONS DO NOT. LOCATIONS WHERE THIS TRAP PRIMER PIPING AND VALVE ARE NOT SHOWN STILL REQUIRE A TRAP PRIMER, BUT THE LOCATION MAY BE SELECTED BY THE CONTRACTOR. SEE DETAIL 4 SHEET M3.32.
5. CLEANOUTS: PROVIDE CLEANOUTS AS REQUIRED BY CODE; USE FLOOR CLEANOUTS WHERE POSSIBLE. SEE DETAILS.
6. PIPE ROUTING: ALL PIPING SHOWN IS SCHEMATIC, CONTRACTOR SHALL PROVIDE ALL OFFSETS/ELBOWS AS REQ'D TO ALLOW ROUTING AROUND STRUCTURE, ELECTRICAL, & OTHER INTERFERENCES. ALL PIPING SHALL BE RUN CONCEALED, UNO.
7. PIPE SIZES: UNSIZED PLUMBING PIPING SHALL MATCH THE SIZE OF THE LARGEST ADJACENT CONNECTING PIPE SIZE SHOWN, WHERE THE ADJACENT PIPE IS NOT SHOWN (OR NOT CLEAR), THE PIPE SIZE SHALL BE BASED ON THE GPM FLOWING IN THE PIPE (USE FIXTURE UNITS AND CORRESPONDING GPM PER THE UPC FOR DOMESTIC WATER SYSTEMS, USE WASTE FIXTURE UNITS & UPC TABLES FOR WASTE/VENT SYSTEM), AND A VELOCITY NO GREATER THAN 4 FEET PER SECOND. USE UPC CURVES FOR GPM/VELOCITY FOR APPROPRIATE PIPING MATERIAL INVOLVED.
8. CONDENSATE DRAINS: PROVIDE PRIMARY CONDENSATE DRAINS FOR UNITS GENERATING CONDENSATE IN ACCORDANCE WITH CODE REQUIREMENTS.
9. CLOSURE COLLARS: ALL DUCT PENETRATIONS THRU WALLS SHALL BE PROVIDED WITH CLOSURE COLLARS (BOTH SIDES OF PENETRATION) AND BE TIGHTLY SEALED TO PREVENT THE TRANSMISSION OF NOISE.
10. COORDINATION: CONTRACTOR SHALL CAREFULLY COORDINATE WORK W/ ALL OTHER TRADES, ESPECIALLY IN CEILING SPACES WHERE SPACE IS TIGHT. SHEET METAL CONTRACTOR SHALL HAVE PRIORITY OVER OTHER MECHANICAL TRADES IN CEILING SPACE WHERE CONFLICTS OCCUR.
11. DUCT LAYOUT: ALL DUCTWORK SHOWN IS SCHEMATIC, CONTRACTOR SHALL PROVIDE ALL OFFSETS/ELBOWS AS REQ'D TO ALLOW ROUTING AROUND STRUCTURE, ELECTRICAL, & OTHER INTERFERENCES.
12. FLEXIBLE DUCT: LENGTH SHALL NOT EXCEED 8 FEET, AND MAY ONLY BE USED WHERE SPECIFICALLY SHOWN ON THE PLANS.
13. BALANCING DAMPERS: PROVIDE MANUAL VOLUME DAMPERS IN ALL BRANCH DUCTS AND SPLITS IN MAIN DUCTS AND WHERE REQUIRED BY BALANCERS; ONLY SOME OF THE REQUIRED DAMPERS ARE SHOWN ON THE PLANS.
14. DUCT SIZES: UNSIZED DUCTS SHALL MATCH THE SIZE OF THE LARGEST ADJACENT DUCT THAT IS SIZED. WHERE THE ADJACENT DUCT SIZE IS NOT SHOWN, PROVIDE THE FOLLOWING SIZED DUCTS (OR EQUIVALENT RECTANGULAR).

CFM	DUCTS TO AIR INLETS/OUTLETS	OTHER DUCT
0 - 100	6" Ø	6" Ø
101 - 150	8" Ø	8" Ø
151 - 250	10" Ø	8" Ø
251 - 400	12" Ø	10" Ø
401 - 500	14" Ø	12" Ø
501 - 700	16" Ø	12" Ø
701 - 900	18" Ø	14" Ø
901 - 1200	20" Ø	16" Ø
1201 - 1500	----	18" Ø
1501 - 2000	----	20" Ø
2001 - 2400	----	22" Ø
>2401	SIZE BASED ON 500 FPM	SIZE BASED ON 0.08"/100' P.D.

15. CEILING LOCATIONS: VERIFY LOCATIONS OF ITEMS INSTALLED IN CEILINGS WITH ARCHITECTURAL REFLECTED CEILING PLANS PRIOR TO BEGINNING WORK. NOTIFY ARCHITECT/ENGINEER OF DISCREPANCIES. SHIFT AIR INLETS/OUTLETS FROM LOCATIONS SHOWN AS REQ'D TO AVOID CONFLICTS W/STRUCTURE & OTHER ITEMS. SUCH SHIFTS SHALL MAINTAIN SYMMETRY OF AIR TERMINALS & SHALL HAVE PRIOR APPROVAL OF ARCHITECT/ENGINEER.
16. LOUVERS: VERIFY ALL LOUVER LOCATIONS & SIZES WITH ARCHITECTURAL DRAWINGS. ARCHITECTURAL DRAWINGS GOVERN. DUCT CONNECTIONS AT LOUVERS SHALL MATCH FULL LOUVER SIZE (UNLESS NOTED OTHERWISE).
17. DUCT FITTINGS: FOR HVAC DUCT FITTINGS/CONNECTIONS OF ELBOWS/TRANSITIONS SEE DETAILS ON SHEET M4.3 & M4.4.
18. CEILING SPACE IS TIGHT IN A NUMBER OF AREAS. IN SUCH AREAS, CEILING AIR INLET/OUTLET CONN'S REQUIRE SIDE INLET PLENUM, SEE DETAIL 1 SHEET M4.3. PROVIDE WHERE REQ'D DUE TO SPACE LIMITATIONS TO PREVENT KINKS IN FLEX DUCT AND ALLOW PROPER CONN.
19. BALANCING NOTES: PROVIDE AIR BALANCING OF HVAC SYSTEM, HYDRONIC SYSTEM, & BALANCING OF DOMESTIC HOT WATER SYSTEM.
20. CONCEALED: ALL DUCTWORK SHALL BE RUN CONCEALED, UNO.
21. ACCESS DOORS: PROVIDE DUCT ACCESS DOORS AT ALL DAMPERS & BDD'S.
22. BALANCER CFM'S: WHERE RETURN GRILLE CFM'S ARE NOT INDICATED, BALANCER SHALL CALCULATE & SUBMIT FOR ENGINEER REVIEW. UNIT RA=SA-OA.
23. FLEX CONNECTORS: PROVIDE FLEX CONNECTORS IN DUCT CONNECTIONS TO ALL EQUIPMENT.
24. WHERE EXPOSED: VERIFY MOUNTING HEIGHTS OF ALL EXPOSED DUCTWORK & WALL GRILLES/WALL CAPS W/ ARCHITECT PRIOR TO BEGINNING WORK.
25. EQUIPMENT TRANSITIONS: PROVIDE TRANSITIONS FROM DUCT SIZES INDICATED TO CONNECTION SIZES AT EQUIPMENT TO MATCH UNIT CONNECTIONS. WHERE THE CONNECTING DUCT IS LINED, THE TRANSITION SHALL BE LINED.
26. DUCT PRESSURE CLASS: SUPPLY AIR DUCTS SHALL BE CONSTRUCTED TO 1" PRESSURE CLASS. RETURN AIR & EXHAUST DUCTS SHALL BE CONSTRUCTED TO -1" PRESSURE CLASS. SEAL DUCTS PER WSEC AND SPECIFICATIONS.
27. FIRE SPRINKLER: PROVIDE COMPLETE FIRE SPRINKLER COVERAGE OF ENTIRE BUILDING AND COVERED PARKING AREA.

FIRE SPRINKLER NOTES

1. FIRE SPRINKLER SYSTEM & WORK IS CONTRACTOR DESIGN/BUILD.
2. ALL AREAS SHALL BE FIRE SPRINKLERED PER NFPA 13, PER THE LOCAL AUTHORITY HAVING JURISDICTION, AND IN EXCESS OF THESE REQUIREMENTS AS INDICATED.
3. PROVIDE DRY PIPE TYPE SYSTEM SERVING ALL AREAS.
4. REVIEW ARCHITECTURAL, STRUCTURAL, AND ALL OTHER DRAWINGS FOR BUILDING DETAILS AND LAYOUT. PLANS SHOWN ON "M" SHEETS ARE APPROXIMATE.
5. COORDINATE WITH ALL TRADES IN ROUTING OF SPRINKLER PIPING TO AVOID CONFLICTS. FIRE PROTECTION SYSTEM HAS THE LOWEST PRIORITY OF ITEMS RAN IN THE CEILING. PROVIDE OFFSETS AS REQUIRED.
6. SPRINKLER HEADS SHALL BE CENTERED IN CEILING TILE.
7. HAZARD CLASS SHALL BE AS DETERMINED BY AUTHORITY HAVING JURISDICTION.
8. ALL FIRE SPRINKLER HEADS SERVING OCCUPIED AREAS OF THE BLDG SHALL BE QUICK RESPONSE TYPE.
9. ALL FIRE SPRINKLER HEADS SHALL BE LOCATED TO BE SYMMETRIC WITHIN SPACES SERVED AND BUILDING ARCHITECTURAL FEATURES.

MECHANICAL LEGEND

SYMBOL	DESCRIPTION
	WASTE OR SOIL (W)
	VENT (V)
	COLD WATER (CW)
	HOT WATER (HW)
	HOT WATER CIRCULATING (HWC)
C	CONDENSATE LINE (C)
RG	REFRIGERANT GAS (RG)
RL	REFRIGERANT LIQUID (RL)
	CLEANOUT
	FLOOR DRAIN
	ISOLATION VALVE
	CHECK VALVE
	UNION
	RELIEF VALVE
	STRAINER WITH BLOW-OFF VALVE
	CONCENTRIC REDUCER
	PRESSURE REDUCING VALVE
	THERMOMETER
	PIPE UP
	PIPE DOWN
	PIPE TEE IN LINE, BRANCH PIPE DOWN
20/12	DUCT (FIRST FIGURE, SIDE SHOWN)
	DUCT SECTION (SUPPLY)
	DUCT SECTION (EXHAUST OR RETURN)
⌀	ROUND DUCT
	VOLUME DAMPER (MANUAL)
	MOTORIZED DAMPER
	FLEXIBLE CONNECTION
	FLEXIBLE DUCT
	ELBOW WITH TURNING VANES
	DUCT UP (RECTANGULAR)
	DUCT UP (RECTANGULAR)
	DUCT DOWN (RECTANGULAR)
	DUCT DOWN (RECTANGULAR)
	DUCT UP (ROUND)
	DUCT DOWN (ROUND)
SIZE SYMBOL CFM	CEILING OUTLET
SIZE SYMBOL CFM	CEILING INLET
T	THERMOSTAT
S	SWITCH
2 / M3.1	DETAIL IDENTIFICATION NUMBER SHEET ON WHICH DETAIL IS SHOWN
A / M3.1	SECTION IDENTIFICATION LETTER SHEET ON WHICH SECTION IS SHOWN

ABBREV.	DESCRIPTION
AFF	ABOVE FINISHED FLOOR
AHJ	AUTHORITY HAVING JURISDICTION
APPROX	APPROXIMATELY
ARCH	ARCHITECTURAL
AUTO	AUTOMATIC
BDD	BACKDRAFT DAMPER
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT/HOUR
BLDG	BUILDING
CAP	CAPACITY
CLG	CEILING
CO	CLEANOUT
COP	COEFFICIENT OF PERFORMANCE
COMP	COMPRESSOR
CONN	CONNECTION
CONT	CONTINUE, CONTINUATION
CFM	CUBIC FEET PER MINUTE
CW	COLD WATER
DEG F, F	DEGREE FAHRENHEIT
DIA, Ø	DIAMETER
DOAS	DEDICATED OUTSIDE AIR SYSTEM
DN	DOWN
DWG	DRAWING
DB	DRY BULB
DL	DOOR LOUVER
EA	EACH
EFF	EFFICIENCY
ECM	ELECTRONICALLY COMMUTATED MOTOR
ELEC	ELECTRICAL, ELECTRIC
EER	ENERGY EFFICIENCY RATIO
EAT	ENTERING AIR TEMPERATURE
EWB	ENTERING WET BULB
EDB	ENTERING DRY BULB
EOL	END OF LINING
EXH	EXHAUST
EXIST, (E)	EXISTING
ESP	EXTERNAL STATIC PRESSURE
F	FIRE
FPM	FEET PER MINUTE
FLEX	FLEXIBLE
FCO	FLOOR CLEAN OUT
FC	FAN COIL
FLA	FULL LOAD AMPS
GAL	GALLON
GALV.	GALVANIZED
HP	HORSE POWER
HW	HOT WATER
HWC	HOT WATER CIRCULATION
IN	INCH
I.E.	INVERT ELEVATION
KW	KILOWATT
LAT	LEAVING AIR TEMPERATURE
LDB	LEAVING DRY BULB
LWT	LEAVING WATER TEMPERATURE
LWB	LEAVING WET BULB
MAX	MAXIMUM
MFR	MANUFACTURER
MBH	THOUSAND BTUH
MCA	MINIMUM CIRCUIT AMPS
MECH	MECHANICAL
MIN	MINIMUM
MUA	MAKE UP AIR
NO.	NUMBER
NTS	NOT TO SCALE
OBD	OPPOSED BLADE DAMPER
OA	OUTSIDE AIR
ORL	OVERFLOW RAINLEADER
PH	PHASE
P.D.I.	PLUMBING AND DRAINAGE INSTITUTE
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH GAUGE
PD	PRESSURE DROP
R	RETURN
RL	RAINLEADER, REFRIGERANT LIQUID
RG	REFRIGERANT GAS
RLA	RATED LOAD AMPS
REF	REFERENCE
REQ'D	REQUIRED
RA	RETURN AIR
RPM	REVOLUTIONS PER MINUTE
RM	ROOM
S	SUPPLY
SA	SUPPLY AIR
SCO	SURFACE CLEANOUT
S.O.	SCREENED OPENING
SS	STAINLESS STEEL
TEMP	TEMPERATURE
TD	TRANSFER DUCT
TG	TRANSFER GRILLE
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VTR	VENT THROUGH ROOF
VERT	VERTICAL
V	VOLTS, VOLTAGE, VENT
WCO	WALL CLEAN OUT
W	WASTE
WA	WATT
WB	WET BULB
WL	WALL LOUVER
W/	WITH
WSEC	WASHINGTON STATE ENERGY CODE

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MASON TRANSIT AUTHORITY
BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title:

Rev.	Description

OWNER Project No:
ART Project No: **1710**
Drawn By: **BS**
Approved By: **RH**
Date: **02/12/2020**

Sheet Title:
MECHANICAL LEGEND AND NOTES

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
M0.1

BID SET

WATER HEATER SCHEDULE

SYMBOL	BASIS OF DESIGN MANUFACTURER AND SERIES NO.	TYPE	AREA SERVED	HEATING CAPACITY INPUT	STORAGE (GAL)	DOMESTIC HW			ELECTRICAL		REMARKS
						GPH	EWT	LWT	FLA	VOLTS/PH	
WH-1	A.O. SMITH DRE-80	ELECTRIC TANK TYPE	BUILDING HW	9 kW	80	23.5	50	120	25	208/3	

PUMP SCHEDULE

SYMBOL	BASIS OF DESIGN MANUFACTURER AND SERIES NO.	TYPE	SERVICE	GPM	FT. HEAD H20	ELECTRICAL		REMARKS
						MIN. HP	VOLTS/PH	
HWCP-1	BELL & GOSSETT	DOMESTIC CIRCULATOR	RESTROOM HWC	3	10	52 W	115/1	ALL BRONZE, W/ AQUASTAT

MISCELLANEOUS EQUIPMENT SCHEDULE

SYMBOL	ITEM DESCRIPTION	BASIS OF DESIGN MANUFACTURER AND SERIES NO.	AREA SERVED	EQUIPMENT CAPACITY	ELECTRICAL		REMARKS
					POWER	VOLTS / PH	
AIR-1	AIR COMPRESSOR	SEE DIVISION 21	DRY SPRINKLER SYSTEM	SELECTED BY DIV. 21 CONTRACTOR	MAX 1 HP	208/3	

PLUMBING FIXTURE SCHEDULE

SYMBOL	DESCRIPTION	W *	V *	CW *	HW *	REMARKS
P-1A	WATER CLOSET	4"	2"	1"	-	FLOOR MOUNT ADA ACCESSIBLE - FLUSH VALVE
P-1B	WATER CLOSET	4"	2"	1"	-	FLOOR MOUNT - FLUSH VALVE
P-3A	LAVATORY	2"	2"	1/2"	1/2"	WALL MOUNT, ADA ACCESSIBLE
P-3B	LAVATORY	2"	2"	1/2"	1/2"	WALL MOUNT
P-5A	KITCHEN SINK	2"	2"	1/2"	1/2"	DOUBLE COMPARTMENT, ADA ACCESSIBLE
P-6A	SERVICE SINK	3"	2"	1/2"	1/2"	FLOOR MOUNT
P-7A	HOT WATER DISPENSER	-	-	-	1/2"	750 WATTS, 120V/1PH
P-7B	FOOD DISPOSER	1-1/2"	-	-	-	3/4 HP, 120V/1PH
P-8A	DRINKING FOUNTAIN	2"	2"	1/2"	-	DUAL HEIGHT DRINKING FOUNTAIN, ADA ACCESSIBLE
P-10A	WALL HYDRANT	-	-	3/4"	-	FREEZE PROOF
P-11C	FLOOR RECEPTOR	SIZES AS NOTED ON PLANS *				W/ TRAP PRIMER
P-12B	REFRIGERATOR FITTING	-	-	1/2"	-	W/ 1/2" QUARTER TURN VALVE

* PROVIDE W/ 2"W & 2"V UNO.
** PROVIDE W/ 4" W & 2" V UNO.

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SCHEDULES

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Sheet No:
M0.2

BID SET

AIR INLET & OUTLET SCHEDULE

SYMBOL	TYPE	BASIS OF DESIGN MANUFACTURE AND SERIES NO.	REMARKS
CD	CEILING DIFFUSER	TITUS SERIES MCD	MODULAR CORE DIFFUSER
CDL	CEILING DIFFUSER LOW FLOW	TITUS SERIES TJD	LOW FLOW ARCHITECTURAL
CRFG	CEILING RETURN FILTER GRILLE	TITUS SERIES 50FF	1/2"x1/2"x1/2" CUBE CORE W/ 1" FILTER
CEG	CEILING EXHAUST GRILLE	TITUS SERIES 50F	1/2"x1/2"x1/2" CUBE CORE
CTG	CEILING TRANSFER GRILLE	TITUS SERIES 50F	1/2"x1/2"x1/2" CUBE CORE
CER	CEILING EXHAUST REGISTER	TITUS SERIES 50F	1/2"x1/2"x1/2" CUBE CORE, W/ OBD
WL	WALL LOUVER	RUSKIN ELF6375DX	EXTRUDED ALUMINUM

NOTES:

1. CEILING DIFFUSERS (CD) SHALL HAVE NO. & DIRECTION OF THROWS AS INDICATED ON PLANS. (E.G. CD-3=3 WAY THROW).
2. ALL AIR TERMINALS SHALL HAVE FACTORY FINISH, COLOR AS SELECTED BY ARCHITECT.
3. SEE LEGEND FOR TERMINOLOGY USED IN AIR TERMINAL CALL-OUTS ON DRAWINGS.
4. SEE ARCH. FINISH SCHEDULE FOR CEILING TYPES, PROVIDE AIR TERMINALS TO MATCH CEILING CONSTRUCTION INSTALLED IN.
5. PROVIDE OBD IN CD'S LOCATED IN GWB CEILING.

VRF INDOOR HEAT PUMP SCHEDULE

SYMBOL	BASIS OF DESIGN MANUFACTURER AND SERIES NO.	TYPE	AREA SERVED	SERVED BY	CAPACITY (BTU/H)		CFM	ESP	FILTER TYPE	UNIT ELECTRICAL			MAX WEIGHT	REMARKS
					COOLING	HEATING				MCA	MOP	VOLT/PH		
FC-01	MITSUBISHI PLFY-P48	CEILING CASSETTE	MULTI-PURPOSE - 101	HP-1	48,000	54,000	1,230	-	PP HONEYCOMB FABRIC	1.24	15	208/1	80	
FC-02	MITSUBISHI PEFY-P18	CONCEALED DUCTED FAN COIL	ENTRY & HALL - 100, 110, 113	HP-1	18,000	20,000	600	.6	PP HONEYCOMB FABRIC	1.6	15	208/1	70	
FC-03	MITSUBISHI PLFY-P05	CEILING CASSETTE	KITCHEN - 105	HP-1	5,000	5,600	280	-	PP HONEYCOMB FABRIC	.24	15	208/1	40	
FC-04	MITSUBISHI PLFY-P05	CEILING CASSETTE	OFFICE - 104	HP-1	5,000	5,600	230	-	PP HONEYCOMB FABRIC	.24	15	208/1	40	
FC-05	MITSUBISHI PLFY-P18	CEILING CASSETTE	BREAK ROOM - 103	HP-1	18,000	20,000	635	-	PP HONEYCOMB FABRIC	1.6	15	208/1	70	
BC-1	MITSUBISHI CMB-P106NU	BRANCH CONTROLLER	VRF SYSTEM: HP-1	HP-1	324,000	324,000	-	-	-	.52	15	208/1	200	BC CONTROLLER W/ CONDENSATE PUMP

VRF OUTDOOR HEAT PUMP SCHEDULE

SYMBOL	BASIS OF DESIGN MANUFACTURER AND SERIES NO.	AREA SERVED	COOLING CAP. *		HEATING CAP.**		OUTDOOR FAN	COMPRESSOR	MAX. WEIGHT LBS	UNIT ELECTRICAL			REMARKS
			TOTAL MBH	EFF (EER / IEER)	MBH	EFF (COP)	QTY	QTY		MCA	MOP	VOLTS/PH	
HP-1	MITSUBISHI: PURY-EP96TNU-A	WHOLE BUILDING	96	13.7 / 26.5	108	3.94	2	1	700	31	45	208/3	

* COOLING CAPACITY IS AHRI RATING: AT 80°F DB; 67°F WB INDOOR COIL EAT AND 95°F OUTDOOR COIL EAT. ** HEATING CAPACITY IS AHRI HI-TEMP RATING: AT 70°F DB INDOOR COIL EAT AND 47°F DB; 43°F WB OUTDOOR COIL EAT.

DOAS HEAT RECOVERY UNIT

SYMBOL	BASIS OF DESIGN MANUFACTURER AND SERIES NO.	AREA SERVED	SUPPLY FAN			EXHAUST FAN			UNIT ELECTRICAL					FILTERS	MAX UNIT WEIGHT (LBS)	REMARKS
			TYPE	CFM	ESP	TYPE	CFM	ESP	HP	FLA	MCA	MOP	VOLTS/PH	TYPE		
DOAS-1	RENEWAIRE - HE1XINV	WHOLE BUILDING	DIRECT DRIVE	640	.43	DIRECT DRIVE	500	.43	(2) .5	9.6	10.8	15	208/1	2" MERV-8	400	

ELECTRIC HEATER SCHEDULE

SYMBOL	BASIS OF DESIGN MANUFACTURER AND SERIES NO.	TYPE	AREA / UNIT SERVED	CFM	DUCT SIZE	ELECTRICAL		REMARKS
						WATTS	VOLTS/PH	
DH-01	INDEECO - QUA	DUCT HEATER SLIP IN - OPEN COIL	DOAS-1	640	12" x 12"	7500	208/3	SCR MODULATING W/ DUCT TEMP SENSOR
EH-1	Q-MARK	FAN FORCED WALL ELECTRIC HEATER	SPRINKLER RISER ROOM	--	--	1500	208/1	W/ THERMOSTAT

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Sheet No:
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BID SET

OA VENTILATION CALCULATION - DOAS
PER IMC 2015

Date: 8/16/19
Calc By: LS

Project: **Mason Transit Authority Belfair Park & Ride**
No: **17-167**

= Manually entered, from **Code**
= Manually entered, from **plans**
= Calculated

Az= zone area
sf= square feet
Rp= OA per person*
P/1000 sf= People density
Pz= zone population
Ps= actual concurrent pop

Ra= OA per sf of area
Vbz= breathing zone OA
= Rp*P/1000 + Ra*Az
= *OA before corrections*
Ez= air distrib effectiveness
Voz= zone OA = Vbz/Ev

HVAC Unit	Zone #	Name	Occup Category	Az (sf)	People OA Rp	People OA P/1000 sf	People OA Pz	People OA Rp*Pz	Area OA Ra	Area OA Ra*Az	OA Vbz	Ez	Voz (cfm)	Selected Airflow
DOAS-1	1	Entry 100	Entry	167	5	10	2	8.4	0.06	10.0	18.4	1	18.4	**20**
	2	Multi Purpose 101	Multi Purpose	835	5	120	60	300.0	0.06	50.1	350.1	1	350.1	**355**
	4	Break Room 103	Break Room	424	5	50	21	106.0	0.12	50.9	156.9	1	156.9	**160**
	5	Office 104	Office	152	5	5	1	3.8	0.06	9.1	12.9	1	12.9	**15**
	6	Kitchen 105	Kitchen	240	7.5	20	5	36.0	0.12	28.8	64.8	1	64.8	**65**
	7	Hall 110	Corridor	349	0	0	0	0.0	0.06	20.9	20.9	1	20.9	**25**
				2167			88.4	454.2		169.9	**624.0**		**624.0**	**640**

ENERGY CODE NOTES

EQUIPMENT SIZING, PERFORMANCE, AND TYPE

1. LOAD CALCULATIONS, C403.1: LOAD CALCULATIONS HAVE BEEN PERFORMED IN ACCORDANCE WITH WSEC C403.2.1.
2. EQUIPMENT AND SYSTEM SIZING, C403.2.2: OUTPUT CAPACITIES OF HEATING AND COOLING EQUIPMENT AND SYSTEMS ARE NO GREATER THAN THE SMALLEST AVAILABLE EQUIPMENT SIZE THAT EXCEEDS THE CALCULATED LOADS.
3. HVAC EQUIPMENT PERFORMANCE, C403.2.3/C403.2.13.1: EQUIPMENT SCHEDULES ARE INCLUDED WITH THESE PLANS.
4. ELECTRIC MOTOR EFFICIENCY, C405.8: ALL ELECTRIC MOTORS SHALL MEET THE MINIMUM EFFICIENCY OF TABLES C405.8(1). FRACTION HP FAN MOTORS 1/12HP OR GREATER UP TO 1HP SHALL BE ECM TYPE OR SHALL HAVE A MINIMUM EFFICIENCY OF 70% OR GREATER.
5. MOTOR NAMEPLATE HP, C403.2.11.2: FOR EACH FAN, THE MOTOR SHALL BE NO LARGER THAN THE FIRST AVAILABLE MOTOR SIZE GREATER THAN THE BHP.
6. PACKAGED ELECTRIC EQUIPMENT, C403.2.3.3: ALL PACKAGED ELECTRIC HEATING AND COOLING EQUIPMENT WITH TOTAL COOLING CAPACITY GREATER THAN 6,000 BTU/H SHALL BE A HEAT PUMP CONTROLLED BY OCCUPANCY DEVICE OR TIME SCHEDULE.
7. OUTDOOR AIR, EXHAUST & RELIEF DAMPERS, C403.2.4.3: PROVIDE ALL OUTSIDE AIR, EXHAUST AIR, AND RELIEF AIR OPENINGS WITH CLASS 1 (MAX LEAKAGE OF 4 CFM/SF AT 1.0" W.C.) MOTORIZED DAMPERS.

HVAC SYSTEM CONTROLS

8. HEAT PUMP SUPPLEMENTAL HEAT, C403.2.4.1.1: HEAT PUMPS SHALL USE COMPRESSION AS FIRST STAGE OF HEATING AND SUPPLEMENTAL HEATING AS SECOND STAGE CONTROLLED SO AS TO PREVENT OPERATION ABOVE 40°F.
9. DEADBAND, C403.2.4.1.2: THERMOSTATIC CONTROLS SHALL BE CONFIGURED WITH 5°F MINIMUM DEADBAND FOR SYSTEMS THAT CONTROL BOTH HEATING AND COOLING.
10. AUTOMATIC SETBACK AND SHUTDOWN, C403.2.4.2/C403.2.4.2.1/C403.2.4.2.2: HVAC SYSTEMS SHALL BE EQUIPPED WITH AUTOMATIC CONTROLS CAPABLE OF STARTING AND STOPPING THE SYSTEM FOR SEVEN DIFFERENT DAILY SCHEDULES, AND SHALL HAVE MANUAL OVERRIDE CONFIGURED TO OPERATE THE SYSTEM FOR 2 HOURS.
11. AUTOMATIC START, C403.2.4.2.3: AUTOMATIC START CONTROLS SHALL BE PROVIDED FOR EACH HVAC SYSTEM, AND BE CAPABLE OF AUTOMATICALLY ADJUSTING DAILY START TIME IN ORDER TO BRING EACH SPACE TO THE DESIRED OCCUPIED TEMPERATURE IMMEDIATELY PRIOR TO SCHEDULED OCCUPANCY.
12. OUTDOOR AIR DAMPERS, C403.2.4.3: OUTSIDE AIR INTAKE DAMPERS SHALL AUTOMATICALLY CLOSE WHEN SYSTEM OR SPACES SERVED ARE NOT IN USE OR DURING WARM-UP AND SET BACK.
13. VENTILATION, C403.2.6/C403.2.11.4: MECHANICAL VENTILATION AIR SYSTEMS SHALL BE CONFIGURED TO PROVIDE NOT MORE THAN 150%, BUT AT LEAST THE MINIMUM REQUIRED VOLUME OF OUTDOOR AIR TO EACH ZONE PER IMC. SEE MECHANICAL EQUIPMENT SCHEDULES FOR MINIMUM OUTSIDE AIR VALUES.

DUCTING SYSTEMS

14. DUCT CONSTRUCTION, C403.2.8.1: DUCTWORK SHALL BE CONSTRUCTED AND SEALED PER IMC.
15. DUCT PRESSURE CLASS, C403.2.8.3: ALL DUCTWORK SHOWN IS LOW PRESSURE DUCT, OPERATING AT STATIC PRESSURE LESS THAN OR EQUAL TO 3 INCHES WATER GAUGE (W.G.).
16. HIGH PRESSURE DUCT TESTING, C403.2.8.3.3: DUCTED SYSTEMS DESIGNED TO OPERATE ABOVE 3 INCHES WATER GAUGE (W.G.) SHALL BE LEAK TESTED TO DEMONSTRATE MAXIMUM LEAKAGE PER WSEC EQUATION 4-9.
17. DUCT INSULATION, C403.2.8.1: MINIMUM DUCT INSULATION PER WSEC IS AS FOLLOWS:

SERVICE	INSULATION LEVEL
OUTSIDE AIR DUCTS AND PLENUMS	PROVIDE INSULATION EQUIVALENT TO ENVELOPE REQUIREMENT FOR METAL FRAMED WALLS (TABLE C402.1.3)
OUTSIDE AIR DUCT SERVING INDIVIDUAL SUPPLY UNIT WITH LESS THAN 2,800 CFM OF SUPPLY AIR	R-7
SUPPLY & RETURN DUCTS IN UNCONDITIONED SPACES	R-6
SUPPLY DUCTS WITHIN CONDITIONED SPACE WHERE SUPPLY AIR IS < 55 DEG F. OR > 105 DEG F.	R-3.3
EXPOSED DUCTWORK WITHIN A ZONE THAT SERVES THAT ZONE	NO INSULATION REQUIRED

PIPING SYSTEMS

18. PIPING INSULATION, C403.2.9: MINIMUM PIPE INSULATION PER WSEC IS AS FOLLOWS:

FLUID OPERATING TEMPERATURE	INSULATION THICKNESS (NOMINAL PIPE SIZE) <1	1 TO <1-1/2	1-1/2 TO < 4	4 TO < 8	OVER 8
>350	4.5	5.0	5.0	5.0	5.0
251-350	3.0	4.0	4.5	4.5	4.5
201-250	2.5	2.5	2.5	3.0	3.0
141-200	1.5	1.5	2.0	2.0	2.0
105-140	1.0	1.0	1.5	1.5	1.5
40-60	0.5	0.5	1.0	1.0	1.0
<40	0.5	1.0	1.0	1.0	1.5

19. PIPE INSULATION EXPOSED TO WEATHER, C403.2.9.1: PROVIDE METAL JACKETING ON ALL PIPE INSULATION EXPOSED TO WEATHER AND SEAL ALL SEAMS WATER TIGHT.

DEDICATED OUTDOOR AIR SYSTEMS (DOAS)

20. DEDICATED OUTDOOR AIR SYSTEMS, C403.6/C403.6.3:FOR OFFICE, RETAIL, EDUCATION, LIBRARIES AND FIRE STATIONS, OUTDOOR AIR SHALL BE PROVIDED TO EACH OCCUPIED SPACE BY A DEDICATED OUTDOOR AIR SYSTEM (DOAS).
21. ENERGY RECOVERY VENTILATION WITH DOAS, C403.6.1: ALL DOAS UNITS SHALL BE PROVIDED WITH EXHAUST HEAT RECOVERY WITH RATED EFFECTIVENESS TO INCREASE OSA ENTHALPY BY 50% OR MORE BASED ON THE DELTA BETWEEN THE RETURN AIR AND THE OUTSIDE AIR ENTHALPIES AT DESIGN CONDITIONS.
22. HEATING/COOLING SYSTEM CONTROLS WITH DOAS, C403.6.2: EQUIPMENT THAT PROVIDES ZONE LEVEL HEATING AND COOLING SHALL BE CONFIGURED WITH FANS AND/OR PUMPS THAT CYCLE OFF AND PRIMARY COOLING AIR SHALL SHUT OFF WHEN THERE IS NO CALL FOR HEATING OR COOLING IN THE ZONES THEY SERVE.

COMMISSIONING

23. AIR SYSTEM BALANCING, C408.2.2: HVAC AIR AND WATER SYSTEMS SHALL BE BALANCED IN ACCORDANCE WITH THE SPECIFICATIONS AND THESE WSEC NOTES. SEE SPECIFICATIONS FOR FLOW RATE TOLERANCES.
24. AIR SYSTEM BALANCING DEVICES, C408.2.2.1: PROVIDE ALL SUPPLY AIR OUTLETS AND TERMINAL DEVICES WITH MEANS OF BALANCING AIRFLOW. BALANCE TO FIRST MINIMIZE THROTTLING LOSSES, THEN ADJUST TO MEET DESIGN AIR FLOWS.

PROJECT CLOSE OUT DOCUMENTATION

25. DOCUMENTATION SUBMITTAL REQUIREMENTS, C103.6: SUBMIT ALL CLOSEOUT DOCUMENTATION INCLUDING AS-BUILTS AND O&M'S TO OWNER WITHIN 180 DAYS OF RECEIPT OF CERTIFICATE OF OCCUPANCY.

SERVICE WATER HEATING CHECKLIST

EQUIPMENT SIZING, PERFORMANCE, AND TYPE

26. SWH (SERVICE WATER HEATING) EQUIPMENT TYPE & EFFICIENCY, C404.2: EQUIPMENT SCHEDULES ARE INCLUDED WITH THESE PLANS.
27. HEAT TRAPS, C404.4: WATER HEATING EQUIPMENT NOT SUPPLIED WITH INTEGRAL HEAT TRAPS SERVING NON CIRCULATED SYSTEMS SHALL BE PROVIDED WITH HEAT TRAPS ON SUPPLY AND DISCHARGE PIPING.
28. INSULATION UNDER ELECTRIC WATER HEATER, C404.5: ELECTRIC WATER HEATERS IN UNCONDITIONED SPACES OR ON CONCRETE FLOORS SHALL BE PROVIDED WITH INCOMPRESSIBLE R-10 INSULATED PAD.

PIPING SYSTEMS

29. INSULATION OF PIPING, C404.6: PROVIDE INSULATION FROM WATER HEATER TO FINAL FIXTURE, AND ON PIPING THAT IS HEAT TRACED. MINIMUM PIPE INSULATION PER WSEC IS AS FOLLOWS:

FLUID OPERATING TEMPERATURE	INSULATION THICKNESS (NOMINAL PIPE SIZE) <1	1 TO <1-1/2	1-1/2 TO < 4	4 TO < 8	OVER 8
141-200	1.5	1.5	2.0	2.0	2.0
105-140	1.0	1.0	1.5	1.5	1.5
40-60	0.5	0.5	1.0	1.0	1.0
<40	0.5	1.0	1.0	1.0	1.5

30. EFFICIENT SWH SUPPLY PIPING, C404.3: ALL PIPING CONNECTING TO SERVICE HOT WATER SOURCE, SHALL COMPLY WITH MAXIMUM ALLOWABLE PIPE LENGTH METHOD. MAXIMUM ALLOWABLE LENGTHS ARE AS FOLLOWS:

NOMINAL PIPE SIZE (INCH)	MAXIMUM LENGTH (FEET) AT PUBLIC LAVATORY	AT OTHER FIXTURES
1/2	2	43
3/4	1	21
1	0.5	13
1-1/4	0.5	8
1-1/2	0.5	6
2 OR LARGER	0.5	4

31. HEATED WATER CIRCULATING SYSTEM, C404.7.1/C404.8: CIRCULATING HOT WATER PUMPS SHALL TURN OFF AUTOMATICALLY WHEN THERE IS NO DEMAND OR DESIRED WATER TEMPERATURE IN RETURN LOOP HAS BEEN MET. CIRCULATING HOT WATER PUMPS SHALL BE EQUIPPED WITH CONTROLS TO TURN OFF DURING PERIODS OF NON-USE.
32. CONTROLS FOR HOT WATER STORAGE, C404.7.3: FOR SYSTEMS WITH STORAGE TANKS, PROVIDE CONTROLS TO LIMIT OPERATION OF PUMPS FROM HEATING CYCLE START-UP TIME TO < 5 MINUTES AFTER THE END OF THE HEATING CYCLE.

PROJECT CLOSE OUT DOCUMENTATION

33. DOCUMENTATION SUBMITTAL REQUIREMENTS, C103.6: SUBMIT ALL CLOSEOUT DOCUMENTATION INCLUDING AS-BUILTS AND O&M'S TO OWNER WITHIN 180 DAYS OF RECEIPT OF CERTIFICATE OF OCCUPANCY.

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Project Title:
MASON TRANSIT AUTHORITY
BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Rev.	Description

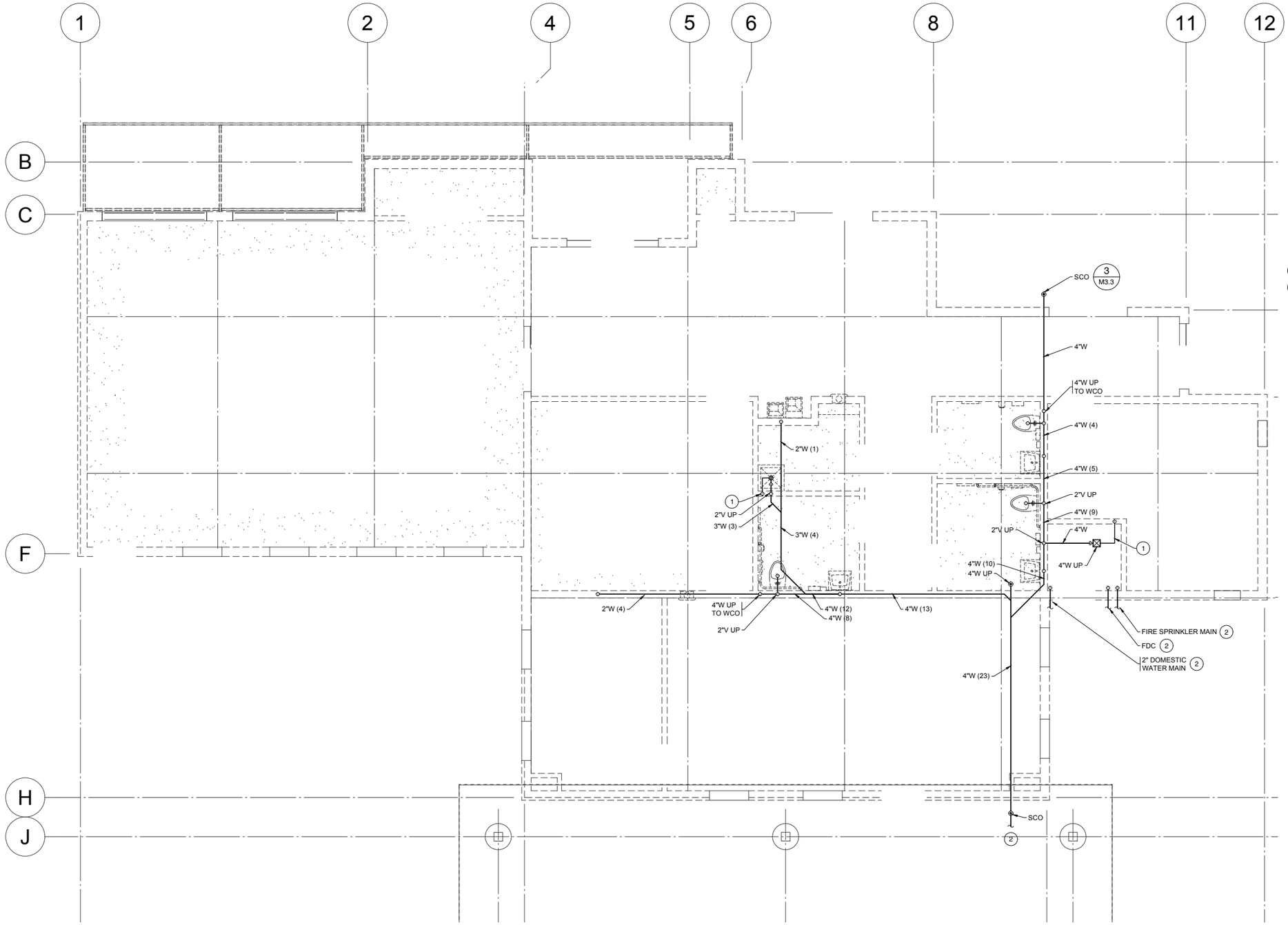
OWNER Project No:
ART Project No: **1710**
Drawn By: **BS**
Approved By: **RH**
Date: **02/12/2020**

Sheet Title:
MECHANICAL SCHEDULES

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
M0.4

BID SET



GENERAL NOTES:

1. SEE MECHANICAL GENERAL NOTES ON SHEET M0.1.
2. FOR PIPING SIZES TO INDIVIDUAL PLUMBING FIXTURES SEE "PLUMBING FIXTURE SCHEDULE" SHEET M0.2.
3. NUMBER AFTER WASTE PIPE SIZE IS DFU'S.
4. VERIFY INVERT ELEVATION OF SITE PIPING BEFORE BEGINNING ANY WORK.

KEYED NOTES:

(NOT ALL NOTES USED THIS SHEET)

(1) TRAP PRIMER LINES UP IN WALL TO TRAP PRIMER.

(2) TO SITE PIPING, SEE CIVIL PLANS FOR CONTINUATION.

1 FOUNDATION PLAN - PLUMBING
SCALE: 1/4" = 1'-0"

Scale 1/4" = 1'0"

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Rev.	Description

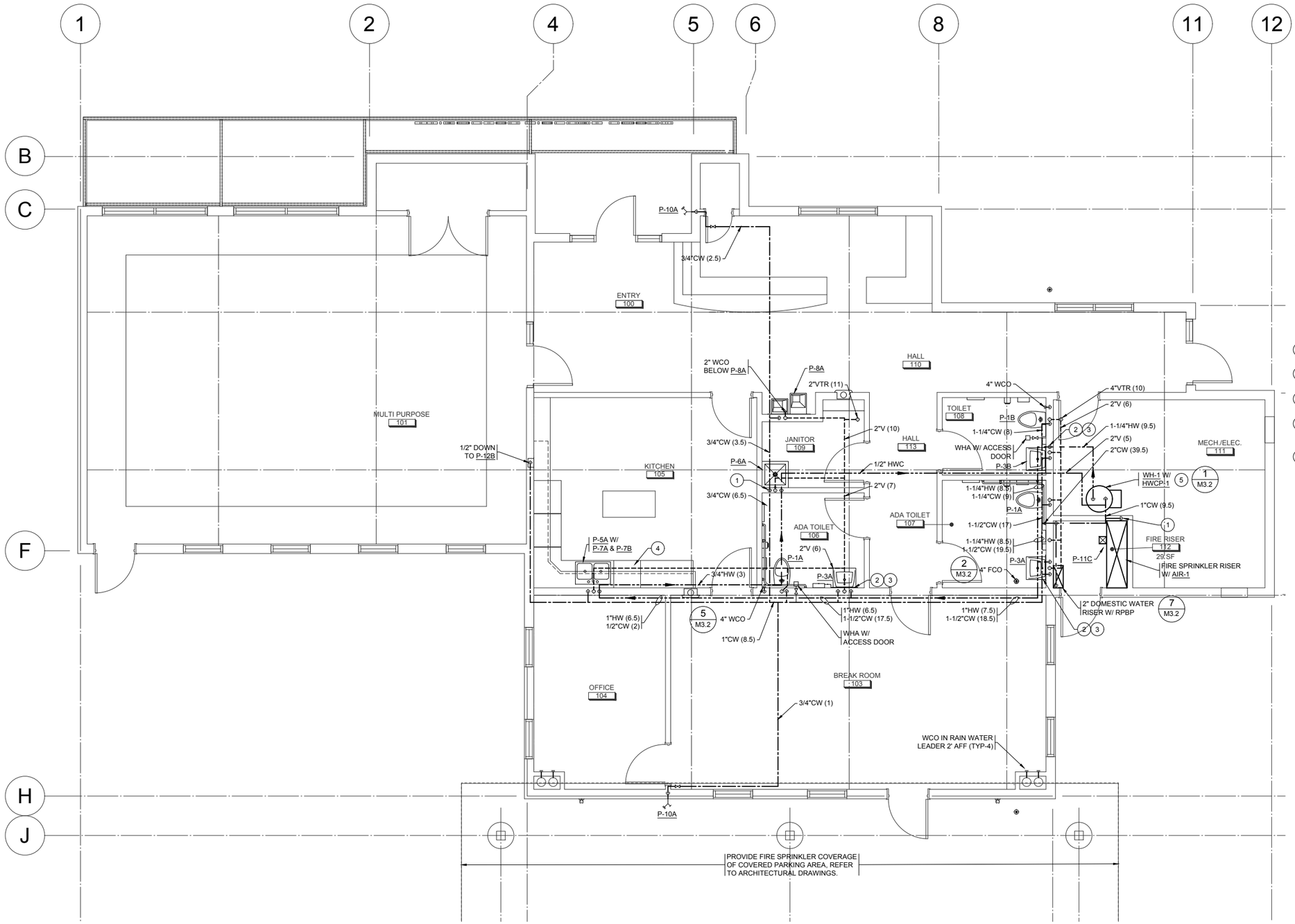
OWNER Project No:
ART Project No: **1710**
Drawn By: **BS**
Approved By: **RH**
Date: **02/12/2020**

Sheet Title:
PLUMBING
FOUNDATION PLAN

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
M2.1

BID SET



1 FIRST FLOOR PLAN - PLUMBING
SCALE: 1/4" = 1'-0"

Scale 1/4" = 1'0"

GENERAL NOTES:

1. SEE MECHANICAL GENERAL NOTES ON SHEET M0.1.
2. FOR PIPING SIZES TO INDIVIDUAL PLUMBING FIXTURES SEE "PLUMBING FIXTURE SCHEDULE" SHEET M0.2.
3. PROVIDE WALL CLEANOUT IN WASTE PIPING BENEATH ALL SINKS.
4. OFFSET PLUMBING PIPING AND VTR'S TO AVOID DUCTWORK AND OTHER OBSTRUCTIONS. TERMINATE VTR'S A MINIMUM OF 15 FEET FROM ANY OUTSIDE AIR INTAKES.

KEYED NOTES:

1. 1/2" CW DN TO TRAP PRIMER VALVE. SEE DETAIL 6 ON SHEET M3.2.
2. LOOP HW DOWN IN WALL TO WITHIN 6" OF STOP VALVE.
3. PROVIDE TEMPERATURE LIMITING MIXING VALVE AT FIXTURE PER CODE.
4. PROVIDE 1/2" HW CONNECTION & WASTE CONNECTION W/ AIR GAP FITTING FROM SINK TO ADJACENT DISHWASHER.
5. ROUTE WH-1 RELIEF PIPE TO FLOOR DRAIN IN FIRE SPRINKLER ROOM.

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Rev.	Description

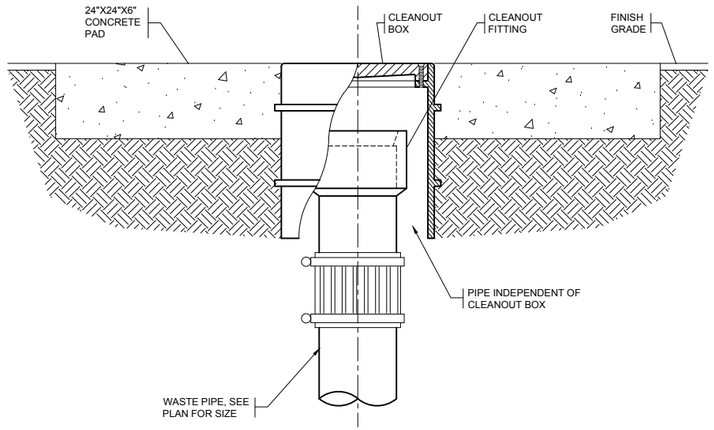
OWNER Project No:	
ART Project No:	**1710**
Drawn By:	**BS**
Approved By:	**RH**
Date:	**02/12/2020**

Sheet Title:
PLUMBING
FLOOR PLAN

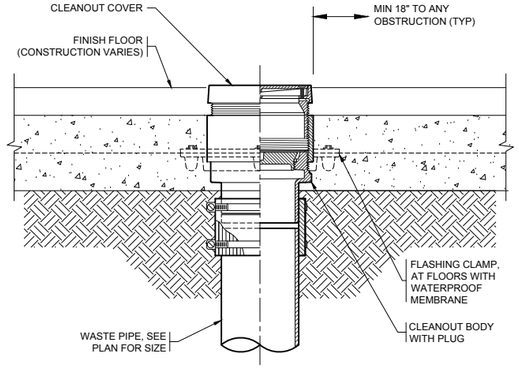
2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
M3.1

BID SET

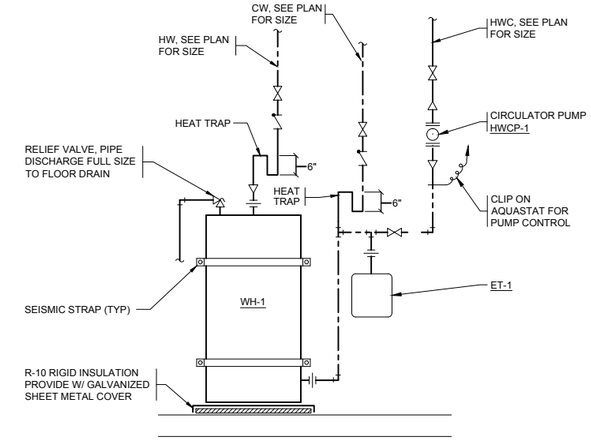


SURFACE CLEANOUT DETAIL 3
NTS — M3.2

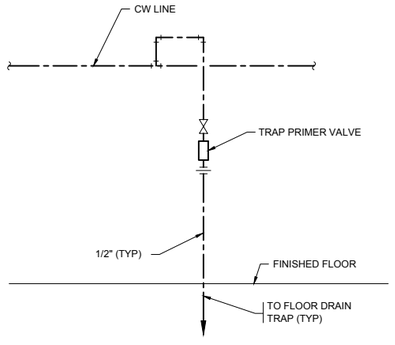


NOTE: SEE SPECIFICATIONS FOR ADDITIONAL FLOOR DRAIN REQUIREMENTS.

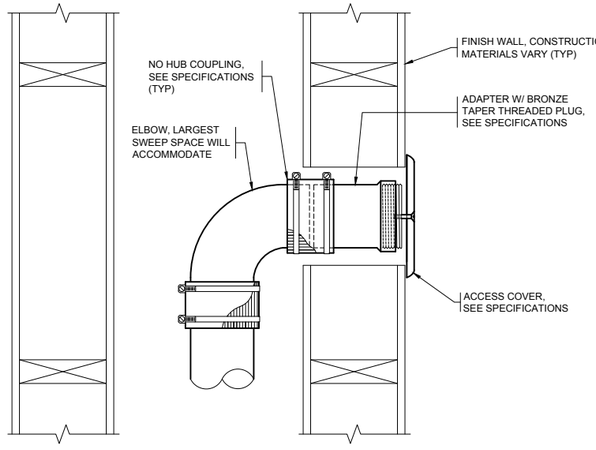
FLOOR CLEANOUT DETAIL 2
NTS — M3.2



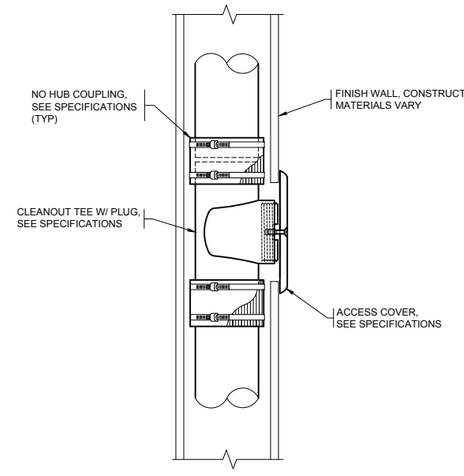
WATER HEATER DETAIL 1
NTS — M3.2



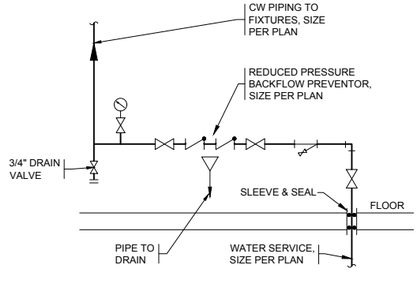
TRAP PRIMER DETAIL 6
NTS — M3.2



WALL CLEANOUT-W/ ELBOW 5
NTS — M3.2



WALL CLEANOUT-IN WALL 4
NTS — M3.2



CW RISER 7
NTS — M3.2

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MASON TRANSIT AUTHORITY
BELFAIR PARK AND RIDE DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title:

Rev.	Description

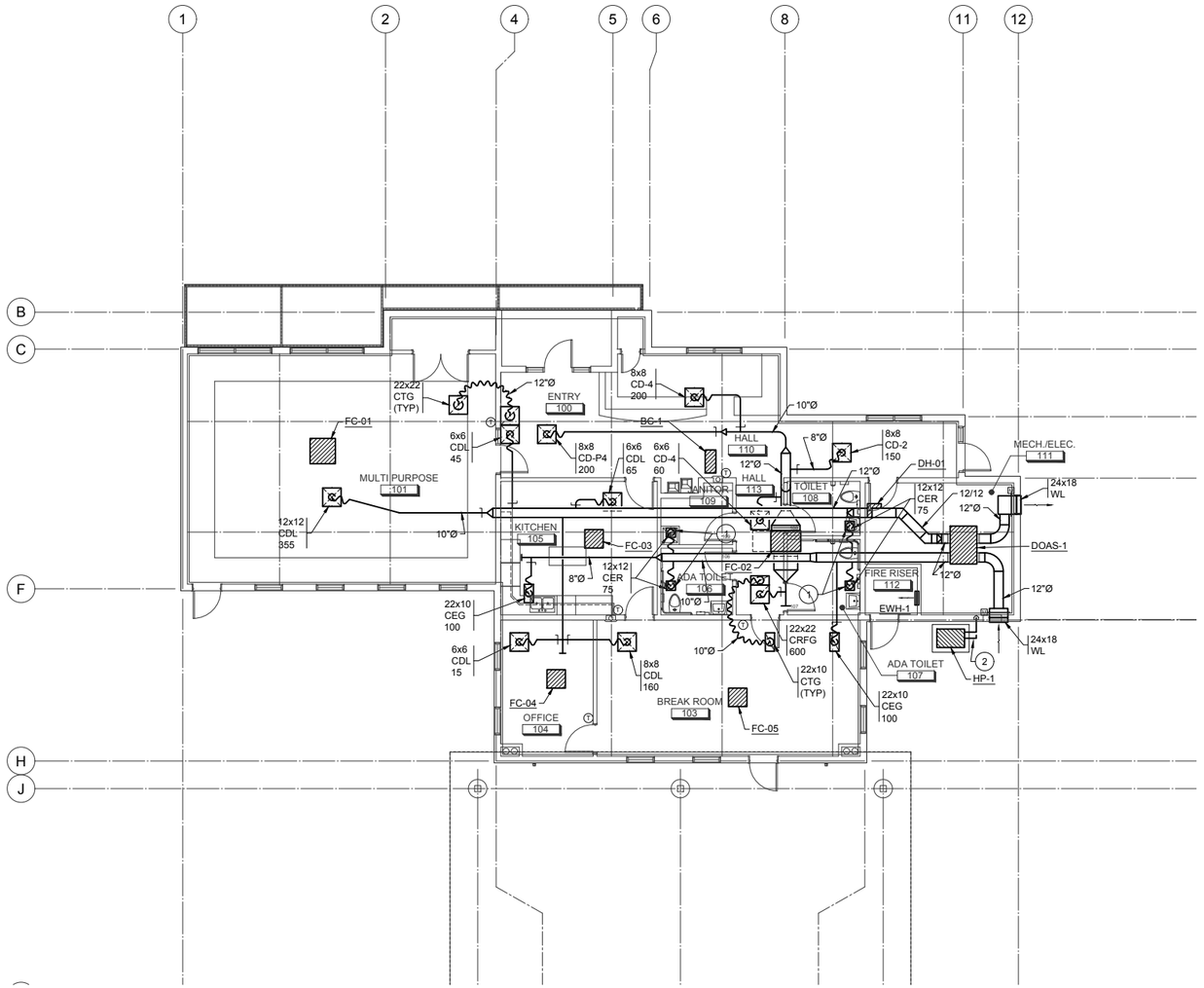
OWNER Project No:	
ART Project No:	1710
Drawn By:	BS
Approved By:	RH
Date:	02/12/2020

Sheet Title:
PLUMBING DETAILS

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
M3.2

BID SET



1 FIRST FLOOR PLAN - HVAC
SCALE: 1/8" = 1'-0"

2' 8'
0' 4' 16'
Scale 1/8" = 1'0"

GENERAL NOTES:

1. SEE MECHANICAL GENERAL NOTES ON SHEET M0.1.
2. LOCATE MOTORIZED DAMPERS, ACTUATORS, & BDD'S TO BE ACCESSIBLE, PROVIDE DUCT ACCESS DOORS AT MOTORIZED DAMPERS, & BDD'S TO ALLOW ACCESS TO DAMPERS.
3. ALL NEW SUPPLY AIR DUCTWORK AT NEW HEAT PUMP UNITS TO BE 1" LINED FROM UNIT CONNECTION TO 5 FEET MINIMUM FROM UNIT.
4. ALL CEILINGS ARE T-BAR TYPE UNO.
5. SEE SYSTEM SCHEMATIC DIAGRAM FOR REFRIGERANT PIPING AND SIZING ON SHEET M4.3.
6. SUPPORT HVAC EQUIPMENT FROM ABOVE, SEE DETAIL ON SHEET M4.3.
7. PROVIDE 3/4" CONDENSATE DRAINS FOR ALL HVAC EQUIPMENT; ROUTE ALL HVAC CONDENSATE TO MOP SINK IN JANITOR RM. 109, OR TO DRAIN IN FIRE RISER ROOM.

KEYED NOTES:

1. PROVIDE EXHAUST GRILLE W/ OBD.
2. PROVIDE METAL JACKET OVER EXTERIOR REFRIGERANT PIPING.

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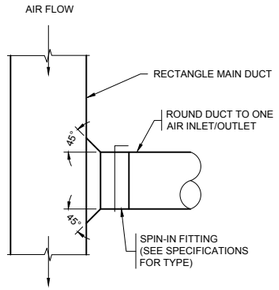
Approved By: RH
Date: 02/12/2020

Sheet Title:
HVAC FLOOR PLAN

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
M4.1

BID SET



BRANCH SERVING MULTIPLE AIR INLETS/OUTLETS

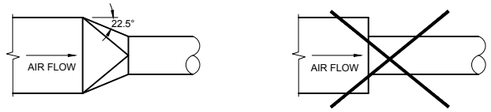
NOTE:

WHERE MAIN DUCT DOES NOT HAVE ADEQUATE HEIGHT TO ACCEPT ROUND DUCT, PROVIDE RECTANGULAR CONNECTION, WITH SAME FREE AREA AS ROUND DUCT, AND TRANSITION TO ROUND

RECT-TO-ROUND BRANCH DUCT CONNECTION

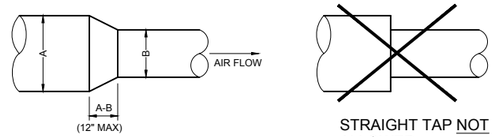
3 M4.2

NTS



STRAIGHT TAP NOT ALLOWED

RECT - TO ROUND



STRAIGHT TAP NOT ALLOWED

ROUND - TO ROUND

ROUND TRANSITIONS

6 M4.2

NTS

CONCENTRIC TRANSITION (DIVERGING)

CONCENTRIC TRANSITION (CONVERGING)

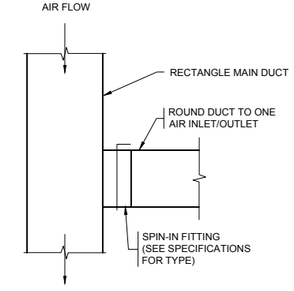
ECCENTRIC TRANSITION

STRAIGHT TAP NOT ALLOWED

RECT-TO-RECT TRANSITIONS

8 M4.2

NTS



SERVING ONE INLET/OUTLET

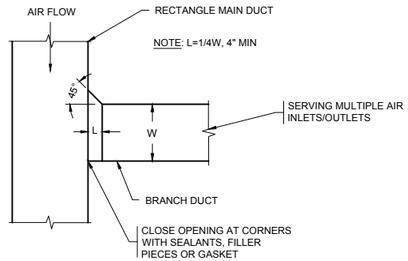
NOTE:

WHERE MAIN DUCT DOES NOT HAVE ADEQUATE HEIGHT TO ACCEPT ROUND DUCT, PROVIDE RECTANGULAR CONNECTION, WITH SAME FREE AREA AS ROUND DUCT, AND TRANSITION TO ROUND

RECT-TO-RECT BRANCH DUCT CONNECTION

2 M4.2

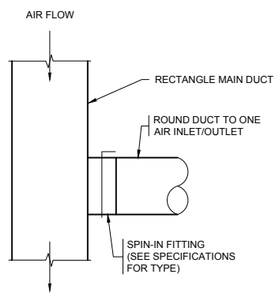
NTS



RECT-TO-RECT BRANCH DUCT CONNECTION

5 M4.2

NTS



SERVING ONE INLET/OUTLET

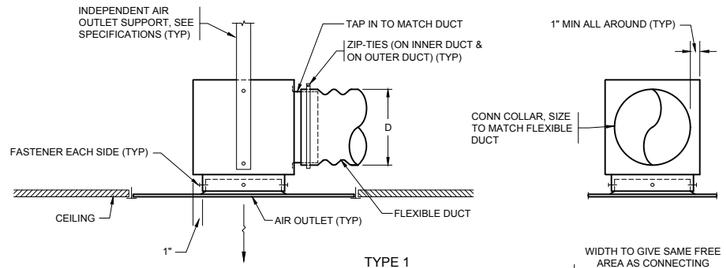
NOTE:

WHERE MAIN DUCT DOES NOT HAVE ADEQUATE HEIGHT TO ACCEPT ROUND DUCT, PROVIDE RECTANGULAR CONNECTION, WITH SAME FREE AREA AS ROUND DUCT, AND TRANSITION TO ROUND

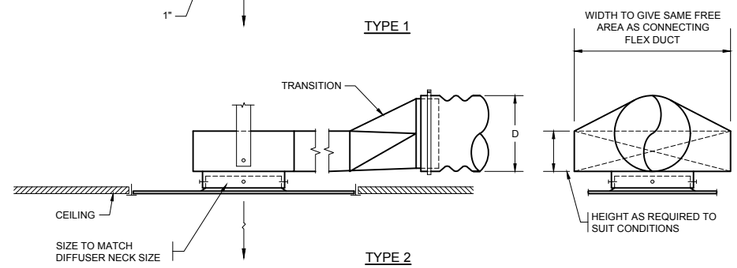
RECT-TO-ROUND BRANCH DUCT CONNECTION

7 M4.2

NTS



TYPE 1



TYPE 2

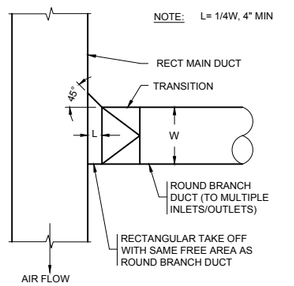
NOTES:

1. PROVIDE TYPE 1 UNLESS BUILDING CONDITIONS REQUIRE LOWER PROFILE - THEN USE TYPE 2.
2. CONSTRUCT PLENUM BOXES OF MIN. 26 GA. GALV. STEEL.
3. NOT ALLOWED AT TRANSFER DUCTS.
4. LINE PLENUM & DUCT TO AIR OUTLET WHERE SO NOTED ON PLANS OR IN SPECIFICATIONS.
5. CEILING TYPE & AIR OUTLET FRAME STYLE MAY VARY FROM THAT DEPICTED.
6. NOT ALL SUPPORTS ARE SHOWN FOR CLARITY.
7. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

TIGHT CONDITION - FLEX DUCT AIR OUTLET CONNECTION

1 M4.2

NTS



SERVING MULTIPLE INLET/OUTLET

RECT-TO-ROUND BRANCH DUCT CONNECTION

4 M4.2

NTS

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MASON TRANSIT AUTHORITY
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BELFAIR, WASHINGTON 98528

Project Title:

Rev.	Description

OWNER Project No:
ART Project No: 1710
Drawn By: BS
Approved By: RH
Date: 02/12/2020

Sheet Title:

HVAC DETAILS

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:

M4.2

BID SET

Additional refrigerant charge is needed depending on the size and length of extended piping. Please refer the amount of pre-charge and the formula of calculation which is mentioned on the data book.
1.25mm²(16 AWG) : 1.25mm²(16 AWG) or more. 0.75mm²(20 AWG) : between 0.5mm²(24 AWG) and 0.75mm²(20 AWG).

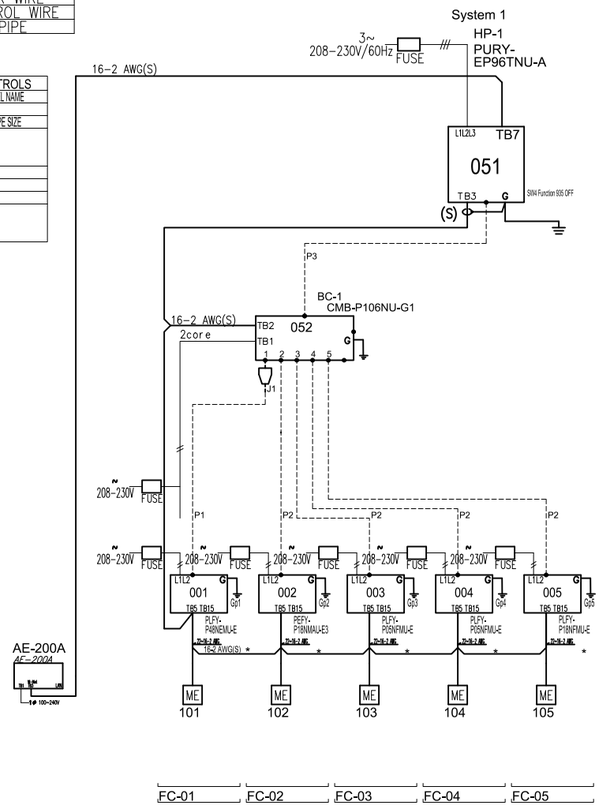
MTA - Park & Ride

DIAGRAM SYMBOL LEGEND	
DISPLAY	DESCRIPTION
——///——	POWER WIRE
————	CONTROL WIRE
- - - -	REF. PIPE

CONT.No		PAGE	

CITY MULTI

SYSTEM SCHEMATIC DWG.

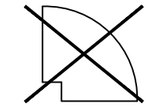


4,1,3,38
Mitsubishi Electric
Diamond System Builder
1/3/2020
1:29 PM

SYSTEM SCHEMATIC DIAGRAM

NTS

12
M4.3



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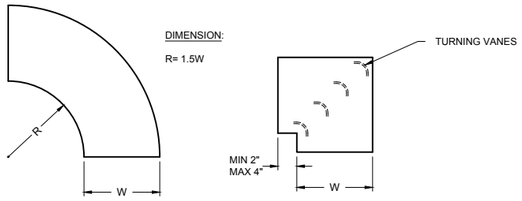


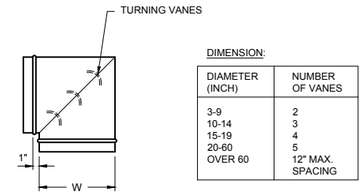
RADIUS ELBOW

MITERED ELBOW

ELBOWS - RECTANGULAR

NTS

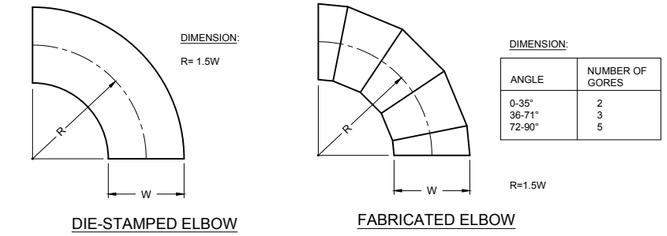
10
M4.3



DIMENSION:

DIAMETER (INCH)	NUMBER OF VANES
3-9	2
10-14	3
15-19	4
20-60	5
OVER 60	12" MAX. SPACING

MITERED 90° ELBOW



ANGLE	NUMBER OF GORES
0-35°	2
36-71°	3
72-90°	5

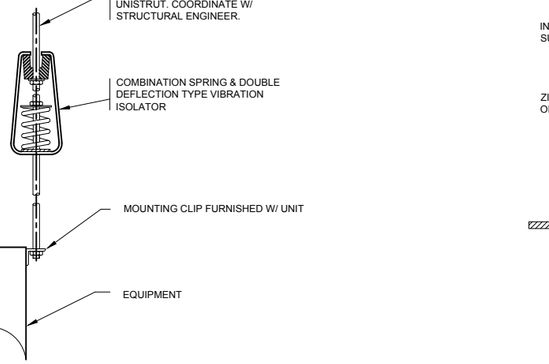
DIE-STAMPED ELBOW

FABRICATED ELBOW

ELBOWS - ROUND

NTS

9
M4.3



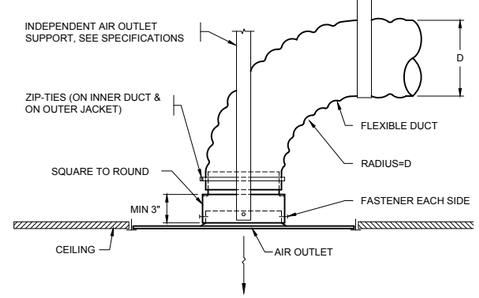
NOTES:

1. ALL SUSPENDED HVAC EQUIPMENT W/ ROTATING COMPONENTS SHALL HAVE VIBRATION ISOLATORS AS SHOWN.
2. VIBRATION ISOLATORS SHALL BE SELECTED FOR 1" DEFLECTION (UNO).
3. SEE STRUCTURAL FOR ATTACHMENT TO STRUCTURE & OTHER ANCHORING REQUIREMENTS.
4. DIRECT DRIVE EQUIPMENT MAY USE RUBBER-IN-SHEAR TYPE ISOLATORS.
5. PROVIDE SEISMIC RESTRAINTS PER SPECIFICATIONS & PER CODE.

SUSPENDED EQUIPMENT SUPPORT

NTS

13
M4.3



NOTES:

1. USE WHERE ADEQUATE SPACE IS AVAILABLE FOR FLEX DUCT RADIUS, AND WHERE FLEX DUCT IS SHOWN ON PLANS TO AIR OUTLET.
2. NOT ALLOWED AT TRANSFER DUCTS.
3. WHEN THERE IS INSUFFICIENT ROOM TO MAINTAIN FLEX DUCT RADIUS, SEE DETAIL TITLED "TIGHT CONDITION - FLEX DUCT AIR OUTLET CONNECTION."
4. NOT ALLOWED WHERE LINED "CANS" (OR LINED DUCTS) SHOWN (OR REQ'D) AT AIR OUTLETS.
5. CEILING TYPE & AIR OUTLET FRAME STYLE MAY VARY FROM THAT DEPICTED.
6. NOT ALL SUPPORTS SHOWN FOR CLARITY.

FLEX DUCT AIR OUTLET CONNECTION

NTS

11
M4.3

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MASON TRANSIT AUTHORITY
BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title:

Rev.	Description

OWNER Project No:
ART Project No: 1710
Drawn By: BS
Approved By: RH
Date: 02/12/2020

Sheet Title:
HVAC DETAILS

2" AT FULL SHEET (22x34)
1" AT HALF SHEET (11x17)

Sheet No:
M4.3

BID SET

GENERAL NOTES

THESE GENERAL NOTES ARE TO BE USED AS A SUPPLEMENT TO THE SPECIFICATIONS. ANY DISCREPANCIES FOUND AMONG THE DRAWINGS, THE SPECIFICATIONS, THESE GENERAL NOTES AND THE SITE CONDITIONS SHALL BE REPORTED TO THE ARCHITECT, WHO SHALL CORRECT SUCH DISCREPANCY IN WRITING. ANY WORK DONE BY THE GENERAL CONTRACTOR AFTER DISCOVERY OF SUCH DISCREPANCY SHALL BE DONE AT THE GENERAL CONTRACTOR'S RISK. THE GENERAL CONTRACTOR SHALL VERIFY AND COORDINATE DIMENSIONS AMONG ALL DRAWINGS PRIOR TO PROCEEDING WITH ANY WORK OR FABRICATION. THE STRUCTURE HAS BEEN DESIGNED TO RESIST CODE SPECIFIED VERTICAL AND LATERAL FORCES AFTER THE CONSTRUCTION OF ALL STRUCTURAL ELEMENTS HAS BEEN COMPLETED. STABILITY OF THE STRUCTURE PRIOR TO COMPLETION IS THE SOLE RESPONSIBILITY OF THE GENERAL CONTRACTOR. THIS RESPONSIBILITY INCLUDES BUT IS NOT LIMITED TO JOB SITE SAFETY; ERECTION MEANS, METHODS, AND SEQUENCES; TEMPORARY SHORING, FORMWORK, BRACING; USE OF EQUIPMENT AND CONSTRUCTION PROCEDURES. PROVIDE ADEQUATE RESISTANCE TO LOADS ON THE STRUCTURES DURING CONSTRUCTION PER SEI/ASCE STANDARD NO. 37-14 "DESIGN LOADS ON STRUCTURES DURING CONSTRUCTION."

CONSTRUCTION OBSERVATION BY THE STRUCTURAL ENGINEER IS FOR GENERAL CONFORMANCE WITH DESIGN ASPECTS ONLY AND IS NOT INTENDED IN ANY WAY TO REVIEW THE CONTRACTOR'S CONSTRUCTION PROCEDURES.

STANDARDS
ALL METHODS, MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE 2015 INTERNATIONAL BUILDING CODE (IBC) AS AMENDED AND ADOPTED BY THE LOCAL BUILDING OFFICIAL OR APPLICABLE JURISDICTION.

CONTRACT DRAWINGS / DIMENSIONS

ARCHITECTURAL DRAWINGS ARE THE PRIME CONTRACT DRAWINGS. CONSULTANT DRAWINGS BY OTHER DISCIPLINES ARE SUPPLEMENTARY TO ARCHITECTURAL DRAWINGS. REPORT DIMENSIONAL OMISSIONS OR DISCREPANCIES BETWEEN ARCHITECTURAL DRAWINGS AND STRUCTURAL, MECHANICAL, ELECTRICAL OR CIVIL DRAWINGS TO ARCHITECT PRIOR TO PROCEEDING WITH WORK.

STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH ARCHITECTURAL DRAWINGS. PRIMARY STRUCTURAL ELEMENTS ARE DIMENSIONED ON STRUCTURAL PLANS AND DETAILS AND OVERALL LAYOUT OF STRUCTURAL PORTION OF WORK. SOME SECONDARY ELEMENTS ARE NOT DIMENSIONED, SUCH AS WALL CONFIGURATIONS, INCLUDING EXACT DOOR AND WINDOW LOCATIONS, ALCOVES, SLAB SLOPES AND DEPRESSIONS, CURBS, ETC. VERTICAL DIMENSIONAL CONTROL IS DEFINED BY ARCHITECTURAL WALL SECTIONS AND BUILDING SECTIONS. STRUCTURAL DETAILS SHOW DIMENSIONAL RELATIONSHIPS TO CONTROL DIMENSIONS DEFINED BY ARCHITECTURAL DRAWINGS. DETAILING AND SHOP DRAWING PRODUCTION FOR STRUCTURAL ELEMENTS WILL REQUIRE DIMENSIONAL INFORMATION CONTAINED IN **BOTH** ARCHITECTURAL AND STRUCTURAL DRAWINGS.

DESIGN CRITERIA

VERTICAL LOADS

AREA	DESIGN DEAD LOAD	LIVE LOAD (2)	PARTITION LOAD	CONCENTRATED LOADS
ROOF	20 PSF	25 PSF (1)		300#

(1) DRIFT AND UNBALANCED SNOW LOAD PER ASCE 7-10, CHAPTER 7.

SNOW: (MINIMUM ROOF SNOW LOAD = 25 PSF)

Pg = 18 PSF = GROUND SNOW LOAD
Pf = 0.7CeCtIsPg = FLAT ROOF SNOW LOAD
Ps = CsPf = SLOPED ROOF SNOW LOAD
Is = 1.0 Ce = 1.0, Ct = 1.0, Cs = VARIES

LATERAL FORCES

LATERAL FORCES ARE TRANSMITTED BY DIAPHRAGM ACTION OF ROOF AND FLOORS TO SHEAR WALLS. LOADS ARE THEN TRANSFERRED TO FOUNDATION BY SHEAR WALL ACTION WHERE ULTIMATE DISPLACEMENT IS RESISTED BY PASSIVE PRESSURE OF EARTH AND/OR SLIDING FRICTION. OVERTURNING IS RESISTED BY DEAD LOAD OF THE STRUCTURE.

WIND:

THE BUILDING MEETS THE CRITERIA TO USE THE "METHOD 2 - SIMPLIFIED ENVELOPE PROCEDURE" PER ASCE 7-10.

- EXPOSURE CATEGORY = C
- BASIC WIND SPEED, (3 SEC. GUST), V_{ULT} = 110 MPH; V_{ASD} = 85 MPH
- RISK CATEGORY PER TABLE 1.5-1 = II
- TOPOGRAPHIC FACTOR K_{ZT} = 1.0
- INTERNAL PRESSURE COEFFICIENT (ENCLOSED) = ± 0.18
- COMPONENTS AND CLADDING LOADS, SEE THE FOLLOWING TABLES:

ROOF SURFACES [1]						
EFFECTIVE WIND AREA	POSITIVE PRESSURES (PSF)			NEGATIVE PRESSURES (PSF)		
	ZONE [2]					
	1	2	3	1	2	3
10 SF	16.0	16.0	16.0	-21.8	-36.5	-55.0
20 SF	16.0	16.0	16.0	-21.2	-32.6	-45.5
50 SF	16.0	16.0	16.0	-20.5	-27.5	-33.1
100 SF	16.0	16.0	16.0	-19.9	-23.6	-23.6

WALL SURFACES AND ROOF OVERHANGS [1]						
EFFECTIVE WIND AREA	POSITIVE PRESSURE (PSF)		NEGATIVE PRESSURE (PSF)		ROOF OVERHANGS (PSF)	
	ZONE [2]					
	4	5	4	5	2	3
10 SF	21.8	21.8	-23.6	-29.1	-31.4	-51.6
20 SF	20.8	20.8	-22.6	-27.2	-30.8	-40.5
50 SF	19.5	19.5	-21.3	-24.6	-30.1	-25.9
100 SF	18.5	18.5	-20.4	-22.6	-29.5	-16.0
500 SF	16.2	16.2	-18.1	-18.1	-	-

1. VALUES SHOWN IN TABLE ARE GROSS ULTIMATE WIND PRESSURES.
2. ZONES ARE AS DEFINED BY FIGURE 30.5-1 IN ASCE 7-10.

SEISMIC: (ASCE 7-10) V = CsW

WHERE $Cs = \frac{S_{DS}}{(\frac{R}{Ie})}$; WITH

Cs MINIMUM = $0.044\, S_{DS} I_E \geq$
OR
Cs MINIMUM = $\frac{0.5S_1}{\frac{R}{Ie}}$ FOR $S_1 > 0.6g$

Cs MAXIMUM = $\frac{S_{D1}}{T(\frac{R}{Ie})}$ FOR $T \leq T_L$
OR
Cs MAXIMUM = $\frac{S_{D1}T_L}{T^2\,(\frac{R}{Ie})}$ FOR $T > T_L$

SEISMIC IMPORTANCE FACTOR, Ie = 1.0
RISK CATEGORY OF BUILDING PER TABLE 1.5-1 = I & II
SPECTRAL RESPONSE ACCELERATIONS Ss = 1.483 & S_1 = 0.586
SITE CLASS PER TABLE 20.3-1 = C
DESIGN SPECTRAL RESPONSE ACCELERATIONS S_{DS} = 0.989 & S_{D1} = 0.508
SEISMIC DESIGN CATEGORY = D
W = EFFECTIVE SEISMIC WEIGHT OF BUILDING = 110 KIPS
ANALYSIS PROCEDURE USED = EQUIVALENT LATERAL FORCE PROCEDURE
RESPONSE MODIFICATION FACTOR PER TABLE 12.2-1, R = 6.5
Cs = 0.152
DESIGN BASE SHEAR V = 16.72 KIPS

PIPES, DUCTS AND MECHANICAL EQUIPMENT SUPPORTED OR BRACED FROM STRUCTURE. CONFORM TO SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION, INC. PUBLICATION "SEISMIC RESTRAINT MANUAL: GUIDELINES FOR MECHANICAL SYSTEMS". SPRINKLER LINE ATTACHMENTS SHALL CONFORM TO NFPA PAMPHLET 13.

FOUNDATION DESIGN CRITERIA REFER TO GEOTECHNICAL REPORT BY LANDAU ASSOCIATES, DATED DECEMBER 12, 2018.

SOIL BEARING PRESSURE: 3500 PSF

ACTIVE PRESSURE - RESTRAINED: 50 PCF +14H SEISMIC SURCHARGE
ACTIVE PRESSURE - UNRESTRAINED: 35 PCF +6H SEISMIC SURCHARGE
PASSIVE RESISTANCE: 280 PCF (INCLUDES F.O.S. ≥ 1.5)
COEFFICIENT OF FRICTION: .35 (INCLUDES F.O.S. ≥ 1.5)
*1/3 INCREASE ALLOWED FOR SEISMIC OR WIND LOADING

ALL FOOTINGS SHALL BEAR ON FIRM, UNDISTURBED EARTH OR "STRUCTURAL BACKFILL". NATIVE EARTH BEARING SHALL BE SURFACE COMPACTED. AREAS OVER-EXCAVATED SHALL BE BACKFILLED WITH LEAN CONCRETE (F'c= 2000 PSI) OR "STRUCTURAL BACKFILL". AREAS DESIGNATED "STRUCTURAL BACKFILL" SHALL BE FILLED WITH APPROVED WELL-GRADED BANKRUN MATERIAL. MAXIMUM SIZE OF ROCK 4". FROZEN SOIL, ORGANIC MATERIAL AND DELETERIOUS MATTER NOT ALLOWED. COMPACT TO AT LEAST 95% OF ITS MAXIMUM DENSITY AS DETERMINED BY ASTM D1557. CONTRACTOR SHALL EXERCISE EXTREME CARE DURING EXCAVATION TO AVOID DAMAGE TO BURIED LINES, TANKS, AND OTHER CONCEALED ITEMS. UPON DISCOVERY, DO NOT PROCEED WITH WORK UNTIL RECEIVING WRITTEN INSTRUCTIONS FROM ARCHITECT. A COMPETENT REPRESENTATIVE OF THE OWNER SHALL INSPECT ALL FOOTING EXCAVATIONS FOR SUITABILITY OF BEARING SURFACES PRIOR TO PLACEMENT OF REINFORCING STEEL. PROVIDE DRAINAGE AND DEWATERING AROUND ALL WORK TO AVOID WATER-SOFTENED FOOTINGS.

FREE DRAINING BACKFILL MATERIAL FOR RETAINING & BASEMENT WALLS

A CLEAN, FREE DRAINING, WELL GRADED GRANULAR MATERIAL CONFORMING TO ASTM D2487 GW OR SW WHOSE MAXIMUM PARTICLE SIZE DOES NOT EXCEED 3/4" AND WHOSE FINES CONTENT (MATERIAL PASSING THE NO. 200 SIEVE) DOES NOT EXCEED 5%,

WITH A MAXIMUM DUST RATIO $\frac{\%\text{ PASSING U.S. NO. 200 SIEVE}}{\%\text{ PASSING U.S. NO. 40 SIEVE}}$ = 2/3 MAX.

CONCRETE

CAST-IN-PLACE CONCRETE

MIX DESIGNS: THE CONTRACTOR SHALL DESIGN CONCRETE MIXES THAT MEET OR EXCEED THE REQUIREMENTS OF THE CONCRETE MIX TABLE. THE MIX DESIGNS SHALL FACILITATE ANTICIPATED PLACEMENT METHODS, WEATHER, REBAR CONGESTION, ARCHITECTURAL FINISHES, CONSTRUCTION SEQUENCING, STRUCTURAL DETAILS, AND ALL OTHER FACTORS REQUIRED TO PROVIDE A STRUCTURALLY SOUND, AESTHETICALLY ACCEPTABLE FINISHED PRODUCT. WATER REDUCING ADMIXTURES WILL LIKELY BE REQUIRED TO MEET THESE REQUIREMENTS. CONCRETE MIX DESIGNS SHALL CLEARLY INDICATE THE TARGET SLUMP. SLUMP TOLERANCE SHALL BE ± 1-1/2 INCHES.

AGGREGATE: COARSE AND FINE AGGREGATE SHALL CONFORM TO ASTM C33

CEMENT: CEMENT SHALL CONFORM TO ASTM C150, TYPE II PORTLAND CEMENT, UNLESS NOTED OTHERWISE.

FLYASH: SHALL CONFORM TO ASTM C618 CLASS C OR F, MAXIMUM LOSS OF IGNITION SHALL BE 1.0%.

SLAG: GROUND GRANULATED BLAST-FURNACE (GGBF) SLAG SHALL CONFORM TO ASTM C989 GRADE 100 OR 120.

ALTERNATE MIX DESIGNS: VARIATIONS TO THE MIX DESIGN PROPORTIONS MAY BE ACCEPTED IF SUBSTANTIATED IN ACCORDANCE WITH ACI 318, CHAPTER 19. PROVIDE SUBMITTALS A MINIMUM OF TWO WEEKS PRIOR TO BID FOR DETERMINATION OF ACCEPTABILITY.

ADMIXTURES: ADMIXTURES SHALL BE BY MASTER BUILDERS, W.R. GRACE, OR PRE-APPROVED EQUAL. ALL MANUFACTURER'S RECOMMENDATIONS SHALL BE FOLLOWED.

WATER: SHALL BE CLEAN AND POTABLE.

MAXIMUM CHLORIDE CONTENT: THE MAXIMUM WATER SOLUBLE CHLORIDE CONTENT SHALL NOT EXCEED 0.15% BY WEIGHT OF CEMENTITIOUS MATERIAL UNLESS NOTED OTHERWISE.

CONCRETE EXPOSED TO WEATHER: PROVIDE 5.0% TOTAL AIR CONTENT FOR ALL CONCRETE EXPOSED TO WEATHER. TOTAL AIR CONTENT IS THE SUM OF ENTRAINED AIR PROVIDED BY ADMIXTURES AND NATURALLY OCCURRING ENTRAPPED AIR. AIR CONTENT SHALL BE TESTED PRIOR TO BEING PLACED IN THE PUMP HOPPER OR BUCKET; IT IS NOT REQUIRED TO BE TESTED AT THE DISCHARGE END OF THE PUMP HOSE. THE TOLERANCE ON ENTRAPPED AIR SHALL BE +2.0% AND -1.5% WITH THE AVERAGE OF ALL TESTS NOT LESS THAN THE SPECIFIED AMOUNT.

TOTAL CEMENTITIOUS MATERIAL: THE SUM OF ALL CEMENT PLUS FLYASH AND SLAG. AT THE CONTRACTORS OPTION FLYASH OR SLAG MAY BE SUBSTITUTED FOR CEMENT BUT SHALL NOT EXCEED 25% BY WEIGHT OF TOTAL CEMENTITIOUS MATERIAL. IN NO CASE SHALL THE AMOUNT OF FLYASH OR SLAG BE LESS THAN REQUIRED BY THE CONCRETE MIX DESIGN TABLE. FOOTING MIXES SHALL CONTAIN NOT LESS THAN **5 SACKS** OF CEMENTITIOUS MATERIAL PER CUBIC YARD, ALL OTHER MIXES SHALL CONTAIN NOT LESS THAN **5-1/2 SACKS** OF CEMENTITIOUS MATERIAL PER CUBIC YARD, UNLESS NOTED OTHERWISE.

ITEM	DESIGN f'c (PSI) (AT 28 DAYS U.N.O.)	MAX. W/C RATIO	MIN. FLYASH OR SLAG (PCY)	AGGREGATE GRADING ASTM AASHTO	NOTES
SLABS ON GRADE - UNO	4000	0.45	100	57 OR 67	-
ARCHITECTURALLY EXPOSED SLABS ON GRADE	4000	0.45	100	57 OR 67	1, 2
FOUNDATIONS - UNO	3000	0.50	--	57 OR 67	
STEM WALLS AND OTHER WALLS EXPOSED TO EARTH OR WEATHER	4500	0.45	100	57 OR 67	

CONCRETE MIX NOTES:

1. MAXIMUM WATER CONTENT 240 PCY.
2. THIS MIX SHALL CONTAIN 1 GALLON PER CY OF 'ECLIPSE' SHRINKAGE REDUCING ADD MIXTURE BY W.R. GRACE OR APPROVED ALTERNATE. FOR CONCRETE REQUIRING AN AIR ENTRAINMENT ADMIXTURE, 'ECLIPSE PLUS' SHALL BE USED.

STRUCTURAL DRAWING INDEX	
SHEET NUMBER	**SHEET DESCRIPTION**
S0.1	GENERAL NOTES
S0.2	GENERAL NOTES
S0.3	GENERAL NOTES
S0.4	GENERAL NOTES
S1.0	FOUNDATION PLAN
S1.1	CANOPY FOUNDATION PLAN
S2.0	GRADE LEVEL FRAMING PLAN
S3.0	ROOF FRAMING PLAN
S3.1	CANOPY ROOF FRAMING PLAN
S4.0	FOUNDATION DETAILS
S4.1	FOUNDATION DETAILS
S5.0	WALL FRAMING DETAILS
S5.1	WALL FRAMING DETAILS
S5.2	WALL FRAMING DETAILS
S6.0	ROOF FRAMING DETAILS
S8.0	CANOPY FRAMING DETAILS
Grand total: 16	

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MASON TRANSIT AUTHORITY

BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title

Rev.	Description

Owner Project No: 2016-657
ART Project No: 1710
Drawn By: MCF
Approved By: JAD
Date: 2/12/2020

Sheet Title:
GENERAL NOTES

2" AT FULL SHEET (24x36)
1" AT HALF SHEET (11x17)

Sheet No.
S0.1

BID SET

CONCRETE PLACEMENT

PLACE CONCRETE FOLLOWING ALL APPLICABLE ACI RECOMMENDATIONS. CONCRETE SHALL BE PROPERLY CONSOLIDATED PER ACI 309 USING INTERIOR MECHANICAL VIBRATORS, DO NOT OVER-VIBRATE. CONCRETE SHALL BE POURED MONOLITHICALLY BETWEEN CONSTRUCTION OR EXPANSION JOINTS. IF CONCRETE IS PLACED
BY THE PUMP METHOD, HORSES SHALL BE PROVIDED TO SUPPORT THE HOSE, THE HOSE SHALL NOT BE ALLOWED TO RIDE ON THE REINFORCING. WEATHER FORECASTS SHALL BE MONITORED AND ACI RECOMMENDATIONS FOR HOT AND COLD WEATHER CONCRETING SHALL BE FOLLOWED AS REQUIRED. CONCRETE SHALL NOT FREE FALL MORE THAN 5 FEET DURING PLACEMENT WITHOUT WRITTEN APPROVAL OF STRUCTURAL ENGINEER.

FLOATING & FINISHING OPERATIONS

WATER SHALL NOT BE ADDED TO THE CONCRETE SURFACE DURING FLOATING & FINISHING OPERATIONS. PRE-APPROVED EVAPORATION RETARDER SPECIFICALLY DESIGNED FOR FLOATING & FINISHING OPERATIONS ARE ACCEPTABLE.

FORMED SURFACES:

FORMWORK CLASS OF SURFACE PER ACI 347 TABLE 3.1	
ITEM	CLASS OF FINISH
ALL SURFACES EXPOSED TO PUBLIC VIEW, U.N.O.	A
ALL SURFACES RECEIVING A COURSE TEXTURED COATING SUCH AS PLASTER OR STUCCO, UNLESS NOTED OTHERWISE	B
ALL OTHER SURFACES, UNLESS NOTED OTHERWISE	C

COLD WEATHER PLACEMENT:

1. COLD WEATHER IS DEFINED BY ACI 306 AS "A PERIOD WHEN FOR MORE THAN 3 SUCCESSIVE DAYS THE MEAN DAILY TEMPERATURE DROPS BELOW 40° F."
2. NO CONCRETE SHALL BE PLACED ON FROZEN OR PARTIALLY FROZEN GROUND. THAWING THE GROUND WITH HEATERS IS PERMISSIBLE.
3. CONCRETE MIX TEMPERATURES SHALL BE AS SHOWN BELOW. HEATING OF WATER AND/OR AGGREGATES MAY BE REQUIRED TO ATTAIN THESE TEMPERATURES.
4. THE CONCRETE MAY REQUIRE PROTECTION FOR 4-7 DAYS AFTER POURING. IF TEMPERATURES REMAIN BELOW FREEZING, INSULATING BLANKET COVERAGE IS REQUIRED. IF TEMPERATURES ARE SLIGHTLY BELOW FREEZING (30° F MIN.) AT NIGHT AND ABOVE FREEZING DURING THE DAY, KRAFT PAPER WITH COMPLETE COVERAGE MAY BE USED IN LIEU OF INSULATED BLANKETS.
5. NO ADDITIVES CONTAINING CHLORIDES SHALL BE USED. USE "POZZUTEC 20+" BY MASTER BUILDERS OR "POLARSET" BY W.R. GRACE OR PRE-APPROVED EQUAL.

CONDITION OF PLACEMENT AND CURING		WALLS & SLABS	FOOTINGS
MIN. TEMP. FRESH CONCRETE AS MIXED FOR WEATHER INDICATED, DEGREES F.	ABOVE 30° F. 0° TO 30° F. BELOW 0° F.	60° 65° 70°	55° 60° 65°
MIN. TEMP. FRESH CONCRETE AS PLACED AND MAINTAINED, DEGREES F.		55°	50°
MAX. ALLOWABLE GRADUAL DROP IN TEMP. THROUGHOUT FIRST 24 HOURS AFTER END OF PROTECTION, DEGREES F.		50°	40°

HOT OR WINDY WEATHER PLACEMENT

HOT WEATHER IS DEFINED BY ACI 305 AS "ANY COMBINATION OF HIGH AIR TEMPERATURE, LOW RELATIVE HUMIDITY, AND WIND VELOCITY, TENDING TO IMPAIR THE QUALITY OF FRESH HARDENED CONCRETE. ACI 305 FIGURE 2.1.5 SHALL BE USED BY THE CONTRACTOR TO ESTIMATE THE RATE OF EVAPORATION. WHEN THE ESTIMATED RATE OF EVAPORATION IS GREATER THAN O.2 PSF/HOUR THE PLACEMENT SHALL BE CONSIDERED A HOT WEATHER PLACEMENT. PRECAUTIONS AGAINST PLASTIC SHRINKAGE CRACKING ARE NECESSARY. PRECAUTIONS TAKEN BY THE CONTRACTOR VARY DEPENDING UPON THE FACTORS ASSOCIATED WITH WATER EVAPORATION AND INCLUDE BUT ARE NOT LIMITED TO:

1. LIMITING CONCRETE TEMPERATURE TO 100°F AT TIME OF PLACEMENT.

2. APPLICATION OF AN EVAPORATION RETARDER.

3. USE OF FOG SPRAY.

4. REDUCTION OF POUR SIZE.

5. PLACING CONCRETE AT NIGHT.

CONTROL AND CONSTRUCTION JOINTS

CONSTRUCTION JOINTS SHALL MEET THE REQUIREMENTS OF ACI 301 SECTIONS 2.2.2.5 AND 5.3.2.6. SPECIAL BONDING METHODS PER SECTION 5.3.2.6 SHALL BE SATISFIED BY ITEM 4 BELOW UNLESS OTHERWISE DETAILED ON THE STRUCTURAL DRAWINGS. WHERE CONSTRUCTION JOINTS ARE NOT SHOWN ON PLAN OR ADDITIONAL CONSTRUCTION JOINTS ARE REQUIRED SUBMIT PROPOSED JOINTING FOR STRUCTURAL ENGINEERS APPROVAL. PROVIDE CONSTRUCTION JOINTS AS INDICATED BELOW UNLESS NOTED OTHERWISE ON THE PLANS:

1. SLABS ON GRADE: PROVIDE CONSTRUCTION AND/OR CONTROL JOINTS AT 16 FEET O.C. MAXIMUM FOR UNEXPOSED SLABS ON GRADE AND 12 FEET O.C. FOR EXPOSED SLABS ON GRADE. COORDINATE JOINTS WITH ARCHITECTURAL DRAWINGS.
2. BONDING AGENT: WHERE BONDING AGENT IS SPECIFICALLY CALLED OUT ON THE STRUCTURAL DRAWINGS USE "WELD CRETE" BY LARSON PRODUCTS CORPORATION OR PRE-APPROVED EQUAL. FOLLOW ALL MANUFACTURERS RECOMMENDATIONS.

EMBEDDED ITEMS

1. NO ALUMINUM ITEMS SHALL BE EMBEDDED IN ANY CONCRETE.
2. ALL EMBED PLATES SHALL BE SECURELY FASTENED IN PLACE.
3. ALL EMBEDDED STEEL ITEMS EXPOSED TO EARTH SHALL BE GALVANIZED.
4. ALL EMBEDDED STEEL ITEMS EXPOSED TO WEATHER SHALL BE PAINTED UNLESS NOTED AS GALVANIZED. SEE DRAWINGS AND SPECIFICATIONS FOR PAINT, PRIMER, AND GALVANIZING REQUIREMENTS.

CONCRETE CURING AND SEALING

CURING PROCEDURES SHALL COMMENCE IMMEDIATELY AFTER FINISHING CONCRETE TO MAINTAIN CONCRETE IN A MOIST CONDITION. VERIFY CURING AND/OR SEALING PRODUCTS ARE COMPATIBLE WITH FLOOR COVERINGS SHOWN ON THE ARCHITECTURAL DRAWINGS. FOLLOW ALL MANUFACTURER'S RECOMMENDATIONS. SLABS ARE DEFINED AS SLABS ON GRADE, CONCRETE ON METAL DECK, ELEVATED POST-TENSIONED OR MILD REINFORCED DECKS, AND TOPPING SLABS.

ITEM	CONCRETE CURING NOTES
SLABS EXPOSED TO EARTH OR WEATHER OR VEHICLE OR FORKLIFT TRAFFIC INCLUDING LOADING DOCKS	1, (3 OR 4 OR 5), 6
ALL OTHER SLABS	1, (3 OR 4 OR 5)
FORMED SURFACES EXCLUDING FOUNDATIONS	2
ALL OTHER CONCRETE	NONE

CONCRETE CURING NOTES:

1. WHEN THE ESTIMATED EVAPORATION RATE IS GREATER THAN 0.2 PSF/HOUR PROVIDE A SPRAY APPLIED EVAPORATION RETARDER IMMEDIATELY AFTER CONCRETE PLACEMENT. THE EVAPORATION RATE MAY BE CALCULATED PER ACI 305 FIGURE 2.1.5.
2. APPLY A LIQUID MEMBRANE FORMING CURING COMPOUND, CONFORMING TO ASTM C309 TYPE 1 CLASS B SPECIFICATIONS, PER MANUFACTURER'S RECOMMENDATIONS TO ALL FORMED SURFACES IMMEDIATELY AFTER FINAL FORM REMOVAL. NOT REQUIRED IF FORMWORK REMAINS IN PLACE FOR MORE THAN 7 DAYS.
3. PROVIDE PRE-APPROVED CONTINUOUS WET CURE METHOD FOR A MINIMUM OF 14 DAYS.
4. APPLY A LIQUID MEMBRANE FORMING CURING COMPOUND, CONFORMING TO ASTM C309 TYPE 1 CLASS B SPECIFICATIONS OR ASTM C1315 TYPE 1 CLASS A SPECIFICATIONS, PER MANUFACTURER'S RECOMMENDATIONS IMMEDIATELY AFTER FINAL FINISHING. CURING COMPOUND SHALL BE COMPATIBLE WITH ARCHITECTURAL FLOOR COVERINGS AND SEALERS.
5. PROVIDE 'ULTRACURE MAX' MOISTURE RETAINING COVER BY MCTECH GROUP, OR APPROVED EQUAL, FOR A MINIMUM OF 14 DAYS.
6. APPLY A SILANE SEALER WITH MINIMUM SOLIDS CONTENT OF 40% PER MANUFACTURER'S RECOMMENDATIONS.

GROUT

NON-SHRINK GROUT: MASTER BUILDERS "MASTERFLOW 928" OR PRE-APPROVED EQUAL. GROUT SHALL CONFORM TO CRD-C621 AND ASTM C1107 WHEN TESTED AT A FLUID CONSISTENCY PER CRD-C611-85 FOR 30 MINUTES. GROUT MAY BE PLACED FROM A 25 SECOND FLOW TO A STIFF PACKING CONSISTENCY. FILL OR PACK ENTIRE SPACE UNDER PLATES OR SHAPES. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR PREPARATION, INSTALLATION, AND CURING.

REINFORCING STEEL

REINFORCING STEEL SHALL CONFORM TO:

ASTM A615, GRADE 60 TYPICAL UNLESS NOTED OTHERWISE.

DETAIL FABRICATE AND PLACE PER ACI 315 AND ACI 318.

REINFORCING SPLICE AND DEVELOPMENT LENGTH SCHEDULE, Fy=60 KSI (UNLESS NOTED OTHERWISE)

BAR SIZE	MINIMUM LAP SPLICE LENGTHS ("Ls")		MINIMUM DEVELOPMENT LENGTHS ("Ld")		MINIMUM EMBEDMENT LENGTH FOR STANDARD END HOOKS ("Ldh")
	TOP BARS (1)	OTHER BARS	TOP BARS (1)	OTHER BARS	
#3	2'-0"	1'-6"	1'-6"	1'-3"	0'-7"
#4	2'-8"	2'-0"	2'-0"	1'-7"	0'-9"
#5	3'-4"	2'-7"	2'-7"	2'-0"	1'-0"
#6	4'-0"	3'-1"	3'-1"	2'-4"	1'-2"

SPLICE TABLE NOTES:

1. "TOP BARS" ARE HORIZONTAL BARS WITH MORE THAN 12" DEPTH OF CONCRETE CAST BELOW THEM.

REINFORCING STEEL COVER

PROVIDE CONCRETE COVER OVER REINFORCEMENT AS FOLLOWS, UNLESS NOTED OTHERWISE:

CONCRETE CAST AGAINST EARTH ---------- 3"
EXPOSED TO WEATHER OR EARTH ---------- 2"
TIES ON BEAMS AND COLUMNS ---------- 1-1/2"
WALLS AND SLABS NOT EXPOSED TO WEATHER---- 3/4"
AUGERCAST PILES ---------- 2-1/2"

POST-INSTALLED ANCHORS

POST-INSTALLED ANCHORS: SHALL ONLY BE USED WHERE SPECIFIED ON THE CONSTRUCTION DOCUMENTS. THE CONTRACTOR SHALL OBTAIN APPROVAL FROM THE STRUCTURAL ENGINEER PRIOR TO INSTALLING POST-INSTALLED ANCHORS IN PLACE OF MISSING OR MISPLACED CAST-IN-PLACE ANCHORS. CARE SHALL BE TAKEN IN PLACING POST-INSTALLED ANCHORS TO AVOID CONFLICTS WITH REBAR. INSTALL IN ACCORDANCE WITH THE MANUFACTURER'S PUBLISHED INSTALLATION INSTRUCTIONS. INSTALLER SHALL BE QUALIFIED AND TRAINED BY THE MANUFACTURER. HOLES SHALL BE HAMMER DRILLED ONLY (ROTARY DRILLED ONLY AT UNREINFORCED MASONRY - NO HAMMER TOOLS).

SUBSTITUTION REQUESTS, FOR PRODUCTS OTHER THAN THOSE SPECIFIED BELOW, SHALL BE SUBMITTED FOR APPROVAL A MINIMUM OF 2 WEEKS PRIOR TO BID, ALONG WITH CALCULATIONS THAT ARE PREPARED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER (LICENSED IN THE STATE IN WHICH THE PROJECT OCCURS) DEMONSTRATING THAT THE SUBSTITUTED PRODUCT IS CAPABLE OF ACHIEVING EQUIVALENT PERFORMANCE VALUES (MINIMUM) OF THE SPECIFIED PRODUCT USING THE APPROPRIATE DESIGN PROCEDURE AND/OR STANDARD(S) AS REQUIRED BY THE BUILDING CODE.

CONCRETE ANCHORS:
- ADHESIVE ANCHORS: HILTI HIT-HY 200 (ICC-ESR-3187)
  *CONCRETE SHALL BE A MINIMUM OF 21 DAYS OLD AT TIME OF INSTALLATION.
  *CONCRETE SHALL BE IN THE TEMPERATURE RANGE AS REQUIRED BY THE CONCRETE MANUFACTURER.
  *HOLE SHALL BY HAMMER-DRILLED ONLY.
  *HOLE SHALL BE DRY AT TIME OF INSTALLATION.
  *INSTALLER OF HORIZONTAL OR UPWARDLY INCLINED (ANY POSITION EXCEPT DIRECTLY DOWNWARD) ANCHORS SHALL ALSO BE CERTIFIED BY THE ACI/CRSI ADHESIVE ANCHOR INSTALLER CERTIFICATION PROGRAM.
- EXPANSION ANCHORS: KWIKBOLT TZ (ICC ESR-1917) BY HILTI, INC. OR STRONG-BOLT 2 (ICC ESR-3037) BY SIMPSON STRONG TIE, INC.
- SCREW ANCHORS: KWIK HUS-EZ (ICC ESR-3027) BY HILTI, INC. OR TITEN HD (ICC ESR-2713) BY SIMPSON STRONG TIE, INC.

STRUCTURAL STEEL

DETAILING, FABRICATION AND ERECTION

ALL WORKMANSHIP SHALL CONFORM TO THE AISC MANUAL OF STEEL CONSTRUCTION, 14TH EDITION, THE AISC SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS JUNE 22, 2010, THE AISC CODE OF STANDARD PRACTICE, APRIL 14, 2010 AND THE AISC SEISMIC PROVISIONS FOR STRUCTURAL STEEL BUILDINGS, JUNE 22, 2010.

STEEL MEMBERS ARE EQUALLY SPACED BETWEEN COLUMNS AND/OR DIMENSION POINTS UNLESS NOTED OTHERWISE.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ERECTION AIDES AND JOINT PREPARATIONS THAT INCLUDE BUT ARE NOT LIMITED TO, ERECTION ANGLES, LIFT HOLES, AND OTHER AIDES, WELDING PROCEDURES, REQUIRED ROOT OPENINGS, ROOT FACE DIMENSIONS, GROOVE ANGLES, BACKING BARS, WELD EXTENSION TABS, COPES, SURFACE ROUGHNESS VALUES AND TAPERS OF UNEQUAL PARTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COMPLIANCE WITH ALL CURRENT OSHA REQUIREMENTS.

HOLES, COPES OR OTHER CUTS OR MODIFICATIONS OF THE STRUCTURAL STEEL MEMBERS SHALL NOT BE MADE IN THE FIELD WITHOUT WRITTEN APPROVAL FROM THE STRUCTURAL ENGINEER.

MATERIAL PROPERTIES

OTHER SHAPES AND PLATES: ASTM A36 (Fy = 36 KSI) TYP. U.N.O.; ASTM A572 (Fy = 50 KSI) WHERE INDICATED

HOLLOW STRUCTURAL SECTIONS: RECTANGULAR & SQUARE - ASTM A500 GRADE B (Fy = 46 KSI) ROUND - ASTM A500 GRADE B (Fy = 42 KSI)

MACHINE BOLTS (M.B.): ASTM A307, GRADE A

HIGH-STRENGTH BOLTS: A325-ASTM F1852, A490-ASTM F2280

ANCHOR BOLTS (A.B.): ASTM F1554, GRADE 55, UNLESS OTHERWISE NOTED, ASTM F1554, GRADE 105 WHERE INDICATED.

WELDING

STRUCTURAL STEEL: WELD IN ACCORDANCE WITH "STRUCTURAL WELDING CODE" AWS D1.1.

CERTIFICATION: ALL WELDING SHALL BE PERFORMED BY WABO/AWS CERTIFIED WELDERS. WELDERS SHALL BE PREQUALIFIED FOR EACH POSITION AND WELD TYPE WHICH THE WELDER WILL BE PERFORMING.

WELD TABS (ALSO KNOWN AS WELD "EXTENSION" TABS OR "RUN OFF" TABS) SHALL BE USED. AFTER THE WELD HAS BEEN COMPLETED THE WELD TABS SHALL BE REMOVED AND THE WELD END GROUND TO A SMOOTH CONTOUR. WELD "DAMS" OR "END DAMS" SHALL NOT BE USED.

THE PROCESS CONSUMABLES FOR ALL WELD FILLER METAL INCLUDING TACK WELDS, ROOT PASS AND SUBSEQUENT PASSES DEPOSITED IN A JOINT SHALL BE COMPATIBLE.

ALL WELD FILLER METAL AND WELD PROCESS SHALL PROVIDE THE TENSILE STRENGTH CHARPY V-NOTCH RATINGS AS FOLLOWS:

ARCHITECTS
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MASON TRANSIT AUTHORITY

BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title

Rev.	Description

Owner Project No: 2016-657
ART Project No: 1710
Drawn By: MCF
Approved By: JAD
Date: 2/12/2020

Sheet Title:
GENERAL NOTES

2" AT FULL SHEET (24x36)
1" AT HALF SHEET (11x17)

Sheet No.
S0.2
BID SET

GRAVITY FRAME

WELD TYPE	FILLER METAL TENSILE STRENGTH	CHARPY V-NOTCH (CVN) RATING
FILLET	70 KSI	-----
PARTIAL PENETRATION	70 KSI	-----
COMPLETE PENETRATION	70 KSI	20 FT-LBS @ -20 DEG F

WELDED CONNECTIONS INSPECTION:

1. ALL WELDING SHALL BE CHECKED BY VISUAL MEANS AND BY OTHER METHODS DEEMED NECESSARY BY THE WELDING INSPECTOR.

THE STANDARDS OF ACCEPTANCE FOR WELDS TESTED BY ULTRASONIC METHODS SHALL CONFORM TO AWS D1.1.

ALL WELDS FOUND TO BE DEFECTIVE SHALL BE REPAIRED AND REINSPECTED BY THE SAME METHODS ORIGINALLY USED, AND THIS REPAIR AND REINSPECTION SHALL BE PAID FOR BY THE CONTRACTOR.

GENERAL REQUIREMENTS

BOLTED CONNECTIONS INSPECTION: CONNECTIONS MADE WITH BEARING TYPE BOLTS SHALL BE INSPECTED PER SECTION 9.1 AND CONNECTIONS MADE WITH SLIP-CRITICAL TYPE BOLTS (A325SC OR A490SC) SHALL BE INSPECTED PER SECTION 9.3 OF RCSC SPECIFICATION.

ADHESIVE ANCHOR RODS: ASTM F1554, GRADE 36 UNLESS NOTED OTHERWISE.

HEADED STUDS: SHALL BE "H4L HEADED CONCRETE ANCHORS" FOR STUDS 5/8" DIAMETER AND SMALLER AND "S3L SHEAR CONNECTORS" FOR STUDS 3/4" DIAMETER AND LARGER AS MANUFACTURED BY NELSON STUD WELDING, INC. OR PRE-APPROVED EQUAL AND SHALL CONFORM TO AWS D1.1. ALL HEADED STUDS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS USING A NELSON WELD GUN, UNLESS NOTED OTHERWISE ON DETAILS. ALL WELDS SHALL BE MADE AND INSPECTED IN ACCORDANCE WITH AWS D1.1.

FINISH: STRUCTURAL STEEL SHALL BE PAINTED WITH PRIMER, UNLESS NOTED OTHERWISE, AND SHALL BE CLEAN OF LOOSE RUST, LOOSE MILL SCALE, OIL, GREASE AND OTHER FOREIGN SUBSTANCES AND SHALL MEET THE REQUIREMENTS OF SSPC-SP1. WHERE STRUCTURAL STEEL IS NOTED TO BE PAINTED, ALL AREAS COMPRISING THE FAYING SURFACES OF BOLTED CONNECTIONS MADE WITH SLIP-CRITICAL TYPE BOLTS (A325SC OR A490SC) SHALL COMPLY WITH THE REQUIREMENTS OF THE RCSC SPECIFICATION. WHERE STRUCTURAL STEEL IS NOTED TO BE GALVANIZED, IT SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A123, A384, AND A385. ALL SURFACES WITHIN TWO INCHES OF ANY FIELD WELD LOCATION SHALL BE FREE OF MATERIALS THAT WOULD PREVENT PROPER WELDING OR PRODUCE OBJECTIONABLE FUMES. FIELD TOUCH-UP OF PRIMED, PAINTED, AND GALVANIZED SURFACES SHALL BE PERFORMED TO REPAIR COATING ABRASIONS, AS WELL AS TO PROTECT ALL AREAS AT CONNECTIONS.

CARPENTRY:

NAILS: CONNECTION DESIGNS ARE BASED ON "COMMON WIRE" NAILS WITH THE FOLLOWING PROPERTIES:

PENNYWEIGHT	DIAMETER (INCHES)	LENGTH (INCHES)	TRACKER** EMBOSSED HEAD / COLOR
8d	0.131	2-1/2	3 / BLUE
10d	0.148	3	4 / WHITE
16d	0.162	3-1/2	6 / ORANGE
20d	0.192	4	-

FOR DIAPHRAGM OR SHEAR WALL NAILING THE FOLLOWING FASTENER TYPES MAY BE USED AT EQUIVALENT SPACING TO THAT SPECIFIED ON PLANS:

FASTENER TYPE	DIAMETER (INCHES)	LENGTH (INCHES)	EQUIVALENT SPACING (INCHES)			TRACKER** EMBOSSED HEAD / COLOR
8d COMMON WIRE	0.131	2-1/2	6	4	3	3 / BLUE
8d "DIPPED GALV. BOX"	0.131	2-1/2	6	4	3	E3 / NONE
8d "SHINY BOX"	0.113	2-1/2	4-1/2	3	2-1/2	1 / BLUE
12 GA. STAPLES	0.1055	1-7/8*	6	5-1/2	4	-
14 GA. STAPLES	0.080	1-1/2*	6	4	3	-
15 GA STAPLES	0.072	1-1/2*	5	3	2-1/2	-
10d COMMON WIRE	0.148	3	6	4	3	4 / WHITE
10d "HOT DIPPED GALV. BOX"	0.148	3	6	4	3	F4 / NONE
10d "SHINY BOX"	0.128	3	4-1/2	3	2-1/4	3 / WHITE

*BASED ON 15/32" PLYWOOD OR OSB.
**REFERENCE TO EMBOSSED HEAD / COLOR CODED NAILS PER TRACKERS SYSTEM.

WOOD SHEATHING (STRUCTURAL): **SHEATHING ON ROOF SURFACES SHALL BE PLYWOOD ONLY**. SHEATHING ON FLOOR AND WALLS SHALL BE PLYWOOD OR ORIENTED STRAND BOARD (OSB). PLYWOOD SHEATHING SHALL BE 5-PLY MINIMUM WHERE INDICATED AS PERFORMANCE CATAGORY 3/4" OR THICKER. WOOD SHEATHING SHALL BE "STRUCTURAL I" CONFORMING TO PS1-09 AND/OR PS2-10. ALL PANELS SHALL BEAR THE STAMP OF AN APPROVED GRADING AGENCY. SPAN RATING SHALL BE PROVIDED AS FOLLOWS: ROOF FRAMING AT 32"O.C. (48/24); ROOF FRAMING AT 24"O.C. (32/16); WALLS (32/16); FLOORS (48/24) ALL WOOD SHEATHED WALLS SHALL BE BLOCKED AT ALL PANEL EDGES UNLESS NOTED OTHERWISE.

GLUE-LAMINATED MEMBERS: CONFORM TO ANSI/AITC A190.1. MEMBERS SHALL BE COMBINATION 24F-V4 DOUGLAS FIR (DF) FOR SIMPLE SPANS AND 24F-V8 DF FOR CANTILEVERED SPANS (Fb=2400 PSI, Fv=265 PSI, E= 1.8X10^6 PSI) AND DF COMBINATION 2 FOR COLUMNS.

FRAMING LUMBER: STANDARDS. EACH PIECE SHALL BEAR THE GRADE TRADEMARK OF THE WEST COAST LUMBER INSPECTION BUREAU (WCLIB), WESTERN WOOD PRODUCTS ASSOCIATION (WWPA), OR OTHER AGENCY ACCREDITED BY THE AMERICAN LUMBER STANDARD COMMITTEE (ALSC) TO GRADE UNDER ALSC CERTIFIED GRADING RULES.

SPECIES AND GRADE (BASE DESIGN VALUE)
1. 6x BEAMS AND HEADERS. "DOUG FIR-LARCH" NO. 1 (Fb=1350 PSI, Fv=170 PSI)
2. 2x TO 4x JOISTS, PURLINS AND HEADERS. "DOUG FIR-LARCH" NO. 2 (Fb=900 PSI, Fv=180 PSI) OR "HEM-FIR" NO. 1 (Fb=975 PSI, Fv=150 PSI)
3. 6x POSTS AND COLUMNS. "DOUG FIR-LARCH" NO. 1 (Fc=1000 PSI)
4. EXTERIOR STUDS, INTERIOR BEARING WALLS AND 4x COLUMNS. "DOUG FIR-LARCH" NO. 2 (Fb= 900 PSI, Fc=1350 PSI) OR "HEM-FIR" NO. 1 (Fb=975 PSI, Fc=1350 PSI).
5. INTERIOR NON-BEARING STUD WALLS. "DOUG FIR-LARCH" NO. 2 (Fb=900 PSI. Fc=1350 PSI) OR "HEM-FIR" NO. 1 (Fb=975 PSI, Fc=1350 PSI)
6. 2x & 3x T&G DECKING: "DOUG FIR-LARCH" COMMERCIAL (Fb=1450 PSI, E=1700 KSI)
7. THE MINIMUM GRADE OF ALL OTHER STRUCTURAL FRAMING. "DOUG FIR-LARCH" NO. 2 (Fb= 900 PSI, Fc=1350 PSI), OR "HEM-FIR" NO. 1 (Fb=975 PSI, Fc=1350 PSI).
8. UTILITY & STANDARD GRADES NOT PERMITTED.

STRUCTURAL COMPOSITE LUMBER (SCL): SHALL BE MANUFACTURED BY REDBUILT LLC., OR PRE-APPROVED EQUAL IN ACCORDANCE WITH APPROVED SHOP AND INSTALLATION DRAWINGS CONFORMING TO A CURRENT EVALUATION REPORT.

MIINIMUM DESIGN VALUES:
1. 2x SCL: Fb = 1700 PSI, Fv = 285 PSI, E = 1300 KSI
2. 1-3/4" SCL: Fb = 2600 PSI, Fv = 285 PSI, E = 1800 KSI
3. 3-1/2" SCL: Fb = 2900 PSI, Fv = 285 PSI, E = 2000 KSI
4. 5-1/4" SCL: Fb = 2900 PSI, Fv = 285 PSI, E = 2000 KSI
5. RIMBOARD:APA/EWS PERFORMANCE RATED RIM (PRR-401) 1-1/4" MINIMUM THICKNESS

MEMBERS HAVE BEEN DESIGNED TO SERVICEABILITY AND OTHER PERFORMANCE BASED REQUIREMENTS, WHICH MAY EXCEED MINIMUM DESIGN LOADS AND CODE REQUIREMENTS. SUBSTITUTIONS MUST MEET OR EXCEED MOMENT, SHEAR, AND STIFFNESS OF THOSE MEMBERS SPECIFIED AT THE SAME DEPTH AND SPACING.

PRESERVATIVE TREATED WOOD REQUIREMENTS:

TREATMENTS OTHER THAN THOSE LISTED BELOW ARE NOT PERMITTED.

		APPLICATION	SPECIFIED MATERIAL	PRESERVATIVE TREATMENT (1)	CONNECTORS & FASTENERS (2)(3)
EXPOSURE	DRY	FOUNDATION SILL PLATES, TOP PLATES & LEDGERS ON CONCRETE OR MASONRY WALLS (4)	2x, 4x, 6x (FIR), OR GLULAM (SP)	SBX	GALV (G60)
				ACQ, CBA, CA	GALV (G185)
	WET	FRAMING, DECKING, POSTS & LEDGERS	2x, & 4x (FIR)	ACQ, CBA, CA	GALV (G185)
			2x, & 4x (CEDAR)	NONE	GALV (G90)
		BEAMS & COLUMNS	6x (FIR), OR GLULAM (SP)	ACQ, CBA, CA	GALV (G185)
			6x OR GLULAM (CEDAR)	NONE	GALV (G90)

1. CCA: CHROMATED COPPER ARSENATE NOT PERMITTED
   SBX: DOT SODIUM BORATE
   ACQ: ALKALINE COPPER QUAT
   CBA & CA: COPPER AZOLE
   FIR: DOUG-FIR OR HEM-FIR
   SP: SOUTHERN PINE
2. CONNECTORS: JOIST HANGERS, STRAPS, FRAMING CONNECTORS, COLUMN CAPS AND BASES, ETC. FASTENERS: MACHINE BOLTS, ANCHOR BOLTS AND LAG SCREWS WITH ASSOCIATED PLATE WASHERS AND NUTS. NAILS, SPIKES, WOOD SCREWS, ETC.
3. G60, G90 & G185 PER ASTM A653 FOR COLD-FORMED STEEL CONNECTORS. BATCH/POST HOT-DIP GALVANIZED PER ASTM A123 FOR CONNECTORS AND ASTM A153 STRUCTURAL STEEL CONNECTORS. HOT-DIP GALVANIZED PER ASTM A153 FOR FASTENERS OR MECHANICALLY GALVANIZED FASTENERS PER ASTM B695, CLASS 55 OR GREATER.
4. AT CONTRACTORS OPTION, LEDGERS AND TOP PLATES A MINIMUM OF 8 FEET ABOVE GRADE ON CONCRETE OR MASONRY WALLS MAY BE UN-TREATED IF COMPLETELY SEPARATED FROM THE WALL BY A SELF ADHERING ICE & WATER SHIELD BARRIER (40 MIL MINIMUM).

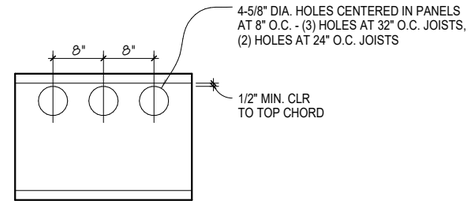
GENERAL REQUIREMENTS: PROVIDE MINIMUM NAILING PER IBC TABLE 2304.10.1 OR MORE, AS OTHERWISE SHOWN. STAGGER ALL NAILING TO PREVENT SPLITTING OF WOOD MEMBERS. ALL WOOD IN CONTACT WITH CONCRETE OR MASONRY SHALL BE PRESERVATIVE TREATED WITH THE EXCEPTION OF INTERIOR CONCRETE TOPPINGS ON WOOD FLOOR SYSTEMS. HOLES AND CUTS IN 3x OR 4x PLATES SHOULD BE TREATED WITH A 9% SOLUTION OF COPPER NAPHTHENATE. BOLT HOLES IN WOOD MEMBERS SHALL BE A MINIMUM OF 1/32" TO A MAXIMUM OF 1/16" LARGER THAN THE BOLT DIAMETER. PROVIDE CUT WASHERS WHERE BOLT HEADS, NUTS AND LAG SCREW HEADS BEAR ON WOOD. PROVIDE A MINIMUM 3"x3"x0.229" PLATE WASHER ON ALL ANCHOR BOLTS WHICH CONNECT MUD SILLS TO FOUNDATION. DO NOT NOTCH OR DRILL STRUCTURAL MEMBERS, EXCEPT AS ALLOWED BY IBC SECTIONS 2308.4.2.4, 2308.5.9, 2308.5.10 AND 2308.7.4 OR AS RESTRICTED BY PLANS OR DETAILS, OR AS APPROVED PRIOR TO INSTALLATION. REFER TO PRESERVATIVE TREATED WOOD REQUIREMENTS IN THESE GENERAL NOTES FOR GALVANIZING REQUIREMENTS FOR CONNECTORS AND FASTENERS.

WOOD SHRINKAGE AND CONSOLIDATION: SHRINKAGE OF WOOD MEMBERS AND CONSOLIDATION OF BEARING WALLS IS EXPECTED FROM TIME OF FRAMING UNTIL AFTER BUILDING IS PUT IN SERVICE. MECHANICAL, ELECTRICAL, AND PLUMBING SYSTEMS SHALL BE CONSTRUCTED TO ACCOMODATE 1/4" OF TOTAL SETTLEMENT PER STORY.

FRAMING CONNECTORS: SHALL CONFORM TO CURRENT EVALUATION REPORT AND BE MANUFACTURED BY SIMPSON STRONG-TIE COMPANY, SAN LEANDRO, CA., OR PRE-APPROVED EQUAL. PROVIDE MAXIMUM SIZE AND QUANTITY OF NAILS OR BOLTS PER MANUFACTURER, EXCEPT AS NOTED OTHERWISE. PROVIDE LEAD HOLES AS REQUIRED TO PREVENT SPLITTING OF WOOD MEMBERS. REFER TO PRESERVATIVE TREATED WOOD REQUIREMENTS IN THESE GENERAL NOTES FOR GALVANIZING REQUIREMENTS FOR CONNECTORS AND FASTENERS.

LAG SCREWS: SHALL CONFORM TO ANSI/ASME STANDARD B18.2.1. LAG SCREWS SHALL BE OF A DIAMETER INDICATED ON DRAWINGS WITH A MINIMUM OF 8x DIA. EMBEDMENT IN SUPPORTING MEMBER UNLESS NOTED OTHERWISE. CLEARANCE HOLE FOR THE SHANK SHALL BE THE SAME DIAMETER AS THE SHANK AND THE SAME DEPTH OF PENETRATION AS THE UNTHREADED PORTION OF THE SHANK. THE LEAD HOLE FOR THE THREADED PORTION SHALL HAVE A DIAMETER EQUAL TO 60 TO 75 PERCENT OF THE SHANK DIAMETER AND A LENGTH EQUAL TO AT LEAST THE LENGTH OF THE THREADED PORTION. THE THREADED PORTION OF THE SCREW SHALL BE INSERTED IN ITS LEAD HOLE BY TURNING WITH A WRENCH. SOAP OR OTHER LUBRICANT SHALL BE USED ON THE SCREWS OR IN THE LEAD HOLE TO FACILITATE INSERTION AND PREVENT DAMAGE TO THE SCREW. LAG SCREWS SHALL NOT BE DRIVEN WITH A HAMMER. REFER TO PRESERVATIVE TREATED WOOD REQUIREMENTS IN THESE GENERAL NOTES FOR GALVANIZING REQUIREMENTS FOR CONNECTORS AND FASTENERS.

I-JOISTS: SHALL BE MANUFACTURED BY REDBUILT LLC, OR PRE-APPROVED EQUAL IN ACCORDANCE WITH APPROVED SHOP AND INSTALLATION DRAWINGS. MEMBERS SHALL BE DESIGNED UNDER THE DIRECT SUPERVISION OF A STRUCTURAL ENGINEER LICENSED IN THE STATE OF PROJECT. THE ENTIRE I-JOIST ASSEMBLY SHALL BE AS APPROVED BY CURRENT EVALUATION REPORT. MEMBERS SHALL BE DESIGNED TO CARRY THE LOADS LISTED IN THE DESIGN CRITERION AND ANY ADDITIONAL LOADS INDICATED ON THE FRAMING PLANS AND DETAILS. THE TRUSS ENGINEER SHALL ASSUME ALL RESPONSIBILITY FOR THE WORK OF ALL SUBORDINATES INVOLVED IN THE PREPARATION OF THE TRUSS PLACEMENT PLANS AND TRUSS DESIGN DRAWINGS. I-JOISTS SHALL BE PROVIDED TO COMPLETE THE ROOF FRAMING FROM THE SHEATHING TO THE SUPPORTING MEMBERS BELOW. MEMBER DESIGNATIONS ON PLANS ARE FOR TYPICAL UNIFORMLY LOADED CONDITIONS. MANUFACTURER SHALL PROVIDE ADDITIONAL MEMBERS AS REQUIRED TO SUPPORT SPECIAL LOADING CONDITIONS INDICATED ON DRAWINGS. TOP CHORD AT STRAP CONNECTIONS TO CONCRETE OR MASONRY WALLS SHALL BE COMPOSED OF A STRUCTURAL COMPOSITE LUMBER MEMBER APPROVED BY A CURRENT EVALUATION REPORT FOR SUCH A USE OR AT CONTRACTORS OPTION, STRAP NAIL HOLES SHALL BE PRE-DRILLED IN CHORD. PROVIDE SHOP AND INSTALLATION DRAWINGS AND CALCULATIONS PRODUCED UNDER THE SUPERVISION OF AND BEARING THE STAMP OF A STRUCTURAL ENGINEER REGISTERED IN THE STATE OF PROJECT. DETAIL DRAWINGS TO INDICATE MEMBER TYPES, SIZE, SPACING, BRIDGING, BLOCKING, CONNECTIONS, ANCHORING, BEARING PLATE AND OTHER PERTINENT DETAILS. PROVIDE 1 1/2" DIA. OPEN KNOCKOUTS AT 12" O.C. ON ALL ROOF I-JOISTS.



TYPICAL I-JOIST VENTED BLOCKING
NO SCALE

MEMBER DESIGN CALCULATIONS SHALL BE PROVIDED FOR STANDARD LOADING ALONG WITH DESIGN CHECKS FOR SPECIAL LOADING CONDITIONS WHICH INCLUDE FREE BODY DIAGRAMS, LOADING BREAK DOWN, DESCRIPTION OF LOADS (I.E. MECH UNIT, SUSPENDED WALL, ETC.) AND THE RATIONALE FOR LOADING DISTRIBUTION ON MULTIPLE MEMBERS. SUBMITTAL SHALL ALSO PROVIDE ANY DOCUMENTATION NECESSARY TO INTERPRET DATA INDICATED ON CALCULATIONS.

MEMBERS HAVE BEEN DESIGNED TO MEET SERVICEABILITY AND OTHER PERFORMANCE BASED REQUIREMENTS, WHICH MAY EXCEED MINIMUM DESIGN LOADS AND CODE REQUIREMENTS. SUBSTITUTIONS MUST MEET OR EXCEED MOMENT, SHEAR, AND STIFFNESS OF THOSE MEMBERS SPECIFIED AT THE SAME DEPTH AND SPACING.

REFER TO THE FRAMING CONNECTORS SECTION OF THESE GENERAL NOTES FOR REQUIREMENTS PLACED UPON CONNECTOR HARDWARE SPECIFIED BY TRUSS ENGINEER AND/OR PROVIDED BY TRUSS MANUFACTURER.

SPRINKLER LINE ATTACHMENTS SHALL CONFORM TO NFPA 13 AND COMMERCIAL PUBLICATION "SPRINKLER SYSTEM INSTALLATION WITH GUIDELINES FOR REDBUILT OPEN-WEB TRUSSES AND I-JOISTS". LOADS HUNG FROM JOIST NOT SPECIFICALLY IDENTIFIED ON STRUCTURAL DRAWINGS SHALL NOT EXCEED 30 POUNDS AT ANY ONE POINT, NOR SHALL TOTAL LOADS IN POUNDS ON ANY ONE JOIST EXCEED 8 TIMES THE JOIST SPAN IN FEET, UNLESS DETAILED OTHERWISE ON THE DRAWINGS. ATTACHMENT OF LOADS EXCEEDING 90 POUNDS SHALL BE APPROVED PRIOR TO INSTALLATION. DO NOT NOTCH OR DRILL THRU TRUSS MEMBERS.

MISCELLANEOUS:

PRE-APPROVED SUBSTITUTIONS: SUBSTITUTIONS MAY BE ALLOWED ONLY IF THEY MEET THE REQUIREMENTS OF THESE GENERAL NOTES AND THE SPECIFICATIONS, AND IF COMPLETE WRITTEN ENGINEERING DATA FOR EACH CONDITION REQUIRED FOR THIS PROJECT IS PROVIDED TO THE STRUCTURAL ENGINEER TWO WEEKS PRIOR TO BID DATE AND APPROVED IN WRITTEN ADDENDA BY THE ARCHITECT. DATA IS TO INDICATE CODE BASIS BY YEAR, AUTHORITY FOR STRESSES AND STRESS INCREASES, IF ANY, AND AMOUNT OF EXPECTED DEFLECTION FOR FLEXURAL MEMBERS UNDER (1) TOTAL LOAD AND (2) LIVE LOAD ONLY. ALL INCREASED COSTS IN MECHANICAL, SPRINKLER, ELECTRICAL OR GENERAL INSTALLATION AND ANY ARCHITECTURAL OR STRUCTURAL REDESIGN RESULTING FROM SUBSTITUTION SHALL BE BORNE BY THE GENERAL CONTRACTOR.

SHOP DRAWINGS/SUBMITTALS

THE FOLLOWING SHOP DRAWINGS/SUBMITTALS SHALL BE PROVIDED FOR REVIEW AND APPROVAL BY THE STRUCTURAL ENGINEER PRIOR TO FABRICATION OR DELIVERY.

		STRUCTURAL ENGR.	BLDG. DEPT.
1.	CONCRETE MIX DESIGNS	X	X
2.	REINFORCING STEEL SHOP DRAWINGS	X	
3.	STRUCTURAL STEEL	X	X
4.	GLU-LAMINATED MEMBERS	X	X
5.	STRUCTURAL COMPOSITE LUMBER	X	X
6.	I-JOISTS	X	X
7.	CONTRACTOR'S STATEMENT OF RESPONSIBILITY	X	X

SPECIAL INSPECTION: SPECIAL INSPECTION SHALL BE PROVIDED BY AN INDEPENDENT TESTING LABORATORY PER THE REQUIREMENTS OF IBC CHAPTER 17 AND THE LOCAL BUILDING OFFICIAL OR APPLICABLE JURISDICTION AND THE CONTRACT DOCUMENTS. THE SPECIAL INSPECTOR SHALL SUBMIT INSPECTION REPORTS AND A FINAL SIGNED REPORT TO THE BUILDING OFFICIAL FOR THE ITEMS LISTED IN THE QUALITY ASSURANCE/SPECIAL INSPECTION SECTION:

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MASON TRANSIT AUTHORITY

BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title

Rev.	Description

Owner Project No: 2016-657
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Sheet Title:
GENERAL NOTES

2" AT FULL SHEET (24x36)
1" AT HALF SHEET (11x17)

Sheet No.
S0.3
BID SET

2/7/2020 10:31:00 AM C:_Revit Models\18179 Mason Trans Authority Drivers Fac Bldg (v2017) Central_BFloyd@pcs-structural.com.rvt

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STATEMENT OF SPECIAL INSPECTIONS:

SPECIAL INSPECTION: SPECIAL INSPECTION SHALL BE PROVIDED PER THE REQUIREMENTS OF IBC SECTION 1704 AND 1705 AND AS NOTED HEREIN.

STRUCTURAL SYSTEM	VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC	COMMENTS	REFERENCES
SOILS	VERIFY MATERIALS BELOW SHALLOW FOUNDATIONS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY		X		IBC 1705.6
	VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL		X		
	PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS		X		
	VERIFY USE OF PROPER MATERIALS, DENSITIES AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF COMPACTED FILL	X			
	PRIOR TO PLACEMENT OF COMPACTED FILL, INSPECT SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY		X		
STEEL CONSTRUCTION	MATERIAL VERIFICATION OF HIGH-STRENGTH BOLTS, NUTS AND WASHERS		X		AISC 360 CHAPTER N5
	HIGH-STRENGTH BOLTING A. SNUG-TIGHT JOINTS		X		AISC 360 CHAPTER N5
	MATERIAL VERIFICATION OF STRUCTURAL STEEL A. FOR STRUCTURAL STEEL, IDENTIFICATION MARKINGS TO CONFORM TO AISC 360 B. MANUFACTURER'S CERTIFIED MILL TEST REPORTS		X X	MANUFACTURER TO PROVIDE CERTIFIED MILL TEST REPORTS	AISC 360 CHAPTER N5 AISC 341 CHAPTER J6
	MATERIAL VERIFICATION OF WELD FILLER MATERIALS A. IDENTIFICATION MARKINGS TO CONFORM TO AWS SPECIFICATIONS LISTED IN GENERAL NOTES B. MANUFACTURER'S CERTIFICATE OF COMPLIANCE		X X	MANUFACTURER TO PROVIDE CERTIFICATE OF COMPLIANCE	AISC 360 CHAPTER N5
	INSPECTION OF WELDING A. COMPLETE AND PARTIAL JOINT PENETRATION GROOVE WELDS B. MULTI-PASS FILLET WELDS C. SINGLE-PASS FILLET WELDS > 5/16" D. PLUG AND SLOT WELDS E. SINGLE-PASS FILLET WELDS ≤ 5/16" F. FIELD-INSTALLED WELDED STUDS	X X X X	 X X	SPECIAL INSPECTIONS IN THIS SECTION ARE WAIVED WHERE FABRICATION IS PERFORMED ON THE PREMISES OF A FABRICATOR REGISTERED AND APPROVED IN ACCORDANCE WITH IBC SECTION 1704.2.5	AISC 360 CHAPTER N5 AISC 341 CHAPTER J6 AWS D1.1
	INSPECTION OF STEEL FRAME JOINT DETAILS FOR COMPLIANCE WITH APPROVED CONSTRUCTION DOCUMENTS		X		
CONCRETE	INSPECT REINFORCEMENT AND VERIFY PLACEMENT		X	SPECIAL INSPECTIONS NOT REQUIRED FOR THE FOLLOWING CONDITIONS: NON-STRUCTURAL SLAB ON GRADE ISOLATED SPREAD FOOTINGS FOR BUILDINGS THREE-STORIES AND LESS ABOVE GRADE PLANE	ACI 318: CH 20, 25.2, 25.3, 26.6-1 TO 26.6-3, IBC 1908.4
	ANCHORS CAST IN CONCRETE-PRIOR TO AND DURING PLACEMENT OF CONCRETE		X		ACI 318: 17.8.2 AISC 360 SECTION N7
	ANCHORS POST-INSTALLED IN HARDENED CONCRETE		X		ACI 318: 3.8.6, 8.1.3, 21.2.8 IBC 1909.1
	VERIFY USE OF REQUIRED DESIGN MIX		X		ACI 318, CH 19
	PRIOR TO CONCRETE PLACEMENT, FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE	X			ASTM C172, C31 ACI 318: 26.4, 26.12 IBC 1908.10
	MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES		X		ACI 318: 26.5.3 TO 26.5.5 IBC 1908.9
	MATERIAL VERIFICATION OF REINFORCEMENT STEEL FOR ASTM A615 REINFORCING		X	MANUFACTURER SHALL PROVIDE MILL TEST REPORTS. CONTINUOUS INSPECTION FOR ALL WELDS GREATER THAN 5/16" FILLET. PERIODIC INSPECTION FOR FILLET WELD 5/16" AND SMALLER	ACI 318: 26.6.4 AWS D1.4 IBC 1705.3.1
	TESTING OF MATERIALS		X		IBC 1705.3.2
WOOD FRAMING	SHEAR WALL NAILING		X	SPECIAL INSPECTION NOT REQUIRED FOR FASTENER SPACING > 4" O.C.	IBC 1705.11.1, 1705.12.2, 1705.5
	DIAPHRAGM NAILING		X	SPECIAL INSPECTION NOT REQUIRED FOR FASTENER SPACING > 4" O.C.	IBC 1705.11.1, 1705.12.2, 1705.5
	NAILING, BOLTING, AND ANCHORAGE OF COMPONENTS THAT ARE PART OF DRAG STRUTS, BRACES AND HOLD-DOWNS THAT ARE PART OF THE SEISMIC RESISTING SYSTEM		X		IBC 1705.11.1, 1705.12.2
	METAL-PLATE-CONNECTED WOOD TRUSSES SPANNING 60 FEET OR GREATER		X	TEMPORARY AND PERMANENT BRACING	IBC 1705.5.2

TESTING AND SPECIAL INSPECTION REPORTS SHALL BE PREPARED FOR EACH INSPECTION ITEM ON A DAILY BASIS WHENEVER WORK IS PERFORMED ON THAT ITEM. REPORTS SHALL BE DISTRIBUTED TO OWNER, CONTRACTOR, BUILDING OFFICIAL, ARCHITECT AND STRUCTURAL ENGINEER OF RECORD.

STRUCTURAL OBSERVATIONS SHALL BE PERFORMED BY THE STRUCTURAL ENGINEER OF RECORD OR DESIGNATED REPRESENTATIVE IN ACCORDANCE WITH IBC 1704.6.
STRUCTURAL OBSERVATION SHALL BE PERFORMED AS FOLLOWS:

- PERIODIC VISUAL OBSERVATION OF STRUCTURAL SYSTEMS FOR GENERAL CONFORMANCE TO CONSTRUCTION DOCUMENTS AT SIGNIFICANT CONSTRUCTION STAGES.
- REVIEW OF TESTING AND INSPECTION REPORTS.
- REPORTS SHALL BE PREPARED FOR EACH SITE VISIT AND SHALL BE DISTRIBUTED TO ARCHITECT.

GENERAL CONTRACTOR SHALL SUBMIT A WRITTEN CONTRACTOR'S STATEMENT OF RESPONSIBILITY TO THE BUILDING OFFICIAL AND OWNER PRIOR TO COMMENCEMENT OF WORK. THE CONTRACTOR'S STATEMENT OF RESPONSIBILITY SHALL INCLUDE ACKNOWLEDGMENT OF AWARENESS OF THE SPECIAL INSPECTION REQUIREMENTS CONTAINED IN THE STATEMENT OF SPECIAL INSPECTION.

ABBREVIATION LIST

@	AT	ELEV.	ELEVATOR	N.F.	NEAR FACE
A.B.	ANCHOR BOLT	ENGR.	ENGINEER	N.S.	NEAR SIDE
ADD'L	ADDITIONAL	EQ.	EQUAL	NTS	NOT TO SCALE
A.F.F.	ABOVE FINISH FLOOR	E.W.	EACH WAY	O.C.	ON CENTER
ALT.	ALTERNATE	EXP.	EXPANSION	OPN'G	OPENING
ARCH.	ARCHITECTURAL	EXT.	EXTERIOR	OPP.	OPPOSITE
BLD'G	BUILDING	FDN	FOUNDATION	P.A.F.	POWDER ACTUATED FASTENER
BLK'G	BLOCKING	F.F.	FAR FACE	PERP.	PERPENDICULAR
BM	BEAM	FLR	FLOOR	PL	PLATE
B.O.F.	BOTTOM OF FOOTING	F.O.M.	FACE OF MASONRY	P.P.	PARTIAL PENETRATION
BOT.	BOTTOM	F.O.S.	FACE OF STUD	P.P.T.	PRESERVATIVE PRESSURE TREATED
BRG	BEARING	FRM'G	FRAMING	P.S.F.	POUNDS PER SQUARE FOOT
BTWN	BETWEEN	F.R.T.	FIRE RETARDANT TREATED	PSL	PARALLAM
B.U.	BUILT UP	F.S.	FAR SIDE	P.T.	POST TENSION
(C=)	CAMBER	FTG	FOOTING	PW.	PLYWOOD
CANT.	CANTILEVER	GA.	GAGE/GAUGE	REINF.	REINFORCING
C.F.S.	COLD-FORMED STEEL	GALV.	GALVANIZED	REQ'D	REQUIRED
C.J.	CONTROL/CONSTRUCTION JOINT	GL.	GLULAM	SCHED.	SCHEDULE
℄	CENTERLINE	GR.	GRADE	S.C.L.	STRUCTURAL COMPOSITE LUMBER
CLR.	CLEARANCE	GWB	GYPSUM WALL BOARD	SHT'G	SHEATHING
CMU	CONCRETE MASONRY UNIT	HDR	HEADER	SIM.	SIMILAR
COL.	COLUMN	HGR	HANGER	S.O.G.	SLAB ON GRADE
CONC.	CONCRETE	HORIZ.	HORIZONTAL	SQ.	SQUARE
CONN.	CONNECTION	HSS	HOLLOW STRUCTURAL SECTION	STD	STANDARD
CONST.	CONSTRUCTION	HT	HEIGHT	STIFF.	STIFFENER
CONT.	CONTINUOUS	INT.	INTERIOR	STL	STEEL
CONTR.	CONTRACTOR	JST	JOIST	STRUCT.	STRUCTURAL
COORD.	COORDINATE	JT	JOINT	T&B	TOP & BOTTOM
C.P.	COMPLETE PENETRATION	L	ANGLE	T&G	TONGUE AND GROOVE
CTR'D	CENTERED	L.L.	LIVE LOAD	THR'D	THREADED
C.Y.	CUBIC YARD	LLH	LONG LEG HORIZONTAL	T.O.F.	TOP OF FOOTING
DBL.	DOUBLE	LLV	LONG LEG VERTICAL	T.O.S.	TOP OF STEEL
D.F.	DOUGLAS FIR	LOC.	LOCATION	TRT'D	TREATED
DIA. OR ℗	DIAMETER	LSL	LAMINATED STRAND LUMBER	TYP.	TYPICAL
DIAG.	DIAGONAL	LVL	LAMINATED VENEER LUMBER	U.N.O.	UNLESS NOTED OTHERWISE
DIM.	DIMENSION	MAX.	MAXIMUM	U.T.	ULTRASONIC TESTED
D.L.	DEAD LOAD	M.B.	MACHINE BOLT	VERT.	VERTICAL
DWG	DRAWING	MECH.	MECHANICAL	W/	WITH
DWL	DOWEL	MEZZ.	MEZZANINE	W.P.	WORK POINT
(E)	EXISTING	MFR	MANUFACTURER	WT	WEIGHT
EA.	EACH	MIN.	MINIMUM	W.W.R.	WELDED WIRE REINFORCING
E.F.	EACH FACE	MISC.	MISCELLANEOUS		
EL.	ELEVATION	MTL	METAL		

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MASON TRANSIT AUTHORITY

BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title

Rev.	Description

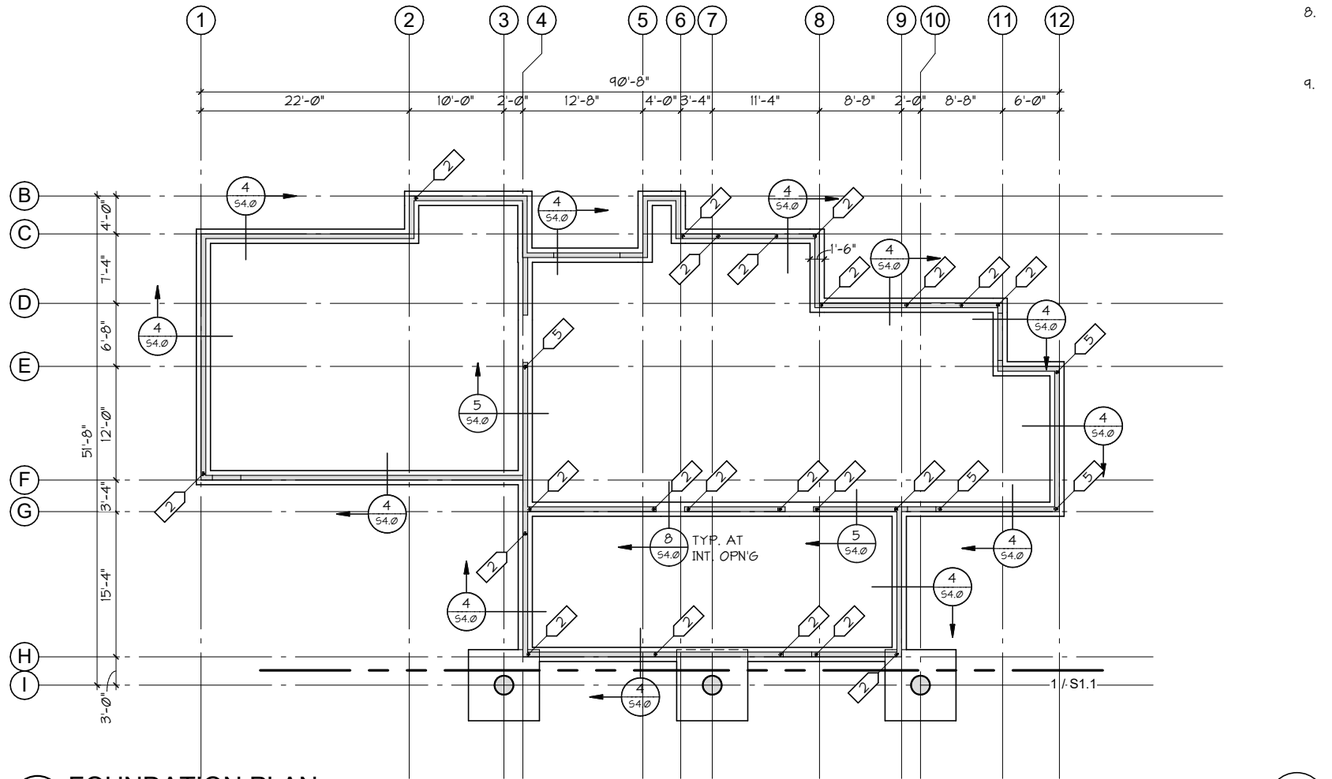
Owner Project No: 2016-657
ART Project No: 1710
Drawn By: MCF
Approved By: JAD
Date: 2/12/2020

Sheet Title:
GENERAL NOTES

2" AT FULL SHEET (24x36)
1" AT HALF SHEET (11x17)

Sheet No.
S0.4
BID SET

2/7/2020 10:31:11 AM



1 S1.0 FOUNDATION PLAN
1/8" = 1'-0"

FOUNDATION NOTES

1. COORDINATE ALL DIMENSIONS WITH ARCHITECTURAL DRAWINGS.
2. REFERENCE ELEVATION 343.7' = 0'-0".
3. TOP OF FOOTING ELEVATIONS = -1'-6" UNLESS NOTED OTHERWISE ON PLANS AND DETAILS.
4. INDICATES CONCRETE STEM WALL. FOR TOP OF WALL REQUIREMENTS AND CALLOUTS SEE GRADE LEVEL FRAMING PLANS.
5. INDICATES CONTINUOUS CONCRETE WALL FOOTING. FOR TYPICAL FOOTING AND STEM WALL DETAILS SEE SHEETS S4.0 & S4.1. FOOTING WIDTH ("W") = 1'-6" UNLESS NOTED OTHERWISE ON PLAN. CENTER FOOTINGS ON CONCRETE STEM WALL. EXTEND FOOTINGS 6" MINIMUM PAST ENDS OF WALL UNLESS NOTED OTHERWISE.
6. "F_" INDICATES CONCRETE SPREAD FOOTING. FOR SCHEDULE SEE 12/S4.0.
7. FOR TYPICAL FOUNDATION DETAILS SEE SHEETS S4.0 & S4.1.
8. FOR TYPICAL PLACEMENT OF STEM WALL REINFORCEMENT AND FOUNDATION CONSTRUCTION JOINTS, SEE DETAILS 2/S4.0 & 3/S4.0.
9. INDICATES HOLDOWN. SEE 7/S5.1 FOR SCHEDULE.

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Approved By:	JD
Date:	2/12/2020

Sheet Title:
FOUNDATION PLAN

2" AT FULL SHEET (24x36)
1" AT HALF SHEET (11x17)

Sheet No.
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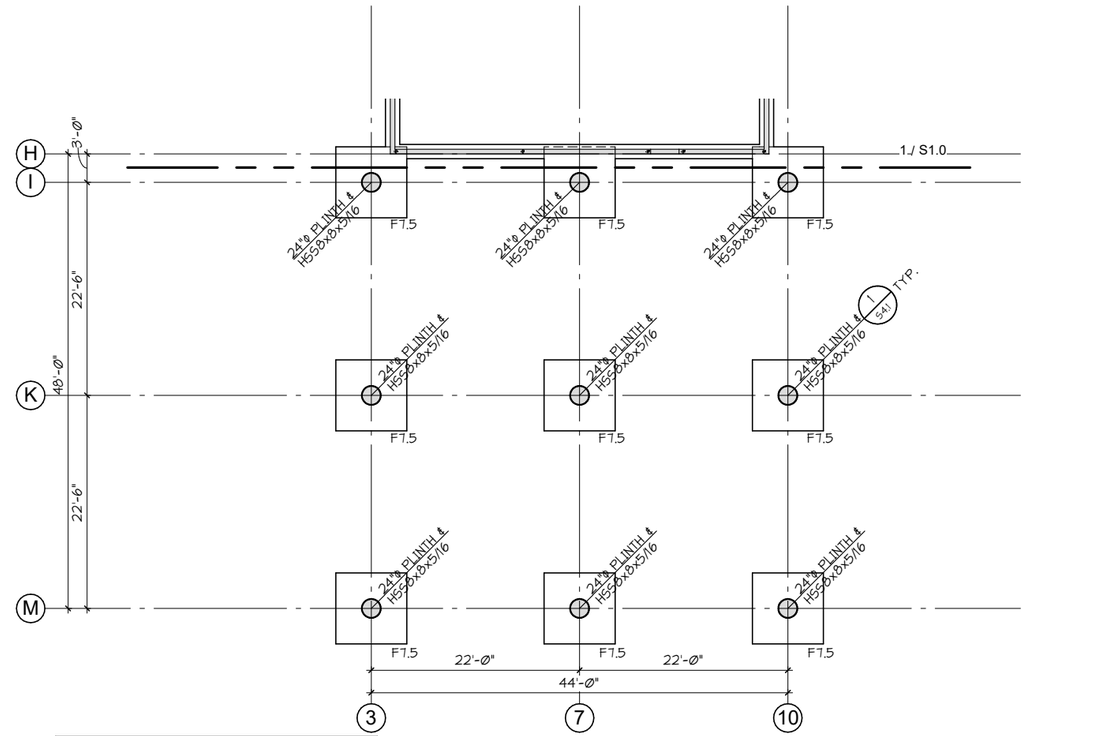

FOR FOUNDATION PLAN NOTES SEE SHEET S1.Ø

1 / S1.1 CANOPY FOUNDATION PLAN

1/8" = 1'-Ø"

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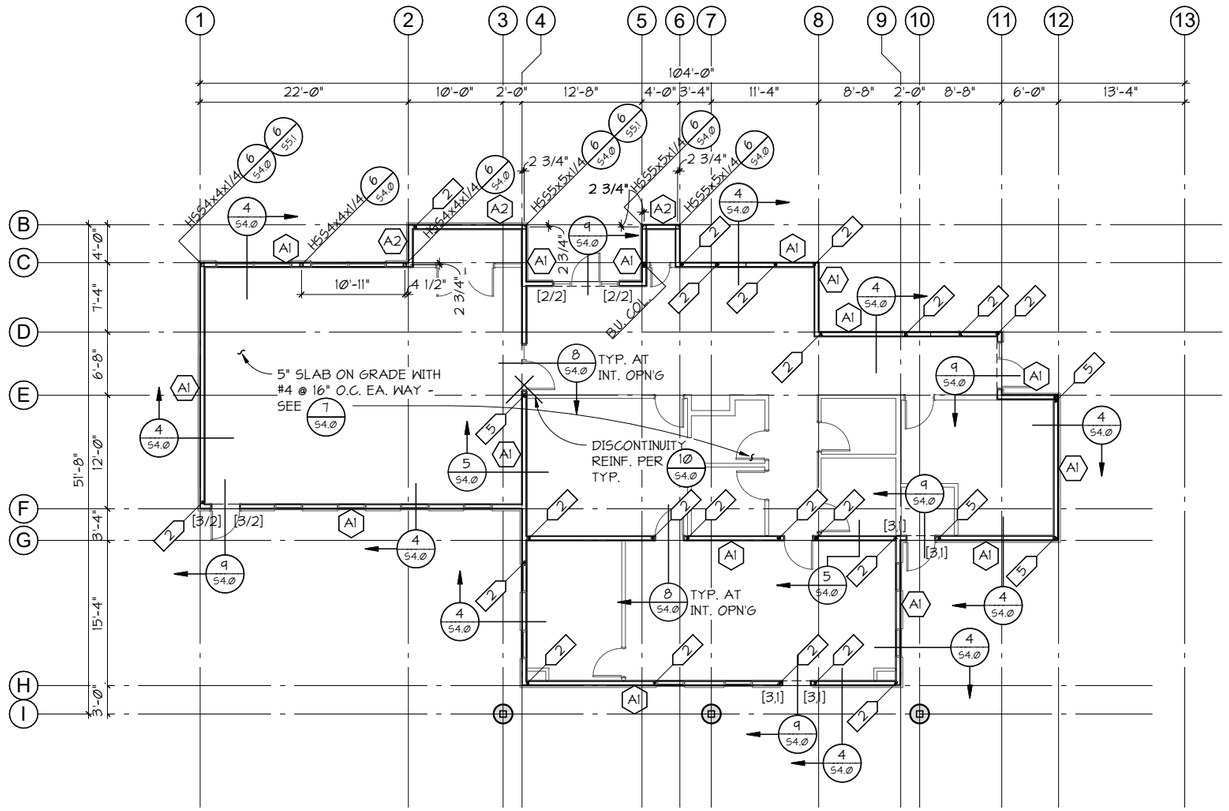
CANOPY FOUNDATION PLAN

2" AT FULL SHEET (24x36)
1" AT HALF SHEET (11x17)

Sheet No.
S1.1

BID SET



1/52.0 GRADE LEVEL FRAMING PLAN

1/8" = 1'-0"

NORTH

GRADE LEVEL FRAMING NOTES

1. COORDINATE ALL DIMENSIONS WITH ARCHITECTURAL DRAWINGS.
2. TOP OF SLAB = 0'-0" ABOVE FINISH FLOOR UNLESS NOTED OTHERWISE.
3. INDICATES WOOD STUD WALL. WOOD STUDS SHOULD ALIGN WITH JOIST LAYOUT AND BE SPACED @ 16" ON CENTER MAXIMUM UNLESS NOTED OTHERWISE. PROVIDE 1/2" WOOD SHEATHING AT ALL EXTERIOR WALLS NAILED WITH 10d @ 6" ON CENTER AT ALL PANEL EDGES (PROVIDE 2x BLOCKING AT UNSUPPORTED PANEL EDGES) AND 10d @ 12" ON CENTER AT INTERMEDIATE FRAMING TYPICAL UNLESS NOTED OTHERWISE. SEE NOTE #7 FOR ADDITIONAL SHEAR WALL NAILING.
4. BU COL. INDICATES WOOD STUD BUILT-UP COLUMN. SEE 2/55.0 FOR TYPICAL DETAIL.
5. HSS4x4x1/4 INDICATES STEEL COLUMNS ORIGINATING AT GRADE LEVEL UNLESS SHOWN ON FOUNDATION PLAN. ALL COLUMNS ARE CONTINUOUS TO ROOF UNLESS NOTED OTHERWISE. FOR TYPICAL ANCHOR ROD/BOLT DETAIL SEE 6/54.0.
6. [X,Y] INDICATES SPECIAL BUILT-UP WOOD STUD COLUMN REQUIREMENTS UNDER HEADER. FOR TYPICAL FRAMING REQUIREMENTS AT OPENING IN STRUCTURAL WALLS SEE 1/55.0 FOR TYPICAL DETAIL - [1,1] TYPICAL UNLESS NOTED OTHERWISE.
7. XX INDICATES SPECIAL WOOD STUD WALL TYPE. SEE 4/55.0 FOR SCHEDULE.
8. INDICATES HOLDOWN. SEE 7/55.1 FOR SCHEDULE.
9. FOR TYPICAL CONCRETE SLAB-ON-GRADE DETAILS SEE 54.0.
11. NON-STRUCTURAL STUD WALLS ARE NOT SHOWN OR SHOWN SCREENED. FOR LOCATION SEE ARCHITECTURAL DRAWINGS. FOR BRACING AT TOPS OF WALLS SEE 55.2.

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Owner Project No: 2016-657
ART Project No: 1710
Drawn By: MF
Approved By: JD
Date: 2/12/2020

Sheet Title: GRADE LEVEL FRAMING PLAN

2" AT FULL SHEET (24x36)
1" AT HALF SHEET (11x17)

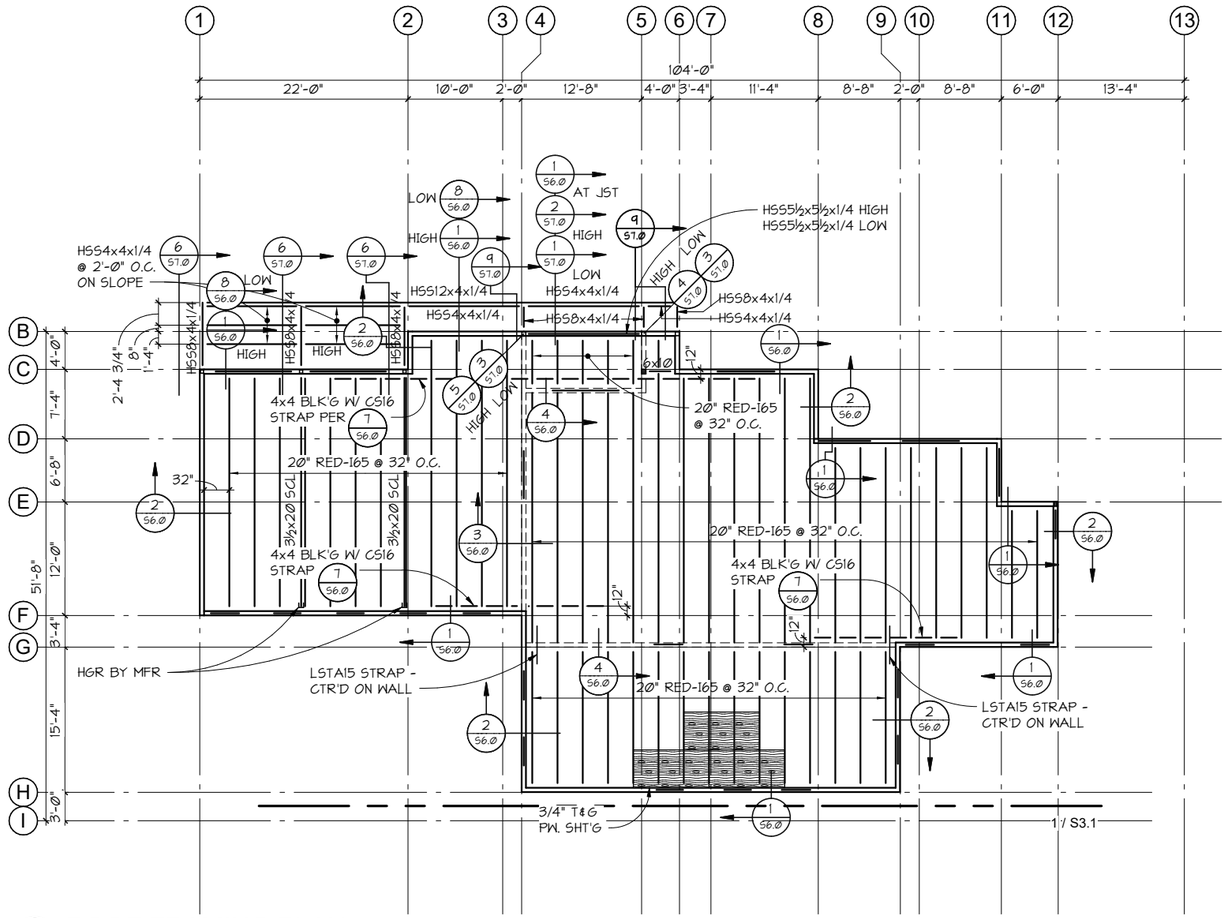
Sheet No.

S2.0

BID SET

ROOF FRAMING NOTES

1. COORDINATE ALL DIMENSIONS WITH ARCHITECTURAL DRAWINGS.
2. INDICATES WALL EXTENDING TO ROOF STRUCTURE. SOLID LINE INDICATES WALLS EXTEND PAST ROOF STRUCTURE.
3. INDICATES TYPICAL HEADER IN WALL BELOW. SEE 1/S5.Ø.
4. PROVIDE 3/4" TONGUE & GROOVE WOOD SHEATHING OVER ENTIRE ROOF STRUCTURE. NAIL SHEATHING WITH 10d @ 6" ON CENTER AT ALL SUPPORTED PANEL EDGES AND 10d @ 10" ON CENTER AT INTERMEDIATE FRAMING. TYPICAL UNLESS NOTED OTHERWISE.
5. FOR SUPPORT OF MISCELLANEOUS MECHANICAL EQUIPMENT AND PIPES FROM ROOF STRUCTURE SEE S6.Ø.



1 / S3.Ø ROOF FRAMING PLAN
1/8" = 1'-Ø"

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Sheet Title: ROOF FRAMING PLAN

2" AT FULL SHEET (24x36)
1" AT HALF SHEET (11x17)

Sheet No.

S3.0

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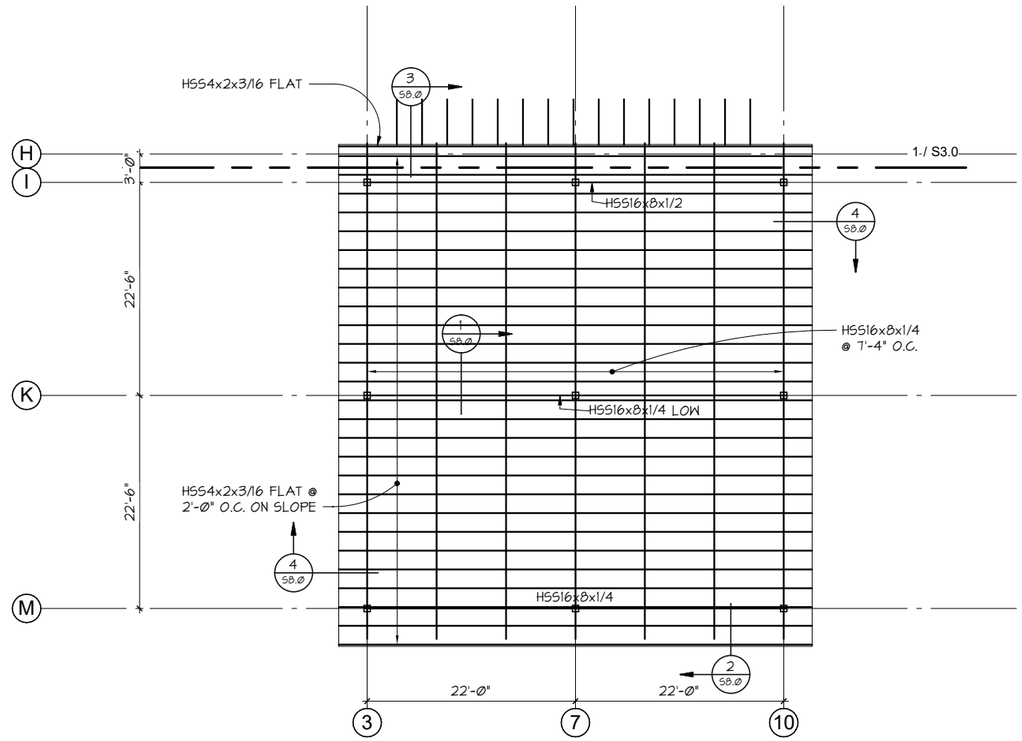

FOR ROOF FRAMING PLAN NOTES SEE SHEET S3.0

1 / S3.1 CANOPY ROOF FRAMING PLAN

1/8" = 1'-0"

NORTH

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Sheet Title:
CANOPY ROOF
FRAMING PLAN

2" AT FULL SHEET (24x36)
1" AT HALF SHEET (11x17)

Sheet No.

S3.1

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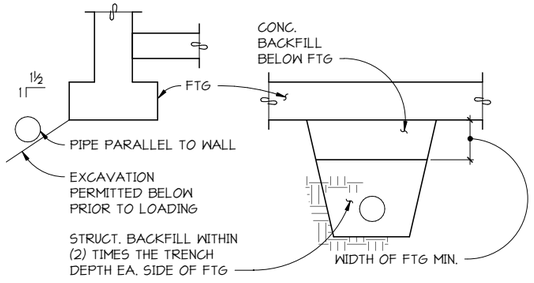
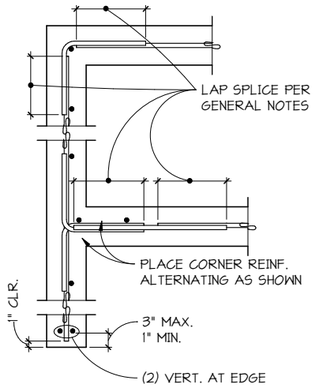


TYPICAL FOR PARALLEL PIPES ADJACENT TO FOOTINGS

TYPICAL FOR PERPENDICULAR PIPES UNDER FOOTINGS

NOTES:
1. FOUNDATIONS SHALL NOT BE LOADED PRIOR TO COMPLETING STRUCTURAL BACKFILL UNDER AND NEAR FOOTINGS.
2. CONCRETE BACKFILL SHALL BE USED UNDER FOOTINGS WHERE 95% COMPACTION CANNOT BE ACCOMPLISHED.
3. ALL STRUCTURAL BACKFILL NOTED SHALL BE COMPACTED TO 95% OF MAXIMUM DENSITY PER ASTM.
4. A PIPE SLEEVE SHALL BE PROVIDED FOR SHALLOW PIPES CAST IN CONCRETE.
5. PIPES SHALL NOT BE PLACED IN THE FOOTING WITHOUT SPECIFIC APPROVAL FROM THE ENGINEER.
6. FOR VARIATIONS CONTACT ENGINEER.

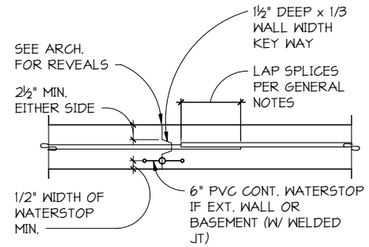
1 / 54.0 SECTION
NO SCALE



TYPICAL REINFORCEMENT PLACEMENT PLAN FOR CONCRETE STEM WALLS

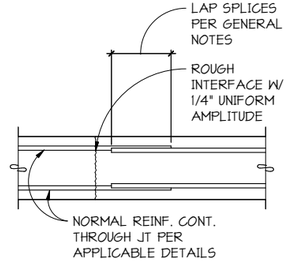
NOTES:
1. VERTICAL REINFORCEMENT SHOWN IS ADDITIONAL IF NORMAL STEM WALL REINFORCEMENT IS NOT IN PROPER LOCATION.
2. CORNER REINFORCEMENT IS SAME SIZE AND SPACING AS HORIZONTAL REINFORCEMENT.
3. STANDARD HOOK MAY BE SUBSTITUTED FOR CORNER REINFORCEMENT.

2 / 54.0 SECTION
NO SCALE



TYPICAL AT VERTICAL WALL JOINTS

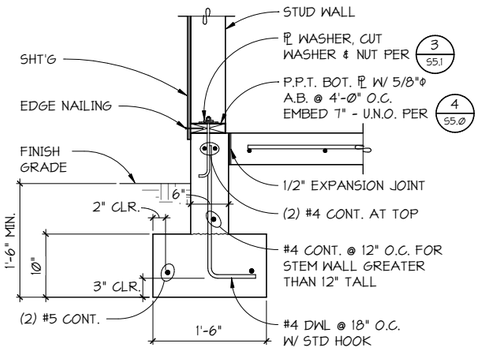
NOTE: OBTAIN APPROVAL OF ENGINEER FOR LOCATION OF ANY CONSTRUCTION JOINT



TYPICAL AT CONCRETE GRADE BEAMS & FOOTINGS

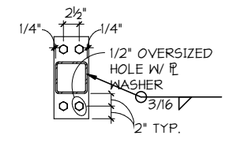
TYPICAL FOR CAST IN PLACE CONCRETE WALLS, GRADE BEAMS AND FOOTINGS

3 / 54.0 SECTION
NO SCALE

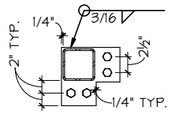


TYPICAL FOUNDATION AT EXTERIOR STUD WALL

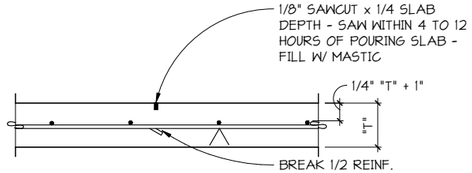
4 / 54.0 SECTION
NO SCALE



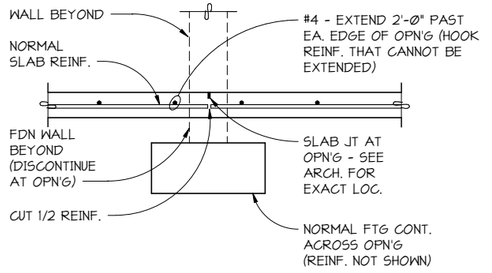
TYPICAL BEARING PLATE



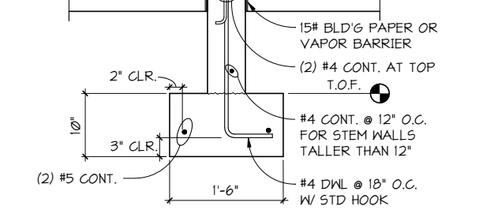
BEARING PLATE AT CORNER



TYPICAL CONTROL JOINT FOR SLAB ON GRADE

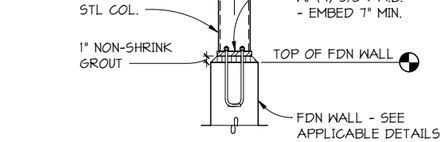


8 / 54.0 SECTION
NO SCALE



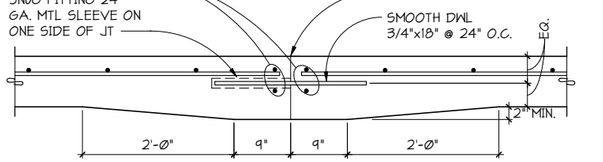
TYPICAL FOUNDATION AT EXTERIOR STUD WALL

5 / 54.0 SECTION
NO SCALE



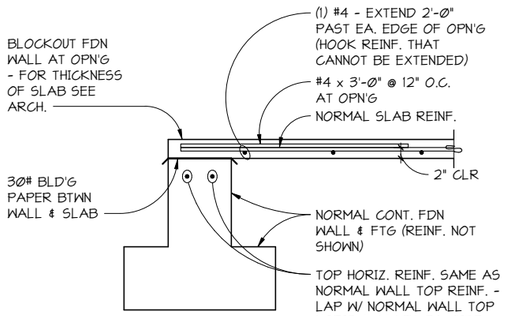
TYPICAL STEEL COLUMN BASE AT CONTINUOUS FOUNDATION WALL

6 / 54.0 SECTION
NO SCALE



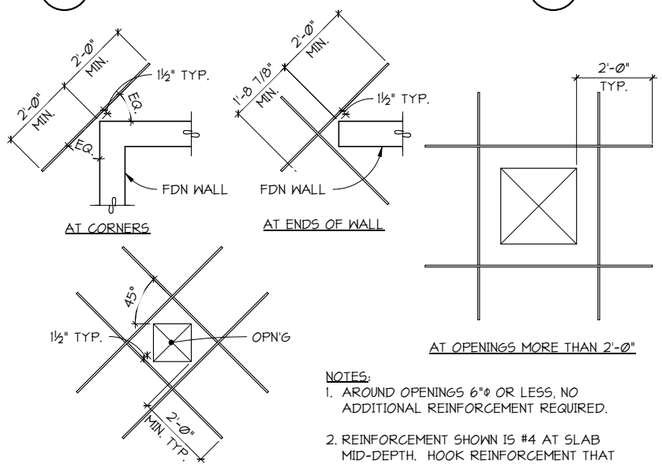
TYPICAL CONSTRUCTION JOINT FOR SLAB ON GRADE

7 / 54.0 SECTION
NO SCALE



TYPICAL SLAB AT EXTERIOR OPENING

9 / 54.0 SECTION
NO SCALE

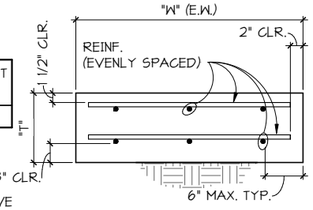


NOTES:
1. AROUND OPENINGS 6"ϕ OR LESS, NO ADDITIONAL REINFORCEMENT REQUIRED.
2. REINFORCEMENT SHOWN IS #4 AT SLAB MID-DEPTH. HOOK REINFORCEMENT THAT CANNOT BE EXTENDED.

TYPICAL SLAB ON GRADE DISCONTINUITY REINFORCEMENT

10 / 54.0 PLAN DETAILS
NO SCALE

MARK	DIMENSIONS		REINFORCEMENT EACH WAY
	"W"	"T"	
F7.5	7'-6"	18"	(7) #6 T&B



SECTION

NOTES:
1. CENTER ALL FOOTINGS ON COLUMN ABOVE EXCEPT AS SHOWN OTHERWISE.
2. FOOTINGS SHALL BEAR ON UNDISTURBED OR COMPACTED MATERIAL PER GENERAL NOTES. DESIGN BEARING PRESSURE IS 3500 POUNDS PER SQUARE FOOT.

TYPICAL CONCRETE SPREAD FOOTING

12 / 54.0 SECTION
NO SCALE

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MASON TRANSIT AUTHORITY
BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title

Rev.	Description

Owner Project No: 2016-657
ART Project No: 1710
Drawn By: MCF
Approved By: JAD
Date: 2/12/2020

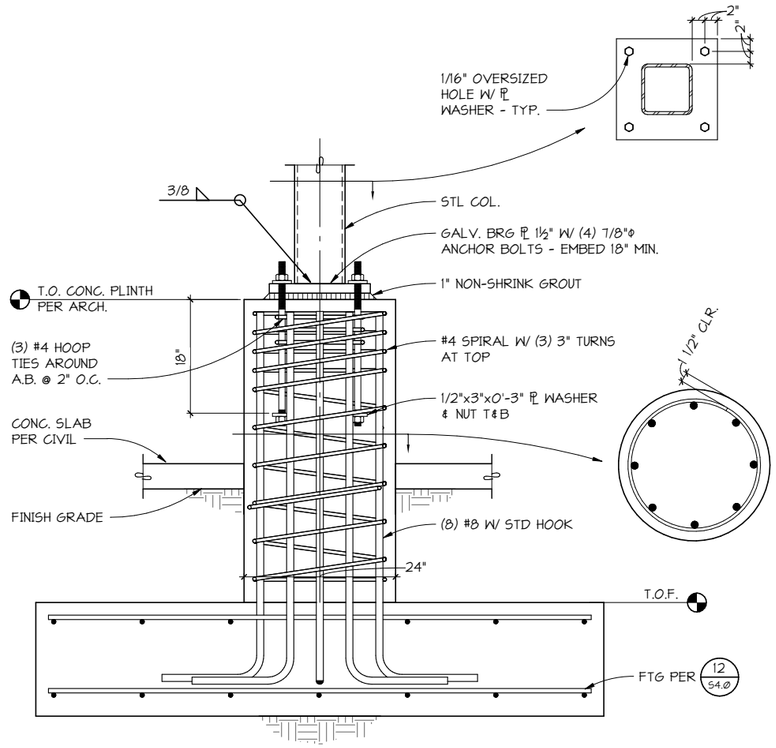
Sheet Title: FOUNDATION DETAILS

2" AT FULL SHEET (24x36)
1" AT HALF SHEET (11x17)

Sheet No.

S4.0

BID SET



1/S4.1 SECTION
NO SCALE

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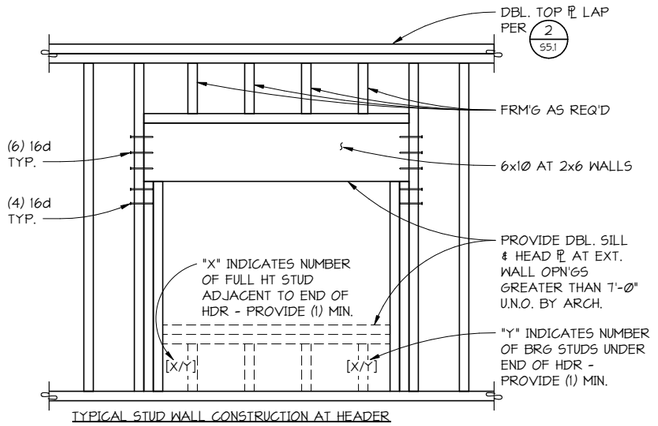
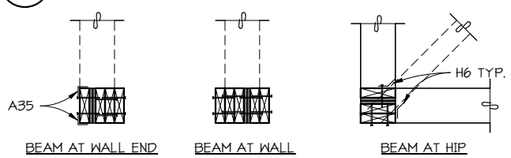
Sheet No.
S4.1
BID SET

2/7/2020 10:30:23 AM C:_Revit Models\18179 Mason Trans Authority Drivers Fac Bldg (v2017) Central_BFloyd@pcs-structural.com.rvt

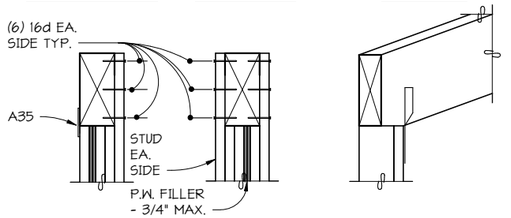


TYPICAL STUD WALL CONSTRUCTION AT HEADER

1/S5.0 SECTION
NO SCALE



BEAM AT WALL END | BEAM AT WALL | BEAM AT HIP



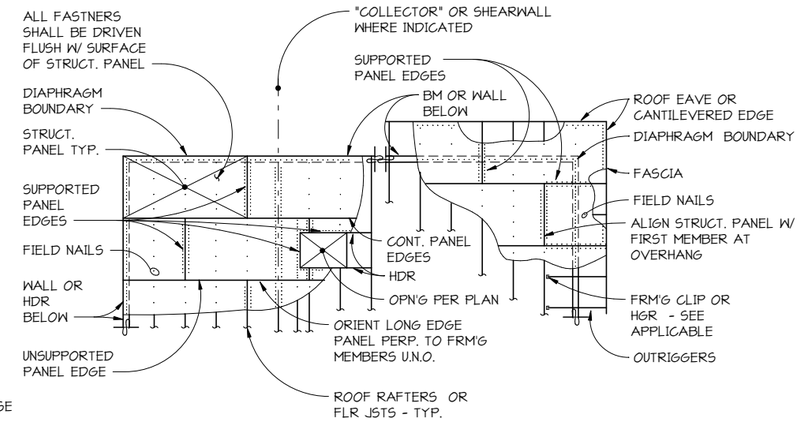
TYPICAL BUILT-UP COLUMN AT BEAM PERPENDICULAR TO WALL

2/S5.0 SECTION
NO SCALE

DIAPHRAGM NAILING SCHEDULE			
DIAPHRAGM TYPE	LOCATION	NAILS	SPACING
FLOOR DIAPHRAGM 23/32" TONGUE AND GROOVE SHEATHING UNBLOCKED UNLESS NOTED OTHERWISE	DIAPHRAGM BOUNDARY	10d	6" O.C.
	FIELD NAILS	10d	12" O.C.
	SUPPORTED PANEL EDGES	10d	6" O.C.
ROOF DIAPHRAGM 19/32" SHEATHING UNBLOCKED UNLESS NOTED OTHERWISE	DIAPHRAGM BOUNDARY	10d	6" O.C.
	FIELD NAILS	10d	10" O.C.
	SUPPORTED PANEL EDGES	10d	6" O.C.

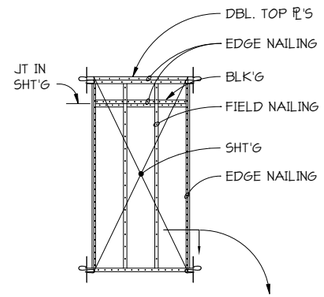
NOTES:

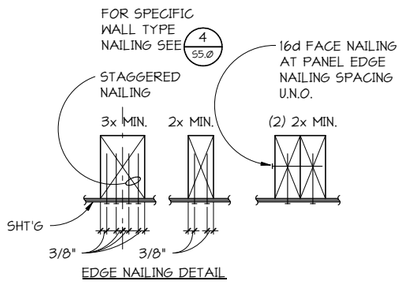
1. PROVIDE (2) ROWS OF SPECIFIED DIAPHRAGM BOUNDARY NAILING OVER INTERIOR SHEAR WALLS AND THE FULL LENGTH OF "COLLECTORS" WHERE INDICATED.
2. AT BLOCKED DIAPHRAGMS PROVIDE 2x4 FLATWISE BLOCKING WITH "Z2" CLIPS AT EACH END AT ALL UNSUPPORTED PANEL EDGES. USE 2x4 STRUCTURAL COMPOSITE LUMBER FLATWISE BLOCKING IN LIEU OF SOLID SAWN WHERE NAILING SIZE OR SPACING EXCEEDS 10d @ 4" O.C.



TYPICAL DIAPHRAGM NAILING

3/S5.0 SECTION
NO SCALE





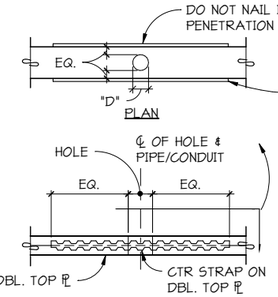
EDGE NAILING DETAIL

NOTES:

1. PANEL EDGE NAILING AND PLATE NAILING SHALL BE STAGGERED IN ALL CASES.
2. SHEATHING JOINT SHALL OCCUR AT COMMON MEMBER UNLESS IT OCCURS AT A SPECIFIED DOUBLE MEMBER.
3. EDGE NAILING APPLIES TO AREAS INDICATED AND AT HOLDOWN ANCHORED STUDS.

TYPICAL SHEARWALL NAILING

5/S5.0 SECTION
NO SCALE

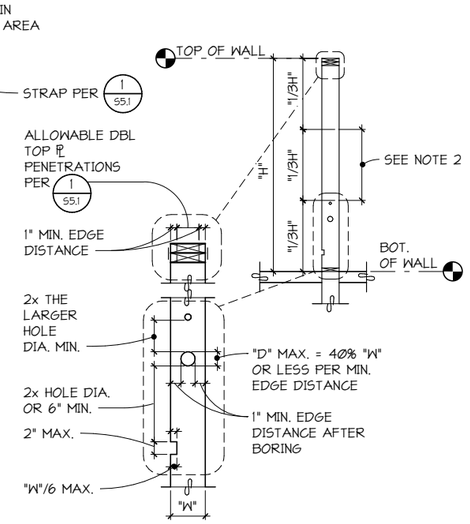


PLAN

DOUBLE TOP PLATE REINFORCEMENT

NOTES:

1. BORING, CUTTING, AND NOTCHING WALL FRAMING OTHER THAN INDICATED HERE REQUIRES PRIOR APPROVAL FROM ENGINEER OF RECORD.
2. BORING, CUTTING, AND NOTCHING WITHIN THE MIDDLE 1/3 OF THE STUD HEIGHT IS NOT ALLOWED WITHOUT PRIOR APPROVAL FROM ENGINEER OF RECORD.
3. NOTCHING AS INDICATED IS PERMITTED ON ONE FACE OF THE WALL ALONE.
4. MAXIMUM BORED HOLE DIAMETER IN STUD "D" MAXIMUM, LIMITED TO 25%. "W" AT BUILT-UP STUDS, AND HOLDOWN ANCHORED STUDS.



ALLOWABLE LOAD BEARING/SHEARWALL STUD BORING, CUTTING, AND NOTCHING

6/S5.0 SECTION
NO SCALE

STUD WALL CONSTRUCTION SCHEDULE										
TABLE 1 - SHEAR WALL REQUIREMENTS										
MARK	WALL SHEATHING	SIDES WITH SHEATHING	SHEATHING NAILS NOTE 2	EDGE NAILING ON CENTER	EDGE FRAMING NOTE 5	FIELD NAILING ON CENTER	BOTTOM PLATE NOTE 6	BOTTOM PLATE NAILING	5/8" ANCHOR BOLT SPACING (EMBED 7" MINIMUM)	RIM/BLOCKING CONNECTOR TO TOP PLATE BELOW
A	15/32"	(1)	10d	6"	2x	12"	2x	16d @ 8" O.C.	48"	A35 @ 24" O.C.

TABLE 2 - STUD REQUIREMENTS		
MARK	STUD SIZE AND SPACING	NUMBER STUDS REQUIRED AT MEMBER BEARING
1	2x6 @ 16" O.C. (2)	(2)
2	2x6 @ 16" O.C. (3)	(3)

FIRST CHARACTER INDICATES SPECIAL SHEAR WALL REQUIREMENTS PER TABLE 1

SECOND CHARACTER INDICATES SPECIAL STUD SPACING PER TABLE 2

NOTES:

1. XX INDICATES SPECIAL STRUCTURAL WALL MARK. ALL WALLS SHOWN ON STRUCTURAL DRAWINGS ARE 2x6 AT 16" ON CENTER UNLESS DESIGNATED SPECIAL. STUD LAYOUT SHALL MATCH FRAMING MEMBER LAYOUT ABOVE WHERE APPLICABLE. ALL EXTERIOR WALLS SHALL HAVE 15/32" WOOD SHEATHING AND BE NAILED WITH 10d AT 6" ON CENTER AT EDGES AND 12" ON CENTER IN FIELD UNLESS DESIGNATED SPECIAL.
2. ALL EXTERIOR WALLS AND ALL DESIGNATED SHEAR WALLS SHALL BE BLOCKED AT ALL SHEATHING EDGES. EDGE NAILING APPLIES TO ALL TOP AND BOTTOM PLATES, VERTICAL JOINTS, HORIZONTAL BLOCKED JOINTS, WALL CORNERS, AND HOLDOWN ANCHORED STUDS.
3. WHERE BEAMS OR HEADERS FRAME INTO WALLS AND A COLUMN IS NOT CALLED OUT, PROVIDE BUILT-UP COLUMNS PER 2/S5.0 FOR BEAM PERPENDICULAR TO WALL.
4. [X,Y] INDICATES BUILT-UP STUD COLUMNS AT HEADERS IN WALLS - SEE 1/S5.0 FOR BEAM PARALLEL TO WALL.
5. PROVIDE 3x OR DOUBLE 2x MEMBERS FACE NAILED PER S/S5.0 AT ALL ABUTTING PANEL EDGES WHERE INDICATED.
6. WHERE SOLID SAWN STUD LENGTH CANNOT BE OBTAINED, STRUCTURAL COMPOSITE LUMBER STUDS MAY BE SUBSTITUTED. SOLID SAWN FRAMING MAY NOT BE SUBSTITUTED FOR SPECIFIED STRUCTURAL COMPOSITE LUMBER FRAMING.

4/S5.0 SECTION
NO SCALE

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WALL FRAMING DETAILS

2" AT FULL SHEET (24x36)
1" AT HALF SHEET (11x17)

Sheet No.
S5.0

BID SET

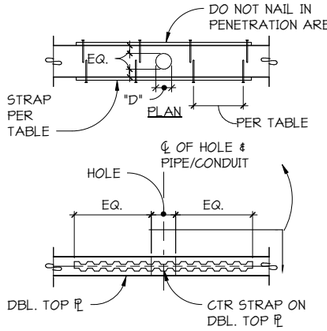
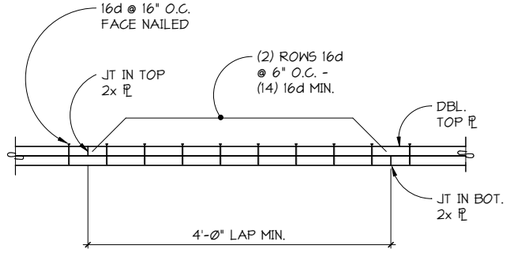


PLATE SIZE	HOLE DIAMETER "D" INCHES	STRAP
2x4	Ø" < "D" < 1" 1" ≤ "D" ≤ 2¼"	NO STRAP REQUIRED (2) ST2215 WITH (8) 16d EACH END
2x6	Ø" < "D" < 2½" 2½" ≤ "D" ≤ 3⅜"	NO STRAP REQUIRED (2) ST2215 WITH (8) 16d EACH END
2x8	Ø" < "D" < 2½" 2½" ≤ "D" ≤ 4"	NO STRAP REQUIRED (2) ST6224 WITH (12) 16d EACH END

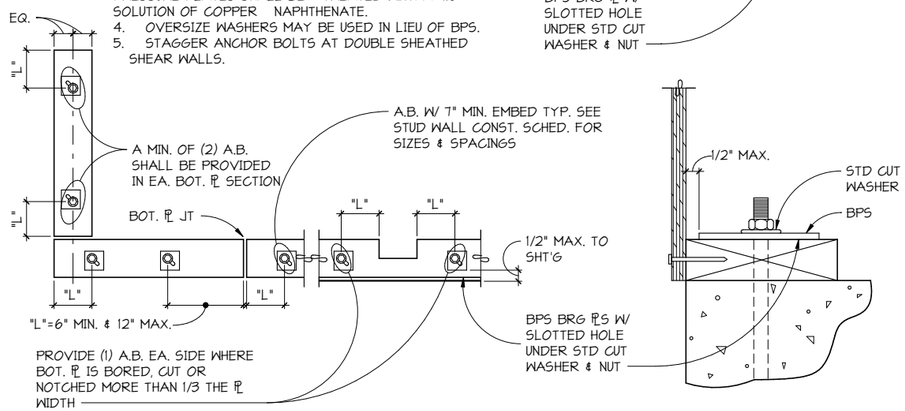
TYPICAL REINFORCING AT WALL DOUBLE TOP PLATE PENETRATIONS

1 S5.1 DETAIL
1" = 1'-Ø"



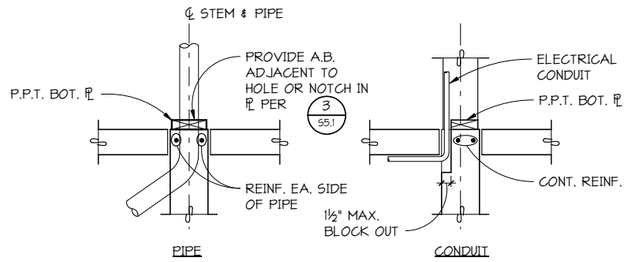
2 S5.1 SECTION
1" = 1'-Ø"

NOTES:
1. BOTTOM SILL PLATE SHALL BE PRESERVATIVE PRESSURVATIVE PRESSURE TREATED. SEE GENERAL NOTES FOR GALVANIZED REQUIREMENTS FOR CONNECTORS AND FASTENERS.
2. HOLES IN BOTTOM PLATE SHALL BE A MINIMUM OF 1/32" TO A MAXIMUM OF 1/16" LARGER THAN THE BOLT DIAMETER.
3. HOLES, CUTS, AND NOTCHES IN 3x OR 4x PRESERVATIVE PRESSURE PLATES SHALL BE TREATED WITH A 9% SOLUTION OF COPPER NAPHTHENATE.
4. OVERSIZE WASHERS MAY BE USED IN LIEU OF BPS.
5. STAGGER ANCHOR BOLTS AT DOUBLE SHEATHED SHEAR WALLS.



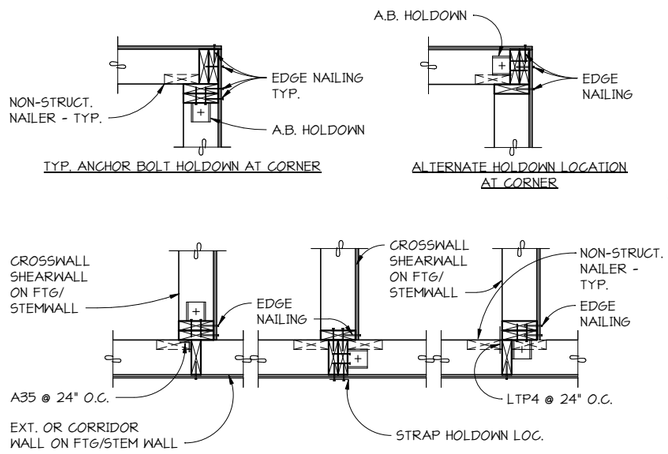
TYPICAL BOTTOM PLATE ANCHORAGE

3 S5.1 DETAIL
1" = 1'-Ø"

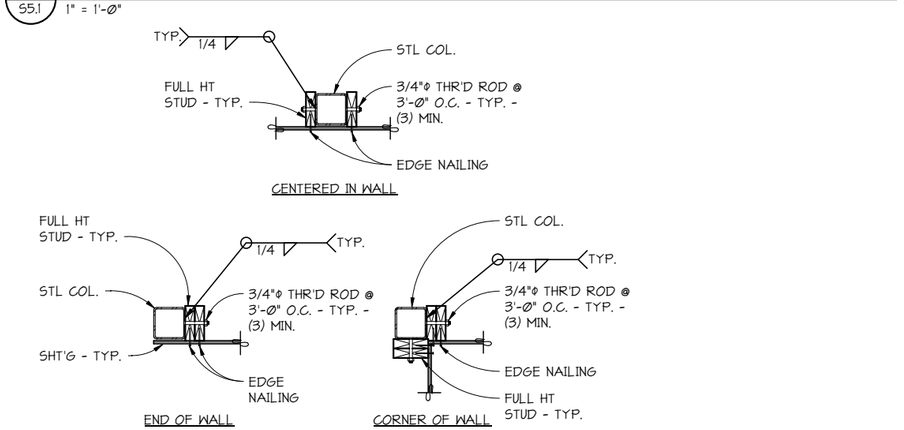


TYPICAL VERTICAL PENETRATIONS IN STEM WALL

4 S5.1 DETAIL
1" = 1'-Ø"



5 S5.1 PLAN DETAIL
1" = 1'-Ø"



TYPICAL STEEL COLUMN IN SHEAR WALL

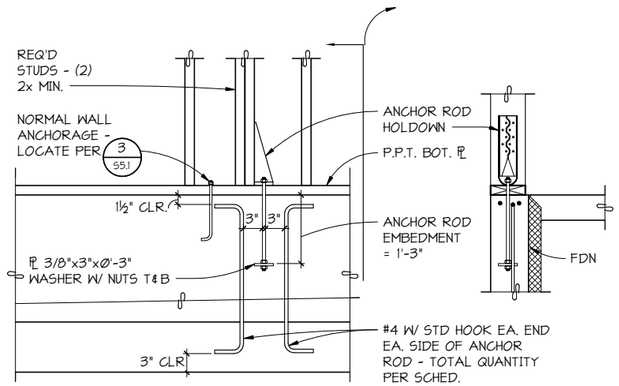
6 S5.1 DETAIL
1" = 1'-Ø"

HOLDOWN SCHEDULE

MARK	HOLDOWN	FOUNDATION ANCHOR ROD TYPE [1] ANCHOR ROD [2] DIAMETER	REINFORCEMENT	REQUIRED STUDS	REFERENCED DETAILS
◁2	HDU2	5/8"	(2) #4	(2) 2x	5/S5.1 & 8/S5.1
◁5	HDU5	5/8"	(2) #4	(2) 2x	5/S5.1 & 8/S5.1

NOTES:
1. ALL HOLDOWNS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
2. ALL-THREAD ROD ASTM A36 WITH 3"x3"x3/8" PLATE WITH DOUBLE NUTS AT FOUNDATION.

7 S5.1 SCHEDULE
1" = 1'-Ø"



TYPICAL FOUNDATION ANCHOR ROD HOLDOWN

8 S5.1 DETAIL
1" = 1'-Ø"

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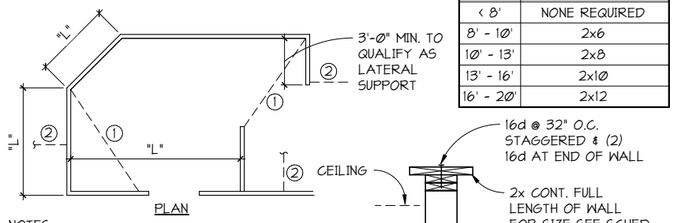


"L"	2x CONTINUOUS MEMBER
< 8'	NONE REQUIRED
8' - 10'	2x6
10' - 13'	2x8
13' - 16'	2x10
16' - 20'	2x12

PLAN

TOP OF WALL BRACE

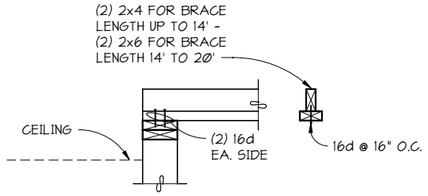
NOTES:
1. THIS PLAN IS AN EXAMPLE ONLY IT DOES NOT REPRESENT A SPECIFIC WALL.
2. "L" INDICATES UNBRACED LENGTH OF WALLS.
3. AT CONTRACTORS OPTION IN LIEU OF EXTRA TOP PLATE.

① INDICATES HORIZONTAL BRACE EXTENDING TO ADJACENT CORNER SEE 2/S5.2.

② INDICATES BRACE UP TO ROOF STRUCTURE SEE 3/S5.2 & 4/S5.2.

TYPICAL LATERAL SUPPORT FOR INTERIOR NON-BEARING WALLS NOT EXTENDNG TO STRUCTURE

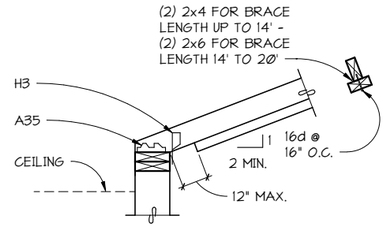
1 / S5.2 DETAIL
NO SCALE



NOTES:
1. MAXIMUM SPACING OF BRACES = 10'-Ø".
2. BRACES NOT REQUIRED WITHIN 8'-Ø" OF OTHER LATERAL WALL SUPPORT, CORNERS AND INTERSECTIONS.

TYPICAL TOP OF WALL BRACE (HORIZONTAL)

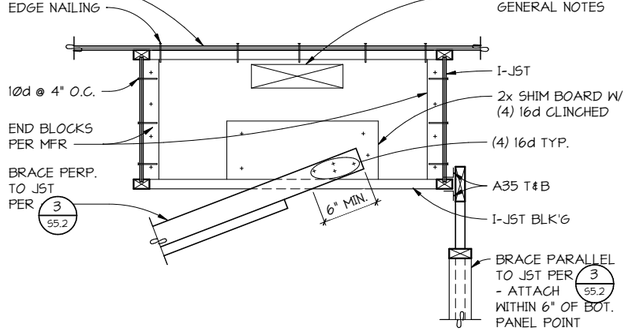
2 / S5.2 SECTION
NO SCALE



NOTES:
1. MAXIMUM SPACING OF BRACES = 10'-Ø".
2. BRACES NOT REQUIRED WITHIN 8'-Ø" OF OTHER LATERAL WALL SUPPORT, CORNERS AND INTERSECTIONS.

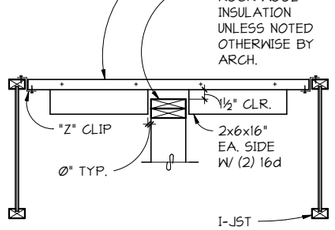
TYPICAL TOP OF WALL BRACE UP TO STRUCTURE

3 / S5.2 SECTION
NO SCALE



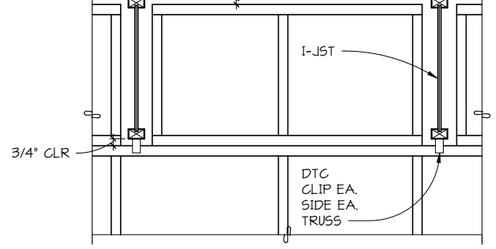
TYPICAL BRACE CONNECTION PERPENDICULAR TO I-JOISTS

4 / S5.2 SECTION
NO SCALE



TYPICAL CONNECTION AT TOP OF NON-BEARING WALL EXTENDING TO ROOF STRUCTURE PARALLEL TO JOIST

5 / S5.2 SECTION
NO SCALE



TYPICAL CONNECTION AT TOP OF NON-BEARING WALL EXTENDING TO ROOF STRUCTURE PERPENDICULAR TO JOISTS

6 / S5.2 SECTION
NO SCALE

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MASON TRANSIT AUTHORITY
BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title

Rev.	Description

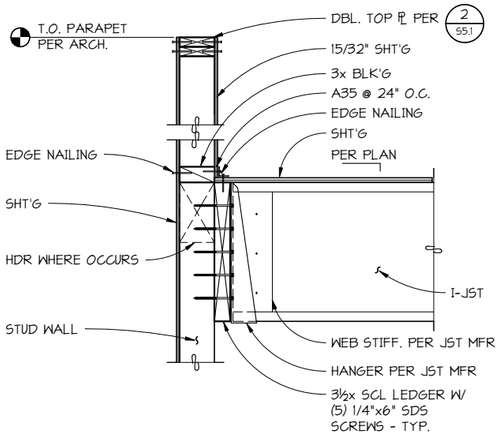
Owner Project No:	2016-657
ART Project No:	1710
Drawn By:	MCF
Approved By:	JAD
Date:	2/12/2020

Sheet Title:
WALL FRAMING DETAILS

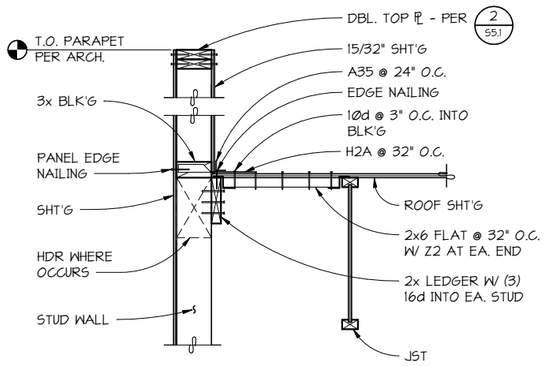
2" AT FULL SHEET (24x36)
1" AT HALF SHEET (11x17)

Sheet No.
S5.2

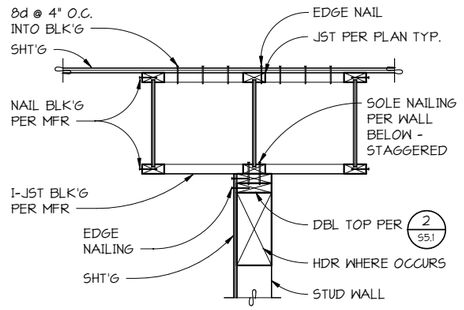
BID SET



1 S6.0 **SECTION** NO SCALE

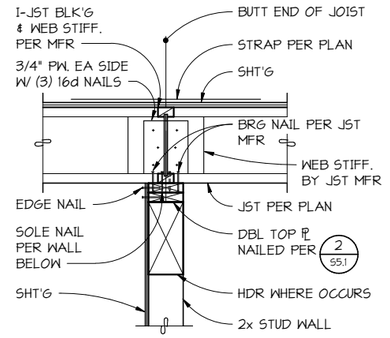


2 S6.0 **SECTION** NO SCALE



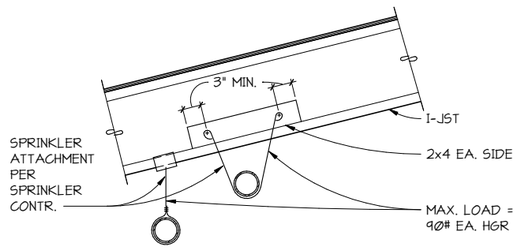
TYPICAL I-JOIST PARALLEL TO STUD WALL

3 S6.0 **DETAIL** NO SCALE



I-JOIST BEARING AT STUD WALL

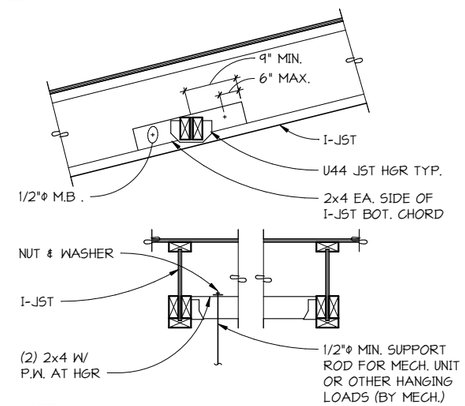
4 S6.0 **SECTION** NO SCALE



NOTES: FOR LINES GREATER THAN 3"ϕ HANG FROM GLULAM BEAMS OR STUD WALL OR HANG PER OR SUPPORT OFF WALLS WHEN SPECIFICALLY APPROVED BY STRUCTURAL ENGINEER. (6/S6.0)

TYPICAL SPRINKLER LINE ATTACHMENT FOR LINES 3" OR SMALLER

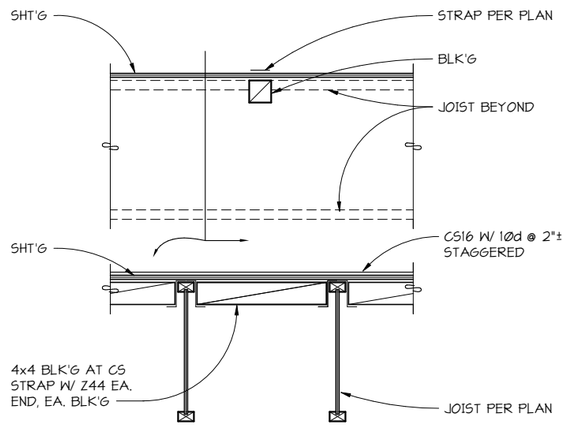
5 S6.0 **SECTION** NO SCALE



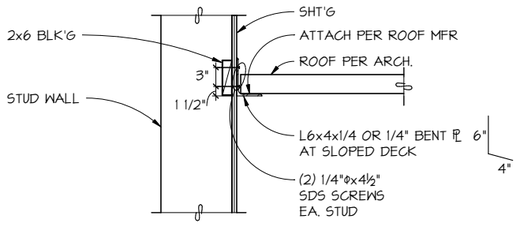
NOTES:
1. ALL FRAMING SHOWN BY GENERAL CONTRACTOR (EXCEPT BY SPRINKLER CONTRACTOR IF USED FOR SPRINKLER LINES.)
2. DO NOT CUT OR DRILL THRU JOIST.
3. MAXIMUM SUPPORT LOAD 500#.

TYPICAL DETAIL FOR HANGING LOADS FROM I-JOIST (ALL HEAT PUMPS OR FANS OVER 90#)

6 S6.0 **SECTION** NO SCALE



7 S6.0 **SECTION** NO SCALE



8 S6.0 **SECTION** NO SCALE

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MASON TRANSIT AUTHORITY

BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title

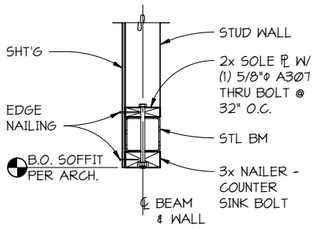
Rev.	Description

Owner Project No:	2016-657
ART Project No:	1710
Drawn By:	MF
Approved By:	JD
Date:	2/12/2020

Sheet Title:
ROOF FRAMING DETAILS

2" AT FULL SHEET (24x36)
1" AT HALF SHEET (11x17)

Sheet No.
S6.0
BID SET



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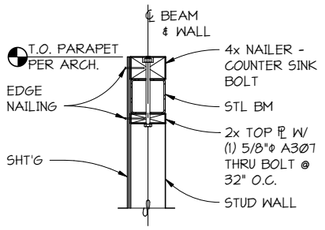

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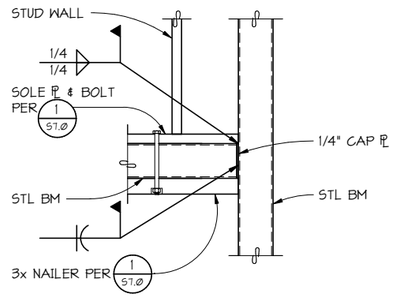

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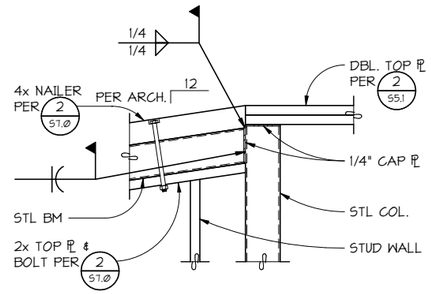
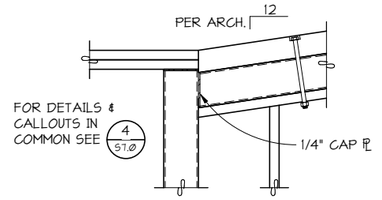


4 S7.0 DETAIL
NO SCALE



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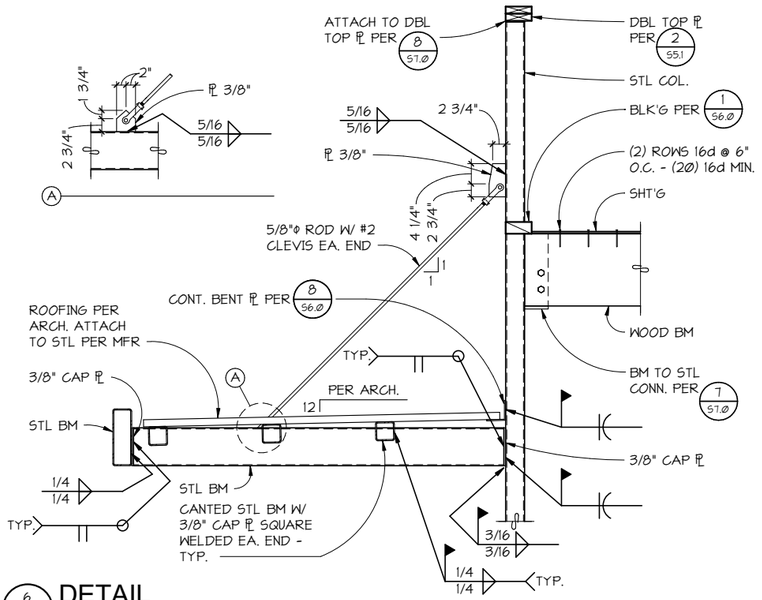

6 S7.0 DETAIL
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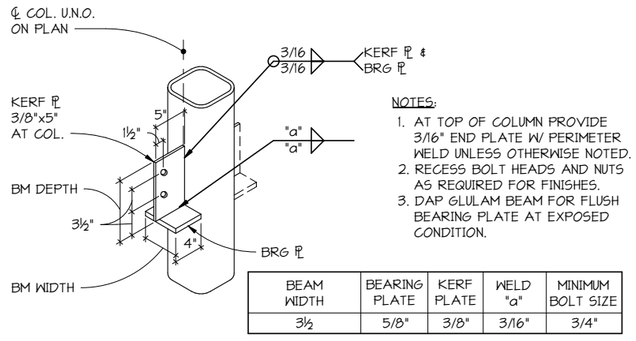
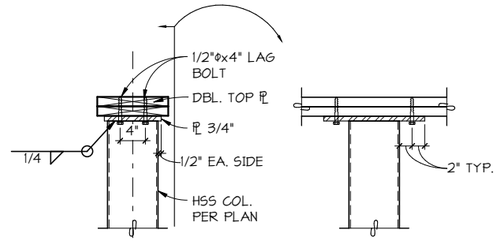


NOTES:
1. AT TOP OF COLUMN PROVIDE 3/16" END PLATE W/ PERIMETER WELD UNLESS OTHERWISE NOTED.
2. RECESS BOLT HEADS AND NUTS AS REQUIRED FOR FINISHES.
3. DAP GLULAM BEAM FOR FLUSH BEARING PLATE AT EXPOSED CONDITION.

BEAM WIDTH	BEARING PLATE	KERF PLATE	WELD "a"	MINIMUM BOLT SIZE
3½	5/8"	3/8"	3/16"	3/4"

7 S7.0 SECTION
NO SCALE



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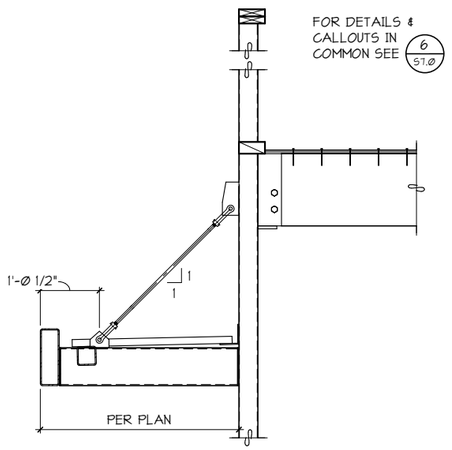

9 S7.0 SECTION
NO SCALE

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MASON TRANSIT AUTHORITY

BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title

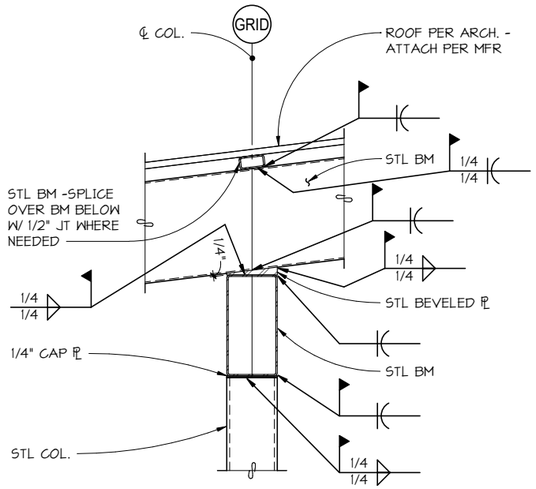
Rev.	Description

Owner Project No: 2016-657
ART Project No: 1710
Drawn By: MCF
Approved By: JAD
Date: 2/12/2020

Sheet Title:
MISC. STEEL FRAMING

2" AT FULL SHEET (24x36)
1" AT HALF SHEET (11x17)

Sheet No.
S7.0
BID SET



1 S8.0 SECTION
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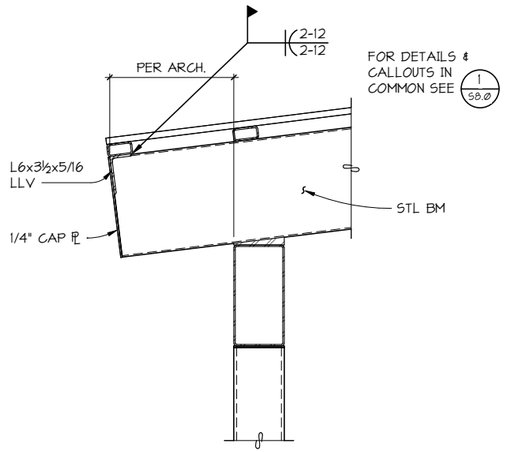

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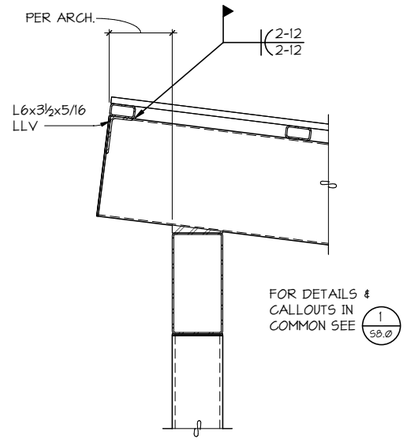

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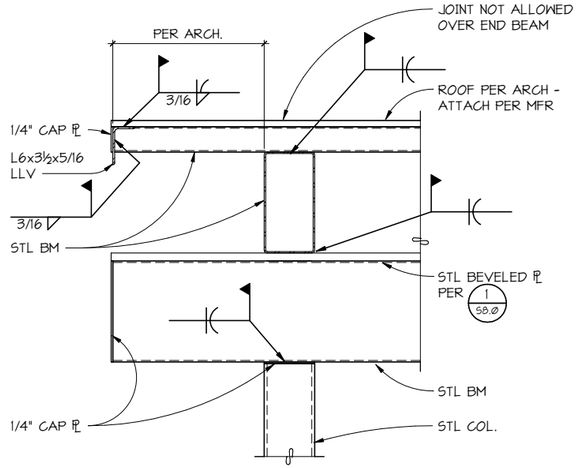

4 S8.0 SECTION
NO SCALE

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MASON TRANSIT AUTHORITY

BELFAIR PARK AND RIDE
DEVELOPMENT PROJECT
BELFAIR, WASHINGTON 98528

Project Title

Rev.	Description

Owner Project No:	2016-657
ART Project No:	1710
Drawn By:	MF
Approved By:	JD
Date:	2/12/2020

Sheet Title:
CANOPY FRAMING DETAILS

2" AT FULL SHEET (24x36)
1" AT HALF SHEET (11x17)

Sheet No.
S8.0
BID SET

2/7/2020 10:31:26 AM