City of Coos Bay

Coos County, Oregon

CONTRACT DOCUMENTS

VOLUME 2 – Technical Specifications

FOR THE CONSTRUCTION OF

West Park Roadway Sanitary Sewer Main Replacement

June 2016

Project No. 1201-058

Civil West Engineering Services, Inc.

Prepared By:

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SECTION 01010 – SUMMARY OF THE WORK

PART 1 GENERAL

1.01 WORK SUMMARY:

A. The Contractor shall furnish all labor, equipment, and materials necessary to complete all work in accordance with the Contract Documents.

B. The work shall be performed along West Park Drive located within the City limits of the City of Coos Bay, Coos County, Oregon. The City of Coos Bay is located on Oregon Coast Highway 101 and is approximately 27 miles south of Reedsport, Oregon and is located along the Oregon Coast.

C. A brief description of the summary of the work to be completed is described below:

West Park Drive Sanitary Sewer Replacement Project – Basic Bid

Furnishing all labor, equipment and materials as required for the West Park Drive Sanitary Sewer Replacement project consisting of clearing and grubbing, removal of existing pavement, excavation, construction and placement of approximately 212 lineal feet of new 12-inch 3034 PVC piping, connection to the existing manholes, install one new catch basin and connect to existing storm drain piping with 10 lineal feet of new 12" PVC, testing of new system, excavation and grading as required for resurfacing of new roadway surface and other miscellaneous items together with landscape restoration all as required for a complete installation of the West Park Drive Sanitary Sewer Replacement project.

D. Work shall not begin until Engineer or Owner has issued the *Notice to Proceed* to the Contractor(s). All pipeline and subsurface work must be complete prior to paving.

1.01 PROJECT INSPECTION

A. Project inspection will be provided by Civil West Engineering Services, Inc. The Project Inspector, will be approved by the City prior to commencement of construction activities.

B. The Project Inspector will perform inspection services as the Project Engineer's authorized representative. However, all engineering decisions will be made by the Project Engineer.

C. In addition to the Project Inspector, the Project Engineer will also provide periodic inspections of construction and progress.

D. At completion of the project, the Project Inspector will certify in writing to the Owner and the Department of Environmental Quality (Department) that construction was inspected by him and found to be in accordance with the Plans and Specifications, including any changes therein approved by the Engineer and Department.

E. Record Drawings will be prepared at the conclusion of construction activities.

1.02 WORK PROGRESS

A. It is the intent of these Contract Documents that the Work proceed in a systematic manner so that a minimum of inconvenience to the WTP results in the progression of the work. Suitable equipment will be required to properly execute the work with the least amount of disruption to services and access through the work area. Contractor shall contain operations to within the WTP property for this project.

B. Order and schedule delivery of materials in ample time to avoid delays in construction. If any item is found to be unavailable, notify the Engineer immediately to permit the Engineer's selection of suitable substitute. Timely delivery of all materials and equipment is Contractor's responsibility. No extensions in Contract Time will be allowed due to delays caused by late delivery of items. Availability of items should be determined during bidding.

C. The Contractor shall protect the work and materials from damage due to the nature of the work, the elements, carelessness of others, or from any other cause until the completion and final acceptance of the work. All loss or damage arising out of the nature of the work to be done under these Contract Documents, or from any unseen obstruction or defects which may be encountered in the execution of the work, or from the action of the elements, shall be sustained by the Contractor.

D. The Contractor shall remove completely all materials designated for removal, to the extent specified and/or indicated in the drawings. For such materials, removal, hauling, disposal (including providing disposal location), and applicable precautions are entirely the Contractor's responsibility. Allow no excess accumulation of non-reusable material at job site(s).

E. Contractor is responsible for the protection of all existing improvements that are to remain in place. This includes, but is not necessarily limited to: existing utilities, roads, driveways, drainage ditches, culverts, fencing, shrubbery, and all landscaping structures and vegetation. Temporary enclosures, walls, covers, or other protection shall be provided and maintained by the Contractor as required. Contractor shall cooperate with the owners of such improvements, and shall restore and/or replace all damaged items as directed, without any additional expense to the Owner or payments to the Contractor.

1. The location and depth shown on the drawings for the existing pipelines are approximate only and are based on Record Drawings, valve locations and other information.

2. Contractor shall pothole and locate the existing pipelines prior to placement of new pipelines. Minor field adjustments to the proposed pipeline routes may be required. Existing pipelines shall remain in service and shall be protected in place until completion of new pipelines. Contractor shall provide temporary service connections as required to maintain continued service until completion of new pipelines.

END OF SECTION

SECTION 01025 – MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SUMMARY

A. Wherever in these Specifications an article, device or piece of equipment is referred to in the singular, such reference shall include as many such items as are shown on the Drawings or are required to complete the installation.

B. Miscellaneous items required in the project that do not have a corresponding Section in the Bid Form are to be considered incidental costs to the project. Compensation for such items and/or work shall be incorporated into other related bid items or total costs. No separate measurement and payment will occur for such incidental costs.

C. Monthly progress payments and final payment will be made in accordance with the Contract, the General Conditions, and the Supplementary General Conditions. A portion of all progress payments will be withheld as "retainage" in accordance with the General and Supplementary General Conditions.

D. Additional detail on measurement and payment may be found in other Sections detailing specific items.

1.02 UNIT PRICES

A. Payment will be made on a unit price basis according to the prices provided by the Contractor in the accepted Bid Form (Proposal). Payment will be made for the actual quantity of individual items (units) incorporated and installed in the project.

1.03 LUMP SUMS

A. Payments on lump sum contracts and/or bid items will be made based on the percentage of work complete at the end of the particular payment period.

B. Percentage of work complete will be recorded and submitted by the Contractor and estimated by the Engineer based on inspection. Payment will be based on the Contractor's approved schedule of values.

1. To help track quantities of materials the Contractor shall provide the Owner with a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

1.04 PROGRESS PAYMENTS

A. Monthly progress payments will be made as set forth in the Agreement, in accordance with the General Conditions and Supplementary General Conditions.

B. At the stated day of the month, submit a monthly payment request in accordance with the General Conditions and Supplementary General Conditions. Base request on actual quantities installed and completed, and/or approved schedule of values with percent complete of each item. Show payment requested for each item, and total payment requested.

C. Engineer will review payment requests and compare with inspection records to verify quantities and completed items. Engineer will recommend payment amounts for Owner approval and payment.

END OF SECTION

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SECTION 01028 – CHANGE ORDER PROCEDURE

PART 1 GENERAL

1.01 SUMMARY

A. Make such changes in the Work, in the Contract Sum, in the Contract Time of Completion, or any combination thereof, as described by Change Orders signed by the Owner, Engineer, and the Contractor.

B. See also applicable sections of the General Conditions and applicable portions of the Supplementary General Conditions.

1.02 PROCESSING CHANGE ORDERS

A. Change Orders will be numbered in sequence and dated. The Change Order will describe the changes and will be signed by the Owner, Engineer and the Contractor. Request for estimates for possible changes are not to be considered Change Orders or direction to proceed with the proposed changes.

B. Change Orders will be prepared by the Engineer.

C. Contractor may request that the Owner consider a Change Order by sending a written Change Order Request to both Owner and Engineer.

END OF SECTION

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SECTION 01040 – COORDINATION

PART 1 GENERAL

1.01 SUMMARY

A. Restrict work to within City of Coos Bay right of way for the project area. Staging and/ or storage of materials or equipment may be conducted on private property. Prior to start of construction and placement of stored materials Contractor must provide to Engineer evidence of:

1. Written consent from affected property owner allowing Contractor utilize and place stored materials.

2. Approval for use of site for stored materials by Owner and Engineer.

B. The Contractor shall coordinate his work with the following:

1. City of Coos Bay Public Works Department

2. Frontier Telephone & Charter Communications or other affected communications

3. Pacific Power & Light

4. Other affected utilities and agencies

5. Private Property Owners and general public

C. Coordinate with Owner for site access and any required water service shut-downs. Notify Coos Bay/North Bend Water Board at least 2 days in advance of when shutdowns of water service are needed. Contractor shall not operate system valves without Owner approval

D. Permit and maintain access for the Owner to any adjacent facilities that are not part of work included within the project.

E. Coordinate with Owner to determine the locations of underground piping, vaults, valves and other items that could be damaged during construction.

F. Coordination between projects and Contractors for timing of construction, paving etc.

G. The City of Coos Bay owns and operates the wastewater treatment plant. The operation of the plant, to the full extent required to meet discharge requirements identified in the National Pollution Discharge Elimination Permit (NPDES) issued by the Oregon Department of Environmental Quality, shall continue during construction. It shall be the responsibility of the Contractor to coordinate any interruptions to the wastewater treatment system with the City and its plant operators in order to remain in full compliance with the above referenced permit during construction.

H. Restoration and cleanup work shall be completed with each phase of the construction project. Parking lots and properties shall be maintained and kept clean and clear of excess excavation, debris, dirt and other materials.

END OF SECTION

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SECTION 01046 – PROTECTION OF EXISTING IMPROVEMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Where Contractor's operations are near utility systems, structures, or are adjacent to other property, no work shall be started until Contractor has made all arrangements necessary for protection thereof have been made. Contractor shall exercise all possible precautions to prevent damage to existing structures, improvements, and underground utilities which are to remain.

B. Approximate locations of known underground utilities are shown on the Plans. Exact location or extent of such utilities is not guaranteed, and utilities may exist which are not shown on the Plans. Contractor shall call for utility locates prior to any digging. Contractor shall also pothole as required ahead of the work to verify the location and depths of affected utilities. No additional compensation will be given for such work or for utilities being different from shown on the plans.

1. All trench excavations and structure excavations within two (2) feet of any existing underground utility shall be performed by hand methods in accordance with state laws.

C. The Contractor shall be solely and directly responsible to the owner's and operator's of such properties and services for any damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of any injuries or damage which may result from the carrying out of the work to be done under this Contract.

D. Restoration of Existing Improvements. Except as shown on the Plans or as provided elsewhere in these specifications, the Contractor shall, at their own expense, repair and/or replace all utilities, services, landscaping, structures, substructures and other improvements damaged by the operations associated with this project, as directed. These repairs and replacements shall all be suitable and proper for intended use and in every respect acceptable to the Owner, Engineer and appropriate governing body or owner of such improvement. At minimum, restoration will be required to match the existing adjacent structure/improvement in thickness, finish, quality, quantity, and aesthetics.

E. In the event of interruption of domestic water, electric, telephone, sewer, or other utility services, the Contractor shall promptly notify the proper authority and the Owner. The Contractor shall cooperate with the proper authority in restoration of service as promptly as possible and shall bear all costs of repair.

F. The Contractor shall pothole existing waterlines or other utilities ahead of his work so that potential conflicts can be minimized or that minor relocation of the new waterline routes can be made. Potholing is defined as exploratory excavation of existing waterlines or other utilities to verify their depth and location.

1.02 INTERFERING STRUCTURES, IMPROVEMENTS AND LANDSCAPING

A. It shall be entirely the responsibility of the Contractor to locate and protect all existing structures, landscaping, and other improvements in advance of the work. Neither the Owner, Engineer, nor any of their officers or agents shall be responsible to the Contractor for damages as a result of any structures or improvements being located differently than indicated in the drawings, nor which exist and are not indicated on the drawings.

B. If interfering power poles, telephone poles, guy wires, or anchors are encountered, the Contractor shall notify the affected utility and the Engineer at least seven (7) days in advance of construction to permit arrangements for protection or relocation of the structure. However, failure of utility to respond shall create no obligation on Owner, and Contractor shall protect all utilities against damage, or shall stand all costs involved thereof.

C. Landscaping, Tree and Plant Protection. Provide adequate protection of existing landscaping against damage from construction operations, including all structures and vegetation. Protect roots, trunk and foliage of existing and new shrubs and trees from all damage including that possible from compaction and dust. Contractor shall be entirely responsible to remove and replace all property which is damaged by work related to the project. Contractor shall bear all costs associated with replacement of existing landscaping, and shall cooperate with the owner of such improvements, the Owner, and the Engineer in all protection and restoration/replacement that is required. In specific circumstances, Contractor may make special arrangements with property owners for removal of landscaping without replacement. Copies of written agreements for all such arrangements shall be furnished to the Engineer.

D. When construction operations will affect the property of a private citizen (such as driveways, landscaping, etc.), even when such improvements are in the road right-of-way, the Contractor shall notify the owner of such property and the Owner, at least seven (7) days in advance of any affecting Work, so that any desired preparations can be made.

1.03 ROADS AND ACCESS

A. All work shall be conducted to minimize damage to existing roadways, easements and parking lots, including limiting wheel loads to acceptable levels. At all times keep roadways, shoulders, and ditches free from excess materials and debris.

B. Spillage of soil, dust, rock, mud, etc. on all roads (including State, County, City and private roads) used by the Contractor (and any working for Contractor) during construction, shall be prevented as much as possible. If spillage cannot be prevented, an hourly patrol shall be provided by the Contractor to police and sweep clean all spillage. At the conclusion of each workday, such traveled areas shall be left completely clean and free from all extraneous materials. Contractor is entirely responsible to prevent such spills and follow all related laws and regulations. If spillage of hazardous material occurs, Contractor shall immediately notify the proper authorities and remove the spill in the proper manner. Owner will not be liable for any additional costs due to spillage of any kind.

C. All damaged gravel, concrete and/or asphaltic concrete surfaces shall be repaired as required to conditions acceptable to the governing body and Engineer. No cleated or crawl-type equipment shall be operated on paved surfaces, except to cross a road when adequate protection of the surface is provided.

D. Contractor is responsible for constructing, maintaining, and removing any additional access that Contractor deems necessary for the Work. Contractor must notify Owner and Engineer, and must obtain written consent from the governing body, prior to construction of additional access not shown on the drawings. All applicable regulations shall be followed in such access construction, including obtaining any required permits.

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SECTION 01050 – FIELD ENGINEERING

PART 1 GENERAL

1.01 SUMMARY

A. Construction stakeout – The Contractor shall be responsible for construction staking of each individual schedule/ project.

1. The Engineer will provide assistance to the Contractor for general stakeout and coordinates.

West Park Drive Sanitary Sewer Replacement

Specific placement of stakeout and controls is not anticipated for this project. The Engineer and Owner will assist the Contractor in marking and identifying dig-out areas and limits of construction and removal of existing asphalt prior to the start of construction.

Engineer will run vertical levels and provide a Temporary Bench Mark as required to assist Contractor in maintaining vertical grade throughout the project as needed.

B. The Contractor shall be solely responsible for laying out the work from this stakeout control and no additional stakeout will be provided except at the expense of the Contractor.

C. It shall be the responsibility of the Contractor to maintain and preserve the construction stakeout as provided. The Contractor will not be allowed time extensions or damages caused by the loss of control stakes. If control is lost and/or disturbed and in the judgment of the Engineer requires replacement, such replacement will be at the expense of the Contractor.

D. It is expected that minor revisions of the stakeout along the proposed sanitary sewer line replacement and roadway alignment may be required during the course of construction to better fit existing ground conditions. These revisions and relocations shall be made only as directed by the Engineer. The Contractor shall not be entitled to any additional compensation for minor revisions or relocations.

END OF SECTION

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SECTION 01060 – REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall at all times observe and comply with all federal and state laws and lawful regulations issued and local laws, ordinances and regulations which in any manner affect the activities of the Contractor under this contract and further shall observe and comply with all orders or decrees as exist as present and those which may be enacted later by bodies or tribunals having any jurisdiction or authority over such activities of the Contractor.

B. The contractor shall be responsible and liable for all accidents, damage or injury to any person or property resulting from any activity, duty and obligation of the Contractor under this Contract for which the Contractor may be legally liable. The contractor shall hold blameless and harmless and shall indemnify the Owner and its officers, employees and against the any and all claims, demands, loss injury, damage, actions and cost of actions whatsoever which they or any may sustain by reason of any act, omission or neglect of the Contractor or employees, agents, representatives or assignees of the Contractor in connection with the activities, duties and obligations of the Contractor under this Contract.

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SECTION 01100 – REFERENCE STANDARDS

PART 1 GENERAL

1.01 GENERAL

A. Abbreviations and Acronyms. Whenever the following abbreviations are used in these specifications or in the drawings, the following definitions apply. Unless otherwise designated, all reference to the following standards, specifications and methods shall imply the latest adopted revision in effect at the time of bid opening. Such standard, except as modified herein, shall have full force and effect as though printed in the specifications.

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Association
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
APWA	American Public Works Association
ASCE	American Society of Civil Engineers
ASTM	ASTM International, formerly known as the American Society for Testing Materials
AWWA	American Water Works Association
EPA	United States Environmental Protection Agency
DEQ	Department of Environmental Quality (both Federal and State)
DWP	Oregon Dept. of Human Services, Drinking Water Program
FM	Factory Mutual
NEC	National Electric Code
NEMA	National Electric Manufacturers Association
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation
OAR	Oregon Administrative Rules
ODOT	Oregon Department of Transportation
ORS	Oregon Revised Statutes
OSHA	Occupational Safety and Health Act (both Federal and State)
OSS	Oregon Standard Specifications – ODOT/APWA
UL	Underwriters' Laboratories
USDA	United States Department of Agriculture
SSPC	Steel Structures Painting Council or, The Society for Protective Coatings

B. The abbreviation of "N.I.C." if shown on the plans or specifications represents work that is "Not in Contract". This work may be completed at a later date by Owner or others and for which the Contractor will not be responsible for unless otherwise directed to do so.

END OF SECTION

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SECTION 01300 - SUBMITTALS

PART 1 GENERAL

1.01 SUMMARY

This section outlines in general the items the Contractor must prepare or assemble during the progress of the work, including technical submittals, Operations and Maintenance (O&M) data, record drawings, and substitution requests. Submittals are required for each piece of equipment or material even when the item being proposed for use is the same as specified.

1.02 RELATED SECTIONS

A. General Conditions – Article 7.04 "Or-equals" and Article 7.05, Substitutes

B. Supplementary Conditions – SC 7.05

C. General Conditions – Article 7.16, Shop Drawings, Samples and Other Submittals

D. Section 01630 – Product Substitutions

E. Section 01700 – Closeout Submittals

F. Section 01780 – Record Drawings

G. Various sections requiring submittals for equipment and materials

1.03 TECHNICAL PRE-BID SUBMITTAL

A. Some of the major equipment items may require approval prior to bid, even when a specific manufacturer and model is specified and contractor plans to use the specified item. For items requiring pre-bid submittals, a complete submittal package must be received by the Engineer no later than 14 days prior to bid opening. Only items that have been approved in writing by the Engineer will be used in the project, and substitution requests for these items will not be considered. Engineer will either approve or reject such items at least 5 days prior to bid date. Items in the specifications that require pre-bid submittals are noted as such and listed below for convenience:

1. N/A

1.04 SUBSTITUTION REQUESTS

A. Where the specifications state "or-equal", "or approved equal", or similar statement, the Engineer alone will determine if the proposed substitute item is allowed.

B. Requests for substitution for items specified by manufacturer or manufacturer's model number as specified throughout the Contract Documents shall be in writing and be accompanied with sufficient information to allow the Engineer to identify the nature and scope of the request. Information to be provided shall include.

1. Reason the substitution request is being made.

2. All submittal information required for the specified item or equipment, including all deviations from the specified requirements necessitated by the proposed substitution.

3. Reproducible contract drawings, marked up to illustrate the alterations to all structural, architectural, mechanical and electrical systems required to accommodate the proposed substitution.

4. If the substitution requires any mechanical, electrical or structural changes, the Contractor will be responsible for costs in evaluating a requested substitution. The cost for such an evaluation will be determined on a case-by-case basis, after receipt of written request. The Engineer will notify the Contractor in writing of said cost. If the Contractor wishes to proceed, he shall advise the Engineer in writing and submit additional information as may be requested. Final approval of a substitution must be made by both the Engineer and Owner.

5. No additional costs of any kind will be incurred by the Owner or Engineer by approval or rejection of any substitution request.

1.05 SUBMITTALS

A. Technical submittals

1. Technical submittals covered by these specifications include manufacturer's information, shop drawings, test procedures, test results, samples, request for substitutions and miscellaneous work related submittals. Submittals shall also include, but not be limited to, all mechanical, electrical and electronic equipment and systems, materials, reinforcing steel, fabricated items, piping and conduit details, and lead time required for delivery to job site.

2. Contractor's Responsibilities

B. The Contractor shall furnish all drawings, specifications, descriptive data, certifications, dimensional drawings, samples, tests, methods, schedules and manufacturers installation and other instructions as required by the contract documents, or the Engineer, to demonstrate fully that the materials and equipment to be furnished and the methods of work comply with the provisions and intent of the contract documents.

1. The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the material, equipment or method of work shall be as described in the submittal. The Contractor shall verify that all features of all products conform to the specified requirements.

2. The Contractor shall ensure that there is no conflict with other submittals and notify the Engineer in each case where his submittal may affect the work as shown on the Plans.

3. The Contractor shall coordinate submittals among his subcontractors and suppliers.

4. Submittals shall coordinate with the work so that work will not be delayed. Coordinate and schedule different categories of submittals, so that one will not be delayed for lack of coordination with another. No extension of time will be allowed because of failure to properly schedule submittals.

5. The Contractor shall not proceed with work related to a submittal until the submittal process is complete.

6. The Contractor shall certify on each submittal document that he has reviewed the submittal, verified final conditions and complied with the contract documents. The Contractor may authorize in writing a material or equipment supplier to deal directly with the Engineer. This interaction shall be limited to contract interpretations to clarify and expedite the work.

7. Charges will be documented and the Contractor will be charged for review of multiple non-conforming submittals for any one (1) item in excess of two (2) times.

1.06 RECORD DRAWINGS

A. During the course of construction, Contractor shall maintain a marked-up set of the project drawings. See Section 01780.

1.07 ENGINEER'S REVIEW

A. Review shall not extend to means, methods techniques, sequences or procedures of construction, or to verify quantities, dimensions, weights or gages, or to fabrication processes, except when specifically indicated or required by the contract documents, or to safety precautions or programs.

B. The Contractor shall submit five (5) copies of all submittal material to Engineer. Two (2) copies will be returned upon final approval. If the submittal is rejected four (4) copies will be returned.

C. Unless otherwise specified, within 14 calendar days after receipt of submittal, the Engineer will return the marked-up copies. The Contractor shall take appropriate action if the submittal needs to be resubmitted. If specified submittal material is to be used for O&M data, all corrections shall be made and new clean copies shall be submitted with the O&M data.

D. Review of contract documents, method of work or information regarding materials or equipment the Contractor proposes to provide, shall not relieve the Contractor of his responsibilities for errors therein and shall not be regarded as an assumption of risks or liability by the Engineer or Owner. The Contractor shall have no claim under the Contract on account of failure or partial failure of the method of work, material or equipment so reviewed.

END OF SECTION

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SECTION 01310 – CONSTRUCTION PROGRESS SCHEDULES

PART 1 GENERAL

1.01 SUMMARY

A. Provide a progress schedule indicating the times for starting and completing the various stages of work, including any Milestones.

B. As work progresses, Contractor shall prepare and submit updated progress schedules as necessary.

C. Schedule duration of each activity shall be based on the work being performed during the normal 40-hour work week with allowances made for legal holidays and normal weather conditions.

D. Updates – Schedule shall be updated at least once per month as required to maintain accuracy.

1.02 SUBMITTALS

A. Within 10 days after the date of the Agreement (Contract), submit a proposed progress schedule to the Owner and Engineer for approval.

B. Interim Schedule

1. Contractor shall submit within 10 days after award of Contract, but before any scheduled pre-construction conference, an Interim Schedule setting forth all activities for the first two (2) months of construction.

2. Review comments by the Engineer concerning the Interim Schedule shall be considered in developing the Overall Schedule.

3. The Contractor shall submit three (3) copies of the Interim Schedule.

C. Overall Schedule

1. For Contract Periods exceeding 60 days, the General Contractor shall prepare and submit, within 30 days after the award of Contract, an Overall Schedule composed of all construction operations in connection with the Contract.

2. Overall Schedule, if it is sufficiently developed to equal or exceed the Interim Schedule requirements, may be submitted in lieu of a separately prepared Interim Schedule. In any event, the Interim Schedule shall form the basis for the Overall Schedule and will be considered an integral part of the Overall Schedule.

3. Contractor shall submit three (3) copies to the Engineer for his review. Within seven (7) days after receipt of the submittal, the Engineer shall review the submitted schedule and return one copy of the marked-up original to the Contractor. If the Engineer finds that the submitted schedule does not comply with specified requirements, the corrective revisions will be noted on the submittal copy returned to the Contractor for corrections and resubmitted.

D. Schedule Content

4. Schedules shall indicate the sequence of work and the time of starting and completion of each activity. Activities shall include, but not be limited to, the following items as they pertain to the Contract:

    a. Each subcontractor's items of work

    b. Temporary provisions for continued service

    c. Installation of specific major items

    d. Submittals from Contractor to Engineer for review and return to the Contractor. Material and equipment order, manufacture and delivery

    e. Dates for performance of all testing procedures

    f. Dates for tie-ins to existing systems

    g. Final cleanup and Start-Up

    h. Allowance for inclement weather

1.03 PROGRESS OF WORK

A. The Contractor shall execute work with such progress as necessary to prevent delay to the overall completion of the project and with such forces, materials and equipment to assure completion in the time established by the Contract.

B. The Contractor may find it necessary to work overtime, double shifts, weekends and/or holidays if such a schedule is required to complete the project within the time allowed.

END OF SECTION

SECTION 01400 – QUALITY CONTROL

PART 1 GENERAL

1.01 SUMMARY

A. Work shall conform to these specifications and the standards of quality contained herein.

1. Only new items of recent manufacturer and quality specified, free from defects, will be permitted on the Work, unless items are specifically noted as existing to be reutilized. Remove rejected items immediately from the Work and replace with items of quality specified. Failure to remove rejected materials and equipment shall not relieve the Contractor from responsibility for quality and character of items used, nor from any other obligation imposed by the Contract.

2. No work defective in construction or quality, or deficient in any requirement of the drawings and specifications will be acceptable in consequence of the Owner's or the Engineer's failure to discover or to point out defects or deficiencies during construction; nor will the presence of Resident Project Representatives on the work relieve the Contractor from responsibility for securing the quality and progress of work as required by the Contract. Defective work revealed within the time required by guarantees shall be replaced by the Contractor by work conforming to the intent of the Contract. No payment, whether partial or final, shall be construed as an acceptance of defective work or improper materials.

END OF SECTION

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SECTION 01500 – TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. This section includes mobilization, temporary utilities, temporary construction, safety requirements, temporary environmental controls, and other temporary controls.

B. Submittals

1. Traffic control plan (see Section 01570).

2. Staging area plan and notification of any obstructions encountered during mobilization.

3. Plans for disposal of waste materials and excavated material not required for fill, including permits as required.

C. Permits:

1. Contractor shall secure and pay for all permits and fees required pertaining to temporary facilities and all other work.

2. Construction permits as required by the City, and/ or other agencies shall be the responsibility of the Contractor to secure.

D. Mobilization shall include de-mobilization and consist of preparatory work and operations, including but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to and from the project site; for the establishment of offices, buildings and other facilities necessary for work on the project; for premiums on bond and insurance for the project, and for other work and operations which the Contractor must perform or costs he must incur before beginning work on the project and after completion of the project.

E. Access of Government Officials. Authorized representatives of the Federal, State and Local Governments shall at all times have safe access to the Work, whenever in preparation or in progress, and Contractor shall provide proper facilities for such access and inspections.

PART 2 PRODUCTS

2.01 MATERIALS

A. Contractor shall provide all materials necessary for all work this Section.

PART 3 EXECUTION

3.01 WORKMANSHIP

A. During all construction operations, the Contractor shall construct and maintain such facilities as may be required to provide access by all property owners to their property. No person shall be cut off from access to their place of business or residence, unless the Contractor has made special arrangements with the affected persons and has notified

Engineer and Owner. All temporary facilities shall be removed by the Contractor upon completion of the Work.

1. Temporary Utilities

   a. Electric Power and Telephone

   b. Electrical power. Power requirements should be confirmed by the Contractor for any special power needs. Arrangements for power shall be the responsibility of the Contractor.

   c. Phone service shall be the responsibility of the Contractor

   d. Sanitary Facilities

2. The Contractor shall provide chemical toilets of suitable types and maintain them in a sanitary condition at all times, conforming to code requirements and acceptable to the health authorities. They shall be of watertight construction so that no contamination of the area can result from their use. Arrangements shall be made for frequent emptying of the toilets. Upon completion of the work, toilets shall be removed and the area restored to its original condition.

   a. Portable toilet facilities shall be located only at locations approved by the Owner.

3. Water

   a. Water for normal filling, flushing and testing operations shall be coordinated with the Coos Bay/ North Bend Water Board.

4. Safety Requirements

   a. Proper traffic control shall be provided in accordance with Section 01570.

   b. Access for Police, Fire, and School Bus Service

   c. Notify the fire department, police department and, when applicable, the School District Bus Company before closing any street or portion thereof, and no closing shall be made without the Engineer's approval. Notify said departments when the streets are again passable for emergency vehicles. Do not block off emergency vehicle access to any area, such as consecutive arterial crossings or dead-end streets, in excess of 300 linear feet, unless the Contractor obtains special written permission from the chief of the fire department. Conduct operations so as to cause the least interference with any fire station access and at no time prevent such access.

   d. The Contractor shall furnish a list of emergency telephone numbers to both the Engineer and the Owner so that contact may be made easily at all times in cases of emergencies.

   e. Fire Prevention. Contractor shall perform all work in a fire-safe manner. Contractor shall supply and maintain on site all fire-fighting equipment, supplies, and capable personnel for extinguishing incipient fires as required by all Federal, State and local laws and regulations. Each piece of internal combustion engine-driven equipment shall be equipped with a

fire extinguisher in accordance with the appropriate recommendation of the National Fire Protection Association (NFPA). All engines shall be equipped with functional spark arrestors and sound suppression devices.

5. Temporary Environmental Controls

   a. The Contractor shall maintain affected areas from his construction free from environmental pollution that would be in violation of federal, state or local regulations.

6. Air Pollution Control

   a. Minimize air pollution likely to occur from construction operations by wetting down bare soils to control dust and requiring proper combustion emission control devices on construction vehicles.

   b. Give unpaved streets, roads, and detours or haul roads in the construction area a dust preventative treatment or periodically water to prevent dust. Strictly adhere to applicable environmental regulations for dust prevention.

7. Water Pollution Control and Erosion Control

   a. Discharge from dewatering, or flushing operations shall not directly impact existing water courses.

   b. Turbidity shall not exceed 10 percent above natural stream turbidities as a result of the project. The turbidity standard may be exceeded for a limited duration, provided all practicable erosion control measures have been implemented, including, but not limited to:

   c. Use of filter bags, sediment fences, silt curtains, leave strips or berms, placing mulch and hay bale silt fences, or other measures sufficient to prevent offsite movement of soil.

   d. Use of an impervious material to cover stockpiles when unattended or during a rain event.

   e. Graveled construction accesses to prevent movement of material offsite via construction vehicles.

   f. Sediment traps or catch basins to settle out solids prior to water entering ditches or waterways.

   g. Spreading mulch on exposed embankments greater than 3 feet in height.

   h. Place hay bale silt fence at any locations where soil erosion potential is evident and as directed by the Engineer.

   i. Constructing sediment basins where surface runoff is causing soil erosion or as directed by the Engineer.

   j. Erosion control measures shall be maintained as necessary to ensure their continued effectiveness.

k. Petroleum products, chemicals, or other deleterious materials shall not be allowed to enter the water.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Mobilization, Bonding, and Insurance - Payment for this, and all items, shall be included within the total lump sum price of the overall project as shown on the bid form. Progress payments will be made based on the progress complete percentage of the schedule of values, as approved by the Engineer.

B. Construction Facilities and Temporary Controls - Payment for this, and all items, shall be included within the total lump sum price of the overall project as shown on the bid form. Progress payments will be made based on the progress complete percentage of the schedule of values, as approved by the Engineer.

END OF SECTION

SECTION 01570 – TRAFFIC REGULATION

PART 1 GENERAL

1.01 SUMMARY

A. This section includes traffic control related safety requirements as may be required for the project.

B. Contractor shall comply with all rules and regulations of County, State, City, and Federal authorities regarding the closing, detouring, and loading of all public streets or highways.

C. No road (public or private) shall be closed or detoured by the Contractor to the public, except by express written permission of the Engineer and entity governing such roadways. Traffic must be kept open on all roads and streets where no detour is possible. The Contractor shall, at all times, conduct the work so as to assure the least possible obstruction to traffic and normal commercial pursuits. The convenience of the general public and residents, safety, and the protection of property is of prime importance and shall be provided for by the Contractor in an adequate and satisfactory manner.

D. Submittals

E. If road closures, lane closures, or detours are required, Contractor shall prepare, and submit for approval a Traffic Control Plan to the appropriate governing body of such road.

1. Note: Contractor may keep West Park Drive closed to through traffic during course of Construction until completion.

PART 2 PRODUCTS

2.01 MATERIALS

A. Contractor shall furnish all flaggers, barricades, lead cars, warning signs, lights, signals, etc. as required to comply with regulations and provide safety.

B. All signs, lights, flags and other warning and safety devices shall meet the current MUTCD standards affecting the location of construction, or to applicable City/County standards.

C. Barricades shall conform to the Standard Specifications for Highway Construction of the State Highway Department affecting the location of construction, or to City or County Standards where applicable.

PART 3 EXECUTION

3.01 WORKMANSHIP

A. Contractor shall, at their own expense, and without further or other order, provide, erect and maintain at all times during the progress or temporary suspension of the work, suitable barricades, fences, signs or other adequate warnings or protection and shall provide, keep and maintain such danger lights, signals, and flaggers as may be necessary or as may be ordered by the Engineer to insure the safety of the public as well as those engaged in connection with the work.

B. Failure of the Engineer to notify the Contractor to maintain barricades, barriers, lights, flares, danger signals, or watchmen, shall not relieve the Contractor from this responsibility. All barricades and obstructions shall be protected at night by signal lights which shall be suitably distributed and kept burning from sunset to sunrise. Barricades shall be of substantial construction and shall be suitably painted to increase their visibility at night.

C. Whenever the Contractor's operations create a hazardous condition, Contractor shall furnish flagmen and guards as necessary, or as directed, to give adequate warning to the public of any dangerous conditions to be encountered. Contractor shall furnish, erect, and maintain approved fences, barricades, lights, signs, and any other devices that may be necessary to prevent accidents and to avoid damage and injury to the public. Flaggers and guards, while on duty and assigned to give warning to the public, shall be equipped with approved red wearing apparel and a red flag which shall be kept clean and in good repair.

D. Contractor shall provide access to private properties at all times, except during urgent stages of construction when it is impractical to carry on the construction and maintain traffic simultaneously. Coordinate all construction activities with the affected property owners.

E. Contractor shall patrol the traffic-control area and reset all disturbed signs and traffic-control devices immediately, and will remove or cover all non-applicable signs during periods not needed.

F. At the end of each day, the Contractor shall leave work in such condition that it can be traveled without damage to the work and without danger to the public.

G. If, in the opinion of the Engineer or other governing traffic authority, traffic control is lacking or otherwise unsafe or deficient, the Engineer may require that all work be halted until the traffic control measures can be improved to an acceptable level.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Payment for this item shall be included as a portion of the lump sum cost as stated on the Bid Form. Payment shall include all activities related to traffic and safety control on the project, preparatory work for work on the project.

END OF SECTION

SECTION 01610 – STORAGE AND PROTECTION

PART 1 GENERAL

1.01 SUMMARY

A. Protect products scheduled for use in the Work by means as described in this Section and as recommended by the manufacturer.

1.02 MANUFACTURER'S RECOMMENDATIONS

A. Except as otherwise approved by the Owner, determine and comply with manufacturers' instructions on product handling, storage and protection.

1.03 PACKAGING

A. Deliver products to the job site in their manufacturer's original container, with the labels intact and legible.

B. Maintain packaged materials with seals unbroken and labels intact until time of use.

C. Promptly remove damaged material and unsuitable items from the job site, and promptly replace with material meeting the specified requirements at no additional cost to the Owner.

D. The Owner may reject as non-complying such material and products that do not bear identification satisfactory to the Owner as to the manufacturer, grade, quality and other pertinent information.

1.04 STORAGE

A. Store materials on-site in coordination with the Owner to provide suitable site access and clearance.

B. Do not store unnecessary materials that will not be incorporated into the work.

1.05 PROTECTION

A. Protect stored materials from moisture and temperature, and unauthorized handling.

B. Provide protection for finished surfaces.

C. Maintain finished surfaces clean, unmarred and suitably protected until accepted by the Owner.

D. Provide proper protection for all workers.

1.06 REPAIRS AND REPLACEMENTS

A. In event of damage, promptly make replacements and repairs to the approval of the Owner and at no additional cost to the Owner.

B. Additional time required to secure replacements and to make repairs will not be considered by the Owner to justify an extension of the Contract Time of Completion.

C. Repair all scratches and damage to painted surfaces promptly with proper color and material.

D. Backfill or other soil materials to be incorporated into the Work which have become too wet due to improper storage and protection shall be properly dried or replaced prior to incorporation into the Work.

END OF SECTION

SECTION 01630 – PRODUCT SUBSTITUTIONS

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes procedures for securing approval of proposed product substitutions.

1.02 PRODUCT OPTIONS

A. The Contract is based on standards of quality established in the Contract Documents.

B. See Section 01300 Submittals, and the General Conditions (Sections 7.04, 7.05 and 7.16) for additional information on submittals and substitutions.

C. In agreeing to the terms and conditions of the Contract, the Contractor has accepted the responsibility to verify that the specified products will be available and to place orders for all required materials in such a timely manner as is needed to meet his agreed construction schedule.

D. The Owner has not agreed to the substitution of materials or methods called for in the Contract Documents, except as they may specifically otherwise state in writing.

E. Where materials and methods are specified by naming one single manufacturer or model number, without stating that equal products will be considered, only the material and method named is approved for incorporation into the Work.

F. Where materials and methods are specified by name or product number, followed by the words "or equal approved in advance", materials and methods proposed by the Contractor to be used in lieu of the named materials and methods shall in all ways be equal or exceed the qualities of the named materials and methods. For consideration as an "equal approved in advance", complete detailed submittals (5 copies) must be received by the Engineer at least fourteen (14) days prior to the bid opening date. Approved substitute items will be listed by addendum prior to bid opening.

G. Where the phrase "or equal," or "or approved equal," occurs in the Contract Documents, do not assume that the materials, equipment or methods will be approved as equal unless the item has been specifically so approved for this Work. Prepare detailed submittal and submit to Engineer. Substitutes will not be incorporated into the work unless submittal is approved by the Owner via the Engineer.

H. Submittals shall include all technical information and diagrams as necessary to allow Engineer to evaluate the proposed substitution. Any/all differences between the specifications or specified equipment and the proposed substitution shall be clearly noted in the submittal. Submittals shall clearly indicate the specific model numbers, part numbers, and options of the proposed substitution.

1.03 DELAYS

A. Delays in construction arising because of the time required for approval of substitution requests will not be considered by the Owner as justifying an extension of the agreed Time of Completion.

END OF SECTION

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SECTION 01700 – CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SUMMARY

A. Section includes procedures and requirements for finalizing and closing out the Project(s).

B. Final clean-ups and restorations shall be done prior to requesting final inspections.

PART 2 PRODUCTS-NOT USED

PART 3 EXECUTION

3.01 RESTORATION AND CLEAN-UP

A. Upon completion of any portion of the work, promptly remove temporary facilities generated by that portion of the work, including surplus materials, equipment and machinery unless directed otherwise by the Engineer or the Owner. All construction work by the Contractor shall be clean and free of rubbish, dirt, overspray, and extraneous materials to the satisfaction of the Engineer before acceptance of the work.

B. Street/Road Cleanup. All roadways affected during construction shall be cleaned and restored. All ditches and culverts shall be cleaned and re-graded for proper drainage. Culverts broken or damaged by construction activities shall be restored to their original condition and location. Immediately following construction, remove all dirt, mud, rock, gravel, and other foreign material at the completion of the day or as otherwise required by the Engineer.

C. Site Restoration and Cleanup. Restore or replace any ground covering (e.g., bark chips, cinders, gravel, river rock, etc.) to the original condition or better. Replace topsoiled areas, rake and grade to conform to their original contours. Replace any damaged landscaping or plantings to prior conditions in manner acceptable to Owner. Reseed grass areas as approved. Seed and protect any disturbed slopes.

3.02 CERTIFICATIONS

A. Contractor shall provide certifications in accordance with the Standard General Conditions Article 15 and Supplementary Conditions SC-15.01 prior to final payment.

B. See Section 01740 for Warranty requirements.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. This item shall be considered incidental and no separate measurement and payment will occur.

END OF SECTION

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SECTION 01740 – WARRANTIES

PART 1 GENERAL

1.01 SUMMARY

A. Installed Materials Warranties. Prior to 75% completion and payment for work under this Contract, the Contractor shall furnish the Owner through the Engineer, all warranty and/or guarantee forms normally furnished by the manufacturer of equipment. Warranty form shall include the specific equipment installed, the duration of the warranty, details of the warranty, and the installer's name, address and phone number. Installation date will be filled in by the Owner and will coincide with date of substantial completion of the work under this contract. All such warranties shall name the Owner as the warranted party.

B. Attention is directed to various other sections of the Contract Documents where specific material or installation warranties may be required for items specified.

1.02 CONTRACTORS WARRANTY OF WORK

A. Contractor shall guarantee the Work for a period of one (1) year from the date of Final Acceptance. All materials and workmanship that prove defective within the one-year guarantee period shall be promptly replaced or corrected with no additional cost to the Owner. Written certification that Contractor will replace all materials and workmanship that prove defective within one-year after the date of Final Acceptance is required for project close-out and shall accompany application for Final Payment.

B. Contractor shall correct any work not in compliance with specifications and is responsible for all repairs of damage to other improvements, natural or artificial structures, systems, equipment and vegetation cause by, or resulting in whole or in part from occurrences beginning during the warranty period and are the result of defects in construction or materials installed under this Contract. Contractor shall be responsible for all costs associated with site cleanup and remediation caused by, or resulting in whole or in part from, defects in its work or materials.

C. Within 10 calendar days of the Owner's written notice of defects, Contractor shall begin repair of the defects and all related damage. If Contractor or Contractor's Surety fails to correct and repair the defects in a timely manner, the Owner may have the correction and repair performed by others. Contractor or Contractor's Surety shall promptly reimburse the Owner for all expenses incurred to correct and repair the defects.

D. In case of an emergency where delay could result in serious loss or damage, the Owner may make emergency corrections and repairs without written notice to Contractor. Contractor or Contractor's Surety shall promptly reimburse the Owner for all expenses incurred to correct and repair the defects.

E. On Contractor's letterhead; provide written letter stating that Work has been completed in accordance with the Contract Documents and that a one year warranty of the work will be provided from the date of Final Acceptance. Written certification that Contractor will replace all materials and workmanship that prove defective within one-year after the date of Final Acceptance is required for project close-out and shall accompany application for Final Payment.

F. One-Year Warranty Inspection. On the 11th month following final project completion and acceptance, Contractor shall be available to be present during the on-site warranty

inspection by Owner. Any defects identified in materials or workmanship shall be corrected within 30 days by the Contractor at his own expense

PART 2 PRODUCTS- NOT USED

PART 3 EXECUTION- NOT USED

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. This item shall be considered incidental and no separate measurement and payment will occur

END OF SECTION

SECTION 01780 - PROJECT RECORD DRAWINGS

PART 1 GENERAL

1.01 SUMMARY

A. This section outlines in general the Contractor requirements for preparing and maintaining and record drawings of the project.

B. Contractor shall provide access to the Record Drawings to the Engineer and Owner throughout construction and shall finalize and submit complete record drawings upon completion of the work.

C. Accurate Record Drawings or "As-Builts" are considered extremely important and it shall be entirely the Contractor's responsibility to maintain a complete and accurate record of all details of the project as he constructs and installs equipment and materials.

D. Engineer or Owner may stop work if it is determined that Contractor is not properly recording details in record drawings and require correction and accurate documentation of all previous work before additional work proceeds.

E. Engineer must accept and approve the drawings prior to recommending final payment.

1.02 RELATED SECTIONS

A. General Conditions – Article 7 , Section 7.11, Record Documents

1.03 SUBMITTALS

A. Submit two complete sets of initial marked-up Record Drawings immediately upon completion of construction work. Engineer will review for completeness and either approve or return one set with comments and corrections.

B. If initial submittal required corrections, submit one complete set of corrected marked-up Record Drawings to Engineer with or before request for final payment.

PART 2 PRODUCTS

2.01 RECORD DRAWINGS

A. Maintain one set of black-line prints of the Contract Drawings. Mark-up drawings using erasable red-colored pencil. Use additional colors as necessary to clearly document changes from original drawings for different categories of work at the same location.

B. Use clear original or copy of project drawings for mark-up. Use shop drawings for markup when they are more capable of showing actual physical conditions completely and accurately.

C. All deviations or differences from the original drawings, including dimensional, location, layout, material, and other details shall be noted clearly. Any additional information discovered during construction shall also be noted including location and depth of buried utilities and structures not shown in the original drawings.

2.02 FORMAT

A. Organize Record Drawings into manageable sets using plans and shop drawings as applicable. Keep sets bound and protected.

B. Keep on-site during construction and clearly identify as "Record Drawing" on cover.

PART 3 EXECUTION

3.01 RECORDING AND MAINTENANCE

A. Record data as soon as possible after obtaining it. Do not wait until the end of the job or a portion of the job to record data.

B. Give particular attention to information concealed that would be difficult to identify or measure and record later. Record and check the markup before enclosing concealed installations.

C. Require the individual who installed or constructed the portion of the work, or otherwise obtained the record data, to prepare that portion of the marked-up record print.

D. Incorporate changes and additional information previously marked on Record Drawings, erase, redraw, and add details and notations where applicable.

E. Refer instances of uncertainty to Engineer for resolution.

END OF SECTION

DIVISION 2 – SITE WORK
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SECTION 02230 – CLEARING & GRUBBING

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work to be performed under this section shall include all labor, equipment, and materials necessary for the removal of vegetation and organic matter including, trees, logs, stumps, roots, shrubs, brush, grass and other organic materials as specified herein and as necessary to complete the proposed improvements. This work shall also include the preservation and protection from injury or defacement of all vegetation and objects designated to remain, hauling and disposal of all resulting materials, backfilling of all voids resulting from clearing and grubbing operations, and grading of areas along the project alignment which are not included elsewhere in grading.

B. Clearing and grubbing work shall be performed in strict compliance with all City, County, State and Federal laws and requirements pertaining to clearing, disposal, erosion control, and other related operations.

C. Extra care shall be taken when construction occurs on private property. For areas within easements the Contractor shall coordinate with the Owner and private property owners prior to removal or trimming of any vegetation.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 CLEARING

A. Clearing shall consist of the felling, trimming or cutting of trees, stumps, shrubs, brush and branches, and the clearing of downed timber, vines, grass and other vegetation to the limits specified herein, with the exception of items designated either on the Plans or within these Specifications to remain. The ground surface shall be cleared completely of all growth and organic matter as specified.

B. Merchantable timber, shrubs and other vegetation of value occurring within areas designated for clearing or resulting from the clearing work shall become the property of the Contractor unless otherwise specified.

C. Trees of which less than one-half (1/2) of the lower portion of the trunk is within the area to be cleared may be left in place unless they are so situated that they interfere with other work to be completed under this contract, in which case they shall be removed.

D. Trimming

1. Tree branches hanging within the zone extending from the ground surface to 13-feet above the finished roadway grade, or 9-feet above other areas, shall be cut off to the boles in a workmanlike manner in conformance with tree surgeon practice, as directed.

2. The Contractor shall remove additional tree branches as directed by the Engineer in such a manner that the tree presents a balanced appearance.

3. Scars resulting from trimming of branches shall be treated with an approved tree sealant.

E. Clearing Limits

1. Clearing shall be performed within designated rights-of-way or easements as shown on the plans or as directed by Engineer and Owner.

3.02 GRUBBING

A. Grubbing shall consist of the removal of all embedded wood and other organic matter. Materials to be removed include stumps, trunks, buried logs, roots one-inch (1") in diameter and larger and other objectionable material.

B. Grubbing Limits

1. Grubbing shall be performed within all clearing area limits, as specified above, to a depth of six-inches (6") below the ground surface, or subgrade, whichever is deeper.

2. At all trenches and other excavations, grubbing shall be conducted to six-inches (6") outside the exposed sides of the excavation. All stumps shall be completely removed to firm undisturbed soils.

3.03 DISPOSAL

A. All materials and debris resulting from clearing and grubbing operations shall become property of the Contractor at the place of origin, and shall be hauled away and disposed of by the Contractor.

B. Materials resulting from clearing and grubbing operations shall not be disposed of on lands owned or controlled by the Owner except by written permission. If so permitted, the Contractor shall place materials only at locations and in such manner as directed by the Owner.

C. The Contractor shall obtain written permission from the owner of any property upon which clearing and grubbing materials are to be disposed. Copies of the agreement between the property owner and the Contractor shall be furnished to the Owner and Engineer.

D. No burning of materials shall be allowed at the project site unless approved by the Owner in writing. No excess accumulation of materials shall be allowed at the project site.

3.04 PRESERVATION OF EXISTING VEGETATION

A. The Contractor shall protect from injury all trees, shrubs, vines, plants, grasses and other vegetation outside of areas to be cleared and grubbed, or which are designated by the Engineer to be preserved. Operations which may damage such vegetation to remain shall be conducted in areas where damage will not result.

B. All items designated to remain which are damaged by the Contractor's operations shall be restored or replaced by the Contractor to as nearly as possible original condition and location at no cost to the Owner.

3.05 COMPLIANCE WITH LAWS AND REGULATIONS

A. The clearing and grubbing work shall be performed in strict compliance with all City, County, State and Federal laws and requirements pertaining to clearing, hauling, disposal, erosion control, and related operations.

3.06 BACKFILLING AND GRADING

A. Stump holes and other excavations which result from clearing and grubbing operations shall be backfilled with suitable material and compacted in accordance with Section 02315.

B. Holes in areas to be excavated or trenched at a later time may be temporarily backfilled or covered as approved to provide for public safety until completion of final backfill.

C. Areas subject to Clearing and Grubbing shall be smoothed and reshaped to blend to surrounding grades.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Payment for Clearing & Grubbing shall be included within the lump sum cost for the overall project and shall include compensation for the removal and disposal of all cleared debris and materials and labor required to complete the work described herein.

END OF SECTION

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SECTION 02250 – DEMOLITION AND SITE PREPARATION

PART 1 GENERAL

1.01 SUMMARY

A. The work in this section includes the furnishing of all labor, equipment, materials, incidentals, and performing all work required for the removal and disposal of concrete, asphalt, miscellaneous structures, sewer piping as designated for removal, debris and other items or improvements of manmade origin, in accordance with the Plans and these Specifications.

B. The removal work described herein does not include the removal or disposal of items or improvements designated to remain.

C. The area in which removal work, under these Specifications, is to be performed shall be confined to the minimum dimensions, within the public right-of-way or easements, which will permit proper construction of the proposed improvements, or as otherwise indicated.

PART 2 PRODUCTS

2.01 MATERIALS

A. Trench Excavation and Backfill shall comply with Section 02315.

PART 3 EXECUTION

3.01 WORKMANSHIP

A. Pavements, Curbs, Walks and Driveways

1. Where construction operations require the removal of pavements and other concrete flatwork or structures, bituminous pavements or portions thereof, the area to be removed shall be neatly sawcut. Just prior to placement of hot ac pavement final sawcuts shall be made 12-inches outside the limits of the trench on each side. All cuts shall be clean, vertical cuts made true to lines designated or approved by the Engineer. See Detail drawings for further clarification.

2. The Contractor shall remove and dispose of all pavement and structures, or portions thereof, which lie within the limits of excavation.

3. Pavements and/or structures designated to remain but damaged as a result of the Contractor's operations shall be sawcut and removed as described above, and replaced or restored at the sole expense of the Contractor.

B. Salvaged Materials

1. Gratings, disinfection system components, valves and other reusable materials removed shall remain the property of the City and shall be salvaged as directed by the City Engineer and delivered to the City's storage yard by Contractor.

2. Other salvageable materials shall become the property of the Contractor and shall be disposed of by the Contractor away from the site.

    a. Salvaged materials of any kind shall not be reused in new work without the written approval of the Engineer.

C. All items and materials designated to remain shall be protected against damage as required. Damage to items or materials not intended for removal shall be repaired promptly by the Contractor to the satisfaction of the affected property owner. If the Engineer determines it necessary, repairs shall consist of complete replacement of the affected items or materials. All such repairs and replacements shall be made by the Contractor without compensation.

D. Disposal of Materials

1. All materials, except those determined by the Engineer or Owner to be reusable, shall become property of the Contractor at the place of origin and shall be disposed of by the Contractor in conformance with all laws, regulations and rules legally imposed on such activities.

    a. Contractor shall make every effort to salvage or recycle construction demolition items and debris as is feasible.

2. Materials shall not be disposed of on City owned or City controlled lands except by written permission of the City, and if so permitted, the materials shall be placed only at such locations and in such manner as the City may direct. Materials may be disposed of on private properties only with written permission of the property owner(s) involved, and with copies of the agreement furnished to the City and Engineer.

E. Excavations resulting from the removal of structures and/or obstructions shall be backfilled and compacted in accordance with the requirements of Section 02320. Backfill materials shall consist of the type and class designated on the Plans and specified in Section 02320.

F. All existing ditches damaged by the Contractor by his operations and incidental ditching shall be re-constructed as required as to maintain existing drainages and ditches. The Contractor shall maintain channel width and side slopes of existing conditions.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Payment for this, and all items, shall be included within the total lump sum price of the overall project as shown on the bid form. Progress payments will be made based on the progress complete percentage of the schedule of values, as approved by the Engineer.

END OF SECTION

SECTION 02315 – TRENCH EXCAVATION, BEDDING, & BACKFILL

PART 1 GENERAL

1.01 SUMMARY

A. This work consists of furnishing all labor, materials, incidentals and equipment, as well as performing all work required for excavation, foundation stabilization, pipe bedding, pipe zone material, trench backfill, compaction, final grading, hauling and disposal of material resulting from the construction of utility piping, and all related appurtenances. Included also is the locating and protecting of existing utilities and other improvements (see Division 1), shoring, and bracing, excepting only such work as is covered and included under other sections of this Division, or other Divisions of these Contract Documents.

B. Excavation must be in accordance with ORS 757.541 to 757.571 and all other applicable laws and regulations.

1.02 REFERENCES

A. Oregon Standard Specifications (OSS) – The 2008 Oregon Department of Transportation/APWA Oregon Chapter Standard Specifications for Construction.

1.03 DEFINITIONS

A. Trench Excavation – Trench excavation consists of the removal of all material encountered in the trench to the limits shown on the Plans or as directed. Trench excavation shall be classified as either common excavation or rock excavation.

1. Common excavation is defined as the removal of all material as required to complete the planned improvements, regardless of type, nature or condition of materials encountered, except that which is designated as rock excavation.

2. Rock excavation is defined as the removal of boulders composed of igneous, sedimentary or metamorphic stone material which have a least dimension of 36-inches or more, or a displacement of one cubic yard or more; or the removal of solid ledge rock which, in the opinion of the Engineer, requires for its removal drilling and blasting, wedging, sledging, barring or breaking with power operated tools.

a. No soft or disintegrated rock; hard-pan or cemented gravel that can be removed with a hand pick or power operated excavator or shovel; no loose, shaken, or previously blasted rock or broken stone in rock fillings or elsewhere; and no rock outside of the minimum limits of measurement allowed, which may fall into the excavation, will be measured or allowed.

b. When solid rock layers have an overburden of non-rock material (common material) which cannot practically be stripped and handled separately, and/or when solid rock is interspersed with non-rock material, the entire mass will be classified as solid rock if the actual solid rock fraction exceeds 85% of the entire volume.

B. Trench Foundation – Trench foundation is defined as the bottom of the trench on which the pipe bedding is to lay and which provides support for the pipe.

C. Foundation Stabilization – Foundation stabilization is defined as the furnishing, placing and compacting of specified materials for any unsuitable material removed from the bottom of an excavation, as directed by the Engineer, to provide a firm trench foundation.

D. Rip-Rap Slope Protection – Rip-rap slope protection is defined as the furnishing and placement of the specified material as an embankment or channel slope protection on exposed sloes or channels for slope protection and erosion control applications.

E. Pipe Bedding – Pipe bedding is defined as the furnishing, placing and compacting of specified materials on the trench foundation so as to uniformly support the barrel of the pipe. The total bedding depth shall be as shown on the Contract Drawings.

F. Pipe Zone – Pipe zone is defined as the furnishing, placing and compacting of specified materials for the full width of the trench and extending from the top of the bedding to a level above the top outside surface of the barrel of the pipe as shown on the Contract Drawings.

G. Trench Backfill – Trench backfill is defined as the furnishing, placing and compacting of material in the trench extending from the top of the pipe zone to the bottom of pavement base, ground surface or surface material. Plans generally show locations for each type of backfill class.

H. Drain Rock – Drain rock is defined as the furnishing, placing and compacting of specified free draining material for the full width of the drain trench (perforated pipe drains) and extending to a level as specified above the top outside surface of the pipe barrel.

1.04 SUBMITTALS

A. Certifications, test results, source, and samples for all imported material proposed to be used in the work. Samples of materials to be used shall be submitted 2 weeks in advance of use. Samples shall consist of 0.5 cubic feet of each type of material. Samples of Class E material are not required.

B. Drawings, tabular product data, and method of installation and removal of all sheeting, sheet piling, shoring, and bracing.

PART 2 PRODUCTS

2.01 MATERIALS

A. Trench Foundation – The trench foundation shall be undisturbed native material when suitable. Where ground water or other unstable conditions exist and the native material cannot properly support the pipe, additional excavation may be required. The trench shall be stabilized with foundation stabilization material when such conditions are present in the opinion of the Engineer.

B. Foundation Stabilization – Foundation Stabilization: 1½"-0 or 2"-0 aggregate base rock meeting OSS Sections 00641 and 02630. Required when native trench foundation material contains groundwater, or is unsuitable to provide a firm foundation in the opinion of the Engineer.

C. Rip Rap Slope Protection – Material for Rip Rap Slop Protection shall be 6"-0 stone embankment material meeting the requirements of OSS 00330.16 and shall be an unweathered, hard, angular, durable free draining material, visibly well graded from course to fine.

D. Pipe Bedding – Material for pipe bedding shall be clean, hard, sound, durable, well-graded, ¾"-0 crushed rock, free from organic matter. Engineer must approve material prior to use.

E. Pipe Zone – Material for pipe zone shall be the same material used for bedding.

F. Trench Backfill

1. Class "A" Backfill: Native or common excavated material, free from organic or other deleterious material, free from rock larger than 3-inches, and which meets the characteristics required for the specific surface loading or other criteria of the backfill zone in the opinion of the Engineer. If stockpiled material becomes saturated or unsuitable, Class B, C or D Backfill shall be substituted. Engineer must approve material prior to use.

2. Class "B" Backfill: ¾"-0 dense-graded aggregate, uniformly graded from coarse to fine and meeting OSS Section 02630.10.

3. Class "C" Backfill: Clean sand with no particles larger than ¼-inch.

4. Class "D" Backfill: Pit run or bar run material, well graded from coarse to fine, with maximum aggregate size of 3 inches.

5. Class "E" Backfill (CLSM or CDF): Controlled Low-Strength Material (cement slurry) conforming to OSS Section 00442.

a. Slurry shall consist of a highly flowable lean concrete mix; mixture of Portland cement, fly ash, fine aggregates, water and admixtures as required for a mixture that results in a hardened, dense, non-settling, hand excavatable fill.

PART 3 EXECUTION

3.01 GENERAL

A. Remove, haul, and dispose of all formations and materials, natural or man-made, irrespective of nature or conditions encountered, within lines and grades shown on the Plans or defined herein, and as necessary for completion of the proposed improvements. The method of excavation shall be as determined by the Contractor, and as required for special protection of existing improvements. Special care shall be taken to avoid over excavation below subgrades. Store and protect materials suitable for use as backfill where applicable. Clearing & Grubbing and Removal of Structures and Obstructions to be completed prior to excavation.

B. Coordinate and provide all utility locates prior to any excavation as required by local state and federal laws and regulations. When the precise location of subsurface structures and/or utilities is unknown, locate such items by hand excavation prior to utilizing mechanical excavation equipment. Use hand excavation when mechanical equipment might damage existing improvements which are to remain undisturbed. See Division 1 for other requirements.

C. Incidental to excavation shall be the furnishing, installing and removal of all shoring, sheeting, bracing as required to support adjacent earth banks and structures, keep excavations free from water, and to provide for the safety of the public and all personnel working in excavations.

3.02 EXCAVATION

A. Excavate to the lines and grades shown on the project Plans, allowing for forms, shoring, working space and gravel base. Provide a minimum clearance around pipe barrel in all directions or greater in accordance with the standard trench detail drawing.

B. Shoring and Bracing

1. Sheet and brace excavation as necessary to prevent caving and to protect adjacent structures, property, workers and the public.

2. The design, planning, installation and removal of all sheeting, shoring, sheet piling, lagging and bracing shall be accomplished in such a manner as to maintain the required excavation or trench section and to maintain the undisturbed state of the soil below and adjacent to the excavation.

3. Horizontal strutting below the barrel of a pipe and the use of pipe as support are not acceptable.

4. All sheeting, shoring and bracing shall conform to safety requirements of OSHA and other Federal, State and local agencies.

C. Dewatering

1. Furnish, install and operate all necessary machinery, appliances and equipment to keep excavations free from water during digging and initial backfilling. Dispose of water in such a manner as to prevent damage to public or private property, or nuisance or menace to the public.

2. At all times have on hand sufficient pumping equipment and machinery in good working condition for all ordinary emergencies, including power outage. Have available, at all times, competent workers for operation of the equipment.

3. Control surface runoff to prevent entry or collection of water within excavations. All excavations shall be kept free of water during placement of backfill and/or concrete placement.

4. Comply with all laws regarding stormwater runoff, protection of natural resources, and other applicable laws and regulations.

3.03 FOUNDATION STABILIZATION

3.04 The contractor shall overexcavate the trench to firm undisturbed soils or rock when, in the opinion of the Engineer, the trench foundation materials are not suitable for the support of the pipe. Foundation Stabilization materials, as specified, shall be placed and compacted in lifts not exceeding 6-inches in compacted thickness to the required grade. Each lift shall be compacted to at least 95% of the maximum dry density in accordance with ASTM D698.

3.05 RIP RAP SLOPE PROTECTION

A. Remove any brush, trees, stumps and other organic material from slopes and channels to be protected by rip rap and dress to a smooth surface. Remove all unsuitable material to the depth as shown or as directed and replace with approved material.

3.06 DISPOSAL OF EXCESS MATERIALS

A. Excavated materials not suitable or required for backfill shall be hauled away and disposed of on approved sites arranged by the Contractor. No site shall be used for disposal of materials without written approval of the property owner. All costs associated with the hauling and disposal of materials shall be borne by the Contractor. The Contractor shall be entitled to any proceeds received from the sale of excess materials.

3.07 TEMPORARY STOCKPILING

A. Place excavated materials suitable for use as backfill (and not excess material) only within construction easements, right-of-way, or approved work area. Stockpiles shall be placed in such manner as to provide the minimum inconvenience to the public.

B. The Contractor shall obtain written permission from any property owners prior to placement of stockpiles on private property. Provide copies to the Owner and Engineer. Remove stockpiles as soon as possible and restore sites to affected property owners' satisfaction.

C. Access to all fire hydrants, water valves and meters shall be maintained. Stockpiles shall not be permitted to block any stormwater drainage ditches, gutters, drain inlets, culverts or natural water courses.

D. Protect stockpiled material which is to be later incorporated into the work so that excessive wetting or drying of the material does not occur. Material shall be brought to near optimum moisture content prior to placement and compaction. Depending on the moisture content of stockpiled materials, necessary processing may include aeration, mixing and/or wetting. No additional payment will be allowed for protecting or preparing native backfill materials.

E. If approved native materials become unsuitable (too wet or mixed with unsuitable materials) due to negligence by the Contractor, then imported granular materials may be required for backfilling at the subject location at no additional cost to the Owner.

F. Provide necessary protection for stockpiled materials so that silt-laden runoff does not occur during rain events and to prevent wind-blown dust from stockpiles.

3.08 PIPE ZONE AND TRENCH BACKFILL

A. Place and compact pipe bedding material before placing pipe in the trench. Dig depression for pipe bells to provide uniform bearing along the entire pipe length. Thoroughly compact bedding material to at least 95% of the maximum dry density in accordance with ASTM D698.

B. Place materials in the pipe zone in layers not greater than 6 inches thick and in a manner that equalizes the pressure on the pipe and minimizes stress. As required under the haunches of pipe and areas not accessible to mechanical tampers or to testing, compact with hand methods to ensure thorough contact between the material and the pipe. Before placing the pipe zone material, condition, aerate, or wet the material so that the moisture content of each layer is within minus 4% to plus 2% of optimum moisture content.

C. Contractor shall backfill the trench above the pipe zone in successive lifts not exceeding 12-inches in loose thickness. Do not allow the backfill to free-fall into the trench until at least 3 feet of cover is provided over the top of the pipe. Each lift shall be compacted, using suitable mechanical or pneumatic equipment, to a minimum of 95% of the maximum dry density as determined by ASTM D698. If the specified compaction is not obtained, the Contractor may be required to use a modified compaction procedure and/or

reduce the thickness of lifts. If approved materials meeting the specifications cannot be compacted to the required density regardless of compactive effort or method, the Engineer may reduce the required density or direct that alternate materials be used. In no case shall excavation and pipe laying operations proceed until the Contractor is able to compact the backfill to the satisfaction of the Engineer.

D. CLSM. When CLSM Backfill is required, backfill above pipe zone with CLSM material. If the CLSM is to be used as a temporary surfacing, backfill to top of the trench and strike off to provide a smooth surface. If CLSM is not to be used as a temporary surface, backfill to bottom of the proposed resurfacing. Use steel plates to protect the CLSM from traffic a minimum of 24 hours.

E. When backfilling is complete, the Contractor shall finish the surface area as specified. In paved or graveled areas the Contractor shall maintain the surface of the trench backfill level with existing adjacent grades with ¾"-0 crushed rock until pavement replacement is completed and accepted by Owner.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Payment for this, and all items, shall be included within the total lump sum price of the overall project as shown on the bid form. Progress payments will be made based on the progress complete percentage of the schedule of values, as approved by the Engineer.

END OF SECTION

SECTION 02320 – BYPASS PUMPING

PART 1 GENERAL

1.01 SUMMARY

A. This work in this section includes the furnishing of all labor, equipment, materials, incidentals, and performing all work required to implement a temporary bypass pumping system for the purpose of diverting sanitary sewer flows around the designated work zone for the project duration.

B. The operation, design and installation of the temporary bypass pumping system shall be the responsibility of the Contractor. The Contractor assumes all liability for the operation of the bypass pumping system and shall man the system during its operation. The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction of the systems operation.

C. Submittals

1. Prior to the start of any excavation the Contractor shall submit a bypass pumping plan to the Engineer for review, see plans for additional information on pumping flows/ requirements. The submittal shall include the method of installation and details of the proposed bypass pumping system.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials and equipment required for the bypass pumping equipment shall be furnished and maintained as required to perform the sanitary sewer line replacement.

B. Pumps

1. Bypass pumps shall be fully automatic, solids handling, self priming units.

2. Contractor shall supply all necessary start/stop controls for each pump.

3. Backup pumps shall be available in the case of a primary pump failure.

C. Piping/Hose

1. Contractor shall provide temporary bypass discharge piping constructed of ridged pipe with positive restrained joints.

2. Aluminum irrigation type piping shall NOT be allowed.

3. Use of discharge hose may be allowed for short sections with prior Engineers review and approval.

4. Discharge piping system shall be watertight. Contractor shall perform pressure and leakage tests on the bypass pumping system prior to start of operation of the system.

PART 3 EXECUTION

3.01 WORKMANSHIP

A. It is essential to the operation of the existing sanitary sewer system that there will be no interruption in the flow of sewerage during the duration of the project. Operation of the bypass pumping system shall maintain the sanitary sewer flows around the work area in such a manor as not to cause surcharging of upstream and downstream sewers, damage to existing sewers, and will protect both public and private property from flooding and damage.

B. Contractor shall provide, maintain and operate all temporary facilities such as damns, plugs, primary pumping equipment, back up pumping equipment, bypass piping and all necessary power, labor and equipment as required to intercept the sewage flow prior to interfering with the work area. Flows shall be conveyed past the work area and returned to the existing sewer system at a point downstream of the work area.

1. After projects completion and installed plugging is no longer required, plugging shall be removed in such a manner that permits sewerage flow to return to normal without surcharging downstream the existing system.

C. The Contractor shall provide the design, installation and operation of the temporary bypass pumping system. The Contractor shall assume responsibility of such bypass pumping system. Bypass system shall meet the requirements of the Oregon Department of Environment Quality (DEQ) and any other State, County or local agencies having jurisdiction over the operation of such facilities.

D. The Contractor will not be permitted to stop mainline flows under any circumstances without prior approval from the City or the Engineer.

E. The Contractor shall assume liability for providing all necessary means to convey sewage past the work area.

F. All water resources, wetlands and other natural resources shall be protected from discharge of sanitary sewers.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Measurement and payment for Bypass Pumping of sewerage flows shall be included within the lump sum price for the project and as stated on the Bid Form. Payment shall include compensation for all equipment, labor, and materials required to provide continuous bypass pumping of sewerage flows during the replacement of the sanitary sewer piping as shown on the plans.

END OF SECTION

SECTION 02321 – COMPACTION TESTING

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall retain and pay for the service of an approved, recognized independent testing laboratory to conduct laboratory tests on materials and field testing to determine the relative compaction of trench backfill, subgrades, embankments, gravel surfacing, aggregate base and asphalt concrete pavement, as indicated. The approved Testing Agency shall recommend methods of compaction to Contractor and issue final report to the Owner, through the Engineer, regarding compaction testing results and material compliance with the specifications.

B. These specifications call for field compaction efforts to achieve a specified relative compaction for each of the indicated classes of backfill. Determination of in-place density shall be made by means of non-destructive nuclear probe method testing in accordance with ASTM D2922-01 and ASTM D3017-01 test methods.

1.02 DEFINITIONS

A. Relative Compaction -- The ratio, expressed as a percentage, of the in-place density of the backfill material to the maximum density of the same material as determined by the ASTM D698 Standard Test Method.

PART 2 PRODUCTS

2.01 APPROVED TESTING AGENCIES

A. Foundation Engineering; 820 N.W. Cornell Ave.; Corvallis, OR 97330; (541) 757-7645

B. Western Testing; 3329 N.E. Stephens; Roseburg, OR 97470; (541) 957-1233

C. Western Testing; 2455 Maple Leaf, Bay #4; North Bend, OR 97459; (541) 266-9875

D. Carlson Testing; 89970 Hwy 99N; Eugene, OR 97402; (541) 345-0289

E. SHN Consulting Engineers & Geologists, Inc.; 275 Market Ave, Coos Bay, OR 97420; (541) 266-9890

F. Other certified private testing laboratory approved by Engineer

PART 3 EXECUTION

3.01 WORKMANSHIP

A. Field Testing

1. Testing to determine the relative compaction of materials placed and compacted by the Contractor shall be performed a short distance behind construction. Tests shall be taken on each lift of the material prior to placement of the succeeding lift to ensure proper compaction is obtained. The Testing Agency shall perform testing at such locations and elevations as to be representative of the entire material and area being compacted. The Engineer shall have authority to require testing at times and locations he deems necessary.

2. A sufficient number of density tests shall be taken on the first section of subgrade and trench backfill placed by the Contractor to establish the effectiveness of the Contractor's compactive efforts. If tests indicate that the specified relative compaction for a given material is not being achieved, the Contractor shall modify compaction methods in order to obtain the specified results.

3. A minimum of 2 tests will be required to be taken at each site visit. It is estimated that the following number of site visits will be required:

   a. A minimum of two (2) site visits shall be required along pipeline routes.

4. Additional site visits or tests may be required to prove Contractor is meeting compaction requirements or as requested by the Owner, Engineer, and other affected utilities.

B. Failing Tests – For areas failing to meet the specified compaction, the Contractor shall be responsible to perform all additional work necessary to achieve specified compaction at no additional cost to the Owner. Additional work may include further compactive effort, moisture treatment, other compaction methods, removal and replacement of failing materials, or other processes required to obtain the specified results.

C. Any subsequent settlement of backfilled areas during the one-year warranty period shall be considered to be the result of insufficient compaction, and shall be promptly repaired by the Contractor at no additional cost to the Owner.

D. The Contractor shall not be allowed any additional compensation for down time incurred as a result of compaction testing or waiting for test results.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Compaction Tests - Payment for this, and all items, shall be included within the total lump sum price of the overall project as shown on the bid form. Progress payments will be made based on the progress complete percentage of the schedule of values, as approved by the Engineer.

1. Only Compaction Tests with results meeting the requirements of these Specifications will be accepted. All costs associated with or arising from additional work required due to failing compaction test results, including removal and replacement of material, shall be borne by the Contractor.

2. Contractor must submit invoice from Testing Agency clearly identifying Project, location and date of testing, material tested, test method, test results, specified compaction, maximum dry density of material tested, and number of tests taken. Only tests directed by the Engineer and which obtain passing results will be paid for.

END OF SECTION

SECTION 02511 – LOCATOR WIRE & WARNING TAPE

PART 1 GENERAL

1.01 SUMMARY

A. This section consists of furnishing all labor, material and equipment, and performing all work required for the burying of an insulated copper conductor wire and plastic underground warning tape in the trench with installed non-ferrous and/or nonconductive (plastic, etc.) water and sewer lines. See the Standard Detail Drawings for trench cross section.

PART 2 PRODUCTS

2.01 MATERIALS

A. Sewer Lines

1. Tracer wire shall be No. 12 AWG, solid copper with green colored insulation. Insulation shall be 0.030-inch thick HDPE designed for direct bury.

2. Underground warning tape shall be 6-inch wide, 4-mil thick, APWA Standard Green color, reading "CAUTION – BURIED SEWER LINE BELOW."

PART 3 EXECUTION

3.01 WORKMANSHIP

A. Waterlines Wire and warning tape shall be buried the entire length of the trench, placed in accordance with the Standard Detail Drawings, for all nonconductive pipelines.

1. Wire shall be brought to the surface and connected at each valve box and each water meter. Distance between tracer lead access locations shall not exceed 1,000 feet. All joints and/or splices in the wire shall be made with a designed waterproof splice kit. Wire shall be taped to pipe every 5 feet and shall be run straight with a small amount of slack.

2. Warning tape shall be placed over the pipe zone material, approximately 15 to 18 inches below finish grade, in accordance with the Standard Detail Drawings. Lay tape flat and untwisted, centered over the pipe and with wording facing upwards.

B. Sewer Lines

1. Wire and warning tape shall be buried the entire length of the trench, placed in accordance with the Standard Detail Drawings, for all nonconductive pipelines.

2. Wire shall be brought to the surface and connected at each manhole and sewer cleanout. Distance between tracer lead access locations shall not exceed 1,000 feet. All joints and/or splices in the wire shall be made with a designed waterproof splice kit. Wire shall be taped to pipe every 5 feet and shall be run straight with a small amount of slack. Wire shall be routed outside each manhole or cleanout riser. Wire shall be exposed inside all cleanout covers and a minimum of 24" of wire provided. At manholes, pass wire into manhole between concrete grade ring and manhole lid frame and provide a minimum of 24" coiled wire.

3. Warning tape shall be placed over the pipe zone material, approximately 15 to 18 inches below finish grade, in accordance with the Standard Detail Drawings. Lay tape flat and untwisted, centered over the pipe and with wording facing upwards.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Payment for Locator Wire & Warning Tape shall be included within the overall lump sum cost for the project.

END OF SECTION

SECTION 02530 – GRAVITY SEWER PIPE AND FITTINGS

PART 1 GENERAL

1.01 SUMMARY

A. This section covers gravity sewer pipe materials for sewer mains and service laterals, including fittings, anchors, complete installation and testing.

B. All work shall conform to the latest version of the Oregon Standard Specifications (OSS) Part 00400, except as specified herein and shown on the Plans.

PART 2 PRODUCTS

2.01 MATERIALS

A. All pipe, fittings and appurtenances shall be new and unused.

B. 4-inch through 15-inch PVC Gravity Sewer Pipe and Fittings

1. Unplasticized polyvinyl chloride (PVC) plastic gravity sewer pipe with integral wall bell and spigot joints for the conveyance of domestic sewage. Pipe shall be colored green for identification as sewer pipe. Pipe shall be furnished in 20-foot laying lengths. Pipe shall meet ASTM D3034 and have an SDR of 35.

2. PVC compounds shall meet the requirements of ASTM D1784, cell classification 12454-B.

3. Bells shall consist of an integral wall section with a solid cross-section rubber ring, factory assembled, and securely locked in place to prevent displacement during assembly. Spigot ends shall be supplied from the factory with beveled ends. Joints shall provide a tight flexible seal meeting the requirements of ASTM D3212. Material used for elastomeric seal in push-on joints shall meet the requirements of ASTM F477.

4. All fittings and accessories shall be as manufactured and furnished by the pipe supplier, or approved equal, and shall have bell and/or spigot configurations compatible with that of the pipe. Fittings shall meet the same requirements as the pipe.

5. All fittings and appurtenances required to construct laterals and cleanouts shall be PVC and provided by or approved by the same manufacturer as the sewer piping. This shall include all tees, caps, wyes, couplings and other required fittings.

6. Pipe and fittings shall be Ring-Tite PVC Gravity Sewer Pipe and Fittings as manufactured by J-M Manufacturing Company, Inc.; or approved equal.

C. Appurtenances

1. Transition couplings and same diameter couplings for new sewer lines, unless otherwise specified, shall be flexible rubber with stainless steel bands. Fernco, or approved equal. Rotate coupling so type and size wording is visible from top to allow for inspection.

2. PVC pipe connections to concrete manholes shall utilize appropriately sized flexible, watertight seal adapters designed for such use. Adapters shall be tested watertight to a minimum of 10.8 psi during factory testing. Adapters shall be for connections to precast concrete shall be KOR-N-SEAL as manufactured by NPC, Inc.; or approved equal. Adapters for connections at cast-in-place manhole bases shall be made with a rubber waterstop grouting ring. Ring shall clamp to pipe with stainless steel clamp and have waterstop ribs. Waterstop Grouting Ring by Press-Seal Gasket Corp., or approved equal

3. Manufactured tees shall be required for service lateral connections to new mains and lateral reconnections to existing mains where use of saddles is not feasible. Tees shall conform to subsection 2.01.B. above.

D. Concrete shall conform to Oregon Standard Specifications Section 00440, Commercial Grade Concrete. Compressive field strength shall not be less than 3,000 psi at 28 days. Maximum aggregate size shall be 1½-inches. Slump shall be between 2 and 4 inches.

E. Non-Shrink Grout. Grout shall be Sika 212, Euco N-S, Five Star, or approved equal nonmetallic cementitious commercial grout exhibiting zero shrinkage per ASTM C827. Grout shall not be amended with cement or sand and shall not be reconditioned with water after initial mixing. Nonshrink grout shall be placed and packed only with the use of an approved commercial bonding agent. Unused grout shall be discarded after 20 minutes.

PART 3 EXECUTION

3.01 PIPE INSTALLATION

A. PVC gravity pipe shall be installed, stored and handled in accordance with the manufacturer's installation guide, the Uni-Bell PVC Pipe Association Installation Guide for PVC Sewer Pipe, ASTM D2321, and these specifications.

B. Remove material from job site, which in the judgment of the Engineer is damaged, not as specified, or otherwise rejected. Payment will not be made for damaged or rejected materials, their removal, or for repairs to such materials.

C. Preparation of Trench – Excavate and prepare trench for pipe laying to the lines and grades as specified and shown on the Plans. Place any required foundation stabilization and compact pipe bedding prior to laying pipe. Stabilize trench as required and comply with OSHA safety provisions.

D. Place and compact pipe bedding material before placing pipe in the trench. Dig depression for pipe bells to provide uniform bearing along the entire pipe length. Thoroughly compact bedding material to prevent future bellies.

E. Prior to lowering pipe into the trench, the Engineer and City representative will check for damage to the pipe. The Contractor shall repair or replace, as directed, all damaged or flawed pipe prior to installation.

F. Thoroughly clean inside the pipe before laying. Prevent foreign material from entering the pipe while it is being placed in the trench. Remove all foreign material from the inside of the pipe and joint before the next pipe is placed. Keep debris, tools, rags or other materials out of the pipes at all times. When pipe laying is not in progress, seal the open end of the pipe with a watertight plug, or by other approved means to prevent the entry of trench water or other foreign materials into the pipe.

G. Lay pipe with bell ends facing the direction of laying. For lines on an appreciable slope, face bells up-grade unless otherwise directed by the Engineer. Thoroughly clean the ends of the pipe to remove all foreign matter from the pipe joint. Lubricate the bell and spigot ends with approved pipe lubricant, as recommended by the manufacturer.

H. Tolerance. For gravity pipelines, vertical deviation from true grade shall not exceed 0.02 feet (0.24 inch). Horizontal tolerance for deviation from line shall be 0.03125 feet (3/8 inch). Depressions or bellies which create the potential for solids deposition are not allowed.

I. Care must be taken to ensure the pipe is not moved and the side support fill is not disturbed when moving sheeting or trench boxes.

J. Place materials in the pipe zone in layers not greater than 6 inches thick and in a manner that equalizes the pressure on the pipe and minimizes stress. As required under the haunches of pipe and areas not accessible to mechanical tampers or to testing, compact with hand methods to ensure thorough contact between the material and the pipe. Before placing the pipe zone material, condition, aerate, or wet the material so that the moisture content of each layer is within minus 4% to plus 2% of optimum moisture content.

K. Provide proper Backfill Class material as required. Backfill the trench above the pipe zone in successive lifts. Do not allow the backfill to free-fall into the trench until at least 3 feet of cover is provided over the top of the pipe. Modify the compaction as necessary to protect the pipe. Compact each lift to not less than 95% of the maximum density.

L. All pipes shall be thoroughly flushed with water prior to testing. Removal of water and debris shall be accomplished by exposing the pipe on the low end of the gravity main in each section and pumping water from the trench to the ground surface for disposal. The Contractor shall be responsible for the removal of all debris that enters into the sewer system from construction. All costs associated with removal of such debris shall be the responsibility of the Contractor and result in no additional costs to the Owner.

M. Service laterals shall be installed at a minimum 2% slope from the mainline or manhole to the connection with the existing lateral from the building, unless otherwise approved by the Engineer. Provide couplings for connection to existing service laterals. Coordinate with home-owner.

N. Service Lateral Connections

1. Service lateral connections shall include the connection of any new or existing service lateral to the main at locations shown on the Plans. Service laterals shall be connected to the main using new manufactured tees or wyes, as specified. In general, tees will be used where new laterals are being added along new mains or where existing laterals are being replaced and reconnected to the new main.

2. The Contractor shall install new PVC tees or wyes with manufactured bends as shown on the Standard Details. Service lateral piping shall be extended from the new connection to the point where the existing service lateral crosses into the public right-of-way, and connected to the existing piping.

3. The Contractor shall provide a minimum of 1-hour notice to any existing user prior to cutting the user's service lateral and thereby disrupting service. Lateral replacement shall be completed within 4-hours or the Contractor will be required to provide bypass pumping for the affected service.

4. The Contractor shall be responsible for all exploratory excavation and/or video inspection necessary to locate existing service laterals.

5. Service laterals shall be neatly cut at the edge of trench line and removed to the point of connection to the mainline. Reconnection to existing lateral piping shall be made using an appropriately sized transition coupling, as specified.

O. After installation and compaction of backfill, all pipe shall be thoroughly flushed and then subject to either hydrostatic or low-pressure air testing. Pipe will also be tested for deflection and will be video inspected.

3.02 MANHOLE CONNECTIONS

A. Where shown on the Plans or directed by the Engineer, the Contractor shall connect new sewer piping to existing manholes.

B. Core drill the manhole wall using appropriately sized core drill for the new pipe. Jack-hammering will not be allowed. Install pipe in accordance with Section 02535 using KOR-N-SEAL boot or an approved equal.

C. When an existing manhole has a poured-in-place base or other obstruction at the pipe level and core drilling is not feasible, contractor may jackhammer to provide penetration for new or replacement pipe. Install pipe in accordance with Section 02535 using Waterstop Grouting Ring or an approved equal.

D. Install flexible transition couplings on all pipes within 2 feet of the outside walls of manholes. Provide a watertight connection.

E. Modify the base of the manhole in accordance with Section 02535-3.03.

3.03 PLUG AND ABANDON PIPING/LATERALS

A. Install an appropriately sized mechanical plug at least 2-feet into the pipe or lateral designated for plugging or abandonment.

B. Concrete slurry for sealing sewer lines and laterals being abandoned shall consist of 2 sacks of Portland cement per cubic yard of cement sand. Water shall be added at such a ratio as to provide a 4-inch slump.

C. Concrete slurry shall be packed into the end of the pipe up to the mechanical plug and troweled flush with the end of the pipe.

3.04 VIDEO INSPECTION OF GRAVITY SYSTEMS

A. All gravity sewer lines constructed as part of the project shall be televised and recorded at the end of construction prior to acceptance. Recording shall be conducted after all backfill and compaction, but prior to final surface restoration. All pipes shall be thoroughly flushed by the Contractor immediately prior to the video inspection. A 1-inch target ball shall be placed in front of the camera. The video shall be recorded in color digital format. Sufficient light shall be provided to show detail. Camera speed shall not exceed 3 feet per second. Camera shall have a swivel head capable of looking up each service connection. A copy of the video recording and a written TV Inspection Report shall be furnished to the Engineer. Any sections of sewer pipe not meeting specifications or exhibiting defects shall, at the Contractor's expense, be corrected to meet specification. Repaired sections shall be re-televised. All repairs must be completed before acceptance of the project.

B. The sanitary sewer lines constructed as part of the project will also be video inspected near the end of the one year warranty period to determine if any defects exist in the system. The warranty video inspection will be conducted during a season of high groundwater as close to the end of the warranty period as possible. The warranty period will continue to be in effect, regardless of duration, until all video recordings are received and approved. All defects in the system will be corrected at the Contractor's expense.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Payment for this, and all items, shall be included within the total lump sum price of the overall project as shown on the bid form. Progress payments will be made based on the progress complete percentage of the schedule of values, as approved by the Engineer.

END OF SECTION

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SECTION 02535 – MANHOLES AND APPURTENANCES

PART 1 GENERAL

1.01 SUMMARY

A. This section covers manholes, frames, covers, adapters, and other manhole appurtenances not specifically paid for in other sections, used in the gravity sewer collection system and outfall line. See Standard Detail Drawings.

B. All manholes, frames and covers supplied under this contract shall be from the same manufacturer.

PART 2 PRODUCTS

2.01 MATERIALS

A. Manholes

1. Manhole riser sections shall be pre-cast reinforced concrete with a minimum wall thickness of 5 inches, conforming to ASTM C 478. Concrete used in forming the sections shall have a minimum compressive strength of 4000 psi at 28 days. Reinforcing steel shall be Grade 60.

2. Manholes shall have precast reinforced concrete bases with shelves, channels and slopes as specified. Precast bases shall have same wall thickness and reinforcement as riser sections.

3. Joints between manhole sections as well as base section shall be tongue and groove with an o-ring gasket or approved equal conforming to ASTM C-443. Preformed gaskets shall be Ram-Nek, Kent-Seal No. 2, or approved equal

4. Manholes shall have yard permeability tests passing ASTM C497-03 prior to delivery. Manhole steps shall be plastic with ½" grade 60 steel reinforcing bars encapsulated with injection molded copolymer polypropylene with serrated surfaces.

B. Frames and Covers

1. All frames and covers shall be heavy duty, gray cast iron designed for H20 traffic loading. Metal used in the castings shall conform to ASTM A48 Class 30. All castings shall be manufactured true to pattern, uniform in quality, free from blowholes, shrinkage, distortion or other defects. Component parts shall fit together in a satisfactory manner and shall have continuously machined bearing surfaces to prevent rocking and rattling. Castings shall be smooth and well cleaned by shotblasting at the factory.

2. Frames and covers shall have skid resistant surface of raised knobs or indentations. Cover shall have the word "SEWER" cast into it. Non-watertight lids shall have two vent holes.

3. Frames and covers shall be manufactured in accordance with the dimensions shown in the Standard Detail Drawings; Olympic Foundry, or approved equal.

C. Manhole Connections

1. Connections to precast manhole sections shall be accurately core-drilled and shall utilize a properly sized flexible rubber boot providing a watertight seal. Adapter shall be factory tested for watertightness up to 10.8 psi. Kor-N-Seal as manufactured by NPC, Inc. or approved equal.

2. Connections to cast-in-place concrete shall be made with a rubber waterstop grouting ring. Ring shall clamp to pipe with stainless steel clamp and have waterstop ribs. Waterstop Grouting Ring by Press-Seal Gasket Corp., or approved equal.

D. Grout

1. Non-Shrink Grout. Grout shall be Sika 212, Euco N-S, Five Star, or approved equal nonmetallic cementitious commercial grout exhibiting zero shrinkage per ASTM C827. Grout shall not be amended with cement or sand and shall not be reconditioned with water after initial mixing. Nonshrink grout shall be placed and packed only with the use of an approved commercial bonding agent. Unused grout shall be discarded after 20 minutes

PART 3 EXECUTION

3.01 MANHOLE INSTALLATION

A. Prepare native soil and place and compact the crushed rock base to 95% maximum dry density as shown in the Standard Detail Drawings. Backfill material around manholes shall be as specified for trenches in Section 02320.

B. Concrete base shall be carefully placed on the prepared bedding so as to be fully and uniformly supported at true grade and alignment.

C. Pipe penetrations shall be core drilled to the appropriate size for each pipe entering or exiting the manhole. Jackhammering will not be allowed. Install appropriately sized KOR-N-SEAL boot on each pipe and apply non-shrink grout to remainder of wall penetration to provide positive seal. Non-shrink grout shall be as specified.

D. Install transition couplings, per Section 02530, within 2 feet of the outside wall of manholes on all pipes; or, a pipe bell shall be located a minimum of 1 foot to a maximum of 2 feet from the outside wall of manholes.

E. All flow channels within precast bases shall be constructed of non-shrink grout with a minimum depth of three-fourths (¾) the contributing pipe diameter. Inverts shall be true to line and grade with flow lines having a minimum drop of 0.2 feet from inlet to outlet. Sides of channels shall be troweled smooth to prevent solids deposition. Ledges or benches shall be sloped towards channel to drain. Provide fine broom finish on ledges.

F. Clean tongue and grooves of base and wall sections, prime and apply joint sealer prior to setting in place. Ensure that joint has fully seated. Use approved flexible joint sealant and same manufacturer's primer. The height of the lowest wall section shall be at least three (3) times the inside diameter of the largest sewer pipe entering the manhole and in no case less than 2-feet. Wall sections shall be plumb vertical.

G. Use eccentric cone top section for manholes greater than 6-feet deep. Use extension rings in accordance with the standard detail.

H. Frame and covers shall be installed so that the cover is exposed and flush with the existing surface. In no case will pavement be raised or lowered to meet the grade of installed manhole frames and covers. Where manholes are installed in sloping areas, the grade of the slope shall intersect the top rim of the cover on the uphill side. Manhole frame shall be sealed to the concrete manhole section with a bed of non-shrink grout on either side of bead of flexible joint sealant. In addition, the frame and cover shall be grouted to the outside of the concrete manhole section.

I. Manhole installations with tilted or otherwise defective bases, wall sections which are not plumb, covers which do not match existing grade properly, or are otherwise not in specification compliance shall be removed by the Contractor and replaced until acceptable.

3.02 MANHOLE VACUUM TESTING

A. Precast concrete manholes shall be tested in accordance with the following procedure. Manhole installations which fail the testing shall be repaired or replaced until passing results are obtained. If flexible joint sealant is pulled out during testing, it shall be repaired. No payment to the Contractor will be made for such repair and/or replacement.

B. Testing shall be done in the presence of the Engineer. Notify Engineer at least 2 working days in advance.

C. All manholes shall be tested for acceptance after the trench has been backfilled, compaction requirements have been met, road base rock has been installed, paving is complete, and concrete manhole collars have been installed. If manhole has passed test and the castings have later been disturbed, manhole shall be re-tested.

D. Thoroughly clean all manholes prior to testing. Remove all debris and do not allow foreign material to enter downstream piping.

E. Contractor shall provide all necessary equipment and personnel to conduct the testing, including vacuum equipment and indicating devices.

F. Procedure:

1. Plug all pipes entering manhole. Secure all plugs to prevent movement while vacuum is being drawn.

2. Testing shall include the joint between the manhole cone or riser ring(s) and the manhole cover frame.

3. Installation and operation of vacuum equipment and indicating devices shall be in accordance with the manufacturer's specifications and instructions.

4. Withdraw air from the manhole until a measured vacuum of 10-inches of mercury (10" Hg) is established in the manhole interior.

5. Record the time it takes for the vacuum to drop to 9-inches of mercury (9" Hg). Acceptance standards are based on this 1-inch of mercury change in negative pressure. Time measured for the 1" Hg pressure change shall be equal to or greater than the values in the following table:

Vacuum Testing Requirements (minimum test times, seconds)

Manhole Depth (ft)	Manhole Diameter (in)				
	42"	48"	54"	60"	72"
8' or less	17	20	23	26	33
10	21	25	29	33	41
12	25	30	35	39	49
14	30	35	41	46	57
16	34	40	46	52	67
18	38	45	52	59	73
20	42	50	53	65	81
22	46	55	64	72	89

6. Hydrostatic testing of manholes may be allowed. Test shall be in accordance with ASTM C497 as modified here. Test will consist of plugging all inlets and outlets and filling the manhole with water to the rim. Leakage in each manhole shall not exceed 0.2 gallons per hour per foot of head above the invert. Leakage will be determined by refilling to the rim using a calibrated or known volume container. Testing duration shall be at least 2 hours.

7. Testing results shall be recorded on the DEQ form included at the end of this specification.

3.03 MODIFY EXISTING MANHOLE BASE

A. Modify or reconstruct manhole bases as required by hand forming channels with non-shrink grout to provide smooth flow surfaces from all inlets to the outlet. Non-shrink grout shall be as specified.

B. All flow channels shall be constructed with a minimum depth of three-fourths (¾) the contributing pipe diameter. Inverts shall be true to line and grade with flow lines having a minimum drop of 0.2 feet from inlet to outlet.

C. Shape flow channels to conform to connecting pipe surfaces. Ledges or benches shall be sloped towards channel to drain.

D. Remove all rough sections or sharp edges that might obstruct flow or cause snags.

E. Form base channels in conformance with the standard detail drawings.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Payment for this, and all items, shall be included within the total lump sum price of the overall project as shown on the bid form. Progress payments will be made based on the progress complete percentage of the schedule of values, as approved by the Engineer.

END OF SECTION

Attachment: Manhole Test Record Form provided on following page.

MANHOLE TEST RECORD

Project: _____ Project No. _____

Contractor: _____ Testing Company: _____

Witnessed By: _____ (Inspector)

Date	MH No.	Paved? (P or U)	MH Depth	VACUUM				HYDROSTATIC						COMMENTS
				MH Diam.	Time Req.	Vac. Start	Vac. End	Time Start	Time End	Total Time	Volume Change	Loss (gph)	PASS FAIL	

NOTE:

All Adjacent surface restoration will be completed before conducting a sanitary manhole acceptance test, including finish paving and final adjustment to grade. Any test conducted beforehand shall be considered informal and will not count for acceptance.

Vacuum test will be conducted in accordance with latest applicable standards, such as established procedures based on ASTM C1244-93, starting at 10" Hg of vacuum. Vacuum tests will be conducted in accordance with latest applicable standards, such as those listed under APWA 306.3.03B, Vacuum Testing.

Hydrostatic test will be conducted in accordance with the 1990 Oregon APWA standards Specifications for Sanitary Sewer Construction, Section 306.03. Manholes shall be filled to a mark on the iron frame at the start of the test, or to the rim of the frame.

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SECTION 02630 – STORM DRAIN PIPING & FITTINGS

PART 1 GENERAL

1.01 SUMMARY

A. This item shall include furnishing and installing of the storm drain piping and fittings as required for the replacement of the existing storm drain piping all as identified on the Plans.

B. The Contractor shall provide manufacturer's certifications, including test results for all piping, fittings and appurtenances supplied. All submittals shall be in conformance with the requirements of Section 01300.

C. All work shall conform to the latest version of the Oregon Standard Specifications (OSS) Part 00400, except as specified herein and shown on the Plans.

PART 2 PRODUCTS

2.01 MATERIALS

A. All pipe, fittings and appurtenances shall be new and unused.

B. PVC Pipe and fittings for storm drain piping shall conform to Class 12454-B, as defined in ASTM D1784. Pipe and fittings shall meet the requirements of ASTM D-3034 for 4" – 15" pipe SDR 35 and ASTM F679 for 18" – 36" pipe SDR 18. Neoprene gaskets with push on joints shall conform to ASTM F477.

1. All fittings and accessories shall be as manufactured and furnished by the pipe supplier or an approved equal and shall have bell and spigot configurations compatible with that of the pipe. Fittings and accessories shall have the same requirements as the pipe.

2. ADS High Performance Sanitie polypropylene pipe is an accepted equal/ approved pipe.

C. HDPE Storm Drain Pipe 12" through 48" diameter

1. Black PE materials used for the manufacture of polyethylene pipe and fittings shall be PE 4710 high density polyethylene meeting ASTM D 3350 cell classification 445574C (formerly PE 3408 meeting 345464C per ASTM D3350-02) and shall be Listed in the name of the pipe and fitting Manufacturer in PPI (Plastics Pipe Institute) TR-4 with a standard grade HDB rating of 1600 psi at 73°F. Color material, when used, shall be the same except for meeting ASTM D 3350 cell classification 445574E.

2. Pipe shall be DR11, Pressure Class 200 minimum, IPS Size, and shall be manufactured to the requirements of ASTM F714 and AWWA C906-99 (IPS) and shall be of standard pipe lengths (40 or 50 foot).

3. HDPE pipe shall be DriscoPlex 4100 IPS HDPE pipe; ISCO industries or approved equal.

4. Pipe shall be provided with a continuous mark made of durable printing containing the following:

a. Name and/or trademark of pipe manufacture, nominal pipe size and dimension ratio.

b. The manufacturing standard reference ASTM F714 and polyethylene grade per ASTM D3350.

D. Concrete shall conform to Oregon Standard Specifications Section 00440, Commercial Grade Concrete. Compressive field strength shall not be less than 3,000 psi at 28 days. Maximum aggregate size shall be 1½-inches. Slump shall be between 2 and 4 inches.

E. Non-Shrink Grout. Grout shall be Sika 212, Euco N-S, Five Star, or approved equal nonmetallic cementitious commercial grout exhibiting zero shrinkage per ASTM C827. Grout shall not be amended with cement or sand and shall not be reconditioned with water after initial mixing. Nonshrink grout shall be placed and packed only with the use of an approved commercial bonding agent. Unused grout shall be discarded after 20 minutes.

PART 3 EXECUTION

3.01 PIPE INSTALLATION

A. All pipe and fittings shall be installed in accordance with the manufacturer's recommendations and APWA standards.

B. Remove from job site material, which in the judgment of the Engineer is damaged, not as specified, or otherwise rejected. Payment will not be made for damaged or rejected materials, their removal, or for repairs to such materials.

C. Preparation of Trench – Excavate and prepare trench for pipe laying to the lines and grades as specified and shown on the Plans. Place any required foundation stabilization and compact pipe bedding prior to laying pipe. Stabilize trench as required and comply with OSHA safety provisions.

D. Place and compact pipe bedding material before placing pipe in the trench. When applicable, dig depression for pipe bells to provide uniform bearing along the entire pipe length. Thoroughly compact bedding material to prevent future bellies.

E. Install to lines and grades shown on the Plans. Maximum deviation shall not exceed 0.05 feet vertically.

F. Prior to lowering pipe into the trench, the Engineer or City representative will check for damage to the pipe. The Contractor shall repair or replace, as directed, all damaged or flawed pipe prior to installation.

G. Thoroughly clean inside the pipe before laying. Prevent foreign material from entering the pipe while it is being placed in the trench. Remove all foreign material from the inside of the pipe and joint before the next pipe is placed. Keep debris, tools, rags or other materials out of the pipes at all times.

H. Lay pipe with bell ends facing the direction of laying. For lines on an appreciable slope, face bells up-grade unless otherwise directed by the Engineer. Thoroughly clean the ends of the pipe to remove all foreign matter from the pipe joint. Lubricate the bell and spigot ends with approved pipe lubricant, as recommended by the manufacturer.

I. Care must be taken to ensure the pipe is not moved and the side support fill is not disturbed when moving sheeting or trench boxes.

J. Place materials in the pipe zone in layers not greater than 6 inches thick and in a manner that equalizes the pressure on the pipe and minimizes stress. As required under the haunches of pipe and areas not accessible to mechanical tampers or to testing, compact with hand methods to ensure thorough contact between the material and the pipe. Before placing the pipe zone material, condition, aerate, or wet the material so that the moisture content of each layer is within minus 4% to plus 2% of optimum moisture content

K. Provide proper Backfill Class material as required. Backfill the trench above the pipe zone in successive lifts. Do not allow the backfill to free-fall into the trench until at least 3 feet of cover is provided over the top of the pipe. Modify the compaction as necessary to protect the pipe. Compact each lift to not less than 95% of the maximum dry density.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Payment for Storm Drain Piping and appurtenances shall be included within the overall lump sum cost for the project.

B. Payment for connection to existing catch basins and other structures or pipes shall be included within the lump sum cost for the overall project and shall include compensation for all materials, equipment and labor for a complete water-tight connection including, but not limited to; coring or jack hammering, flexible rubber boot or water stop ring, transition coupling and appurtenances for a complete installation and connections.

END OF SECTION

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SECTION 02631 – CATCH BASINS

PART 1 GENERAL

1.01 SUMMARY

A. This section includes the furnishing and installing of catch basins and area drains. Catch basins and area drains shall conform to the type and as shown on the Plans and shall include frames and grates.

B. Catch basins and area drains shall be precast unless specified otherwise or as approved by the Engineer. Catch basins and area drains shall conform to the sizes, dimensions and locations as shown on the Plans.

C. Minor revisions in the new catch basins and area drains may be required to allow for adjustment of new drain pipe grades. The Contractor shall field verify pipe penetrations and dimensions (height) required and shall not be entitled to any additional compensation for revising precast catch basins to allow for minor filed revisions.

PART 2 PRODUCTS

2.01 MATERIALS

A. Catch Basins

1. Site Catch Basins

a. Catch Basins shall be precast to the sizes shown within the details of these Plans.

B. Type 2 catch basin shall be ODOT Type G-2MA with frame and type 2 grates.

1. Frame and grate shall conform to the ODOT type 2 grate.

2. Provide minimum 12" sump under outlet.

3. Provide concrete apron only where shown on Plans.

4. Catch basin, frame, and grate shall meet H20 loading.

C. Area Drains (If applicable)

1. Reinforced Concrete Pipe (RCP)

a. Pipe and fittings shall conform to the requirements of ASTM C76 or ASTM C655.

b. Frame and Grate shall be Olympic Foundry Model No MH9G or approved equal.

c. Concrete for base shall be in conformance with Section 03300.

D. Grout shall be non-shrink as specified in Section 03600.

E. Aggregate base material shall conform to Section 02340.

F. Cast-in-place concrete shall conform to Section 03300.

PART 3 EXECUTION

3.01 GENERAL

A. All inside surfaces shall be smooth and free of depressions or protrusions. Cast-in-place concrete shall comply with Section 03300 and precast concrete shall comply with applicable parts of Section 03480.

B. Connecting pipe shall be placed the full thickness of wall and flush with inner face. Place pipe at the required grade and alignment. Connect pipe to each catch basin and area drain with grout as required for water tight joints.

C. Precast cast basins and area drains shall be installed per manufacturer's recommendations.

D. Aggregate base material shall be compacted to at least 95 percent of maximum density as determined by AASHTO T-180. Unless otherwise shown, depth of base material shall be a minimum of 6-inches.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Wastewater Treatment Plant Improvements

1. Payment for Catch Basins and other work in this section shall be included as a portion of the lump sum price for the overall project. No separate measurement for these quantities will occur.

END OF SECTION

SECTION 02720 – AGGREGATE BASE/ GRAVEL SHOULDER

PART 1 GENERAL

1.01 SUMMARY

A. This section includes all work necessary for furnishing, placing, compacting and grading aggregate base/ Gravel Shoulder on the prepared surface to the lines, grades, thicknesses and cross sections shown on the Plans or where indicated.

1.02 REFERENCES

A. ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

B. OSS – Oregon Standard Specifications for Construction, 2008 Edition.

1.03 SUBMITTALS

A. Contractor shall furnish sample of proposed material for visual inspection by Engineer and Owner for approval prior to importing to site.

PART 2 PRODUCTS

2.01 MATERIALS

A. Aggregate base course and shoulder rock shall be 1" – 0 or ¾" – 0 (19.0mm – 0) angular crushed rock conforming to OSS Section 00640. Use clean, hard, durable aggregates, reasonably well-graded from the maximum size to dust.

B. Aggregate base shall conform to OSS Section 00640 or shall be obtained from a source pre-approved by the Owner.

C. Geo-Fabrics

1. Separation liner shall be provided beneath aggregate base and native bearing soil and shall have a mean average roll value (MARV) strength properties meeting the requirements of AASHTO M 288-2000 Class 2 geotextile (geotextile for separation) with a permittivity greater than 0.05 sec. $^{-1}$ and an apparent opening size less than 0.6 mm.

2. Specification sheet to be provided on selected geotextiles for approval prior to order and delivery to site.

PART 3 EXECUTION

3.01 WORKMANSHIP

A. Sequencing and Scheduling –

1. Notify Owner 48-hours prior to any road closures and/ or disruption of flow of traffic.

2. Notify Engineer 48-hours prior to placement of aggregate base to permit inspection.

B. Excavate to proper sub-grade depths or elevations as shown on the Plans or as necessary to provide required thickness of aggregate base.

C. Preparation of sub-grade – Provide a firm sub-grade surface on which aggregate base is to be placed.

1. Sub-grade Over Excavation & Replacement – Remove and dispose of any unstable or unsuitable materials as directed by the Owners representative or Engineer. Replace any excavated materials with successive lifts of aggregate sub-base or other materials as directed by the Owners representative or Engineer. Grade and compact, as required, to provide a smooth surface that conforms to the surrounding grades.

2. Sub-grade Compaction – compact exposed sub-grade by wetting or other means until it is firm and unyielding, per OSS 00344.45.

3. Place geo-fabric separation liner over the entire area/ subgrade to provide a bridge over any soft native bearing soils. Liner shall be placed smooth and without wrinkles or folds in the direction of filling with a minimum 2 foot overlap between adjacent rolls.

D. Mixing – Mix to provide a homogeneous mixture of unsegregated and uniformly dispersed materials. Add water or aerate, as necessary, during mixing to achieve optimum moisture content ±2% during placement.

E. Placement

1. When, in the judgment of the Engineer, the weather is such that satisfactory results cannot be achieved, operations shall be suspended. Owner shall not be liable for damages or claims of any kind or description due to the suspension of operations by the Engineer.

2. Aggregate base materials shall be deposited on the sub-grade at a uniform quantity per linear foot so that the Contractor will not resort to spotting, picking up, or otherwise shifting material. Segregation of aggregates shall be avoided and material so spread shall be free of pockets of coarse or fine materials.

3. Place aggregate base materials such that when compacted and finish graded it will conform to the grades and sections shown on the Plans. Aggregate base materials shall be placed in maximum lifts of 6-inches, or as approved by the Engineer. Place each layer in spreads as wide as practical and to the full width of the course before a succeeding layer is placed.

4. Place shoulder rock materials such that when compacted and finish graded it will match final pavement grade. Shoulder rock materials should be 1 foot wide and depth as needed, or as approved by the Engineer.

F. Compacting and Shaping

1. Aggregate base materials shall be compacted by self propelled, smooth drum, static or vibratory rollers capable of achieving the specified compaction.

2. Shape and maintain the surface of each layer of aggregate base during compaction operations such the surface of each layer is parallel to the established grade and cross section for the finished surface within 0.05 foot.

3. Aggregate base materials shall be compacted to 95% maximum dry density as determined by the ASTM D698 test method.

G. Comply with Section 02321, Compaction Testing.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Measurement and payment for Compacted Aggregate Base shall be included within the lump sum cost for the overall project. Payment shall include compensation for materials, hauling, placement, and compacting, testing and all other incidental work.

B. Measurement and payment for geo-fabric separation liner shall be included within the lump sum cost for the overall project. Payment shall include compensation for materials, placement of materials and all other incidental work.

D. Measurement and payment for gravel shoulder rock to provide a smooth transition to existing ground and grades shall be included within the lump sum cost for the overall project. Payment shall include compensation for materials, hauling, placement, and compacting, testing and all other incidental work.

END OF SECTION

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SECTION 02740 – HOT MIX ASPHALT CONCRETE PAVEMENT

PART 1 GENERAL

1.01 SUMMARY

A. This section includes furnishing all materials, labor and equipment necessary to construct asphalt concrete pavement to the lines, grades and cross sections shown or established, including one or more courses and overlays. Work shall be performed in conformance with any applicable State, County or City Standards.

PART 2 PRODUCTS

2.01 DEFINITIONS

A. Hot Mixed Asphalt Concrete (HMAC) – Asphalt concrete is a hot mix of asphaltic cement; well graded, high quality aggregate; mineral filler and additives, as required; plant mixed into a uniformly coated mass, hot laid in on a prepared foundation, and compacted to a specified density.

B. Oregon Standard Specifications (OSS) – The 2008 Oregon Department of Transportation/APWA Oregon Chapter Standard Specifications for Construction.

2.02 MATERIALS

A. Unless otherwise specified herein, types, grades, quality and proportions of materials shall conform to specified and/or applicable sections of the current Oregon Standard Specifications.

B. HMAC shall be Level 3 HMAC, ½-inch Dense Graded Mix in accordance with OSS Section 00745.

C. Asphalt Tack Coat shall consist of CSS-1 or CSS-1h emulsified asphalt (EA) tack coat conforming to OSS 00730.

D. Base Aggregate shall be as specified in Section 02720 of these specifications.

PART 3 EXECUTION

3.01 WORKMANSHIP

A. Unless otherwise specified herein, HMAC shall be mixed, processed, hauled, laid, compacted and finished in accordance with OSS Section 00745.

B. Notify the Engineer at least 48-hours prior to placement of base aggregate and asphalt concrete pavement to permit inspection.

C. When, in the judgment of the Engineer, the weather is such that satisfactory results cannot be achieved asphalt concrete paving operations shall be suspended. Owner shall not be liable for damages or claims of any kind or description due to the suspension of operations by the Engineer. HMAC shall not be placed when the ambient temperature is below 35° F.

D. Adhere to all applicable State and/or OSHA regulations pertaining to road closure, traffic control, and other related safety precautions.

E. To provide for the convenience and safety of the traveling public, pavement replacement shall be performed immediately following the completion of backfilling operations. In the event that pavement replacement cannot be performed as such, the Contractor shall maintain the trench backfill on a daily basis, as directed, until pavement replacement has been completed.

F. Subgrade and aggregate base shall be prepared, compacted and finished in accordance with Section 02720.

G. Pavement Sawcutting

1. Utility trenches in existing pavement areas shall be sawcut immediately prior to repaving. Sawcuts shall be made a minimum of 12-inches outside the limits of the trench, or to the outer extents of pavement damaged as a result of the Contractor's operations, whichever is greater.

H. Tack Coat Asphalt

1. Contact surfaces of manholes, catch basins, gutters and existing pavements shall be treated with a layer of tack coat asphalt. Do not place on wet surfaces.

2. Joints between existing and new AC pavement shall be filled with tack coat asphalt.

3. Apply tack coat asphalt with a pressure distributor capable of uniformly applying the emulsified asphalt at even heat on variable surface widths up to 16-feet, at readily determined and controlled rates from 0.05 to 0.20 gallons per square yard, and with uniform pressure. Pressure distributor shall include a tachometer, pressure gages, accurate volume measuring devices and a thermometer for measuring temperature of tank contents. Pressure distributor shall be equipped with a positive power asphalt pump and full circulation spray bars adjustable both laterally and vertically. Set bar height for triple lap coverage.

4. Minimum surface temperature at the time of placement of tack coat asphalt shall not be less than 50° F.

5. Tack coat shall only be applied to clean dry surfaces. All loose material should be removed by sweeping, flushing with water or other approved methods.

6. Apply tack coat asphalt at the following rates for the indicated surfaces.

Surface	Application Rate (gallons / yd^2)	
	Undiluted	Diluted 1:1 with Water
New HMAC	0.05 – 0.07	0.10 – 0.13
Oxidized HMAC	0.07 – 0.10	0.13 – 0.20
Milled HMAC	0.10 – 0.13	0.20+

7. Tack coat asphalt shall be at a temperature between 140° F and 185° F as recommended by the manufacturer at the time of application.

8. Do not place HMAC on the tack coat until the asphalt separates from the water, but before it loses its tackiness.

I. Asphalt Concrete Pavement

1. HMAC shall be a minimum of 250° F at the time of placement.

2. Storage of HMAC in silos shall not be permitted.

3. Control of line and grade shall be manual.

4. HMAC shall be covered during hauling if rain or cold air temperatures are encountered any time between loading and placement. HMAC will be rejected if any of the following is observed: mix falls below minimum specified temperature; slumping or separating; solidifying or crusting; absorbing moisture. Rejected loads shall be disposed of at the Contractor's expense.

5. Deposit HMAC from the hauling vehicles so segregation is prevented. HMAC shall not be windrowed.

J. Placement

1. HMAC should be placed using a self-contained, self-propelled paver supported on tracks or wheels that do not contact the mix being placed.

2. When leveling irregular surfaces and raising low areas, do not exceed 2-inches actual compacted thickness on any one lift.

3. Place the mix in the number of lifts and courses, and to the compacted thickness for each lift and course as shown on the Plans. Limit the minimum lift thickness to twice the maximum aggregate size in the mix.

4. The compacted depth of new asphalt concrete pavement on public streets shall be 4-inches, minimum. Asphalt concrete paving for utility trench patches shall be 4-inches, minimum, or shall match the existing paving, whichever is greater. Asphalt concrete overlays on public streets shall have a minimum thickness of 4-inches. On non-public roads or driveways, match existing thickness, with a minimum thickness of 2-inches. Asphalt concrete pavement in excess of 2-inches thick shall be constructed in multiple lifts of approximately equal thickness. The maximum compacted thickness of any individual lift shall not exceed 2-inches.

5. Pavement shall be placed, shaped, compacted and finished to the grades and cross sections shown on the Plans or established. Taper new overlays at limits to match existing asphalt pavement.

6. HMAC shall be compacted using self-propelled steel wheeled static rollers, vibratory rollers, or pneumatic tired rollers capable of achieving the minimum compaction specified. If vibratory rollers are used, they should be specifically designed for compaction of HMAC, have adjustable amplitude and frequency, and be capable of at least 2000 vibrations per minute. Finish rolling should be performed by a static roller or a vibratory roller in the static mode.

7. Asphalt concrete pavement shall be compacted to a minimum of 92% relative compaction with the theoretical maximum density determined by AASHTO T-209. Testing shall be performed at random locations using a nuclear gauge operated in the back-scatter mode. At least one density test shall be performed every 1000 lineal feet on each spread or a minimum of one test each day of production. At least one density test will be required.

8. No traffic shall come in contact with any newly paved surface until surface has cooled and set sufficiently to prevent marking. The Contractor is responsible for traffic control.

K. Warranty

1. Contractor shall maintain all asphalt concrete paved areas and shall furnish all required materials and workmanship at no additional cost to the Owner for a period of one year following the Owner's acceptance of the complete project.

2. If any newly paved asphalt concrete surfaces settles, cracks, breaks, or becomes otherwise defective within the warranty period as described herein, then the deficiencies or damages in surfacing shall be immediately repaired by the Contractor upon request and in a manner approved by the Engineer.

3. All costs incurred in the repair of deficiencies or damages shall be borne by the Contractor, with no additional compensation allowed.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Payment for this, and all items, shall be included within the total lump sum price of the overall project as shown on the bid form. Progress payments will be made based on the progress complete percentage of the schedule of values, as approved by the Engineer.

END OF SECTION

SECTION 02900 – LANDSCAPE RESTORATION & CLEANUP

PART 1 GENERAL

1.01 SUMMARY

A. This section covers the work necessary to reseed, restore and cleanup the site(s). Work shall include the removal of all construction equipment, rubbish, construction debris, and unused materials of any kind resulting from the project activities.

B. Site cleanup shall include the cleanup of all pavement surfaces, whether new or existing within the limits of the project and shall include the replacement of any disturbed pavement markings.

PART 2 PRODUCTS

2.01 RESEEDING MATERIALS

A. Grass seed shall be from blue tag stock and from the latest crop available. Deliver each variety in standard containers labeled in accordance with Oregon State laws and U.S. Department of Agriculture rules and regulations under the Federal Seed Act. Provide with label showing seed variety, percentage of purity, germination, maximum weed content, date of test within nine months of date of delivery, and as set forth in the General Seed Certification Standard by the Oregon State University Certification Board. Mold or other evidence of container having been wet or otherwise damaged will be cause for rejection of each lot of seed. Grass seed may be delivered to the project as a mixture provided each variety of grass seed in the mixture is identified and labeled as specified.

B. Where imported topsoil is required, provide natural, fertile, friable topsoil, representative of local productive soil, and 90% free of clay lumps or other foreign matter larger than 2-inches in diameter, not frozen or muddy, with pH 5.0 to 7.0, and not less than 3% humus as determined by loss of ignition of moisture-free samples dried at 100° C. Gravel portion (particles larger than 2 mm) shall not exceed 15% of total volume. Topsoil shall be free of quack grass, horsetail and other noxious vegetation and seed. Should such regenerative material be present in the soil, all resultant growth, both surface and root, shall be removed by the Contractor within 1-year of acceptance of the work at no expense to the Owner.

C. Provide a lime compound of ground dolomitic limestone not less than 85% total carbonates and magnesium, ground so that 50% passes a number 100 sieve and 90% passes a number 20 sieve. Coarser material will be acceptable provided the specified rates of application are increased proportionately on the basis of quantities passing the number 100 sieve.

D. Furnish fertilizer in moisture-proof bags marked with weight and the manufacturer's certified analysis of the contents showing the percentage for each ingredient. Furnish fertilizer in a dry condition free from lumps and caking, in granular or palletized form, of standard commercial grade conforming to all State and Federal regulations and to the standards of the Association of Official Agricultural Chemists.

E. Provide all other materials required to accomplish the work specified.

PART 3 EXECUTION

3.01 WORKMANSHIP

A. Surface Dressing

1. Slopes, sidewalk areas, planting areas, easements and roadways shall be smoothed and dressed to the required cross section and grade by means of a grading machine insofar as it is possible to do without damaging the work or existing improvements, trees and shrubs. Supplement machine dressing by hand work as directed.

2. Upon completion of the cleaning and dressing, the project shall appear uniform in all respects. Grade all areas true to line and grade as shown or as approved. Where the existing planting is below sidewalk and curb, fill and dress the area to the walk regardless of limits shown. Wherever fill material is required in the planting area, make finished surface high enough to allow for final settlement.

3. Remove and dispose of all excavated or construction materials, equipment, and rubbish of all kinds resulting from the work. Where brush and trees beyond the limits of the project have been disturbed or damaged, remove and dispose of or restore same, as directed, at no expense to the Owner.

4. Clean all drainage facilities such as inlets, catch basins, culverts and open ditches of all excess material or debris resulting from the work, to the satisfaction of the Owner.

5. Clean all pavement surfaces, whether new or existing within the limits of the project. Clean existing improvements such as curbs, gutters, walls, sidewalks, castings for manholes, monuments, water gates, lamp poles, vaults, signs, and other similar installations as approved. Flush the roadway with a pressure type flusher as approved. Hand sweep or flush all sidewalks as directed.

B. Restoring Planted Areas

1. Hand rake and drag all formerly grassed and/or planted areas leaving disturbed areas free from rocks, gravel, clay, or any other foreign material and ready, in all respects, for seeding. The finished surface shall conform to the original surface, be free draining and free from holes, rough spots, or other surface features detrimental to a seeded area.

2. Plant grass seed only at times when local weather and other conditions are favorable to the preparation of the soil and to the germination and growth of grass. Sow grassed areas evenly with a mechanical spreader at a rate of one pound per 300 square feet, roll with packer to cover seed, and water with fine spray. Method of seeding may be varied as approved, however, responsibility to establish a smooth, uniformly grassed area will not be waived.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Payment for Landscape Restoration & Cleanup shall be included within the overall lump sum cost of the project as stated on the Bid Form, and shall include topsoil, seed, landscape shrubs/trees, site cleanup, miscellaneous painted pavement markings and all other materials and work required to provide complete restoration of the site.

END OF SECTION

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SECTION 03110 – CONCRETE FORMWORK AND ACCESSORIES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Concrete formwork required for all project structural concrete.

B. Formwork design, placement, proper securing and support, and removal.

C. Coordination for various wall and slab penetration locations and sizes including sleeve positioning for casting in place.

D. Positioning of anchor bolts, grating and vault lid frames, and other imbedded items.

1.02 RELATED SECTIONS

A. Section 03300 – Cast-In-Place Concrete

B. Section 03200 – Concrete Reinforcement

C. Hangers and Inserts for Mechanical and Electrical Work: Divisions 15 and 16

1.03 REFERENCES

A. American Concrete Institute (ACI) 318-11, Chapter 6 – Formwork, Embedded Pipes, and Construction Joints.

B. ACI 347R-04 – Guide to Formwork for Concrete

C. ACI Special Publication, SP-4(7^{th}) – Formwork for Concrete

1.04 QUALITY ASSURANCE

A. The formwork shall be designed for the loads, lateral pressure, and allowable stresses outlined in "Recommended Practice for Concrete Formwork", ACI 347 and for design considerations, wind loads, allowable stresses and other applicable requirements of the local building code. The design and construction of the formwork shall be the responsibility of the CONTRACTOR. Form design shall be certified by a Registered Structural Engineer.

B. Forms shall be constructed by laborers experienced in concrete formwork erection. Formwork shall be constructed such that the hardened surfaces shall conform to the tolerance limits of ACI 347.

C. Formwork shall be true in every respect to produce hardened concrete to the required shape, size, grade, and alignment as indicated on the Construction Drawings, and of sufficient strength, bracing, and rigidity to maintain their position and shape under the loads and operations incidental to placing and curing the concrete, as well as other forces resulting from the movement of the forms. The forms shall be mortar-tight at the time concrete is placed in them and shall be so constructed that the surfaces of the finished concrete will be reasonably free from ridges, fins, offsets, or similar defects. Adequate and suitable means for removing the forms without injury to the surfaces or edges of the finished concrete shall be provided.

D. Resulting work which is not in conformance with applicable contract specifications shall be promptly removed and replaced.

1.05 DELIVERY, STORAGE AND HANDLING

A. Protect form materials from damage that may affect finish appearance or form stability.

B. Keep forms clean and free from deleterious materials. Protect form coating to prevent contamination.

C. Protect form ties from rusting.

PART 2 PRODUCTS

2.01 FORM MATERIALS

A. Plywood Forms will be grade marked B-B Plyform, Exterior Class 1 and 2 and HDO Medium Density Overlaid Plywood Concrete Form, B-Matte Formquard or equal, conforming to the requirements of U.S. Products Standard PS-1.

B. Metal Forms will use smooth metal plate free from surface irregularities.

2.02 ACCESSORIES

A. Form Ties

1. Shall be factory fabricated form ties, snap-off type of adequate design to prevent form deflection and concrete spalling upon removal. The permanently embedded portion shall terminate not less than ¾-inch from the face of finished concrete. The permanently embedded portion shall have a waterseal washer located at the approximate center of walls.

2. Breakback Distance: Ties will be placed so that the set back in the concrete is such that the portion of the tie remaining after snap-off and removal of exterior portions is at least 1 inches back from the concrete surface.

3. Do not use wire ties and wood spacers

D. Form Release Agents

1. Form coating will be non-grain-raising and non-staining resin or polymer type that will not leave residual matter on the surface of the concrete or adversely affect bonding to concrete of paint, plaster, mortar, protective coatings, waterproofing or other applied materials. Coatings containing mineral oils, paraffin, and other non-drying ingredients are not permitted. For concrete surfaces contacting potable stored water, the coatings and form release agents shall be completely non-toxic and approved by the EPA for the intended use.

E. Form Joint Caulking

1. Manufacturer and Brand: Sonneborn Sonolac, Dap Acrylic Latex, or approved

E. Chamfer Strips – clear white pine or similar with planed surface against concrete.

PART 3 EXECUTION

3.01 PREPARATION

A. Ensure that reinforcing steel is properly placed according the spacing and tolerances required, and that proper inspection has been conducted.

B. Ensure waterstops are installed as required when placed prior to formwork.

C. Review plans for wall and slab penetrations and imbedded items.

D. Remove debris and foreign matter from formwork. Clean form contact surfaces. Replace with new material when necessary or when directed.

E. Remove loose rust and foreign matter from reusable hardware prior to installation into Formwork.

F. Re-use Forms only when contact surfaces equal original use and forms have been adequately cleaned.

3.02 INSTALLATION

A. Comply with ACI 318 and ACI 347. Fabricate with facing materials that produce the specified tolerance requirements of ACI SP-4, produce true surfaces and lines, sharp corners, and surfaces free of offsets, bulges, ridges, etc.

B. Carefully conform to the shapes, lines and dimensions of the drawings. Ensure that edges are chamfered where shown. Form any Surface Indentations shown on the Drawings.

C. Arrange to provide concrete cold joints as indicated on the drawings. Unless otherwise directed, make contraction, expansion, and construction joints only where shown. Continue reinforcing steel across construction joints which are not indicated to be free moving.

D. At forms for exposed concrete, fill form panel joints with Form Joint Caulking Compound, and strike compound flush with panel on face adjacent to exposed Concrete, or cover joints with thin, smooth, plastic, pressure-sensitive tape.

E. At forms for exposed concrete, seal Form Ties against leakage with Form Joint Caulking Compound.

F. Make form joints tight to prevent leakage. Minimize the number of form joints used.

G. Ensure that formwork is properly supported, tied, and braced to prevent deflection and maintain shape (see allowable tolerances for formwork).

1. Provide bracing as required to meet load requirements.
2. Protect against undermining or settlement when placed on ground.
3. Anchor as required to prevent upward or lateral Formwork movement during Concrete placement.
4. Locate ties equidistant and symmetrical. Align vertically and horizontally.

H. Provide Access Openings as required for cleaning and inspection of Forms and Embedded Items prior to placing Concrete. Locate where not exposed to view.

I. Provide Openings and Chasings of Slabs and Walls for Mechanical and Electrical Work. Sizes and locations are directed by Mechanical and Electrical Trades and Drawings.

J. Anchor Bolts: Set with templates to assure accurate bolt positioning

K. During Concrete placement, in areas where Formwork develops weakness, settlement, or distortion, stop concrete placement, remove placed concrete, and remove or strengthen Formwork.

L. Reposition to true alignment prior to, during, and after Concrete placement, if necessary.

3.03 ALLOWABLE TOLERANCES FOR FORMWORK

A. Variation from Plumb: 1/4 inch in 10 feet maximum

B. Variation of Building Lines: 1/4 inch in any Bay or 20 feet maximum

C. Variation in Cross-Sectional Dimensions: Minus 1/8 inch; plus 1/4 inch

D. Variation in Surface Tolerance: 1/8 inch in any 10 feet measured with 10-foot straightedge.

E. Maximum Deflection of Form facing between Supports: 0.00025 x Span

F. Wall Locations: Accurately size and locate within 1/8 inch.

3.04 FORM TREATMENT

A. All forms shall be adequately treated with form release agent to prevent concrete damage during form removal.

B. Prior to each use: Apply form coating to contact surfaces in accordance with Manufacturer's instructions. Conduct surface preparation in accordance with manufacturer's instructions prior to coating forms.

C. When treating previously set forms, carefully prevent coatings from covering reinforcing steel, waterstops, imbedded items, or existing concrete.

D. Prevent coatings from collecting in puddles.

3.05 FORM REMOVAL

A. Leave forms and shoring in place until concrete has attained sufficient strength to safely support own weight and imposed loads.

B. Remove forms at time and in manner to insure safety of structure, and without concrete surface damage.

C. At exposed concrete, form removal time shall be uniform to avoid color differences.

D. Remove top forms from any sloping concrete surfaces as soon as concrete is self-supporting. Repair and finish, if necessary, and cure immediately.

3.06 CLEANING AND REPAIRING

A. Including Work of other Trades, clean, repair, and touch-up, or replace when directed, products which have been soiled, discolored, or damaged by Work of this Section.

B. Remove debris from Project Site upon Work completion, or sooner if directed.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Payment for concrete formwork items shall be included within the unit prices for concrete items in the Bid Form or as part of the lump sum price for concrete items in the Bid Form as applicable. No separate measurement and payment for concrete formwork and concrete accessories will occur.

END OF SECTION

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SECTION 03200 – CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section includes reinforcement for concrete including deformed steel bars, welded-wire-fabric, and fiber reinforcement.

B. Supply, detail shop drawings, and place reinforcement.

C. Provide reinforcing to the sizes and dimensions shown on the drawings and according to approved shop drawings for rebar placement.

1.02 RELATED SECTIONS

A. Section 03110 – Structural Cast-In-Place Concrete Forms

B. Section 03300 – Cast-In-Place Concrete

1.03 REFERENCES

A. American Standards for Testing and Materials (ASTM), latest edition

1. ASTM A 615 – Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
2. ASTM A 185 – Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
3. ASTM A 82 – Specification for Steel Wire, Plain, for Concrete Reinforcement

B. American Concrete Institute (ACI), latest edition

1. ACI 315-99 – Details and Detailing of Concrete Reinforcement
2. ACI 318 – Building Code Requirements for Reinforced Concrete
3. ACI 408R – Bond and Development of Straight Reinforcing Bars in Tension
4. ACI 439.3R-07 – Types of Mechanical Splices for Reinforcing Bars

C. Oregon Structural Specialty Code (OSSC) – Adopted Oregon code, 2010 edition or latest revision.

D. Concrete Reinforcing Steel Institute (CRSI)

1. CRSI Manual of Standard Practice, 1997
2. CRSI Reinforcing Bar Detailing, 1999
3. CRSI 63 – Recommended Practice for Placing Reinforcing Bars
4. CRSI 65 – Recommended Practice for Placing Bar Supports

1.04 SUBMITTALS

A. Certified Mill Test Reports for steel.

B. Detail and placement drawings. Submit in accordance with Section 01300 at least 14 days prior to reinforcement fabrication.

1. Reinforcing steel shall be detailed in accordance with the "ACI Detailing Manual" SP-66 (04), ACI Committee 315; CRSI; and in conformance with the project drawings.

2. Shop drawings shall include sufficient plan, section, and elevation drawings of all beams, walls, slabs, footings, columns, and other shapes to clearly show all reinforcement details, spacing, and sizes.

3. Bends, splices, hooks, ties and all other details shall be shown. Drawings shall indicate any fieldwork required.

4. Shop drawings shall show steel specifications and conformances.

C. Samples of all proposed bar supports with a written description of where each support is proposed to be used.

1.05 QUALITY ASSURANCE

A. Coordinate with other Trades affecting or affected by Work of this Section.

B. Bends, hooks, laps, splices, cover, and other details shall conform to OSSC Section 1907; and ACI 318, except where more stringent requirements are shown in the drawings or specified herein.

C. Perform reinforcement work in accordance with CRSI Documents 63 and 65.

D. Conduct field measurements as necessary prior to fabrication. Conform to the approved detail and placement drawings.

E. All materials shall be new, unused, specifically manufactured for the intended purpose.

F. Any welding shall be conducted by persons with Welder Certification in accordance with AWS D1.4.

1.06 DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered properly bundled and labeled to show grade, size and location. Deformed bars shall be marked with the letter "S" per ASTM A615. Deliver with suitable hauling and handling equipment.

B. Properly store to protect from moisture. Cover steel with waterproof covering and store so that materials are not against unprotected earth.

C. Handle material carefully to protect from cuts, nicks, kinks, deformation, and other damage. Ensure worker safety.

PART 2 PRODUCTS

2.01 REINFORCEMENT MATERIALS

A. Reinforcing Bars for Concrete

1. All structural reinforcement shall be deformed bars.
2. Deformed billet steel; ASTM A 615, Grade 60

2.02 ACCESSORIES

A. Provide all Accessories necessary for proper Reinforcement placement, spacing, support, and fastening. Bricks, broken CMU, spalls, rocks or similar materials shall not be used for support of reinforcing steel.

B. Tie Wire: 16-gauge minimum, black annealed steel; acceptable patented system.

C. Bar Supports, Bolsters, Chairs and Spacers

1. Sized and shaped for strength and support of reinforcement during installation and placement of concrete. Use only approved materials.
2. High density concrete dobies. Compressive strength equal or greater than concrete to be placed. No plastic or low cement content dobies accepted.
3. Chairs: Stainless steel. With plastic tips when used at surfaces that will be exposed to view.
4. Spacers: Plastic wheel type. Preco Barspan Wheels, or approved equal.
5. Plastic Shims may be used to support plastic spacers.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify that surfaces to receive Reinforcement are accurately sized and located, square, plumb, rigid, secure, and otherwise accurately prepared.

B. Prior to starting Work, notify General Contractor about defects requiring correction.

C. Reinforcement shall be free from mud, oil or other nonmetallic coatings that decrease bond.

D. Remove surface rust and mill scale with wire brush. Heavily rusted bars shall not be used.

E. Do not start Work until conditions are satisfactory.

3.02 PLACEMENT

A. Perform reinforcement work in accordance with CRSI Documents 63 and 65, and fabricate in compliance with ACI 315.

B. Conform to approved placement and detail drawings and specified tolerances herein.

C. Reinforcement shall be accurately placed and adequately supported before concrete is placed, and shall be secured against displacement within the tolerances of this section.

D. All reinforcement shall be bent cold unless otherwise permitted by the Engineer.

E. Reinforcement partially embedded in concrete shall not be field bent unless approved by the Engineer.

F. Do not weld splices, crossing bars, or other locations.

G. Splices: Provide bars in full lengths to preclude the need for splices as much as possible. Locate any allowed splices not indicated on the drawings at points of minimum stress. Development length and splices shall conform to ACI 318. At wire mesh, lap one full mesh plus 2-inches. Splices of adjacent bars shall be staggered. Use greater splice lengths where shown in the drawings.

H. Spacing: Comply with OSSC Section 1907.6, contract drawings, and approved shop drawings.

I. Protective Concrete Cover: Comply with OSSC Section 1907.7 minimums. Provide greater cover where shown in the drawings.

J. Bars in slabs shall be supported on well-cured concrete blocks or approved chairs.

K. Tolerances:

1. Concrete Cover: Plus or minus ¼ inch.

2. Spacing Between Bars: ¼ inch.

L. Bar relocation to avoid interference with other reinforcement, conduits or embedded items: 1 bar diameter, unless otherwise approved by Engineer.

M. Reinforcement around openings: Unless otherwise shown on the drawings, place at least double the area of steel removed by the opening around the opening and extend on each side sufficiently to develop bond in each bar. At square or rectangular openings, place at least one diagonal bar at each corner.

3.03 PROTECTION

A. Protect other Work against damage and discoloration caused by Work of this Section.

B. Protect placed reinforcement from subsequent movement and inclement weather until concrete is placed.

3.04 FIELD QUALITY CONTROL

A. The Engineer shall be notified when reinforcing steel is ready for inspection. Inspection must occur before any concrete is placed.

B. Notify Engineer at least 48 hours in advance and allow sufficient time for inspection.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Cost for Concrete Reinforcement work shall be included within the applicable unit price or lump sum items in the Bid Form. No separate measurement and payment for concrete reinforcement will occur.

END OF SECTION

03300 CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Section includes work required to supply, place, finish and cure cast-in-place concrete, including mix design, certifications, submittals and testing.

B. Installation of inserts, sleeves, anchor bolts, grounding cable and other items embedded in concrete, but furnished under other sections.

C. Rinsing out of transit mix trucks, washing or wetting of concrete, site cleanup, or other activity related to water at the site shall be in conformance with all EPA requirements for the prevention of water runoff to storm water sewers or creeks.

1.02 RELATED SECTIONS

A. Section 03110 – Structural CIP Concrete Forms
B. Section 03200 – Concrete Reinforcement
C. Section 03600 – Grout

1.03 REFERENCES

A. American Standards for Testing and Materials (ASTM), latest editions
   1. ASTM C31 – Standard Specification for Making and Curing Concrete Test Specimens in the Field
   2. ASTM C33 – Specification for Concrete Aggregate
   3. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
   4. ASTM C94 – Standard Specification for Ready-Mixed Concrete
   5. ASTM C143 – Standard Test Method for Slump of Hydraulic Cement Concrete
   6. ASTM C150 – Standard Specification for Portland Cement
   7. ASTM C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
   8. ASTM C260 – Standard Specification for Air Entrained Admixtures for Concrete
   9. ASTM C309 – Standard Specification for Liquid Membrane – Forming Compounds for Curing Concrete
   10. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete
   11. ASTM C618 – Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete

B. American Concrete Institute (ACI), latest editions
   1. ACI 301 – Standard Specification for Structural Concrete in Buildings
   2. ACI 304R – Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
   3. ACI 305R – Recommended Practice for Hot Weather Concreting
   4. ACI 306R – Recommended Practice for Cold Weather Concreting
   5. ACI 309R – Guide for Consolidation of Concrete
   6. ACI 318 – Building Code Requirements for Reinforced Concrete
   7. ACI SP-15 – Field Reference Manual *(have copy on-site)*

C. Oregon Structural Specialty Code (OSSC) – 2010 Edition or latest revision.

1.04 SUBMITTALS

A. Mix design submittals and certificates of compliance shall be furnished at least 30 days prior to any anticipated concrete placement. All submittals must be approved by the Engineer prior to placement of any concrete.

B. Contractor is responsible to obtain design of the concrete mix that shall conform to ASTM C94 and the requirements of this section. Mix design shall be prepared by a professional testing laboratory or concrete mix design professional.

C. Submit properties of each mix design for each class of concrete including:
   1. Average compressive strength of proposed mixture
   2. Documentation of strength test results of similar concrete mixtures in accordance with ACI 318
   3. Slump
   4. Air Content
   5. Density
   6. Water/Cement ratio
   7. Maximum aggregate size
   8. Cementitious materials and type
   9. Admixtures

D. Certificates of compliance for aggregate, cement, and admixtures signed by the concrete supplier certifying that materials meet or exceed these specifications.

E. Concrete placement schedule showing construction joint locations and type, and placement sequence.

F. Product data for proposed curing compounds, admixtures, hardeners, sealers, etc. to be used.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.
B. Conform to ACI 305R in hot weather.
C. Conform to ACI 306R in cold weather.
D. Installer Qualifications: Concrete work shall be finished by persons with at least 5 years experience with work of similar scope and quality.
E. No chloride containing admixtures shall be used.
F. On-Site water addition to concrete will not be permitted.
G. Conduct field-testing as specified.
H. Admixtures shall be added in strict conformance with the manufacturer's instructions.
I. Manufacturer Qualifications: Concrete supplied from concrete plants with current certification under the NRMCA Certification of Ready Mixed Concrete Production Facilities. Individual with responsibility for concrete mixtures certified as an NRMCA Concrete Technologist Level 2.

1.06 DELIVERY

A. Concrete shall be scheduled and delivered in a timely manner in accordance with ASTM C94 and ACI 304R. Ensure that forms and reinforcement are complete and ready to accept concrete prior to scheduling delivery.

B. When installing a continuous pour section, ensure that trucks arrive and concrete is placed with no greater than 45 minutes elapsing between lifts.

PART 2 PRODUCTS

2.01 CEMENTITIOUS MATERIALS

A. Hydraulic Cement per ASTM C150

B. Fly Ash: ASTM C618, up to 15% by volume of cement content

2.02 WATER

A. Water used for mixing shall be clean and potable.

2.03 AGGREGATE

A. Aggregates shall be natural materials conforming to ASTM C33 as modified herein.

B. Aggregates shall be nonreactive as defined in ASTM C33 and tested per ASTM C289.

C. Aggregate shall contain no soil, friable particles, organic matter, or other deleterious materials. Aggregate shall be washed prior to use in the concrete mix.

D. Aggregates shall contain no chert, limestone, or shale.

E. Coarse Aggregate:
1. Use coarse aggregate from only one source for exposed concrete in a single structure.
2. Coarse aggregate shall be smooth, rounded and uniform. No more than 15% shall be elongated (max. dimension 5 times min. dimension).
3. Coarse aggregate shall be durable, sound and hard.
4. Maximum Size: 3/4-inch, but not more than one-fifth of narrow dimension between sides of Formwork, one-fourth depth of slab, nor three fourths of narrowest distance between Reinforcing Steel.

F. Fine Aggregate:
1. Use fine aggregate from only one source for exposed concrete in a single structure.
2. Fine aggregate shall not exceed 40% by weight of combined aggregate total, except when coarse aggregate maximum size is ½-inch or less.
3. Fine aggregate shall be durable, sound, clean and hard.
4. Sand Equivalent of 75 minimum per ASTM D2419.

G. Combined (Coarse and Fine) Gradation per ASTM C136:

US Standard Sieve	% Passing by Weight
1½-inch	100
1-inch	90-100
3/8-inch	45-75
No. 4	33-50
No. 8	28-44
No. 16	23-38
No. 30	10-22
No. 200	0-2

2.04 CHEMICAL ADMIXTURES

A. General:

1. When two or more admixtures are used, they shall be certified by the manufacturer(s) to be compatible.
2. Chlorides are not permitted in any form.
3. Air Entraining and Water Reducer admixtures are required.
4. All admixtures shall be added at the batch plant, unless otherwise specified.

B. Midrange Water Reducer:
1. Shall conform to ASTM C494, Type A and F.
2. Master Builders, Inc. "PolyHeed" Series; or approved equal.

C. High-Range Water Reducer (Superplasticizer):
1. Shall conform to ASTM C494, Type F or G; and ASTM C1017, Type I or II.
2. Master Builders, Inc. "Rheobuild"; or approved equal.

D. Air-Entraining Admixture:
1. Shall conform to ASTM C260.
2. Master Builders, Inc. "MicroAir", "MB-AE 90"; or approved equal.

2.05 FIBERS

A. Fibrous Concrete Reinforcement: ASTM C1116. Shall be "Fibermesh MD" added at a minimum of 1.5 pounds per cubic yard. Use where specified or shown on the drawings.

2.06 BONDING AGENT

A. Required where new concrete is poured against existing concrete, and on embedded items with less than 1½-inches of cover.

B. 100% solids, two component epoxy bonding compound meeting ASTM C881, Type II, Grade 2, Class B or C materials except as modified herein.

C. Properties:
1. Bond Strength @ 14 days (ASTM C882) – 1800 psi minimum
2. Tensile Strength @ 7 days (ASTM D638) – 4400 psi minimum
3. Tensile Elongation @ 7 days (ASTM D638) – 1.49% maximum

D. Master Builders, Inc. "Concresive Liquid PL"; or approved equal.

2.07 CURING COMPOUNDS AND SEALERS

A. Evaporation Reducer: Spray applied monomolecular film that reduces the rate of surface moisture evaporation, minimizes plastic shrinkage, and does not effect the cement hydration process. Master Builders, Inc. "Confilm"; WR Meadows "Sealtight Evapre"; or approved equal.

B. Exterior Use Liquid Membrane-Forming Curing Compound: Shall conform to ASTM C309, Type I, Class B and ASTM C1315, Type 1, Class A. WR Meadows "CS-309-25"; or approved equal.

C. Interior Use Liquid Membrane-Forming Curing Compound: Water-base acrylic curing and sealing compound conforming to ASTM C309, Type I, Class B and ASTM C1315, Type 1, Class A. WR Meadows "Vocomp-25-1315"; or approved equal.

D. Concrete Sealer: Non-yellowing, acrylic co-polymer solution meeting ASTM C309, Type 1, Class B and ASTM C1315, Type 1, Class A. WR Meadows "TIAH 1315"; or approved equal.

2.08 CONCRETE HARDENERS

A. Liquid concrete densifier and hardener, chemical resistant, colorless, with 100% active chemicals. WR Meadows "Liqui-Hard"; or approved equal.

2.09 VAPOR BARRIER

A. ASTM D2103 – Polyethylene Film and Sheeting, 6 mils thickness.

2.10 HIGH-PERFORMANCE CONCRETE MIX

A. Use: All water-holding structures and adjoining structures, equipment pads, footings, support walls, retaining walls, and others not designated for standard concrete. May be used in place of standard concrete except for interior slabs where a smooth trowel finish is required.

B. Mix Design Requirements:
1. Cement: Portland Cement, Type II, ASTM C150.
2. Water / Cementitious Materials Ratio: 0.35-0.40 by weight
3. Strength: 4500 psi minimum, ASTM C39
4. Slump before plasticizer: 1.5 to 3-inches, ASTM C143
5. Air Content: 5.5-7% by volume, ASTM C231
6. Water Reducer: High-Range
7. Maximum slump at time of placement: 8-inches (with rheoplastic admixture)

2.11 STANDARD CONCRETE MIX

A. Use: Sidewalks and walkways, curbs and gutters, reinforced concrete parking areas and other miscellaneous structures

B. Mix Design Requirements:
1. Cement: Portland Cement, Type I or II, ASTM C150
2. Water / Cementitious Materials Ratio: 0.45-0.50 by weight
3. Strength: 3500 psi minimum, ASTM C39
4. Air Content: 2.5-5% by volume, ASTM C231
5. Water Reducer: Mid or High-Range
6. Maximum slump at time of placement: 5-inches or less

PART 3 EXECUTION

2.01 PREPARATION

A. Examine all reinforcement, formwork, waterstops, premolded joint fillers, and other embedded items to ensure they are accurately placed, properly secured and cleaned.

B. Ensure that inspection of reinforcement is complete and installation approved.

C. Ensure concrete mix design and test certifications have been submitted and approved.

D. Ensure that all required materials and equipment are on-site and operable.

E. Ensure that subgrade and base rock are properly placed and compacted. Place vapor barrier and leveling sand at slab-on-grade locations. Sprinkle subgrades and other porous surfaces with water to reduce adsorption.

F. Apply form release agent to formwork.

G. Apply bonding agent where required.

H. Notify General Contractor of work requiring correction. Do not start work until conditions are satisfactory.

I. Review for various locations to receive different types of concrete mixes.

J. Notify Engineer at least 48 hours in advance of concrete placement.

2.02 CONCRETE PLACEMENT

A. Comply with ACI 304, ASTM C94, ACI 305R and 306R, and OSSC Section 1905 as required.

B. Convey and place by methods with will prevent material separation, segregation, and loss. Mix for at least 10 minutes and at least 3 minutes immediately prior to discharging at the job site.

C. Concrete shall be delivered to site and placed within formwork within 1½ hours after the introduction of water to the mixture.

D. Deposit concrete continuously or in layers so that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams or other planes of weakness. Where seams are unavoidable, provide construction joints as directed.

E. Do not convey pneumatically placed concrete through aluminum pipe.

F. Do not retemper concrete, or add water on-site for other reasons.

G. Use trunks or tremies when pouring walls to ensure concrete does not drop or fall more than 4 feet. Place in layers not exceeding 2 feet in depth.

H. Screed all slabs to true levels or slopes, true within ¼ inch per 10 feet. Evenly slope to any drain at 3/16 inch per foot, unless otherwise shown on Drawings.

I. When mean temperature exceeds, or is expected to exceed 80°F during placement and finishing operations, steps shall be taken in accordance with ACI 305R to reduce concrete temperature and water evaporation. Slabs will be fog sprayed from the completion of screeding until curing is begun (except during troweling). Submit detailed hot weather concreting procedure to Engineer for approval at least 2 days prior to planned placement.

J. When mean temperature falls below, or is expected to fall below 40°F, comply with ACI 306R. Concrete shall be protected from freezing by means acceptable to the Engineer. Submit detailed cold weather concreting procedure to Engineer for approval at least 2 days prior to planned placement.

2.03 CONSOLIDATION

A. Employ mechanical, high frequency vibrators to consolidate concrete around reinforcement, into corners and angles of formwork, and to exclude rock pockets, air bubbles and honeycomb.

B. Have sufficient number of vibrators and tampers on-site. Minimum of 1 device per each 20 c.y. placed per hour.

C. Vibration shall be in accordance with ACI 309. Vibrator frequency shall be between 8000 and 12000 rpm.

D. Hold Vibrator in one spot no longer than 15 seconds; keep in constant motion, insert and withdraw at points approximately 18 inches o.c.

E. Maintain vibrator in vertical position when penetrating concrete walls. At slabs, hold vibrator perpendicular to the surface at all times.

F. Vibrate each successive lift. Extend vibrator into previous lift to avoid seams.

G. Transporting concrete with vibrator is not permitted.

H. Maintain spare vibrators at jobsite during concrete placement.

I. Supplement vibration by forking and spading along surfaces of forms and between reinforcing whenever flow is restricted.

2.04 CONTROL JOINTS

A. Form to true, straight lines, with adjacent slab sections flush at Joints. Make panels as close to square as possible.

B. Conform to ACI 302 and the Project Drawings. If not shown, submit control joint layout plan to Engineer for approval.

C. Joints shall be formed by tooling into fresh concrete. The joint shall be perpendicular to the concrete surface and ¼ of the thickness of the slab. Zip strips not allowed.

D. Fill joint as directed with proper joint sealants.

E. Extend Reinforcement through Joints, unless otherwise shown on Drawings.

F. If necessary, and approved by Engineer, joint may be saw cut as soon as concrete has sufficiently hardened to prevent dislodging of aggregates. Saw continuous slots perpendicular to surface and ¼ of slab thickness. Must be complete within 12 hours of concrete placement.

2.05 CONCRETE FIELD TESTING

A. Samples for concrete tests shall be taken in accordance with ASTM C172.

B. If total quantity of a class of concrete for the project is less than 50 cubic yards, strength tests are not required when evidence of satisfactory strength is submitted to and approved by Engineer.

C. Samples for compressive strength tests of each class of concrete shall be taken not less than once per day, nor less than once for each 150 cubic yards of concrete, nor less than once for each 5000 feet squared of surface area of walls or slabs. If the total volume of concrete for each class is such that less than 5 tests are required, then samples shall be made from at least 5 random batches or each batch if less than 5 batches is required.

D. Acceptance of concrete shall be based on strength test results of standard cured cylinders in accordance with ASTM C 31 and tested at 28 days in accordance with ASTM C 39. Strength test results are the average of two specimens.

E. When strength cylinders are made, tests of slump per ASTM C143, air content per ASTM C94, temperature per ASTM C1064 and density per ASTM C138shall be made and recorded with the strength test results.

F. Strength of each concrete class shall be deemed satisfactory when both of the following criteria are met:

1. The average of three consecutive compressive-strength tests equals or exceeds specified compressive strength

2. Any individual compressive-strength test result does not fall below specified compressive strength by more than 500 psi.

G. When compressive strength tests indicate low strength, follow procedure in ACI 318 chapter 5.6.4 Investigation of low-strength test results.

2.06 FINISHES

A. Rough Form Finish
1. Finish resulting after form removal with fins or projections exceeding ¼-inch removed, and with tie holes and defective areas repaired and patched.
2. Location: Formed concrete surfaces not exposed to view in the finished structure.

B. Standard Smooth Finish
1. As-cast surface with all fins and projections completely removed and smoothed, and with all tie holes and defective areas repaired and patched for a uniform, smooth appearance.
2. At unformed surfaces, such as tops of walls, strike-off smooth and finish with a texture matching adjacent surfaces.
3. Location: Formed surfaces exposed to view in the finished structure.

C. Float Finish
1. After placing slabs, do not work the surface until ready for floating. Begin floating when the surface water has disappeared or when the concrete has stiffened sufficiently to permit the operation of a power-driven float, or by hand-floating if area is small or inaccessible to power units.
2. Check the level of the surface plane to a tolerance not exceeding ¼-inch in 10 feet when tested with a 10-foot straightedge placed on the surface in not less than two different angles from a reference point. Cut down high spots and fill low spots. Uniformly slope surfaces to drain where shown on the drawings.
3. Immediately after leveling, refloat the surface to a uniform, smooth, granular texture. Do not overfinish.
4. Location: Monolithic slab surfaces that are to receive a trowel finish and other finishes.

D. Trowel Finish
1. After floating, begin the first trowel finish operation using a power driven trowel. Consolidate the concrete surface by the final hand troweling operation, free of trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding 1/8-inch in 10 feet when tested with a 10-foot straightedge.

2. Do not absorb wet spots with neat cement or cement-sand mixture, and do not use chemical dryers.
3. Location: Monolithic slab surfaces exposed to view, or to be covered with resilient floor covering, or to receive liquid hardener treatment.

E. Nonslip Broom Finish
1. After concrete has received floating finish specified above, provide light brushing with fiber-bristle broom perpendicular to traffic flow.
2. Location: Exterior walks and other horizontal walking surfaces.

2.07 CONCRETE SURFACE REPAIRS

A. After removal of forms, repair and patch defective areas with specified repair mortar.

B. In honeycomb and rock pocket areas, saw cut area and remove material down to solid concrete. Saw cut edges perpendicular to the concrete surface. Thoroughly clean out loose material, saturate area with water to a saturated surface dry condition and brush-coat the area to be patched with a slurry coat of structural repair mortar. Place additional mortar to patch the area before the slurry coat has dried. Smooth and blend to surrounding surface. Do not feather edges.

2.08 CONCRETE CURING AND PROTECTION

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Protect concrete from rapid moisture loss before and during finishing operations with a fog spray or evaporation reducer. Apply evaporation reducer in accordance with manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

B. Curing shall begin as soon as the finishing operation has been completed and the surface will not be damaged by the curing method. Curing shall be maintained for not less than 7 days.

C. Curing Methods: Perform curing of concrete by curing compound, by moist curing, by moisture-retaining cover curing, or combinations thereof, as specified herein.

1. Moist Curing. Use one of the following methods
   a) Keep concrete surface continuously wet by covering with water
   b) Use continuous water-fog spray
   c) Cover concrete with absorptive cover (burlap cloth, 9 oz./s.y.), thoroughly saturate with water, and keep continuously wet. Completely cover all concrete and lap edges 4-inches. Place moisture retaining cover (polyethylene film) over absorptive cover.

2. Moisture-Retaining Cover. Cover all surfaces completely with polyethylene sheets, lap edges at least 3-inches, and seal with waterproof tape. Immediately repair any holes or tears with sheet material and tape.

3. Curing Compound. Use specified compound and apply in accordance with manufacturer's instructions. Apply within 1 hour of final finishing operations or form removal. Maintain continuity of coating and protect from damage during curing period. If finish materials are to be applied later, follow manufacturer's instructions for compound removal.

D. Exterior Structural Concrete: Cure for 7 days with moist cure or moisture-retaining cover. After 7 day period, apply specified or approved sealing compound to surfaces that will be exposed in the finished structure.

E. Interior Slabs to be Covered (with resilient flooring): Cure for 7 days with moist cure or moisture-retaining cover. Or; cure for 7 days using specified or approved interior curing/sealing compound. Ensure compound compatibility with adhesives.

F. Interior Slabs Exposed and Other Exposed Interior Concrete: At interior slab locations that will remain uncovered, interior curbs, equipment pads, etc., cure for 7 days with moist cure or moisture-retaining cover. After 7days, or as recommended by the manufacturer, apply liquid chemical hardener. Follow manufacturer's instruction for hardener application. Apply at least two coatings unless otherwise recommended by the manufacturer and approved. Protect adjoining work from overspray and remove all excess hardener from surface of floor slab.

G. Protect all surfaces from damage until curing is complete and sealers and hardeners have dried.

2.09 CORRECTION AND REMOVAL OF DEFECTIVE WORK

A. Remove and replace any concrete which shows excessive cracks or severe damage. Remove and replace slabs which do not drain properly, or are improperly finished, and other defective concrete as directed.

B. Remove and replace work with improper cover over steel, concrete containing wood, cloth or other foreign matter.

C. Fill and repair all voids, rock pockets, and other defects as directed. Voids larger than ¾-inch shall be considered excessive and such work shall be removed and replaced.

D. Remove and replace any concrete that has been improperly cured or finished.

E. Should concrete fail to meet the minimum specified 28 day strength as determined by tests on both the regular and spare cylinders, the concrete will be deemed defective and shall be removed and replaced. Contractor shall bear the entire cost of such testing, removal, redesign, and replacing of defective concrete.

F. Concrete which has improper water/cement ratios, and/or improper air contents shall be removed and replaced as directed.

G. Contractor shall bear all costs for removal and replacement of defective work.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Cost for cast-in-place concrete and other work in this section shall be included within the unit prices for concrete structures, concrete surfaces, other miscellaneous items requiring concrete as stated on the Bid Form.

END OF SECTION

SECTION 03480 – PRECAST UTILITY VAULT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section specifies all work necessary to furnish and install complete precast utility vaults.

B. Vault shall be provided as shown in Plans.

1.02 SUMMARY

A. Vaults shall be provided as shown in Plans and specified herein. Vaults shall be provided complete with access doors and accessories as specified or as shown on the Plans. Vault shall be installed according to manufacturer's recommendations and as indicated in the Plans.

1.03 REFERENCE

A. Section 02000 – Site Work

B. Section 03600 – Non-Shrink Grout

1.04 QUALITY ASSURANCE

A. Manufacturer shall specialize in manufacture of precast utility vaults and shall have at least 10 years experience fabricating and installing precast, in-ground vaults.

B. Vault and doors shall be manufactured to withstand H20 wheel loading in off street locations. All doors shall be H20 rated unless otherwise specified on the Plans or in these Specifications. Calculations shall be made available to Engineer upon request.

1.05 WARRANTY

A. Warranty shall meet the standard warranty requirement as outlined in the contract documents.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Strictly follow manufacturer's recommendations regarding deliver, unloading and handling of vault sections.

B. Contractor shall schedule delivery of vault to minimize storage time and to avoid construction delays.

1.07 SUBMITTALS

A. Submit product data in accordance with Section 01300.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The precast utility vault shall be manufactured by Utility Vault Oldcastle; or approved equal. Oldcastle Utility Vault 687-2-LA Vault and Utility Vault 687-T-2-332NS (non-slip) access doors.

2.02 CONSTRUCTION

A. Vault

a. Vaults shall be precast reinforced concrete base, sections and flat top lids. All components shall be structurally sufficient for the intended use. Flat top lids and access doors shall withstand H20 wheel loading.

b. Vault shall be ordered with reinforcement set to accommodate pipe penetrations as shown in the Plans.

c. Joints shall utilize rubber gaskets conforming to ASTM C443. Install per manufacturer's recommendations.

d. Assembled vault shall be made watertight.

B. Access Door

a. Access doors shall be sized as indicated on the Plans.

b. Access door shall be constructed of galvanized steel, reinforced to withstand AASHTO H-20 wheel loading in off-street locations. Cover shall be diamond-tread plate.

c. Latch shall be stainless steel slam lock with fixed interior handle.

d. Handle shall be a recessed stainless steel handle.

e. Each door shall be equipped with spring lift assistance and automatic hold-open arms with grip handle release. Each door shall be easily opened by one person with one hand operation. Door shall lock open in the 90° position.

f. Finish shall be mill finish with bituminous coating applied to the exterior of the frame in all areas expected to come into contact with concrete.

g. Hatch shall be capable of withstanding H20 wheel loads in off-street locations. The hatch frame shall be cast into the vault lid by the manufacturer.

h. Minimum access clear opening in vault shall be 33-inch x 66-inch.

C. Ladder

a. Ladder shall be painted using the interior paint system for Structural Steel outlined in Section 09900.

b. Mounting brackets shall be hot-dipped galvanized.

c. Anchor bolts shall be stainless steel.

D. Pipe Penetrations

a. Pipe penetrations shall be core drilled to sizes indicated on the Plans or as necessary. Jack-hammering is not allowed.

b. Grout shall be installed in a workmanlike manner to insure filling of all voids in the joint, and in accordance with Section 03600.

c. Pipe penetrations shall be made watertight.

PART 3 EXECUTION

3.01 INSTALLATION

A. Excavation for vault shall comply with the pertinent sections of Section 02315 Trench Excavation, Bedding & Backfill and Section 02316 Excavation & Select Backfill.

B. Provide shoring, bracing, dewatering and foundation stabilization as specified and as required.

C. Place and compact eight (8) inches of aggregate base as shown in the details and plans.

D. Install vault in accordance with manufacturer's instructions.

E. Precast concrete base shall be carefully placed on the prepared bedding so as to be fully and uniformly supported at true grade and alignment.

F. Clean tongue and grooves of base and top section, apply rubber gasket per manufacturer's instructions.

G. Backfill as specified, per Plans, and as follows:

a. Backfill around the vault should consist of good compactable material such as ¾-inch minus pea gravel, crushed rock, clean sand, or approved class "A" backfill material, free from organic matter. In no case shall the material be saturated soil or contain rock larger than 2-inches. No voids shall remain between the vault walls and native soil of excavation.

b. Backfilling should not be done until the vault is completely assembled making certain to place backfill evenly around vault and compact backfill progressively in one foot lifts from the bottom to the top surface.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Payment for Pre-cast Utility Vault and related items, shall be included within the lump sum basis for the amount stated on the Bid Form. Payment shall include compensation for all materials and labor required to complete the work described herein.

END OF SECTION

SECTION 03600 GROUT

PART 1 GENERAL

1.01 SUMMARY

A. Section includes various types of grout as may be required for the project as shown on the Drawings and as required.

B. Work includes supply, preparation, mixing, application, finishing and curing of grout.

1.02 RELATED SECTIONS

A. Section 03200 – Concrete Reinforcement
B. Section 03300 – Cast-In-Place Concrete
C. Miscellaneous Sections of Divisions 5, 11 and 15 for anchor bolts, base plates and other materials to be grouted or bonded in place.

1.03 REFERENCES

A. ASTM C1107 - Standards Specification for Packaged Hydraulic-Cement Grout (Nonshrink)
B. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars – Modified
C. ASTM C1090 - Standard Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic Cement Grout
D. ASTM C939 - Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)
E. ASTM C827 – Test Method for Early Volume Change of Cementitious Mixtures
F. ASTM C882 – Test Method for Bond-Strength of Epoxy-Resin Systems Used with Concrete.
G. ACI 351 - Grouting for Support of Equipment and Machinery

1.04 SUBMITTALS

A. Submit list of each type of grout proposed for each location to be grouted. Include manufacturer's specifications, use recommendations, surface preparation and application instructions, and protection of adjacent surfaces.

B. Submit three copies of submittal package. Grout shall be approved prior to use.

1.05 QUALITY ASSURANCE

A. Grout Manufacturer shall be consulted when questions arise during selection of a particular grout for application. Grout used shall be as recommended by the manufacturer for each type of application.

B. Grout shall be mixed, placed and cured in strict conformance to the manufacturer's instructions. Surfaces to be grouted shall be carefully prepared according to the manufacturer's instructions. Improper surface preparation and curing are the most common causes of grout failure and problems.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer's sealed containers with contents clearly labeled.

B. Store materials in a dry area at a temperature between 40 and 100°F.

PART 2 PRODUCTS

2.01 STANDARD NON-SHRINK GROUT

A. Non-metallic, non-bleeding, cement based non-shrink grout meeting ASTM C1107, Grades B or C. Pumpable and pourable with positive expansion per ASTM C827.

B. Compressive Strength at Flowable Consistency per ASTM C109: 2500 psi at 1 day, 5000 psi at 3 days, and 8000 psi at 28 days (minimums).

C. Use: Grouting around pipe and conduit penetrations in concrete slabs, and other locations where non-shrink grout is called for and other specified grouts are not required.

D. Manufacturers: Dayton Superior Corp. "1107 Advantage Grout"; ThoRoc "621 Construction Grout; EUCO "NS Grout"; or approved equal.

2.02 PRECISION NON-SHRINK GROUT

A. High performance, non-metallic, non-bleeding, non-gaseous, chloride-free, cement based non-shrink grout meeting ASTM C1107, Grade C. Pumpable and pourable, vibration resistant, and heat and thermal shock resistant. Positive expansion per ASTM C827 and ASTM C1090.

B. Expansion: 0.01-0.07% at 1 day and 0.02-0.07% at 28 days when tested per ASTM C1107 in Fluid State.

C. Compressive Strength at Fluid Consistency per ASTM C1107: 4000 psi at 1 day, 6000 psi at 3 days, and 9000 psi at 28 days (minimums).

D. Use: Under base plates of equipment and other items where grout base is shown in the drawings or required.

E. Manufacturers: Dayton Superior Corp. "Sure-Grip High Performance Grout", "1107 Advantage Grout"; EUCO "Hi-Flow Grout"; or approved equal.

2.03 DRY PACK GROUT

A. Cement based, non-shrink, noncorrosive, non-metallic, high density, high strength grout for dry pack applications. Meets COE CRD-C-621.

B. Compressive Strength per ASTM C109: 3000 psi at 1 day, 6500 psi at 7 days, and 8000 psi at 28 days (minimums) at damp pack consistency.

C. Use: Pipe penetration patches in precast concrete, overhead applications and other areas where poured or pumped grout use is not practical.

D. Manufacturers: Dayton Superior Corp. "Sure-Grip Grout Dri-Pak"; W.R. Meadows "Pac-It"; EUCO "Dry Pack Grout"; or approved equal.

2.04 EPOXY GROUT

A. Multi-component, pre-proportioned epoxy grout. High impact and vibration resistance.

B. Compressive Strength per ASTM D695 at 50°F: 9200 psi at 1 day and 12000 psi at 14 days

C. Tensile Strength per ASTM D638 at 10 days: 2600 psi minimum

D. Flexural Strength per ASTM D790 at 14 days: 5000 psi minimum

E. Bond Strength per ASTM C882 at 14 days: 2200 psi minimum (to concrete)

F. Water Absorption per ASTM D570: 0.3%

G. Use: Deep pour applications (more than 4-inch thick), grouted rods and anchor bolts.

H. Manufacturers: Dayton Superior Corp. "Sure-Grip Epoxy Grout"; or approved equal.

2.05 ACCESSORIES

A. Aggregate: Washed pea gravel, maximum 3/8-inch size.

B. Water: Clean potable water.

C. Curing Compound: Water based, acrylic as recommended by grout manufacturer.

PART 3 EXECUTION

3.01 MIXING

A. Mix materials in accordance with the manufacturer's instructions.

B. Where grout depth will exceed 2-inches, add aggregate at a maximum rate of 25 pounds per 55 pound bag.

C. Do not retemper mix.

3.02 PREPARATION

A. Carefully prepare all surfaces to be grouted in accordance with the manufacturer's recommendations and as specified. Concrete must be cured for 28 days before placing grout.

B. Clean surfaces to remove loose and foreign material by waterblasting, mechanical abrasion, or sandblasting. Surface shall be free of dirt, oil, curing compounds and laitance.

C. Remove unsound concrete by chipping or grinding. Grind or sandblast steel surfaces to remove all rust, mill scale and paint.

D. Install forms to contain liquid grout. Seal joints and corners.

3.03 INSTALLATION – CEMENTITIOUS GROUTS

A. Follow manufacturer's instructions.

B. Just prior to grouting, thoroughly saturate concrete surfaces for 24 hours; remove excess water.

C. Place grout continuously by most practical means. Work from one side to avoid entrapped air.

D. Grout may be rodded or tamped, but do not vibrate.

E. Apply curing compounds to exposed grout in accordance with manufacturer's instructions or cure with wet burlap for 3 days. Curing shall commence immediately after placement.

3.04 INSTALLATION – EPOXY GROUTS

A. Follow manufacturer's instructions.

B. Allow surfaces to dry completely before grouting.

C. Place grout continuously by most practical means. Work from one side to avoid entrapped air.

D. For grout depths exceeding 3 inches, place grout in maximum 3-inch lifts; allow each lift to cure before placing next lift.

E. Consolidate material to eliminate voids and air pockets.

F. Lightly mist exposed grout with solvent, then steel trowel to smooth surface. Do not apply curing compounds.

PART 4 SPECIAL PROVISIONS

4.01 MEASUREMENT AND PAYMENT

A. Payment for grout shall be included within the respective unit prices for each type of pipe, service, manhole and other associated appurtenance item. No separate measurement or payment will be made for these quantities and or items.

END OF SECTION