Clark Regional Wastewater District

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DESIGN MANUAL

CLARK REGIONAL WASTEWATER DISTRICT

CLARK REGIONAL WASTEWATER DISTRICT
CLARK COUNTY, WASHINGTON

RESOLUTION NO. 1783

A RESOLUTION OF THE BOARD OF COMMISSIONERS OF THE CLARK REGIONAL WASTEWATER DISTRICT, CLARK COUNTY, WASHINGTON; ADOPTING 2020 DESIGN MANUAL, FOR PUBLIC WORKS CONSTRUCTED OR ACCEPTED BY THE DISTRICT; AND AMENDING SECTION 5.04.080 OF THE CLARK REGIONAL WASTEWATER DISTRICT CODE.

WHEREAS, by Resolution No. 1532, the District adopted amendments to its standard specifications for public works; and

WHEREAS, District staff sought public input through the development, engineering, and construction community as well as other professional stakeholders, requesting comment on the amendments to the District's design criteria for public works; and

WHEREAS, the Board of Commissioners of the District desires to adopt the new 2020 Design Manual for public works; now, therefore,

BE IT RESOLVED by the Board of Commissioners of the Clark Regional Wastewater District, Clark County, Washington, as follows:

Section 1. Section 5.04.080 of the Clark Regional Wastewater District Code is amended as follows:

5.04.080 Adoption of standard specifications.

Specifications adopted - The following are adopted as the standard specifications for public works projects constructed or accepted by the District:

A. Washington State Department of Transportation Standard Specifications for Road, Bridge and Municipal Construction, 2020 edition, as amended by the Special Provisions for the Clark Regional Wastewater District, dated April 28, 2020;

B. Washington State Department of Ecology Criteria for Sewage Works Design, 2008 Edition, as amended by Design Criteria for the Clark Regional Wastewater District, dated April 28, 2020;

C. Special Provisions for the Clark Regional Wastewater District, dated April 28, 2020;

D. Design Criteria for the Clark Regional Wastewater District, dated April 28, 2020;

E. Standard Construction Drawings for the Clark Regional Wastewater District, dated April 28, 2020;

These documents are on file in the District office and may be amended by motion of the Board of Commissioners of the District. In case of conflict between the standard specifications and this Code, the standard specifications shall govern.

Section 2. The amended standard specifications adopted in Section 1 of this Resolution shall apply to public works projects advertised after the date of adoption of this Resolution and to developer extension projects that are approved after April 28, 2020.

ADOPTED by the Board of Commissioners of the Clark Regional Wastewater District of Clark County, Washington, at a regular meeting held on April 28, 2020.

CLARK REGIONAL WASTEWATER DISTRICT

Attest:

Neil Kimsey, Secretary

Denny Kiggins, President

Norm Harker, Vice President

Clark Regional Wastewater District

DESIGN MANUAL

Includes:

DESIGN CRITERIA

GENERAL SPECIAL PROVISIONS

STANDARD DRAWINGS

Adopted by the Clark Regional Wastewater District
Board of Commissioners

By Resolution Number 1783

Adopted April 28, 2020
Effective April 28, 2020

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FOR THE
CLARK REGIONAL WASTEWATER DISTRICT
DESIGN CRITERIA

DESIGN CRITERIA

For The
CLARK REGIONAL WASTEWATER DISTRICT
(AMENDMENTS TO STATE OF WASHINGTON DEPARTMENT OF ECOLOGY CRITERIA FOR SEWER WORKS DESIGN)

Adopted April 28, 2020

Heath Henderson, PE
District Engineer

The Clark Regional Wastewater District Design Criteria consists of the August 2008 Criteria for Sewage Works Design of the State of Washington Department of Ecology (Orange Book) Chapters C1 Sewers and C2 Sewage Pump Stations amended and supplemented as follows (amendments to the Orange Book are *italicized*).

Chapter C1 Sewers

This chapter covers the design, construction, operation and maintenance of gravity and low-pressure sewers and manholes. The requirements apply equally to sewer systems that are privately owned as well as publicly owned sewer systems. Also included in this chapter is a section on various types of alternative systems for conveyance of wastewater to a centralized location or wastewater facility.

C1-1 GENERAL REQUIREMENTS

C1-1.1 Approvals

The District shall approve project plans, specifications and materials

Designs of new sewer systems or extensions of existing systems must provide for:

- Adequately processing the added hydraulic and organic load; or

See Chapter G1 of the State of Washington Department of Ecology Criteria for Sewer Works Design for additional information on approvals.

C1-1.2 Ownership

The District is the owner of all public sanitary sewer facilities within the District service boundary except where the District has formal agreements with other agencies.

C1-1.3 Design

Sewer systems shall be designed and constructed to achieve total containment of sanitary wastes and maximum exclusion of infiltration and inflow (I/I). No new combined sewers will be approved.

C1-1.3.1 "To and Through Policy"

A. *Within Right-of-Way. Where the service parcels will be served by a collection line in right-of-way abutting the service parcels, the owner shall construct the collection line across the entire length of the abutting right-of-way; provided, that the owners of the last three parcels that can be served by such collection line,*

as determined by the District Engineer, shall construct collection lines of three equal lengths, as determined by the District Engineer; and provided further, that the owners of the last two parcels that can be served by such collection line, as determined by the District Engineer, shall construct collection lines of two equal lengths, as determined by the District Engineer.

B. *Within Service Parcels. Except as provided in subsection E of this section, the owner, when constructing the collection line within the service parcels, shall construct extensions of the collection line and provide easements to serve adjacent parcels that can be served by the collection line.*

C. *To Sewer Corridor. When constructing the collection line, and its extensions if any, in accordance with subsections A and B of this section, the owner shall extend the collection line, and its extensions if any, to the sewer corridor of any additional right-of-way that abuts the service parcels and connects with the abutting right-of-way in which the collection line is located. The sewer corridor shall be seven feet south or west of the centerline of the right-of-way, as applicable.*

D. *Determination of Adjacent Service. The District Engineer shall determine whether an adjacent parcel can be served by the collection line in the service parcels, considering the District's comprehensive plan, the topography in the vicinity, the pattern of development in the vicinity, and the existing and proposed sanitary sewer systems and lines that are not contained in the District's comprehensive plan.*

E. *Single-Family Residence. Where (1) the collection line for the service parcels provides sewer service to a single-family residence or residences, (2) the service parcels can be further subdivided or developed under zoning regulations and (3) the adjacent parcel can be served by the collection line, the owner may extend the collection line through fifty percent of the service parcels and provide an easement to the adjacent parcel, in a location and size as determined by the District Engineer. Upon approval of a preliminary plat or issuance of a development permit, the owner shall construct the collection line in the easement.*

F. *Location of Lines and Easements. The District Engineer shall determine the locations and types of collection lines and the locations and sizes of easements, and may require review of the collection line installation.*

G. *The requirements of this section shall not apply to service parcels that (1) abut right-of-way on two property lines of the service parcels (that is, constitute a corner parcel), (2) have a functional and usable collection line, as determined by the district engineer, across the entire length of one of the two abutting rights-of-way, (3) can be served by such collection line, (4) are not being subdivided concurrently with the sewer service, and (5) will contain a single-family residence only.*

H. *Finality of Decision. The decisions of the District Engineer pursuant to this section shall be final.*

C1-1.3.2 General

The purpose of the Design Criteria is to provide Engineers with the District's minimum standards for sanitary sewer design. The Design Criteria is not intended to cover all possible situations or conditions.

All engineers doing work within the Clark Regional Wastewater District on any projects, private or public, are required to have a current adopted copy of the Clark Regional Wastewater District Design Criteria, General Special Provisions and Standard Drawings and shall comply with these documents.

Plan approval by the District consists of compliance with the Design Criteria, General Special Provisions, and Standard Drawings. The Design Engineer *is responsible for accuracy, errors or omissions on the plans, profiles and other documents relating to the specific project.*

Sanitary sewer systems shall be designed to:

A. *Achieve total containment of sanitary waste; and exclude infiltration and inflow; and prevent exfiltration of sewage into the surrounding soil and groundwater; and not have any combined storm and sanitary sewers; and be consistent with the District's Comprehensive General Sewer Plan (GSP); and*

B. *Be consistent with Washington Department of Ecology standards; and*

C. *Be of adequate size to carry the expected flow within the design life; and*

D. *Be designed at sufficient depth to serve all properties within the sewer basin as defined in the GSP or as determined by the District at time of development application; and*

E. *Be able to resist all external loads that will be imposed; and*

F. *Be of materials resistant to both corrosion and erosion caused by sanitary sewage; and*

G. *Be economical to build and maintain.*

C1-1.3.3 Approval of Alternate Materials or Methods

Any alternate material or method will be considered for approval on the basis of the objectives in Chapter C1-1.3.2 General and C1-3.3 Design Basis. The Design Engineer *shall make application to the District in writing citing specific details of why the alternate material and/or method is required for the proposed development and how it meets those objectives. Approval by the District Engineer will be in writing and the District's decision will be final.*

C1-1.3.4 Specialty Designs

The following are considered examples of specialty designs not covered in the Design ***Criteria*** *and project specific engineering reports, plans and specifications must be provided to the District for approval:*

A. Inverted siphons

B. Relining and Pipe Bursting of existing sewers

C. Trenchless technologies

D. Internal sealing of existing sewers

E. Treatment plants

F. Outfall sewers

G. Energy dissipaters

H. Flow regulating devices

I. Flow measurement devices

J. New technology

K. Drop manholes

L. Poured in place manholes

M. Curved line installations

N. 8-inch pipe slopes at less than minimum design requirements

O. Less than 0.2 feet of drop through a manhole

P. Pipelines entering manholes adverse to the direction of flow through the manhole.

C1-1.3.5 Plans, Profiles and Record Drawings

A. *General.*

1. Design Engineer *shall call for pre-design locates from the NW Utility Notification Center at 1-800-424-5555. Design Engineer or Surveyor is responsible for field verification of location and elevations of facilities.*
2. *Plans, profiles, details and grading plans will be submitted to the District for each review of all new or extended sanitary sewers.*
3. *Plans will be submitted in PDF format via e-mail, approved file-sharing platform or through the District's website.*
4. *For the District's initial review, storm sewer plans and profiles must be included with the sanitary sewer plans and profiles for District review. Water distribution plans must be included with the sanitary sewer plans.*
5. *After District approval of plans, profiles and details, the Design Engineer shall submit one (1) complete set of Plans and four (4) partial sets at least five (5) working days prior to the preconstruction conference. The partial sets shall include the signed coversheet, sanitary plans and profiles, and sanitary notes and detail sheets. The complete Plans shall also include all other road, storm, water and grading plans for the work.*
6. *For projects that are the subject of a site plan or land division approved by Clark County or a City with land use authority, the approval of plans and specifications is valid for the period of the original site plan / land division approval. Plan approval for projects that are not the subject of other site plan / land division approvals will expire in accordance with the terms and conditions of the developer extension agreement. Plans that have expired may be submitted for re-approval; but are subject to additional review.*
7. *Text size shall be a minimum of 0.08".*

B. *Engineering Drawings - Plans. Plan sheets for sanitary sewer lines shall contain at least the following information:*

1. *A suitable title sheet with the name, address, telephone numbers, contact name, and email address of the owner, developer and the Design Engineer; scale; north arrow; vicinity map; sheet index; revision box; date; drawing number; the Design Engineer's Professional Civil Engineers State of Washington seal signed with date of signature; and a District signature block per District Standard Drawings. Applicable sheets shall include a legend with symbols and abbreviations and general notes generic to all construction.*
2. *All elevations shall be based on Clark County Datum (NGVD 29(47)). The benchmark used to determine elevations shall be identified on the Plans.*
3. *District Standard Construction Notes for Gravity Sewers (See Standard Drawing) shall be included in the plans for sanitary sewer construction. These are standard Construction Notes. Special designs, installations or conditions may require additional Construction Notes.*
4. *Horizontal dimensions from right-of-way, centerline of road, easement lines or property lines and other utilities or structures.*
5. *Subtitles on each sheet describing the contents.*
6. *Adjacent streets, property lines, tax lot numbers and serial numbers or plat references.*
7. *All existing survey monumentation within 100 feet of the project limits shall be shown.*
8. *All existing and proposed easements shall be shown with dimensions.*
9. *District Standard Drawings that apply to the project.*
10. *All sanitary sewer lines shall be clearly identified as public or private. All private sanitary sewer lines and easements shall be labeled as "Private".*

11. *Conditional serviceability within any project resulting from varying topography or depth of sewer line shall be noted on the plans. Examples of conditional serviceability include:*

    a. *Shallow side sewers with a lot sloping downward from the lateral in which case a minimum finished floor elevation shall be shown on the plans; or*

    b. *Side sewers that cannot serve basements in which case a statement shall be shown on the plans that basements cannot be served; or*

    c. *Minimum finished floor when topography indicates side sewer invert is less than three (3) feet below the lowest elevation on a given lot or on flag lots where long runs of private side sewers are required to reach the building site.*

12. *All existing manholes and cleanouts shall be labeled with the District assigned identifier number. All appurtenances shall be numbered and stationed to facilitate checking the plans with the profiles. Stationing will be based on road stationing with the exception of side sewers (see 13 below). The first downstream manhole shall be shown as "Existing." The identifier (numbering system) for all other appurtenances shall be consecutive along the main run of the sanitary sewer. All branch line manholes and appurtenances shall be identified with consecutive numbering systems beginning with the mainline manhole (alpha, numeric, alphanumeric) and progressing in a logical order.*

13. *All side sewers shall be stationed upstream from the nearest downstream mainline structure. Depths and lengths shall be shown at the end of each side sewer. Residential side sewers shall not be connected to cleanouts. When practical, side sewers will be at a right angle from the mainline at the center of the lot. Side sewers shall be located a minimum of five (5) feet from the property line. It is recommended that a side sewer table be shown on the plans indicating the station, length, invert elevation, depth and type of pipe material. If required, minimum finished floor elevations will be shown on the individual lots and/or in the side sewer table.*

14. *Location of watercourses, wells, stream and railroad crossings, water mains, gas mains, culverts, telephone, underground power, cable television and other utilities or structures based on best available information and field locates. All existing gravel or hard surface paving including widths and distances from existing right of way, easement or property line.*

15. *Existing contours for the proposed development extending at least 100 feet outside of the proposed development along existing, proposed or future roads. If site grading is anticipated, a final site contour map shall be provided. Contour interval shall not be greater than two (2) feet in elevation except in steep terrain where contours are not easily distinguished at two (2) foot intervals.*

16. *Plans shall be drafted at a scale that will be legible when the plans are reduced fifty (50) percent. If the entire project cannot be shown on one (1) sheet, a key map must be provided noting the sheet where each individual segment of the plan is located. Where multiple sheets are used for plans and profiles, match lines will be shown. Where multiple sheets are used for plans, a master utility plan will be provided.*

17. *Sheet size shall be 24" x 36" or 22" x 34".*

18. *For commercial projects: contours; pipe type, size and slopes; monitoring manholes; grease interceptors (if required) and oil-water separators (if required) must be shown. If private sewer mains are required, all requirements of public sanitary sewer plans and profiles must be met. If only an individual building side sewer is required, a plan and profile or the invert and rim elevations of all sewer appurtenances must be provided. Mechanical and/or plumbing plans, flow calculations and required pretreatment forms must be submitted for review with the plans.*

19. *All new easements shall:*

    a. *Be a minimum of fifteen (15) feet in width for sanitary sewers eight (8) feet or less in depth. The width of the easement shall increase by two (2) feet for every one (1) foot in depth beyond eight (8) feet.*

b. Have the sewer pipe centered in the easement.

c. Be located on a single lot when feasible. If the easement will be on more than one lot, no side sewers may connect to the main within the easement.

d. Have legal description(s) submitted to the District in writing with a map in addition to platted easement(s). The District will complete the document and record the easement at the Clark County.

e. Wider easements may be required for larger pipe installations or unusual site conditions.

20. *Length, pipe size and type of material for all sanitary sewers. (e.g., 400 LF, 8" PVC)*
21. *Locations of existing septic tanks and finished floor elevations for the existing buildings.*
22. *Project phasing shall be shown. If the project is phased, each individual phase must be submitted for separate approval.*

C. *Engineering Drawings - Profiles. Profile sheets for sanitary sewer lines shall be contain at least the following information:*

1. *Location of manholes and other appurtenances numbered and stationed as shown on the plans. Each manhole and appurtenance shall show rim elevation and invert elevation(s). Invert elevation(s) shall be specified as inlet (i.e. in), outlet (i.e. out) or knockout (K.O.) elevation and indicate the outlet line direction from the manhole and the inlet line(s) direction to the manhole. (E.g. N, E or NW).*
2. *Profiles of existing and proposed ground surface or road finished grade and sanitary sewer invert(s).*
3. *Sanitary sewer size, type of material, slope, length from centerline of manhole or cleanout to centerline of manhole or cleanout.*
4. *Suitable title block, scale, dates, drawing number, and the Design Engineer's name, address, telephone number and their Professional Civil Engineer's State of Washington signed seal.*
5. *Profiles shall be drafted to a vertical scale at one-tenth (1/10) of the horizontal scale unless steep terrain exists.*
6. *All storm drains, storm water quality facilities, storm drain detention and/or retention ponds, water or utility crossings of sanitary sewers shall be shown with elevations and vertical clearances.*
7. *All side sewers shall be shown with lot number or serial number, station and invert elevation at the end of lateral.*

D. C1-3.3.1*Engineering Drawings - Record Drawing Plans and Profiles. Record drawings for Plan and Profile sheets for sanitary sewer lines shall:*

1. Be legible and complete plans including all road, storm drainage, water supply and grading plans for the work.

2. Be completed by the Design Engineer and submitted to the District prior to project acceptance by the District.

3. Be submitted in electronic form as a "PDF" file and a complete paper copy.

4. Be the approved engineering drawings with the design data marked out and the Record Drawing data shown adjacent to design data.

5. Show all final rim and invert elevations and stations of manholes, cleanouts, stub outs and laterals.

6. Show all changes made to pipe material.

7. Show all final pipe slopes, length of pipe, finished grade, etc.

8. *Show the distance from the back of curb to the end of the side sewer, depth, station and distance to the end of the lateral from the sanitary sewer line.*
9. *Be clearly marked "record drawings" with the drawing date updated.".*
10. *Become the permanent property of the District.*

C1-1.5 Siting Considerations

New sanitary sewers shall serve within the basin specified by the District Comprehensive General Sewer Plan unless otherwise approved by the District in writing.

Providing gravity flow shall be the primary consideration in siting sanitary sewage facilities.

Siting of public sanitary sewer mains, manholes, side sewers and appurtenances shall be restricted to public right-of-way or easements. *The District preference is to locate sanitary sewer facilities in public rights-of-way. Sanitary sewers shall be located either seven (7) feet south or west of centerline of public right-of-way unless otherwise required by the owner of the right-of-way and approved in writing by the District.*

Sewer systems shall be accessible by District maintenance personnel for periodic inspection, cleaning, and repair. Access to the system components shall be provided by an all-weather roadway, twelve (12) feet in width, paved with either asphaltic concrete or concrete and designed to support an H-20 highway loading. Clark County standard cross-section for a public residential road is the minimum requirement.

Lines designed within or adjacent to wetland areas, or adjacent to stormwater infiltration trenches shall require the installation of clay dams/cut off walls to prevent unrestricted flow of water within the sewer trenches.

Where lines will be located outside of right-of-way, consideration should be given to the placement of sewer lines within the corridors proposed for use in the regional trail network as proposed by the local park jurisdiction. Where such opportunities exist, coordination between sewer line construction and trail construction should be pursued.

C1-2 INDUSTRIAL AND COMMERCIAL PRETREATMENT

Pretreatment of sanitary sewer discharges may be required for those users who do not conform to the standards established by the federal, state and local authorities as required by the Clean Water Act and the General Pretreatment Regulations. No user shall introduce or cause to be introduced into the waste stream any pollutant or wastewater which causes pass-through or interference problems.

C1-3 GRAVITY SYSTEMS DESIGN CONSIDERATIONS

All gravity system sewers must be designed to be consistent with the approved general sewer plan.

C1-3.1 Definitions

Building
A building is a structure built, erected and framed of component structural parts designed for the housing, shelter, enclosure or support of persons, animals, or property of any kind.

Construction Specifications
The Standard Specifications for Road, Bridge and Municipal Construction of the Washington State Department of Transportation and the American Public Works Association, 2020 edition, as amended by the Clark Regional Wastewater District General Special Provisions and the Clark Regional Wastewater District Standard Construction Drawings all as adopted by the District Board of Commissioners.

Owner
The private landowner or authorized representative proposing to develop property.

Design Engineer
A professional engineer registered in the State of Washington retained by the Owner to design the work.

Plans or Plans and Profiles
Where the word "Plans" is used, it is in reference to plans and profiles and details prepared by the ***Design*** *Engineer.*

Side Sewer or Lateral

A. Private Side Sewer (also a Building Sewer or Private Sewer Lateral)
The building sewer is that part of the horizontal piping of a sewage system which extends from the building drain (plumbing) and which receives the discharge of the building drain two (5) feet outside the building and conveys it to a public sewer or public side sewer.

B. Public Side Sewer
A public (District) side sewer that extends from a District main sanitary sewer line to:

1. *The edge of right of way; or*
2. *Six (6) feet beyond the edge of the public right of way into an adjacent public utility easement, or*
3. *The edge of a public sanitary sewer easement.*

Main or Trunk
A sewer that receives flow from one or more mains *and may have direct lateral connections*.

Interceptor
A sewer that receives flow from a number of main or trunk sewers, force mains, etc. and generally has no direct lateral connections.

C1-3.2 Design Period

C1-3.2.1 Service Laterals

Service laterals shall be designed for the ultimate development of the parcel being served.

The minimum requirements for public and private side sewers are as follows:

A. All single-family public and private side sewers shall:

1. *Be four (4) inches in diameter; and*
2. *Be at a minimum slope of two (2) percent.*
3. *Under unusual circumstances, the District may approve up to two (2) single-family residential units to be connected to a single four (4) inch public sewer line. The Design Engineer must apply in writing in accordance with Section C1-1.3.3 Approval of Alternate Materials or Methods and receive approval before construction.*

B. All multi-family residential public and private side sewers shall:

1. *Be minimum of six (6) inches in diameter; and*
2. *Be at a minimum slope of one (1) percent to the building cleanout. Upstream of the building cleanout, a transition in sewer pipe diameter may be made.*
3. *Under unusual circumstances, as determined by the Engineer, the District may approve up to two (2) multi-family residential units to be connected to a single four (4) inch public side sewer. The Engineer must apply in writing in accordance with Section C1-1.3.3 Approval of Alternate Materials or Methods.*

C. All commercial public side sewers shall:

1. *Be a minimum of six (6) inches in diameter, unless the Design Engineer shows that a four (4) inch lateral is adequate for the anticipated use and flow; and*

2. *Be at a minimum slope of one (1) percent for six (6) inch diameter pipe or two (2) percent for four (4) inch diameter pipe;*

   a. *To the monitoring manhole if the monitoring manhole is within ten (10) feet of the public right of way or public sewer easement; or*

   b. *To the public cleanout.*

   3. If the monitoring manhole is greater than ten (10) feet from the public right of way or public sewer easement, a public cleanout will be placed at the public right of way or public sewer easement; and

   4. Upstream of the building cleanout, a transition in sewer pipe diameter may be made.

   5. If the private side sewer is larger than six (6) inches in diameter, the public side sewer will match the size of the private side sewer.

D. All commercial private side sewers shall:

1. *Transition to the public side sewer at the monitoring manhole or public cleanout as noted above.*

C1-3.2.2 Collection Sewers

Collection sewers shall be designed for the ultimate development of the tributary areas.

C1-3.2.3 Trunk and Interceptor Sewers

Selection of the design period for trunk and interceptor sewers should be based on an evaluation of economic, functional and other considerations. Some of the factors that should be considered in the evaluation are:

- Possible solids deposition, odor and pipe corrosion that might occur at initial flows.
- Population and economic growth projections and the accuracy of the projections.
- Comparative costs of staged construction alternatives.
- Effect of sewer sizing on land use and development.

C1-3.3 Design Basis

Sewer systems shall be designed on the basis of per capita flows for the design period in conjunction with a peaking factor or approved alternative methods. Design calculations for trunk and interceptor sewers shall be submitted to the *District* for approval. Larger systems should have hydraulic modeling performed, consult with the District prior to model development. Replacement mains or rehabilitation of existing mains shall be designed on the basis of measured flows with projections for the design period as applicable. Documentation shall be submitted for approval of the authorized entity and/or Ecology. Documentation of the alternative method shall be provided upon request.

C1-3.3.1 Design for Average Daily Flow

Design flows shall be determined by consideration of the following factors:

A. *Drainage basin area to be served based on the District's Comprehensive General Sewer Plan.*

B. *Population within the area to be served (both present and future) based on the District's Comprehensive General Sewer Plan. Residential population is 2.66 people per household (ERU).*

C. *Land use within the area to be served based on Clark County's Comprehensive Plan.*

D. *Per capita, employee and student sewage flow per Table C1-3 Design Factors.*

E. *Wet industrial flow in designated areas per Table C1-3 Design Factors.*

In the absence of flow data or other reliable information, the design factors from Table C1-3 shall be used. Appropriate peaking ratios shall be applied to determine flows.

As a minimum, design calculations shall include estimates of peak hourly, average maximum and minimum daily flows (where applicable). The submission of design calculations shall not ordinarily be required for residential developments, but the Design Engineer should be prepared to substantiate pipe sizes, layout, population estimates, land uses or other design assumptions as may be requested by the District. Design calculations will be required for all commercial and industrial development.

Type of Use	*Average Flow*	*Peak Flow (1)*
Residential	*75 gpcpd (2)*	*3.0 Minimum*
Commercial & Industrial - Employment	*15 gpepd (3)*	*None*
Wet Industrial (6)	*1,500 gpad (4,7)*	*None*
Student Enrollment	*15 gpspd*	*3.0 Minimum*

(1) Shall be determined using Figure C1-1, Peaking Flow Factor, minimum 3.0
(2) Gallons per capita per day
(3) Gallons per employee per day
(4) Gallons per acre per day
(5) Gallons per student per day
(6) Limited to zoned Industrial lands within areas designated as Industrial Hubs in the General Sewer Plan
(7) Allocation is above or in addition to domestic flows captured by employment flow projections

Table C1-3 Design Factors

New sewer systems may be designed by methods other than those listed in Table C1-3. Alternative methods may include the use of per capita flow rates based on water consumption records, or other methods. Documentation of the alternative method used shall be provided to *the District* for review and approval.

C1-3.3.2 Peak Flow

Sanitary sewers shall be designed to carry at least the peak hourly flow when operating at capacity. Peak hourly flow shall be the design average daily flow in conjunction with a peaking factor as determined from Figure C1-1, Peaking Flow Factor. The peaking factor shall not be less than 3.0.

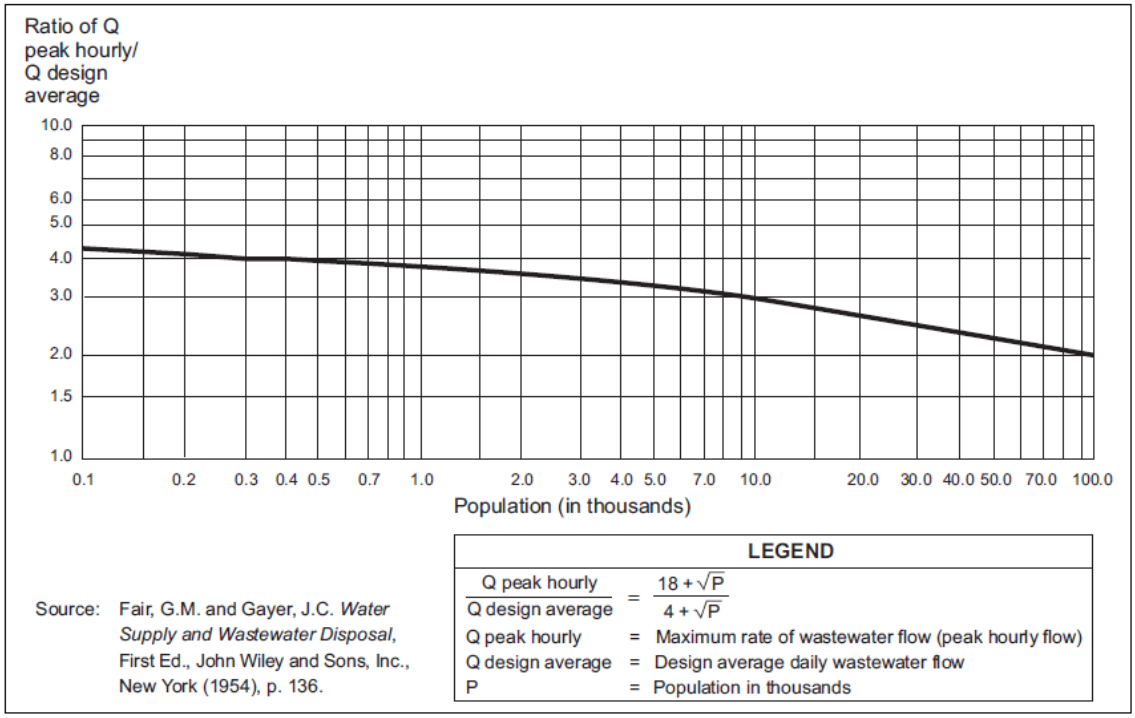

Figure C1-1. Ratio of Peak Hourly Flow to Design Average Flow

C1-3.3.3 Infiltration/Inflow

Infiltration and Inflow is accounted for with Figure C1-1 peaking factor.

C1-3.4 Design Factors

The design engineer shall utilize current design criteria. At a minimum, the design of gravity sanitary sewers will include the following:

- Peak sewage flows from residential, commercial, institutional and industrial sources.
- Infiltration/Inflow.
- Topography and depth of excavation.
- Treatment plant location.
- Soil conditions.
- Flow impacts from upstream pump stations, if applicable.
- Maintenance.
- Existing sewers.
- Existing and future surface improvements.
- Controlling service connection elevations.
- Potential surcharge in downstream sewers.

C1-4 GRAVITY SEWER DESIGN AND CONSTRUCTION DETAILS

C1-4.1 Minimum Size

No sewer main shall be less than 8 inches in diameter .

C1-4.2 Depth

C1-4.2.1 Minimum Depth

Sanitary sewers shall:

A. *Generally have a minimum depth of cover of eight (8) feet; and*

B. *Unless approved in writing by the District, shall not have a depth of cover less than three (3) feet when subject to vehicular traffic; and*

C. *Be deep enough to prevent freezing and physical damage; and*

D. *Be designed at an elevation that is sufficient to serve the limits of the service basin; and*

E. *Be of sufficient depth to serve existing and proposed basements*

Public side sewers shall:

A. *Have a depth of cover of at least six (6) feet at the property line unless such is precluded by the depth of the sanitary sewer main; and*

B. *Where physically possible, serve all existing and proposed buildings, including basements, by gravity.*

C1-4.3 Roughness Coefficient

An “n” value of 0.013 shall be used in Manning’s formula for the design of all sewer facilities (regardless of pipe material) except inverted siphons, where an “n” value of up to 0.015 can be used.

C1-4.4 Slope (Minimum Velocity)

All sewers shall be designed and constructed to give mean velocities, when flowing full, of not less than 2.0 fps. Self-cleaning velocity shall be provided and demonstrated by the *Design* Engineer to the *District* to accept the problem caused by a lack of sufficient flow.
Table C1-1 lists the minimum slopes that should be provided; however, slopes greater than those listed in this table are desirable under low-flow conditions.

Sewer Size (inches)	Minimum Slope (feet per 100 feet)
8	*0.45*
10	0.28
12	0.22
14	0.17
15	0.15
16	0.14
18	0.12
21	0.10
24	0.08
27	0.07
30	0.06
36	0.05

Table C1-1. Minimum Slope of Sewers, by Size (Assuming Full Flow)

Sewers shall be laid with uniform slope between manholes.

Sewers on a 20-percent slope or greater shall be anchored securely with concrete anchors or their equal. Suggested minimum anchorage spacing is as follows:

- Not over 36 feet center-to-center on grades of 20 percent and up to 35 percent.
- Not over 24 feet center-to-center on grades of 35 percent and up to 50 percent.
- Not over 16 feet center-to-center on grades of 50 percent and more.

C1-4.5 Alignment

Gravity sanitary sewer lines shall be designed with a straight alignment between manholes. As a general rule, horizontal and vertical curves in gravity sewers are not acceptable.

In cases where justification can be demonstrated, the District may consider limited use of curved sanitary sewer lines. The Design Engineer must submit a report documenting the justifications for utilizing a curved alignment. As a minimum, the District shall require:

A. *A slope greater than the minimum slope for the size of the pipe; and*

B. *Manhole spacing of less than 400 feet; and*

C. *A radii of curvature that will not cause joint widening and will maintain water tightness; and*

D. *The location of curved sewers, length of curve, degree of curve (or radius), and stationing of curve points clearly labeled on the plans and profiles; and*

E. *The radius of curvature shall not exceed the manufacturer's specification; and*

F. *The owner or contractor shall provide personnel under the direct supervision of the Design Engineer to continuously monitor installation of the curved sewer; and*

G. *A pipe manufacturer's representative to be on the site during the installation; and certification by the Design Engineer that the line was installed in accordance with the Plans.*

H. *Continuous toning wire and appropriate locate access points shall be installed for use by the District.*

C1-4.6 Increasing Size

Where a smaller pipe joins a larger pipe, the crowns of both sewers will be at the same elevation or as approved by the District. Pipeline sizes shall only be changed at a manhole.

C1-4.7 High-Velocity Protection

Where velocities greater than 15 fps are expected, special provision shall be made to protect against internal erosion or displacement by shock.

C1-4.8 Material

All material for sewers will meet the requirements of the Design Criteria and Section 7-17.2 Materials of the Construction Specifications.

The materials for mainline pipe shall be in accordance with the following requirements:

A. *ASTM D 3034 SDR 35 PVC pipe may be installed at depths of cover from five (5.0) feet to a depth of cover of twenty (20.0) feet.*

B. *AWWA C-900 or C-905, SDR 18 PVC or Standard Thickness Class 50 ductile iron pipe may be installed at depths of cover greater than three (3.0) feet .*

C. *Other pipe materials (i.e. HDPE, Profile Wall or Concrete) may be considered by the District in accordance with C1-1.3.3 Approval of Alternate Materials or Methods.*

All sewers shall be designed to prevent damage from superimposed loads. Proper allowance for loads on the sewer because of the width and depth of a trench should be made. When standard-strength sewer

pipe is not sufficient, the additional strength needed may be obtained by using extra-strength pipe or by special construction, such as improving bedding conditions or encasing the pipe in concrete.

C1-4.9 Joints

The method of making joints and the materials used shall be included in the specifications and approved by the District.

C1-4.10 Flushing

Flushing shall be in accordance with the Construction Specifications Section 7-17.3(1) Protection of Existing Sewerage Facilities.

C1-5 TESTING

Testing shall be in accordance with the Construction Specifications Section 7-17.3(2) Cleaning and Testing.

C1-6 MANHOLES, Monitoring Manholes, Cleanouts, Grease Interceptors, Grease Traps and Oil-Water Separators

C1-6.1 Location *and Miscellaneous Requirements*

Manholes (except as noted under cleanouts) shall:

A. *Not have edges of manhole casting and cover within three (3) feet of the curb storm drainage gutter unless an inflow dish is installed.*

B. *Be installed at the end of each line with eight (8) inch inner diameter or greater; and*

C. *Be installed at all changes in slope, pipe size, or pipe alignment; and*

D. *Shall be a Type 3 shallow manhole per Standard Drawings between three (3) and five (5) feet in depth; and*

E. *Be installed at all pipe intersections and at distances not greater than 400 feet; or*

F. *Be installed at distances not greater than 500 feet for sanitary sewers with thirty six (36) inch or larger inner diameter; and*

G. *Not have lines entering that are adverse to the flow through the manhole. The minimum angle for a line through a manhole in any one direction shall be ninety (90) degrees; and*

H. *Shall have a minimum of two-tenths (0.20) of a foot drop from the inlet sewer pipe to the outlet sewer pipe; and*

I. *Have inflow dishes installed in areas of I/I concern as determined by the District.*

Monitoring Manholes:

A. Shall be installed at all commercial and industrial buildings that have other than domestic sewage in accordance with the District industrial pre-treatment requirements and for all shell or speculative buildings where tenants have not been determined; and

B. Shall be a standard forty eight (48) inch pre-cast manhole per Standard Drawings; and

C. Shall be a Type 3 shallow manhole per Standard Drawings between three (3) and five (5) feet in depth; and

D. Shall have the steps aligned over the inlet sewer line; and

E. May be substituted for the District cleanout if within ten (10) feet of the normal location of the District cleanout. ; and

F. Shall have two-tenths (0.20) of a foot drop from the inlet sewer pipe to the outlet sewer pipe; and

G. Manholes to be used for monitoring flow volumes shall have a minimum of three (3) feet of pipe on the inlet and outlet side of the manhole aligned with the manhole channel to provide laminar flow ; and

H. Have inflow dishes installed in areas of I/I concern as determined by the District.

Cleanouts:

A. Standard Cleanouts may be used instead of manholes at the end of lines not more than 150 feet long; and

B. Stub Marker Cleanouts shall be used instead of manholes at the end of lines eight (8) inches in diameter or larger, not more than 250 feet long, provided the line is intended to be extended in the future.

Grease Interceptors shall:

A. Meet or exceed the requirements of the Uniform Plumbing Code Sections 209.0, 210.0 and 1009.0 through 1015.5, and have a minimum volume of 1,000 gallons; and

B. Conform to Standard Drawing and District Pretreatment requirements; and

C. Not be placed within ten (10) feet of a drive-in window or in a drive-in lane; and

D. Not be placed within fifteen (15) feet of a building entrance or exit; and

E. Not have greater than 24" of risers installed, and

F. Not be placed in a standard parking stall, and

G. Meet the flow sizing criteria listed in C1-6.10, and

H. Shall not accept flow from sanitary facilities, or garbage disposals.

Grease Traps May be used in lieu of a grease interceptor if;

A. The District approves the use in writing; and

B. The food preparation area does not utilize a Type 1 commercial exhaust hood; and

C. The grease trap meets all the requirements of the Uniform Plumbing Code Sections 210.0, and 1009.0 through 1015.5.

Oil-Water Separators shall:

A. Meet or exceed the requirements of the Uniform Plumbing Code Section 211.0, 1009.0 through 1009.7, and 1017.0 through 1017.2; and

B. Conform to District Pretreatment requirements

C. Not be placed in a standard parking stall.

C1-6.2 Connections

The ends of all pipes shall be trimmed flush with the inside walls of the manhole. Flexible pipes connecting to sanitary sewer manholes shall be provided with an entry coupling or gasket. No pipe joint in flexible pipe shall be placed within 10 feet of the manhole.

Rigid pipes connected to the sanitary sewer manhole shall be provided with a flexible joint at a distance from the face of the manhole of not more than 1.5 times the nominal pipe diameter or 18 inches, whichever is greater. For precast concrete manholes, the cut through the manhole wall and steel mesh shall be *constructed with a coring saw sized to meet the flexible boot requirement for the pipe size, producing a non-leaking connection.*

The District normally does not allow the use of drop manholes. The District will consider a written request from the Design Engineer and evaluate the request in accordance with the Design Criteria section C1-1.3.3 Approval of Alternate Materials or Methods.

C1-6.3 Diameter

The minimum inside diameter of manholes shall be 48 inches. For incoming pipe larger than 24 inches in diameter, the manhole diameter should be 54 inches or greater. Manholes are mandatory when connecting significant industries to the system and should be of adequate size to provide for monitoring and sampling equipment.

C1-6.4 Flow Channels

Flow channels in manholes shall be shaped and sloped to provide a smooth transition between the inlet and outlet sewer lines and minimize turbulence. The channels and manholes shall conform accurately to the sewer grade. Channeling height shall be to the springline of the sewer or above. Benches shall be sloped from the manhole wall toward the channel to prevent accumulation of solids.

The elevation difference from the inlet pipe through the manhole to the outlet pipe shall be a minimum of two-tenths (0.20) of a foot and a maximum of five-tenths (0.50) of a foot. Under unusual conditions, the District may allow a one-tenth (0.10) of a foot drop through a manhole when requested by the Design Engineer in writing outlining the reasons for the request. The District will respond in writing and the District's decision will be final. The bench shall be sloped at two (2) percent from the inside wall of the manhole to the channel.

The District will allow the direct connection of laterals into manholes provided:

- *It is a terminus manhole; and*
- *No more than 4 laterals are connected into a single manhole; and*
- *The elevation difference from the inlet pipe through the manhole to the outlet pipe shall be a minimum of three-tenths (0.30) of a foot and a maximum of five-tenths (0.50) of a foot.*

C1-6.5 Watertightness

Watertight manhole covers shall be used wherever the manhole tops may be flooded. Joints between precast manhole units shall have rubber gaskets or be provided with positive self-sealing mastic. Care should be exercised during the handling of the precast units to avoid disturbing or damaging the gasket and to attain proper alignment of the joints. *Additional gaskets (1 for every 2 watertight lids) shall be provided to the District by the installer.*

All sewer line connections to existing and new manholes shall conform to the Construction Specifications Section 7-05.3(3) Connections to Existing Manholes.

All manholes in areas of high groundwater shall conform to the Construction Specifications Sections 7-05.3 Construction Requirements and 7-05.3(1) Adjusting Manholes and Catchbasins to Grade.

C1-6.7 Frames, Covers, and Steps

All manhole covers and frames shall conform to the Construction Specifications Section 9-05.15(1) Manhole Ring and Cover and District Standard Drawings. All manhole steps will conform to District Standard Drawings.

C1-6.8 Liners

Corrosion resistant coatings should be considered for adverse environmental conditions. Structural linings should be considered for manhole rehabilitation and for reduction of I/I. If required, *Raven 405 blue or gray epoxy coating, or equivalent, shall be specified.*

C1-6.9 Manhole Testing

Manhole testing shall conform to the Construction Specifications Section 7-05.3(5) Vacuum Test for Manholes.

Grease Interceptors and Oil/Water Separators shall be exfiltration tested in accordance with the Construction Specifications.

C1-6.10 Grease Interceptors

Sizing for grease interceptors shall comply with the following formula:

V = R x S x F, where

V = Minimum volume
R = Retention time (30 minutes minimum)
S = Storage Factor = 1.25
F = maximum flow rate in gpm

C1-7 DELETED

C1-8 SEWER SYSTEM REHABILITATION/REPLACEMENT TECHNIQUES

The objectives of sewer system rehabilitation/replacement are principally to preserve structural integrity and reduce I/I. There are a number of products available from a variety of manufacturers and contractors to help meet these objectives. Sewer system owners should take care to verify that a certain class of product is suited for its proposed application and that a specific product and its installer meet appropriate standards, including successful performance history. The purpose of this section is to highlight the advantages, disadvantages, and other issues for the various classes of sewer rehabilitation/replacement products.

C1-8.1 Sewer Mains

The rehabilitation/replacement techniques for sewer mains are discussed in Table C1-3.

Technique	Advantages	Disadvantages	Issues
Sliplining Sliplining is the insertion of a new pipe, either continuous (typically butt-fused HDPE) or segmented (typically PVC, ductile iron, or HDPE), of smaller diameter into an existing host pipe.	• Economical. • Strong. • Bypass pumping of sewage may not be needed (for segmented slipliner pipe).	• Hydraulic capacity reduced. • Entry pits usually required. • Service lateral connections must be excavated.	• Flotation of liner must be prevented during grouting of annular space. • Condition of existing pipe may limit length of slipliner runs between pits, diameter of slipliner pipe, and/or lengths of segmented pipe pieces.
Cured-In-Place Pipe (CIPP) The CIPP lining process consists of inverting a resin- impregnated flexible tube into an existing line using hydrostatic head or air pressure. The resin is cured using heat.	• No access pits. • Service laterals can be internally reopened. • Minimal annular space. • Suitable for various cross-sectional shapes. • Strength can be selected as a function of liner thickness and resin formula. • Manholes can be rehabilitated rather than replaced.	• Bypass pumping of sewage required. • Limited local competition.	• Liner wet-out with resin must be ensured. • Resin pot life must not be exceeded. • Proper curing temperatures and times must be maintained. • I/I must be controlled during installation. • Expertise and performance of manufacturer and installer must be ensured.
Fold-and-Form Lining The fold-and-form process involves inserting a heated PVC or HDPE thermoplastic liner, folded or deformed into a U-shape, into an existing sewer and rerounding the liner using heat and pressure.	• No access pits. • Service laterals can be internally reopened. • Manholes can be rehabilitated rather than replaced.	• Annular space allows migration of I/I unless service lateral connections are sealed. • Bypass pumping of sewage required. • Limited local competition.	• Liner contraction during cooling induces stresses; consider use of materials with lower co-efficients of thermal expansion/contraction and minimize installation tension. • I/I must be controlled during installation. • Expertise and performance of manufacturer and installer must be ensured.
Pipe Bursting Pipe bursting is a trenchless replacement technology. Through pipe bursting, the existing pipeline is fragmented and forced into the surrounding soil by pulling a bursting head through the line. A new pipe (typically butt-fused HDPE) of equal or larger diameter is pulled behind the bursting head. New manholes are usually provided at insertion and withdrawal pits.	• Creates a new, strong pipeline, not just rehabilitation of existing pipes. • Capacity can be increased. • Preparation of existing line is not critical.	• Entry pits are required. • Service lateral connections must be excavated. • Bypass pumping of sewage required. • Manholes must usually be replaced.	• Condition and location of adjacent buried utilities and foundations as well as surface improvements should be considered. • Dense or rocky soil may limit suitability of this method.
Point Repairs Point repairs can structurally rehabilitate and eliminate infiltration in short sections of lines by such methods as short CIPP liners, epoxy resins, and structural grouting sleeves. Defects such as protruding laterals can be repaired by robotic grinding. Point repairs may be needed to properly prepare the line for some of the manhole-to-manhole rehabilitation/replacement options described in the techniques listed above.	• Economical. • Repairs only what is needed.	• May not be appropriate for old lines if many more repairs may be needed in near future.	• Goals of project must be considered, along with cost estimates, to ensure manhole-to-manhole rehabilitation and replacement is not warranted.

Table C1-3. Rehabilitation/Replacement Techniques for Sewer Mains

C1-8.2 Side Sewer Repairs

Side sewers (also referred to as private service laterals) are sewer lines that connect building drains on private property to the public sewer main in the public right-of-way or easements.

Research studies by EPA and others indicate that a significant percentage of systemwide I/I is caused by private property sources. These include sump pumps, foundation drains, roof drains, and defects in service laterals. Service lateral defects include cracked, broken, or open-jointed laterals. In addition, infiltration frequently occurs at a leaky connection of the lateral to the sewer main.

Repair of service lateral defects can be accomplished using many of the same methods listed above for sewer mains. Currently, chemical grouting, CIPP lining, and pipe bursting, in addition to open-cut excavation and replacement, are most widely used.

Removal of other private property I/I sources requires an effective public awareness and disconnection program.

In cases where sewage backups have occurred through service laterals and into buildings, installation of backwater valves provides an immediate solution until the longer term sewer system rehabilitation/replacement program shows results. Backwater valves are typically installed beneath basement floor slabs on that portion of the building drain serving the basement only. This allows plumbing fixtures on the main floor and above to drain even during times when the sewer main is surcharged.

C1-8.3 Manhole Rehabilitation

Manhole rehabilitation can be performed to correct structural deficiencies, address maintenance concerns, and/or eliminate I/I. Some of the manhole rehabilitation options include lining, sealing, grouting, or replacing various components or the entire manhole. The rehabilitation method selected depends on whether inflow or infiltration, or both, is to be eliminated and whether structural integrity is an issue.

Inflow typically occurs through holes in the manhole cover or around the manhole frame and cover. Manhole covers can be sealed by replacing them entirely with new watertight covers, or by sealing existing covers with rubber-covered gaskets, rubber vents, and pick- hole plugs, or by installing watertight inserts under the existing manhole covers (inflow protectors). Inflow protectors should contain vacuum and gas release valves.

Chemical grouting is commonly used to eliminate infiltration.

C1-8.4 Trench Excavation for System Repairs and Retrofits (Added 10/2006)

Pipeline separation is a necessity for protection of public health and safety, property, and the quality of the product in the pipeline. Pipeline failure or leaks result in contamination of the pipeline product that leads to a public health and safety risk. The process of excavating one pipeline to repair a leak increases the risk of complete failure of adjacent pipelines. This can also be a concern when excavating trenches for reclaimed water retrofit projects. The Pipeline Separation Design and Installation Reference Guide (2006) can be used to address these concerns.

C1-9 SPECIAL REQUIREMENTS

C1-9.1 Required Separation between Potable Water Lines, Reclaimed Water Lines, and/or Sanitary Sewers (Rev. 10/2006)

The minimum separation requirements established in this section apply to all gravity and pressure sewers of 24-inch diameter or less. Larger sewers may create special hazards because of flow volumes and joint types, and generally require additional separation. The special construction requirements given below are for the normal conditions found with sewage and water systems. Requirements that are more stringent may also be necessary in areas of high ground water, unstable soil conditions or other geotechnical constraints. Any site conditions not conforming to conditions described in this section will require assessment and approval of the appropriate state and local agencies.

C1-9.1.1 Horizontal and Vertical Separation (Parallel)

A minimum horizontal separation of 10 feet between sanitary sewers, reclaimed water lines, and any existing potable water lines, and a minimum vertical separation of 18 inches between the bottom of the water line and the crown of the sewer shall be maintained. The distance shall be measured edge to edge (i.e., from the outer diameter of the pipes.) See Figure C1-2.

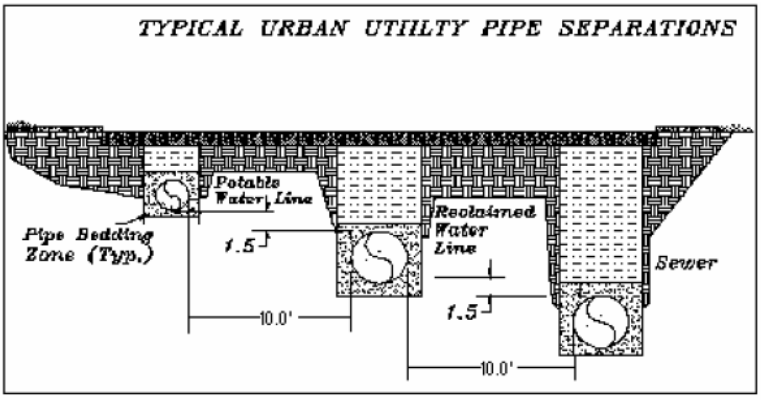

Figure C1-2 Required Separation between Potable Water Lines, Reclaimed Water Lines, and Sanitary Sewers, Parallel Construction

C1-9.1.2 Unusual Conditions (Parallel)

When local conditions prevent the separations described above, a sewer may be laid closer than 10 feet horizontally or 18 inches vertically to a water line or reclaimed water line, provided the guidelines below are followed:

- It is laid in a separate trench from the water line.
- When the vertical separation cannot be obtained, the sewer shall be constructed of materials and joints that are equivalent to water main standards of construction and shall be pressure tested to ensure water tightness (see C2-3.6) prior to backfilling. Adequate restraint should be provided to allow testing to occur.
- If sewers must be located in the same trench as a potable water line, special construction and mitigation is required. Both water lines and sewer lines shall be constructed with a casing pipe of pressure-rated pipe material designed to withstand a minimum static pressure of 150 psi.
- The water line shall be placed on a bench of undisturbed earth with the bottom of the water pipe at least 18 inches above the crown of the sewer, and shall have at least 5 feet of horizontal separation at all times. Additional mitigation efforts, such as impermeable barriers, may be required by the appropriate state and local agencies. See Figure C1-3.

C1-9.1.3 Vertical Separation (Perpendicular)

Sewer lines crossing water lines at angles including perpendicular shall be laid below the water lines to provide a separation of at least 18 inches between the invert of the water line and the crown of the sewer.

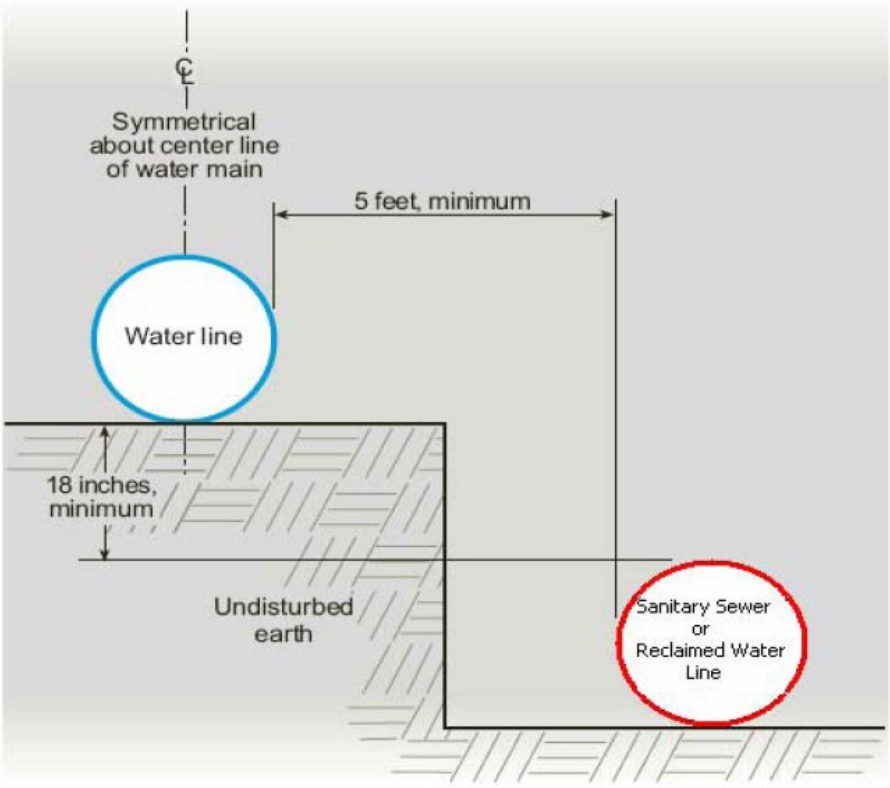

Figure C1-3 Required Separation between Water Lines and Sanitary Sewers, Unusual Conditions Parallel Construction

C1-9.1.4 Unusual Conditions (Perpendicular)

When local conditions prevent a vertical separation as described above, construction shall be used for crossing pipes as follows:

A. Gravity Sewers Passing Under Water Lines
All of the following shall apply to gravity sewers:

- Constructed of material described in Table C1-4. The one segment of the maximum standard length of pipe (but not less than 18 feet long) shall be used with the pipes centered to maximize joint separation; or
- Standard gravity-sewer material encased in concrete or in a one quarter-inch thick continuous steel, ductile iron or pressure rated PVC pipe with a dimension ratio (DR) of 18 or less, with all voids pressure-grouted with sand-cement grout or bentonite. Commercially available pipe skids and end seals are acceptable. When using steel or ductile iron casing, design consideration for corrosion protection should be considered.
- The length of sewer pipe shall be centered at the point of crossing so that the joints will be equidistant and as far as possible from the water line. The sewer pipe shall be the longest standard length available from the manufacturer.

Table C1-4 Recommended Pipe Material for Unusual Conditions

Type of Pipe	AWWA (ASTM) Standard		
	Pipe	Joint	Fittings
Ductile Iron	C 151 and C 104	C 111	C 110
Polyvinyl-Chloride	C 900	(D 3139 AND F 477)	C 110

HDPE 3408	C 906	Fused per C 906	C 906

*Pipe spec C900 for pipe less than or equal to 12 inches in diameter; C905 for pipe greater than 12 inches in diameter.

B. Gravity Sewers Passing Over Water Lines
Water lines shall be protected by providing:

- A vertical separation of at least 18 inches between the invert of the sewer and the crown of the water line.
- Adequate structural support for the sewers to prevent excessive deflection of joints and settling on and breaking of the water lines.
- The length of sewer pipe shall be centered at the point of crossing so that the joints will be equidistant and as far a possible from the water line. The sewer pipe shall be the longest standard length available from the manufacturer.
- A water line casing equivalent to that specified in C1-9.1.4A.

C. Pressure Sewers under Water Lines
These pressure sewers shall be constructed only under water lines with ductile iron pipe or standard sewer pipe in a casing equivalent to that specified above in C1-9.1.4A for a distance of at least 10 feet on each side of the crossing.

C1-9.2 Pumpout Facilities at Marinas

Pumpout facilities and shore side facilities for disposal of sanitary wastes from boats shall be installed at marinas at the time of initial construction or expansion of facilities, when the marina is of sufficient size and design to serve boats 17 feet or larger in overall length.

The facilities shall be designed according to “Design Criteria for Pumpout Facilities at New or Expanded Marinas,” which is the criteria established by the Washington State Parks and Recreation Commission in its document, “Financial Assistance Application for Clean Vessel Funding Program.”

The requirement for construction of sewage pumpout facilities shall be specified in the Water Quality Certification for the Corps of Engineers Section 10 permit.

Each marina shall prominently display signs stating that it is illegal to discharge untreated sanitary wastes into US waters and directing boaters to the pumpout facilities.

C1-9.3 Stream Crossing

The pipe and joints shall be tested in place, exhibit zero infiltration, and be designed, constructed, and protected against anticipated hydraulic and physical, longitudinal, vertical, and horizontal loads, erosion, and impact. Sewers laid on piers across ravines or streams shall be allowed only when it can be demonstrated that no other practical alternative exists. Such sewers on piers shall be constructed in accordance with the requirements for sewers entering or crossing under streams. Construction methods and materials of construction shall be such that sewers will remain watertight and free from change in alignment or grade. *A minimum depth of cover of 5 feet for stabilized channels and 7 feet for shifting channels should be provided.*

Permits from other agencies or departments are required for work in or adjacent to waterways.

C1-9.4 Inverted Siphons

Inverted siphons shall have not less than two barrels, with a minimum pipe size of 6 inches, and shall be provided with necessary appurtenances for convenient flushing and maintenance. The manholes shall be designed to facilitate cleaning and, in general, sufficient head shall be provided and pipe sizes selected to secure velocities of at least 3 fps for average flows. A rock catcher and coarse screen should be provided to prevent plugging of the siphons. The inlet and outlet details shall be arranged so that normal flow is diverted to one barrel and so that either barrel may be removed from service for cleaning or other maintenance.

C1-9.5 Required Separation from Water Supply Wells

Sewer lines shall be placed no closer than 100 feet to any public water supply well.
When constructing sewer lines in the vicinity of any water supply, contact *Clark County Public* Health *and the appropriate local water purveyor* for local requirements, including the use of alternative construction materials.

C1-9.6 Odor Control

Odor problems are typically related to the presence of hydrogen sulfide. Therefore, the alternatives for control of odor are usually aimed at preventing sulfide generation or at removing sulfides through chemical or biological action. Regular inspection and cleaning of existing collection systems can reduce sulfide buildup, significantly minimizing odor problems. Sealing manhole lids and their openings can be used as a temporary solution for reducing odor complaints.

Slope is the key criterion in designing a new wastewater collection system to avoid sulfide problems. Sewers designed with long runs at minimum slope are prone to sulfide generation due to long residence times, poor oxygen transfer and deposition of solids. Sulfide generation can be a problem in new sewers where actual flows are much less than design flows during the early lifetime of the system, and velocities are inadequate to maintain solids in suspension.

Current conventional design practice recommends that a minimum velocity of 2 fps be achieved regardless of pipe size to maintain a self-cleaning action in sewers. It should be noted that this is a minimum velocity and that it is desirable to have a velocity of 3 fps or more whenever practical.

If sulfide generation is anticipated to be a problem, larger pipe sizes may be selected to improve the rate of re-aeration. However, adequate scouring velocities must still be maintained if larger pipe is used.

The use of drops and falls in manholes can be used as a method of adding substantial amounts of oxygen to the wastewater.

However, drops or falls are not recommended when appreciable amounts of dissolved sulfide are present, as the turbulence will release sulfide from the stream, generating odors and potentially deteriorating the structure.

Sewer line junctions and transitions at manholes require special consideration because they offer an opportunity for both solids deposition and the release of dissolved sulfide. For aerobic wastewater, the major goal of junction design is to provide smooth transitions with minimum turbulence between incoming and outgoing lines in order to prevent eddy currents or low velocity points that will permit deposition of solids. See G2-5 for additional information on odor prevention and treatment

C1-9.7 Corrosion Control

Hydrogen sulfide may result in severe corrosion of unprotected sewer pipes made from cementitious materials and metals. The corrosion occurs when sulfuric acid is derived through the oxidation of hydrogen sulfide by bacterial action on the exposed sewer pipe wall. Various pipe materials exhibit resistance to corrosive attack from sulfuric acid but other forms of chemical corrosion should also be considered. Certain concentrated organic solvents can soften the polymeric materials in plastic pipes and in plastic joints on non-plastic pipe, but this type of damage is rare. Galvanic action is the cause of most corrosion in buried iron and steel pipe.

Where corrosion problems are the result of hydrogen sulfide action, similar actions to those taken to control odor will also have the beneficial effect of reducing corrosion. Various linings and coatings are available to protect concrete, ductile iron, steel and ABS composite pipes. External polyethylene film encasements are often used on metal pipes to impede external corrosion from galvanic action. Manholes can also be protected from corrosion by the use of lining systems.

C1-9.8 Trenchless Technologies

Trenchless techniques for new construction include: micro-tunneling, auguring or boring, pipe jacking, and other mining-type operations.

Costs, topography or other issues that may preclude traditional open-cut-and-excavation methods will most often direct the use of these techniques. See C1-8 for descriptions of techniques involving trenchless technologies applicable to sewer system rehabilitation or replacement. Some of these techniques may also be applicable for new construction.

C1-9.9 Pipe Casing

Often when a sanitary sewer is installed by boring methods, a casing pipe is inserted and the sanitary sewer pipe is placed inside. *Casing crossings will normally be required on all State Highway crossings, Railroad crossings and major arterial crossings. Casings may be required on stream crossings.* When installing pipe in a casing, the pipe must be uniformly supported *with approved spacers and end caps*. *The spacers will be constructed of non-decaying material, firmly connected to the pipe and spaced per manufacturer's specifications or District standards.* Generally, the annular space between the pipe and the casing is filled with *sand,* grout or controlled density fill.

C1-10 ALTERNATIVE SYSTEMS

Alternative systems are systems which may be used as alternatives to gravity sewers when special conditions warrant the usage of these nonstandard systems.

Alternative systems for conveyance of wastewater to a centralized location or wastewater treatment facility include grinder pump (GP), septic tank effluent pump (STEP), small diameter gravity (SDG), and vacuum systems. *The following description provides general information for the design of STEP systems and GP systems. Sections C1-10.6 provides additional District specific design criteria.*

GP systems use a macerating type pump to convey sewage through small diameter pipelines to a centralized location.

Grinder pumps are also commonly used in conjunction with gravity systems where a particular structure is located below the invert of a gravity collection pipe or there is insufficient vertical drop between the structure and the gravity pipe.

STEP systems use an effluent-type pump to convey the relatively clear liquid from the center of a vessel (STEP tank) that is similar in nature to a septic tank. A STEP system is similar to a grinder system in that it conveys liquid to a common location through small diameter pipelines. The major difference is that much of the solids remain in the STEP tank and have to be removed periodically (similar to pumping a septic tank) and that the liquid conveyed in a STEP system is septic.

STEP; Commercial Duplex. The site must be of sufficiently sized area to accommodate the necessary equipment for maintenance, repair and replacement. The site must have an all weather access to it capable of sustaining H-20 loads from equipment trucks as large as 40' long and 10' wide with no turns less than a 30' radius. As every application of a commercial Duplex system may have significantly different sizes and shapes the site area placement, paving, fencing, gates, access road needs will be determined through the plan review process. For this reason, the District encourages owners and their design engineers to request a predesign conference before initial plan submittal.

SDG systems, sometimes referred to as septic tank effluent filter (STEF) systems or septic tank effluent gravity systems, use gravity to convey liquid to a common location. A SDG system conveys the relatively clear liquid from the center of a vessel, similar to a septic tank.

The liquid is conveyed by gravity through a system of small diameter pipelines that are designed and sized to ensure that the hydraulic grade line is below the liquid level of the SDG tanks during peak flow. Similar to a STEP system, much of the solids remain in the tank or vessel and are periodically removed. It is common to combine

STEP and SDG on a single system with the SDG units above the hydraulic grade line and the STEP units in areas that are below the peak hydraulic grade line.

C1-10.1 Grinder Pump, Septic Tank Effluent Pump, and Septic Tank Effluent Filter/Small Diameter Gravity Systems

C1-10.1.1 Application

The designer may consider alternative collection methods for a variety of different applications. An alternative method of conveyance can be used in any application but is usually selected due to the circumstances surrounding the installation. Examples of such circumstances are as follows:

- Difficult construction conditions, such as high ground water, subsurface rock removal, large amounts of street reconstruction to implement the system, undulating terrain requiring multiple pump stations for a gravity collection system, and difficult topography requiring the structures to pump to the collection line.
- Low- to moderate-density structures along the collection system route or high-density structures separated from the remainder of the collection system by long distances.
- Limited treatment plant capacity requiring I/I to be kept to a minimum.
- Low system costs for certain installations.

C1-10.1.2 Design Considerations

Design of a STEP, STEF/SDG, or GP system shall, at a minimum, incorporate the system design considerations such as determining the peak-hydraulic grade line, matching the peak-hydraulic grade line to the individual pump curve or elevation of the SDG units, sizing the holding vessel based on estimated or actual wastewater flows, and designing system appurtenances required to provide a reliable municipal system.

A. Peak Design Flows
The minimum peak flow used in the pipeline design for alternative systems shall be equal to or greater than the following:

$$Q = 15 + .5D \text{ or}$$

$$Q = 15 + .15P$$

Where:

Q = Design peak flow, gpm

D = Number of equivalent dwellings

P = Population

Peak flow is defined as an event that lasts about 15 minutes. If a dead-end reach of pipe has single or minimal users with high individual flows, the designer shall use the estimated discharge from two vessels or the combined discharge from two pumps as the minimum design flow.

B. Infiltration and Inflow Considerations
Alternative forms of collection are not meant to receive high amounts of I/I from ground water or surface water. The designer shall incorporate methods and materials in the design to eliminate sources of I/I from the system.

C1-10.1.3 Hydraulic Grade line/Pipeline Sizing

Pipelines for STEP, SDG and GP systems shall be sized to keep the peak hydraulic grade line below the critical operating elevations of the individual system. The hydraulic grade line shall be computed using common engineering fluid mechanics calculations using the Hazen Williams or Manning equation with an appropriate roughness co-efficient.

If downhill pumping cannot be avoided, the downhill pipeline shall be sized for two-phase flows (water and air). The pipeline shall be sized to allow air to transfer to properly located and sized air release assemblies.

A. SDG Hydraulic Grade line
   The maximum hydraulic grade line based on peak flow (C1-10.1.2) shall be below the outlet of the SDG/STEF tank minus 2 percent fall along the service line between the tank and the collection main. The service line will include, at a minimum, a check valve to prevent surcharge of the vessel from the collection line.

B. STEP/GP Hydraulic Grade line
   The maximum hydraulic grade line of the mainline, service line, and minor friction losses based on peak flow (C1-10.1.2) shall be no greater than the installed elevation of a STEP/GP pump plus 85 percent of the total available head of the pump. The designer shall also consult the manufacturer of the pump equipment to be used to determine if the individual pump criteria allows continued use at that position on the head curve. The designer shall use whichever criteria are more stringent. The service line will include a minimum of two check valves to prevent surcharge of the vessel from the collection line.

C1-10.1.4 Minimum Velocity

Minimum velocities for STEP and/or SDG pipelines are not required. STEP and/or SDG pipelines will be installed with cleanouts (pig ports) at the end of each line and at critical line size changes to necessitate cleaning. Minimum velocities for GP pipelines shall be 2 fps. GP pipelines will be installed with cleanouts (pig ports) at the end of each line and at critical line size changes to necessitate cleaning.

C1-10.1.5 Pump Selection STEP/GP

Pumps installed on a STEP or GP system shall meet the criteria for the maximum hydraulic grade line and be able to meet the pumping requirements of the structure where it is installed.

The designer shall review the system as a whole and select a type or characteristic of a pump for the entire system that has sufficient head to operate at the maximum hydraulic grade line (see C1-10.1.3). The designer may opt to include design zones within the system with different maximum hydraulic gradelines.

The pump selected *(see sections C1-10.5.5 and C1-10.6.5)* shall also be able to discharge influent peak flow (volume) without exceeding the working volume within the pump holding vessel (see C1-10.1.6). Influent peak flow (volume) will be determined by reviewing the number of fixtures within a structure or by applying a peaking factor to average daily volumes. The designer shall use a minimum of 400 percent of average daily flow for estimating peak influent volumes.

C1-10.1.6 Tank/Vessel Type and Sizing

Any vessel used for construction of a STEP, SDG or GP system shall conform to general guidelines, as follows:

- Vessels shall be constructed of a material that does not degrade from corrosion caused by the surrounding soil or the wastewater being held in the vessel.

  Common materials include reinforced cement concrete, reinforced fiberglass and polyethylene.

- Vessels shall be designed to withstand the external soil loading based upon the type of soil, lateral loading due to hydrostatic water pressure and wheel loading. Vessels to be located in a traffic-bearing area shall be designed to withstand HS-20 truck loading with appropriate impact factors.

- All vessel designs will bear the stamp of an engineer licensed in the State of Washington with specific expertise in design of similar vessels certifying that the tanks will meet the loading conditions specified herein.
- The vessel, appurtenances (risers, lids, cleanouts, inspection ports, inlet and outlet piping, etc.), and the connection between the vessel and appurtenances shall be watertight. Each vessel and appurtenances once fully assembled and installed shall be tested for leakage by filling with water. The test will be witnessed by the agency operating the system or their duly authorized representatives. No vessel will be accepted if there is any noticeable leakage during the testing period.

A. Tank Configuration STEP/SDG
A vessel (tank) up to 1,500 gallons in size shall be configured in accordance with the intent of the International Association of Plumbing and Mechanical Officials (IAPMO) SPS 1-87 with the following recommendations:

- A baffle wall or compartment wall is recommended but not required for 1,000- and 1,500-gallon tanks.
- The baffle wall will be constructed with a hole or knockout at the top of the baffle wall for ventilation and multiple holes or knockouts located in the clear zone of the tank (approximately 70 percent of the liquid level of the tank). The holes or knockouts shall be of sufficient size to prevent plugging from raw sewage.

A vessel (tank) over 1,500 gallons in size shall be configured to allow solids to deposit in the tank. It is recommended that the tanks conform to the following approximate configurations:

- An approximate tank size of 3,000 gallons shall have an equivalent diameter of 6 feet.
- An approximate tank size of 6,000 gallons shall have an equivalent diameter of 8 feet. It is recommended that tank volume over 6,000 gallons be accomplished with tanks in series to facilitate tank pumping. If tanks are placed in series, a baffle wall will not be required.

Tanks shall have a baffle wall installed that represents two-thirds volume in the first chamber and one-third volume in the second chamber. It is recommended that the baffle wall shall be constructed as outlined above. Tanks that are over 2,500 gallons total volume shall have three access ports with a minimum diameter of 18 inches, two in the first chamber and one in the second chamber. *Multiple tanks may be used upon application to and approval of the District Engineer.*

All tanks will include an inlet tee. The bottom of the tee will be extended to 18 inches below the liquid level.

A STEP/SDG tank shall contain detention volume, working volume, and storage volume.

B. Detention Volume STEP/SDG
The detention volume or liquid volume of a STEP or SDG tank that serves a single-family home or small business shall be a minimum of 950 gallons. Detention volume is defined as the volume of liquid below the “OFF” switch (STEP) or the outlet pipe (SDG). Tanks that serve structures with higher wastewater discharge volumes shall be sized in accordance with the following equation:

V = 1.5Q (residential strength waste)

V = 2.0Q (nonresidential strength waste)

Where:

V = Liquid volume

Q = Peak day flow for the structure being served

The equation provides the minimum liquid volume within the STEP/SDG tank. The tank shall also contain sufficient working volume and storage volume. Liquid volume shall be approximately 65 to 75 percent of the total tank volume.

C. Working Volume STEP/GP
The working volume shall be greater than the difference between the peak influent flow and the discharge of the STEP or grinder pump over a period of time estimated to be the peak duration. Working volume is defined as the volume between the “ON” and the “OFF” switch.

D. Storage Volume
STEP, SDG and GP vessels (tanks) shall have a minimum of 24 hours of storage within the tank except as allowed (see C1-10.1.6E.2). Tanks without 24 hours of storage shall be installed with a power transfer switch with an emergency generator plug or other device for allowing emergency power connection, or shall have reserve volume provided with a separate vessel. Storage volume is defined as the volume between the “OFF” switch and the top of the tank.

E. Power Outages

1. Applicability
STEP, SDG, and GP systems installed in areas with a history of prolonged power outages may require additional storage volumes. The designer shall review historical records of the local power purveyor to determine the advisability of adding more storage.

2. Power Transfer Switch/EG Plug
Vessels without 24 hours of storage shall be provided with a power transfer switch with an emergency generator plug. The number of tanks installed with power transfer switches shall be limited to the number of tanks or vessels that can be serviced by the local agency during a power outage. The agency shall also keep power generators with the proper connection to the generator plug on hand and in good working order.

C1-10.2 System Components

C1-10.2.1 Pipeline

Generally, pipelines shall be constructed of material that is not readily subject to corrosion by raw or septic wastewater.

A. Service Line/Check Valves
Each service line between the SDG vessel, STEP, or GP pump and the collection line shall have a corporation stop valve installed at the main. In addition, a minimum of two check valves will be installed on the STEP and GP service lines, and a minimum of one check valve will be installed on the SDG service line. The check valve attached to either the STEP or GP pump counts as one of the check valves.

Service lines shall be a*s further outlined in the Design Specifications*.

B. Cleanouts/Pig Ports
Cleanouts (pig ports) shall be installed at the ends of all pipelines. Cleanouts will be designed to launch a 2 lb/ft^3 polyfoam pig for scouring the pipelines. A cleanout can accept a pig that is 2 inches larger in diameter than the pipe that it is being inserted (for example, a 4-inch pig can be launched into a 2-inch pipeline). An additional pig port will be installed when the pipeline diameter exceeds the size of pig that can be launched in a cleanout (such as the transition between a 4- and 6-inch-diameter pipeline).

C. Valves

Sufficient mainline valves shall be installed at locations to isolate portions of the system and to ensure continuous operation for maintenance and repair. On straight runs of pipeline, it is recommended that valves be installed every one-thousand (1,000) feet.

D. Air Release Assemblies
In conformance with good engineering practices, air release and combination air release assemblies shall be installed in the system. Special attention shall be given to the release of air from STEP/SDG pipelines. Air evacuated in these pipelines shall be stripped of odor using activated carbon, soil filters or other odor control mechanism. The designer should take extra precaution in reducing or eliminating the amount of air being exhausted by keeping the pipeline full of liquid wherever possible.

E. Pipeline Material and Pressure Testing
Pipeline material shall be pressure rated equal to working pressure of the system. Material shall be resistant to the corrosive nature of wastewater. Common materials include PVC, polyethylene, stainless steel and epoxy-coated or lined ductile iron. Pressure testing of service lines shall be completed with the ball valve at the mainline in the closed position. Pressure testing of the mainline shall be completed with the service line corporation stop in the open position. Pressure testing shall be in compliance with pressure testing for water mains using *District* standards.

- STEP service lines shall be a minimum of one and one-quarter (1¼) inch diameter Schedule 40 PVC;
- Grinder service lines shall be a minimum of two (2) inch diameter Schedule 40 PVC

F. Discharge to a Gravity Collection System

1. Grinder Pump System
Discharge to a gravity system from a GP system can be accomplished at a manhole. Discharge in a manhole shall be accomplished by producing a laminar flow in the manhole channel. *The manhole shall have a protective manhole coating applied.*

   Both types of installations assume that the GP system has sufficient internal velocity and that the raw sewage has not turned septic. If the raw sewage within the GP pipeline has turned septic, provisions shall be made to reduce or eliminate the effects of hydrogen sulfide release.

2. Corrosion Control in STEP/SDG Systems
Discharge to a gravity system from a STEP or SDG system can be accomplished by either installing a saddle on the gravity main or at a manhole. Discharge in a manhole shall be accomplished by producing a laminar flow in the manhole channel. Laminar flow shall not be accomplished using a drop manhole. Prior to discharge, the STEP/SDG effluent shall be conditioned to reduce or eliminate the effects of hydrogen sulfide release. Conditioning may include aeration or chemical addition.

3. Odor Control
Release of air at the discharge point will require odor control, *which shall include the use a Parson's Environmental Odoreater manhole insert, or approved equal*.

G. Discharge to a Conventional Force Main
In extraordinary circumstances, as approved by the District Engineer, a STEP or GP system may be connected to a conventional force main. The designer shall review the following issues to ensure that there will not be a negative effect on the existing system:

A. Ensure that the hydraulics or performance of either the system being connected or the existing force main pump station are not appreciably altered beyond the design parameters.

B. Ensure that the downstream facilities are protected from release of hydrogen sulfide. Protection shall consider, when applicable, impacts to treatment, corrosion and odor.

C. The system must be designed to interface with existing pump station controls.

C1-10.2.2 Pump or SDG Assembly

A. Pumps
Grinder or effluent pumps installed in a municipal system shall be UL listed for the intended application. Each pump shall be affixed with a UL tag denoting its use and shall have available for review a UL card showing the intended application.

B. Pump/Effluent Vault (Screen) STEP/SDG
Effluent pumps installed in STEP systems that are not rated to pump solids shall be protected with a screening or filtering mechanism to prevent the impeller from plugging. The screening or filtering mechanism shall be designed to provide sufficient effective screen area to prevent plugging. Solids entering the pump impeller shall be reduced to one-eighth-inch in size.

Small diameter gravity tanks will be installed with a screening or filtering mechanism at the discharge of the tank to prevent solids over one-eighth-inch in size from entering the service line and mainline. The screening or filtering mechanism shall be designed to provide sufficient effective screen area to prevent plugging.

C. Control Panel/Level Control
Each STEP and GP pump assembly shall be equipped with a pump control panel and level-sensing mechanism that is UL listed for the application.

The control panel shall include an audio and visual alarm that is activated when a high liquid level occurs within the vessel.

The controls and alarms shall be powered by a separate circuit from the pumps.

The audio alarm will be capable of being silenced until repair or corrections can be made.

If the system is owned and operated by a single agency, each panel will be affixed with a permanent placard with the name of the agency operating the system, the phone number of the agency, and instructions for silencing the audio alarm.

It is recommended that the control panel audio and visual alarm also be activated by low liquid levels occurring within the vessel. It is recommended that each SDG tank be equipped with an alarm panel and a level-sensing mechanism that is UL listed for the application. The alarm panel shall include an audio and visual alarm that is activated when a high liquid level occurs within the vessel. The panel shall have the same alarm and placard features as listed for the STEP and GP control panel.

D. Electrical Requirements
All electrical components of a STEP, SDG or GP system shall be in compliance with the latest version of the NEC and latest requirements of the state Labor and Industries Electrical Inspection Division.

E. Ventilation
Each vessel for a STEP, SDG or GP system shall either be vented through the structure plumbing or provided with a separate ventilation system.

C1-10.3 Vacuum Sewer System

Clark Regional Wastewater District does not allow vacuum systems within the current system.

C1-10.4.5 Easements for Municipalities

The property owner shall grant an easement to the District *for STEP systems* that allows, at a minimum, access onto the property to:

- Monitor and provide routine maintenance.
- Repair or replace defective components.
- Remove and replace all on-site components, if necessary.

The minimum duration of the easement shall be for the life of the system.

C1-10.4.6 Replacement Parts

The District shall keep on hand sufficient replacement parts to ensure that corrections to the system can be made in an expeditious manner.

C1-10.5 Alternative Systems-Grinder systems

Alternative systems for conveyance of wastewater to a centralized location or wastewater treatment facility include grinder pump and septic tank effluent pump (STEP systems).

This section is for grinder pump systems only and does not include gravity or force mains. For gravity main requirements see Design Criteria Chapter C1. For force main requirements see Chapter C2-3 Force Mains.

C1-10.5.1 Application

Grinder systems are the preferred/recommended alternative system inside the Vancouver or Ridgefield Urban Growth Areas when alternate systems are required. Grinder systems will not be designed or installed within the urban area without written approval from the District.

The Design Criteria is primarily for single-family residential simplex grinder pump systems. All other applications will require duplex systems. The Developer shall retain an Engineer to design all duplex grinder pump systems.

The design of duplex systems will be in accordance with the Design Criteria and Gravity and Force Main Design Criteria Section C1-1.3.3 Approval of Alternate Materials or Methods. The Design Engineer's plans, profiles and specifications must be submitted to, reviewed by and approved by the District.

C1-10.5.1.1 Plans, Profiles, Construction Notes and Record Drawings

A. *General*

1. *Plans, profiles and construction notes, and record drawings are not required for the installation of a single-family residential grinder pump system. The requirements of the District's Standard drawings must be met.*
2. *Plans, profiles and construction notes, and record drawings are required for the installation of a duplex grinder pump system.*
3. *If a force or gravity main extension is required, all requirements for plans, profiles, construction notes and record drawings will be required as per Design Criteria, Chapter C-1 and C-2, and Grinder Pump Design Criteria, Chapter C1-10.*

C1-10.5.5 Pump Selection Grinder pumps

A. Grinder pumps shall be in compliance with Table C1-10.5 – Approved Pumps, unless otherwise approved by the District in writing.

B. Grinder pumps shall be cast iron submersible grinder pumps suitable for submersion in septic tank effluent.

C. Motors shall be 240-volt, single phase with permanently split capacitor located in the motor housing.

D. Motor casing shall be oil filled.

E. *Lower bearings shall be ball thrust bearings. Upper bearings shall be radial bearings.*

The pumps shall be capable of starting and running on a 20-ampere, 240-volt, single phase circuit.

F. *Motors shall be non-overloading throughout the range of the manufacturer's pump curve.*

G. *Horsepower rating for the pump motors shall not exceed two and one-half (2½) horsepower. Pumps shall be compatible with the specified electrical control panel.*

H. *The cable splice to the motor lead shall be watertight.*

I. *Pump power cords shall use copper wire with type SO insulation and non-metallic cord grips resistant to septic tank corrosive atmospheres. The cords shall be suitable for use with two (2) – two and one-half (2½)-horsepower, 240-volt motors including locked rotor conditions.*

J. *Conductor insulation shall be color coded consistently throughout the power supply system.*

K. *Cord grip material manufactured of type 18-9 stainless steel shall be an approved equal to non-metallic material.*

Wire Size and Color

The float control conductors from the control panel to the tank junction box shall be:

- *Stranded copper #12 with THHN insulation; with*
- *Red insulation for OFF; and*
- *Blue insulation for ON; and*
- *Green insulation for GROUND; and*
- *Grey insulation for REDUNDANT OFF; and*
- *Yellow insulation for HIGH WATER ALARM.*

All pumps shall be installed with one-half (½) inch polypropylene lifting ropes connected to 304 SS hooks at the top of the riser. The rope shall extend three (3) feet above the top of the riser.

Pump Designation (Residential)	*Minimum Head @ Shutoff*	*Minimum Head @ 20 GPM*	*Required Pump*
Grinder Pump	*95 feet*	*75 feet*	*ABS Piranha S20/2W*
Grinder Pump	*94 feet*	*84 feet*	*Goulds RGS2012*
Grinder Pump	*108 feet*	*87 feet*	*Liberty Omnivore LSG202A*
Grinder Pump	*160 feet*	*0 @ 15 gpm*	*Environment One Extreme U-series*

Table C1-10.5 – Approved Pumps

C1-10.5.6 Tank/Vessel Type and Sizing

A. *Tank Configuration GP*

All single-family residential grinder pump tanks shall be for a simplex installation and be installed per manufacturer's recommendations.

The minimum size tank for grinder pump systems is 500 gallons nominal capacity and shall be concrete as manufactured by and available through Sound Placement Services LLC of Castle Rock, WA, Roth Multitank RMT-500, or spherical HDPE pump tanks as manufactured by Norwesco or approved equal;

C1-10.5.7. System Components

C1-10.5.7.1 Pipeline

A. *Discharge to a Gravity Collection System*
Grinder Pump System
Discharge to a gravity system from a grinder pump system shall be accomplished by extending a gravity lateral from the gravity sewer line to the property line and connecting the grinder pump pressure sewer service at that point. Upon approval of the District, a 2" pressure lateral may connect directly to a gravity main. See District Standard Drawings for details. The valve box shall be located within five (5) feet of the right-or-way or public easement.

C1-10.5.7.2 Pump Assembly

A. *Control Panel, Safety Disconnect Panel and Level Control*
All units shall be in conformance with District Standard Drawings and Construction Specifications for Grinder Pump Systems, 12-02.4.C Float Assembly and 12-02.7 Electrical.

C1-10.5.8 Force Mains

C1-10.5.8.1 Construction Methods and Materials

All pressure sewer services shall:

A. *Be designed to prevent damage from superimposed loads. Proper allowance for loads imposed on the pipe shall be calculated for the width and depth of the trench; and*

B. *Be Schedule 40 PVC, ASTM D1785; and*

C. *Have a minimum of three (3) feet depth of cover over the top of the pipe from finished grade or the flow line of a ditch; and*

D. *Have a continuous toning wire attached to the top of the pressure sewer service, and*

E. *Valve box shall generally not be located in the driveway. If located within a driveway, the valve box shall be traffic rated; and*

F. *Taps will be allowed for two (2) inch pressure sewer services. All larger pressure sewer services shall be made with a tee in accordance with District Standard Drawings.*

G. *Grinder service lines shall be two (2) inches in diameter.*

C1-10.5.8.2 Pressure Tests

Pressure service lines shall be tested at 150 psi for 15 minutes with no loss of pressure.

C1-10.6 Alternative Systems – STEP systems

This section is for STEP systems only and does not include gravity or force mains. For gravity main requirements see Design Criteria Chapter C-1. For force main requirements see Chapter C-2-3 Force Mains.

C1-10.6.1 Application

With the written approval of the District, the Design Engineer may consider alternative collection methods for a variety of different applications. The Hockinson and Meadow Glade areas are STEP systems and no alternatives will be considered in these service areas. STEP systems will not be designed or installed within the urban area without written approval from the District.

The Design Criteria is primarily for single-family residential simplex STEP systems. All other applications will require duplex systems. The Owner shall retain an Engineer to design all duplex STEP pump systems. The design of duplex systems will be in accordance with the Design Criteria and Gravity and Force Main Design Criteria Section C1-1.3.3 Approval of Alternate Materials or Methods. The Design Engineer's plans, profiles and specifications must be submitted to, reviewed by, and approved by the District.

C1-10.6.1.1 Plans, Profiles, Construction Notes and Record Drawings

A. General

1. *Plans, profiles and construction notes, and record drawings are not required for the installation of a single-family residential STEP pump system. District Standard drawing requirements shall be met.*
2. *Plans, profiles and construction notes, and record drawings are required for the installation of a duplex STEP pump system.*
3. *If a force main or gravity main extension is required, all requirements for plans, profiles, construction notes and record drawings will be required as per Design Criteria, Chapter C-1 or STEP Design Criteria, Chapter C1-10.*

C1-10.6.5 Pump Selection STEP

All STEP systems (other than single-family residential) shall be a duplex pump system designed in accordance with the Design Criteria (See C1-3 Gravity Systems Design Consideration,

Table C1-3 Design Factors). In addition, with the exception of specific sizing for single-family residential, all other duplex systems shall meet the following requirements.

All duplex STEP systems shall have separate wiring, discharge and valve assemblies.

All duplex STEP systems shall be designed by a professional engineer. Plans and specifications shall be submitted for written approval of the District.

All STEP single-family residential pumps shall be simplex installation and meet the following requirements.

A. STEP pumps shall be in compliance with Table C1-10.6 – Approved Pumps unless otherwise approved by the District in writing.

B. STEP pumps shall be cast iron submersible septic tank effluent pumps suitable for submersion in septic tank effluent.

C. Motors shall be 240-volt, single phase with permanently split capacitor located in the motor housing.

D. The controls and alarms shall be powered by a separate circuit from the pumps.

E. Motor casing shall be oil filled.

F. Lower bearings shall be ball thrust bearings. Upper bearings shall be radial bearings.

G. The pumps shall be capable of starting and running on a 20-ampere, 240-volt, single phase circuit.

H. Motors shall be non-overloading throughout the range of the manufacturer's pump curve.

I. Horsepower rating for the pump motors shall not exceed two (2) horsepower. Pumps shall be compatible with the specified electrical control panel.

J. The cable splice to the motor lead shall be watertight.

K. Pump power cords shall use copper wire with type STOW insulation. Cord grips shall be manufactured of non-metallic material or type 18-9 stainless steel resistant to septic tank corrosive atmospheres. The cords shall be suitable for use with two (2) horsepower, 240-volt motors including locked rotor conditions. Conductor insulation shall be color coded consistently throughout the power supply system.

L. Wire Size and Color
The float control conductors from the control panel to the tank junction box shall be:

- *Stranded copper #12 with THWN insulation; with*
- *Red insulation for OFF; and*
- *Blue insulation for ON; and*
- *Green insulation for GROUND; and.*
- *Grey insulation for REDUNDANT OFF; and*
- *Yellow insulation for HIGH WATER ALARM.*

M. All pumps shall be installed with one-half (½) inch polypropylene lifting ropes connected to 304 SS hooks at the top of the riser. The rope shall extend three (3) feet beyond the top of the riser.

Pump Designation (Residential)	***Minimum Head @ Shutoff***	***Minimum Head @ 20 GPM***	***Required Pump***
STEP- Meadow Glade Low Head	*72 feet*	*55 feet*	*Gould WE1012H*
STEP – Meadow Glade High Head	*105 feet*	*90 feet*	*Gould WE1512 HH*
STEP – Hockinson	*105 feet*	*90 feet*	*Gould WE1512 HH*

Table C1-10.6 – Approved Pumps

C1-10.6.6 Tank/Vessel Type and Sizing

All STEP system tanks (other than single-family residential) shall be designed for a duplex pump system in accordance with the Design Criteria (See C1-3 Gravity System Design Consideration, Table C1-3, Design Factors). Duplex STEP tank systems shall be designed by a licensed Professional Engineer.

A. Tank configuration for STEP Systems
Tanks shall be a minimum 1,500 gallons nominal capacity and shall be either:

1. *Fiberglass as manufactured by Fiber Septic Systems of Yakima, WA; or*
2. *Fiberglass as manufactured by FSI of Red Bluff, or*
3. *Concrete as manufactured by and available through Sound Placement Services LLC of Castle Rock, WA; and*
4. *All single STEP tanks shall have one (1) baffle installed that divides the volume of the STEP tank into two thirds (2/3) solids tank and one third (1/3) pump chamber by volume;*
5. *All multiple tank STEP systems shall be submitted for review by the District; or*
6. *Approved equal.*

Upon installation and prior to backfilling, the tank shall be filled to a point above the riser with potable water. Concrete tanks shall be filled for a period of 24 hours to allow for absorption. Following this period, the tank shall be filled to a point above the base of the riser. There shall be no more than a one (1) inch loss of water depth over a 24-hour period.

The District shall approve all STEP tanks in writing. Contractor's submittal shall include design information and detail drawings with dimensions and specifications.

C1-10.6.8 Force Mains

C1-10.6.8.1 Construction Methods and Materials

All pressure sewer services shall:

A. *Be designed to prevent damage from superimposed loads. Proper allowance for loads imposed on the pipe shall be calculated for the width and depth of the trench; and*

B. *Be Schedule 40 PVC, ASTM D1785; and*

C. *Have a minimum of three (3) feet depth of cover over the top of the pipe from finished grade or the flow line of a ditch; and*

D. *Have a continuous toning wire attached to the top of the pressure sewer service; and*

E. *Valve box shall generally not be located in the driveway. If located within a driveway, the valve box shall be traffic rated; and*

F. *Taps will be allowed for one and one-quarter (1¼) inch and two (2) inch pressure sewer services. All larger pressure sewer services shall be made with a tee in accordance with District Standard Drawings.*

C1-10.6.9 Pressure Tests

Pressure service lines shall be tested at 150 psi for 15 minutes with no loss of pressure.

C1-11 REFERENCES

Recommended Standards for Wastewater Facilities. (10 States Standards.) 1990 Edition.

US Environmental Protection Agency. Handbook for Sewer System Infrastructure Analysis and Rehabilitation. EPA/625/6-91/030. 1991.

Washington State Parks and Recreation Commission. Design Criteria for Pumpout Facilities at New or Expanded Marinas from Financial Assistance Application for Clean Vessel Funding Program.

Water Environment Federation and American Society of Civil Engineers. Existing Sewer Evaluation and Rehabilitation. WEF Manual of Practice FD-6 and ASCE Manual and Report on Engineering Practice No. 62, Second Edition. 1994.

Water Pollution Control Federation. Alternative Sewer Systems. 1986.

WRC, Inc. Waves Multimedia CD. Contact: 2655 Philmont Ave., Huntingdon Valley, PA 19006, (215) 938-8444). 1995.

Washington State Departments of Health and Ecology. Pipeline Separation Design and Installation Reference Guide. Publication Number 06-10-029. 2006. http://www.ecy.wa.gov/biblio/0610029.html

Chapter C2 Sewage Pump Stations

C2-1 GENERAL REQUIREMENTS

These Design Specifications, the Construction Specifications and Standard Drawings are typical for District sewage pump station installations. The design of each sewage pump station must be specific to the conditions and requirements of the sewage pump station being designed.

C2-1.1 Location, Site Selection, and Site Layout

All sewage pump station locations, sites and layouts are to be approved by the District in writing. All site layouts will substantially conform to the District Standard Drawings.

C2-1.1.1 Location and Site Selection

Sewage pump stations are usually located at the low point of the service area. The pump discharges to the treatment works or to a high point in the sewer system for continued conveyance by gravity. Generally, sewage pump stations should only be used when gravity flow is not possible.

There is often little choice in siting sewage pump stations. Locations should be sited as far as practical from present or proposed built-up residential areas to reduce community impacts. The amount of land area required is a direct function of the station's size and type and of the need or desire for ancillary facilities such as a maintenance building. The station should be sited to accommodate reasonable pumping head, force main length and depth of the gravity influent sewer(s). Other considerations are:

- Local land use and zoning regulations.
- Location on public right-of-ways versus private easements or site acquisition by the sewer purveyor.
- Permits (or variances) which might be required, such as grading, building, and so on.
- Availability of needed utilities, such as water, electricity and natural gas.
- Applicable noise ordinances, especially when an emergency backup generator will be present.
- Space for future expansion, especially if population growth or development in the drainage area may increase substantially.
- *Local, state and federal critical areas, regulations, permits, etc.*
- *Adjacent land uses.*

C2-1.1.2 Flood Protection

The station shall be designed to remain fully operational during the 100-year flood/wave action

C2-1.1.3 Access for Maintenance Vehicles

- Adequate access to the site is required for maintenance personnel and equipment and for visitors after construction.
- Adequate access during construction is required for construction equipment.
- Access road grade shall not exceed 15%.
- The road and parking configuration should be adequate for vehicle turnaround or allow for one-way access, minimum 40' x 12'.
- Adequate parking spaces for maintenance equipment and visitors should be provided.
- Additional easement or site acquisition may be required for the access road.
- Ingress/egress to the site near busy public right-of-ways may be affected by traffic.

C2-1.1.4 Fire Protection

- Contact the local fire jurisdiction for its requirements.
- Contact the local water purveyor to determine fire flow availability.
- Conform to the requirements of Standards for Fire Protection in Wastewater Treatment and Collection Facilities (NFPA) 820.

C2-1.1.5 Site Piping Layout

- Avoid installing buried pipes directly underneath each other, and minimize pipes crossing one another.
- Maintain appropriate minimum and/or maximum velocities in pipes.
- Provide appropriate restraint or thrust blocking for pressure pipe bends, etc.
- Conform to water purveyor's requirements for meter service, backflow prevention, etc.
- Provide potable water cross-connection protection in accordance with State DOH regulations.
- Provide flexible pipe connections to pipe penetrations through vaults and other underground structures.
- Provide a pig launch facility for the force main.
- *All site piping shall substantially conform to the District Standard Drawings.*
- *If off-site force or gravity mains are required in relation to the sewage pump station, the design and drawings will be in conformance with C1 Sewers and C2-3 Force Mains.*
- *Normally only one inlet line will be allowed into the wet well.*

C2-1.1.6 Other Site Design Factors

- Landscaping may be required for aesthetic reasons or by local land-use agency codes. Use low-maintenance landscaping wherever possible. *Alternative landscape plans may be submitted for review and approval. Alternative plans shall be designed by a licensed landscape architect licensed in the State of Washington. The plan should be designed: in accordance with governing land use regulations, to be incorporated into the landscape pattern or theme of the project or neighboring area, to reduce or minimize maintenance, and to fit the context of the site and account for factors that will affect plant health and survivability (i.e. sun and wind exposure, soil conditions). The use of native and drought tolerant plants is encouraged.*
- Provide exterior lighting, easily accessible for manual operation, in case maintenance at night is required.
- Provide appropriate security against vandalism.
- *Provide odor control as necessary.*
- Consider intrusion telemetry alarms.

C2-1.1.11 Plans, Profiles, Cross-Sections, Details, Construction Notes and Record Drawings

A. General.

1. *Design Engineer shall call for pre-design locates from the NW Utility Notification Center at 1-800-424-5555. Design Engineer or Surveyor is responsible for field verification of location and elevations of facilities.*
2. *Plans, cross sections, elevations and details will be submitted to the District in PDF format for review of all sewage pump stations. Plans will be submitted in PDF format via e-mail, approved file-sharing platform or through the District's website.*

3. *After District approval of plans, cross sections, elevations and details, Design Engineer shall submit four (4) sets of prints of the cover sheet and sewage pump station Plans, profile(s) and details to the District at least 5 working days prior to the preconstruction conference.*

4. *For projects that are the subject of a site plan or land division approved by Clark County or a City with land use authority, the approval of plans and specifications is valid for the period of the original site plan /land division approval.*

   Plan approval for projects that are not the subject of other site plan/land division approvals will expire in accordance with the terms and conditions of the developer extension agreement. Plans that have expired may be submitted for re-approval; but are subject to additional review.

5. *Text size shall be a minimum of 0.08".*

B. *Engineering Drawings -Plans. Plan sheets for sewage pump stations shall be drawn in ink and contain at least the following information:*

1. *A suitable title sheet with the name, address, telephone numbers, contact name, and e-mail address, of the Owner, Developer (including contact name) and the Design Engineer; scale; north arrow; vicinity map; section, township and range; legend including symbols and abbreviations; general notes generic to all construction; sheet index; revision box; date; drawing number; the Design Engineer's Professional Civil Engineers State of Washington signed seal with date of signature; and District signature block per District Standard Drawings.*

2. *All elevations shall be based on Clark County Datum (NGVD 29(47)). The benchmark used to determine elevations shall be identified on the Plans.*

3. *District Standard Construction Notes for Pump Stations (See Standard Drawing). and Specifications shall be included on the plans sheet for sewage pump station construction. These are standard Construction Notes. Special designs, installations or conditions may require additional Construction Notes.*

4. *Horizontal dimensions from right-of-way, centerline of road, easement lines or property lines and other utilities or structures.*

5. *Subtitles on each sheet describing the contents.*

6. *Adjacent streets, property lines, tax lot numbers and serial numbers or plat references.*

7. *All existing and proposed easements shall be identified with dimensions shown.*

8. *All existing survey monumentation within 100 feet of the project limits shall be shown.*

9. *District Standard Drawings that apply to sewage pump stations, force mains and gravity mains.*

10. *Site and landscape plans with dimensions and finished grade elevations in substantial conformance with the District Standard Drawings.*

11. *Each drywell, wetwell, electrical panel, valve, valve vault and other appurtenance identified to facilitate checking the cross-section and elevation views.*

12. *Location of all critical areas including buffers, watercourses, wells, septic systems, stream and railroad crossings, water mains, gas mains, culverts, telephone, underground power, cable television and other utilities or structures based on best available information and field locates.*

13. *All existing gravel and hard surface paving including width(s)*

14. *Contours for the proposed sewage pump station site extending at least 10 feet outside of the proposed sewage pump station site. If site grading is anticipated, a final site contour map shall be provided. Contour interval shall not be greater than two (2) feet in elevation except in steep terrain where contours are not easily distinguished at two (2) foot intervals.*

15. *Spot elevations and slopes indicating how the proposed sewage pump station site will be drained of stormwater runoff.*

16. *Plans shall be drafted at a scale that will be legible when the plans are reduced fifty (50) percent. If the entire project plans cannot be shown on one (1) sheet, a key map will be provided noting the sheet that each individual section of the plans is located. Where multiple sheets are used for*

plans or profiles, match lines will be shown. Where multiple sheets are used for plans, a master utility plan will be provided.

17. *Sheet size shall be 24" x 36" or 22" x 34".*
18. *Pump station sites should be a minimum of fifty (50) feet by fifty (50) feet.*
19. *The proposed sewage pump station site shall:*
    a. *Be in the form of an easement or platted as a separate lot to be owned by the District; and*
    b. *Have legal description(s) submitted to the District in writing with a map in addition to platted easement(s); and*
    c. *If an easement is required, the District will complete the document and record the easement with Clark County.*
20. *Length, pipe-size and type of material for all on site force or gravity sanitary sewers. (e.g., 50 LF - 6" DIP)*

C. *Engineering Drawings - Profiles. If off-site force or gravity mains are required in relation to the sewage pump station, the profiles will be in conformance with C1 Sewers and C2-3 Force Mains.*

D. *Engineering Drawings – Cross-Sections and Elevation Views and Details. Cross-section and elevation view and detail sheets for sewage pump stations shall contain at least the following information:*

1. *Suitable title block, scale, dates, drawing number, and the name, address, telephone number and the Design Engineer's Professional Civil Engineer's State of Washington signed seal.*
2. *Plan and elevation cross-section of the drywell (if applicable), wetwell and valve vault with elevations and dimensions for each component of the system.*
3. *Elevation view of the electrical panels with all components outlined and named and all conduit sizes and their intended use. If a permanent standby power generator (motor generator) is required by the District, show all wiring, connections and conduits.*
4. *Profiles of existing and proposed ground surface or road finished grade.*

E. *Record Drawings, plans, cross-sections and elevation views. Record drawings for plans and profile sheets for sewage pump stations shall:*

1. *Be completed by the Design Engineer or Surveyor and submitted to the District prior to project acceptance by the District.*
2. *Be submitted in electronic form as a "PDF" file and a complete paper copy.*
3. *Be placed on the approved drawings.*
4. *Show all final elevations and measurements of the dry pit (if applicable), wetwell, valve vaults and valves and other appurtenances.*
5. *Show all changes made to pipe material, slope, length of pipe, finished grade, etc.*
6. *Be clearly marked Record Drawings with the drawing date updated.*
7. *Be completed by the Design Engineer and submitted to the District prior to project acceptance by the District.*
8. *Become the permanent property of the District.*

C2-1.2 Design Flow Rates, Hydraulics, and Number of Pump Units

C2-1.2.1 Design Flow Rates

The firm capacity of a pump station shall be equal to or greater than the peak hourly design flow. This peak design flow should be based on projected growth in the tributary area, future improvements anticipated in the collection system, and any phased improvements planned for the pump station and force main. It should also allow for a reasonable amount of wear to pump equipment, particularly in a

tributary area that is at or near build out. Because mechanical and electrical equipment is typically designed for a 20-year life, it is recommended that the peak design flow be based on a 20-year forecast or greater.

The flow rates shall be determined by C1-3.3. Design Basis as amended by the District.

In addition to establishing the peak design flow, it is also necessary to review minimum flows and determine how the station will operate under low flow conditions.

C2-1.2.2 System Hydraulics

System hydraulics should provide an optimum balance for the project's force main characteristics, pump selection, and minimum and maximum flows. The force main should be small enough in diameter to minimize solids deposition yet large enough that the total head permits a good pump selection and minimizes the requirements for surge protection facilities. Recommended sizing considerations for force mains are covered under the force main section (see C2-3). A cost-benefit analysis is often useful in selecting the best alternative.

Pump stations shall be designed to operate under the full range of projected system hydraulic conditions. Both new and old pipe conditions should be evaluated, along with the various combinations of operating pumps and minimum and maximum flows, to determine the highest head and lowest head pumping conditions. The system should be designed to prevent a pump from operating for long periods of time beyond the pump manufacturer's recommended normal operating range.

Selection of head loss coefficients for pipes and valves should be conservative to allow for installation and equipment variations and normal aging of the pumping system.

C2-1.2.3 Number of Pumps

All pump stations shall have a minimum of two (2) pumps.

The number of pumps selected shall allow the station to provide the peak design flow with the largest pump out of order. Also, the number of pumps should correlate to the wetwell size and prevent excessively short periods between pump starts. On constant speed pump stations, the number of pumps is often based on the pumping capacity required to provide a minimum scour velocity in the force main.

C2-1.2.4 Pump Selection

The District must approve all pumps in writing.

Pumps should be designed for pumping sewage and capable of passing solids at least 3 inches in diameter. Pump suction and discharge should be 4 inches or greater. Exceptions to these criteria are discussed in the sections on grinder pumps and septic tank effluent pumps (see C1-10).

C2-1.2.5 Wetwells

Sewage pump station wetwells should be designed to provide acceptable pump intake conditions, adequate volume to prevent excessive pump cycling and sufficient depth for pump control, while minimizing solids deposition. *The minimum wetwell inner diameter shall be six (6) feet.*

For wet well and dry well installations, the sump pump from the dry pit to the wet pit shall enter the wet pit approximately three (3) feet from the bottom of the top slab and be cored and booted with a ninety (90) degree bend inside the wet pit turned downward for discharge. The sump pump shall be as specified on the Plans and the piping and fittings shall be Schedule 40 PVC.

For constant speed pumps, the minimum volume between pump on and off levels can be calculated using the following general formula:

$V = tQ/4$, where

V = minimum volume (gallons)

t = minimum time between pump starts

Q = pump capacity (gallons/minute)

Recommendations for various pump intake designs can be found in the references included at the end of this chapter. At normal operating levels, the designer should consider the following recommendations:

- Reduce or eliminate the free fall of sewage into the wetwell.
- Minimize prerotation of water at the pump intake.
- Provide adequate submergence to minimize surface vortices.
- Locate the pump intakes to minimize the forming of subsurface vortices from the walls or floor.

There are exceptions, however, to these criteria. For example, a prerotation chamber can be used to swirl the water in the same direction as the pump is turning in order to reduce flow through the pump at low wetwell levels. This provides turndown ability for the pump without requiring a variable speed drive. Another exception is drawing down the water level to flush out solids buildup in the wetwell.

Wetwells should be designed to minimize solids buildup. The wetwell should be either trench or hopper style with side slopes of 45 degrees or steeper (60 degrees is preferred). Maintenance procedures should be developed to remove any solids that do build up in the wetwell. A recycle pipe can be provided to temporarily route pumpage to the bottom of the wetwell to dislodge solids. Another method is to periodically operate the wetwell below its normal level, increasing velocities and allowing the pumps to pull in deposited solids.

Wet wells shall be designed to minimize solids buildup. They shall be designed to have:

1. *A six (6) inch fillet around the base as per District Standard Drawings; or*
2. *Trench or hopper style with side slopes or 45 degrees or steeper (60 degrees is preferred); or*
3. *A WEMCO Hidrostal Prerostal, pre-rotation pumping system; or*
4. *A self-cleaning pit using the Ogee ramp; or*
5. *Approved equal.*

In most cases, all electrical equipment in a raw sewage wetwell should meet the requirements of the NEC Area Classification as listed in NFPA 820.

Personnel entering the wetwell shall meet the requirements of current State Department of Labor and Industry confined space regulations, contained in Chapter 296-62M WAC.

C2-1.3 Grit, Grease, and Clogging Protection

If it is necessary to pump sewage prior to grit removal, the design of the wetwell should receive special attention. In particular, the discharge piping should be designed to prevent grit settling in discharge lines of pumps when not operating.

At some pump stations, it may be beneficial to use bar screens, grinders or comminutor devices. Design of bar screen facilities should include odor control and a method for handling the screening.

Grease in the flow entering sewage pump stations can present problems, both for the sewage collection pipelines (from the source to the station) and in handling or removal after flow is present in the wetwell. Grease floats on the surface of the liquid in the wetwell, and tends to cake on the walls and accumulate at the high pump start or upper level control setting. That can interfere with the pump control systems, including float switches, air bubbler controls, pressure bells (either static or encapsulated in a bulb or containment bag), and a variety of other mechanical or electrical control styles. (One control virtually free from grease-related problems is the ultrasonic level controller.)

Grease can also contribute to odor in the pump station. Allowed to build up to the point of collapse from the wall or other surface, chunks of grease can clog the pump suction, restrict flow through other features such as vortex breakers and flow-directing vanes, or just increase operation or maintenance problems in the station or the force main downstream from it. Provisions to limit grease from entering the system, such as regulating the allowable fats, oils and grease by sewer ordinances, pretreatment requirements, or other ways to put the burden for grease limits on the originator, should be considered. Adequate access to the wetwell for grease removal using mechanical means, such as vactor or septic pumping-truck suction pipes or hoses, blasting using high-pressure water to loosen the material, injecting grease control chemicals by pumping, drip, shock or maintenance dosing, or hand scraping and removal methods should be provided.

C2-1.4 Flow Measurement

Suitable devices for measuring sewage flow shall be provided at pump stations. Run timers should be provided on all pumps. A wide variety of pump station level and flow control devices and instrumentation exists. Consider strategies that use instrumentation, monitoring, control or process-driven concepts to integrate flow measurement into the overall perspective of the pump station design.

With complete information at hand, or data available for computer analysis, great gains can be made in operating efficiency, maintenance prediction, budgeting, coordination of treatment processes, and other useful productivity steps. *Pressure gauges and flow meters will be installed on all pump stations.*

C2-1.5 Surge Analysis

C2-1.5.1 General

Hydraulic surges and transients (water hammer) should be considered during design of pump stations and force mains. All systems should be at least conceptually reviewed for the possibility of damaging hydraulic transients. The transients can cause vapor cavities, pipe rupture or collapse, joint weakening or separation, deterioration of pipe lining, excessive vibration, noise, deformation, or displacement, and otherwise unacceptable pressures for the system.

Possible sources of damaging conditions include closing or opening a valve, pump starts and stops, sudden power loss, rapid changes in demand, closure of an air release valve, pipe rupture and failure of surge protection facilities. Particular care should be taken in design if the expected change occurs in less than two wave periods, velocities are high (greater than 4 feet per second), the force main is long, the piping system has dead ends, or significant grade changes occur along the force main.

C2-1.5.2 Surge Modeling

If it is not possible in conceptual design or with simple manual calculations to ensure that the system is safe from excessive water hammer conditions, the system should be computer modeled. It is important that a computer modeling program is selected that suits the complexity of the project and has proven accuracy when compared to field-test results. The design methodology should include some method of checking the model results before construction. During facility startup, modeled results should be verified by gradually generating increasingly severe conditions. In this way it can be shown that the system will work as predicted prior to generating the worst-case design conditions.

C2-1.5.3 Surge Protection Facilities

There are many methods to provide surge protection, including the following:

- Open surge tanks.
- Pressurized surge tanks.
- One-way surge tanks.
- Appropriate check valve attachments.
- Pump control valves.
- Surge relief valves.

- Surge anticipator valves.
- Vacuum relief valves.
- Regulated air release valves.
- Optimizing the force main size and alignment.
- Electric soft start/stop and variable speed drives for pumps.
- Electric interlocks to prevent more than one pump from starting at the same time.
- Slow opening and closing valves.
- Increasing the polar moment of inertia of the rotating pump/motor assembly.
- Different pipe material to reduce surge forces.

Some of these techniques are not suitable for raw sewage. A combination of methods may be necessary to provide a safe operating system. Care must be taken in design so that adding a protection device does not precipitate a secondary water hammer equal to or worse than the original water hammer. Reliability of the surge protection facilities is critical. Routine inspection and maintenance must be incorporated into the design. Where appropriate, redundancy should be provided for essential pieces of equipment, such as vacuum relief valves. Adequate alarms should be provided on surge tanks and similar equipment to give operators early warnings. Consideration should be given to preventing the pumping system from operating if the surge protection facilities are not operable.

C2-1.6 Odor and Noise Control

The design of both sewage pump stations and related pipelines should incorporate planning and construction techniques that consider odor and noise-producing conditions and solutions. Gravity and pressure mains carrying wastewater to and from the station present separate problems.
The physical layout of the pump station should allow a variety of accessory systems to be applied that meet whatever odor concern is indicated, either before construction, in the planning/design phase, or after starting operation. Both the expected waste load, with associated chemical or unusual physical parameters, and the detention time and hydraulic characteristics of pipes and wetwell should be considered.

C2-1.6.1 Odor Control

Odor control is discussed in general terms in Chapter G2.

Odor Control options – The Design Engineer shall submit a report to the District detailing the need for and method of odor control.

C2-1.6.2 Noise Control

Noise control for sewage pump station design depends on location, type, and layout of the station components, and local conditions, such as zoning, property use, or other ordinances (see C2-1.1.1). Noise control systems shall comply with all local and state regulations. The regulations usually are set by local government, development covenants or simply a cooperative understanding between the station owners and adjoining properties. The WISHA standards also speak to noise and safety considerations, specifically Chapter 296-62 WAC of the General Occupational Health Standards.

The Design Engineer shall submit a report to the District detailing the need for and method of noise control.

The most significant sources of noise are emergency generators, ventilation equipment, and, in some cases, motor or pump operations. Of these, the emergency generator is most significant. The generator may be powered by a piston internal-combustion engine, fueled by gasoline, diesel, propane or natural gas, or powered by a rotary-power source, such as gas or steam turbine. These kinds of engines can produce mechanical, intake air, or exhaust stack noise, which may result in racking, pulsating, whining, humming or other noises. A variety of sound insulation schemes are used to reduce the effects of these noises, and are rated by the degree of sound reduction they can achieve. Hospital-grade silencing is recommended as the design standard. Consider manufacturers' recommendations and careful study of

the rated noise production values assigned to each component of a pump station in implementing a successful noise-reduction strategy.

C2-1.7 Operations and Maintenance

The design of the pump station should take into account the safety of operations and maintenance personnel.

During the design of sewer pump stations, consideration must be given to operations and maintenance (O&M) needs. This is typically documented in an O&M manual (see REVIEW need in Chapter G1-4.4 of the State of Washington Department of Ecology Criteria for Sewer Works Design) which conforms to the operating agency's O&M plan for the wastewater utility.

A bookmarked and searchable PDF copy and one (1) bound copy of an operation and maintenance manual shall be submitted to the District and include provisions for:

- *Table of contents,*
- *Record drawings that include design data for pumps, motors, force main, standby power, overflow point and elevation, telemetry, and odor control system as applicable,*
- Pump curve with computed system curve showing design operating point.
- *Product information, including brochures.*
- *Maintenance requirements.*
- *Test results and verification.*
- *Warranty time periods and stipulations.*
- *Inventory of critical components, including nameplate data for pumps and motors.*
- *Wiring schematics, including telemetric and alarm floats.*
- *The PLC program with documentation including one (1) paper copy with documentation, one (1) paper copy without documentation and one (1) electronic copy of PLC program.*
- *The HydroRanger operating program and instructions with one (1) paper copy.*
- *Engine generator operation and maintenance instructions including one (1) paper copy.*
- *A bill of materials for each item including quantity; voltage rating; manufacturer; model and part numbers; local supplier's company name, name of representative, address, telephone number and e-mail address. The bill of materials shall be referenced to the panel or site layout plans for easy identification.*
- *All manuals for the PLC, CPU and associated modules.*
- *The OIT program with documentation including (1) paper copy with documentation, and one (1) electronic copy of the OIT program.*
- *Provide a fully functional and licensed copy of the OIT programming software for use by the owner. Software shall be PC compatible and shall include all required communications cables and converters*

C2-1.8 Reliability

C2-1.8.1 Objective

Sewage pump stations *shall* be designed to provide enough reliability that accidental spills of wastewater into the environment or backups of sewage into structures do not occur. All pump stations should be designed to EPA Class 1 reliability standards, unless otherwise approved by Department of Ecology. Refer to G2-8 for additional information on reliability.

Reliability is achieved by:

- Specification of quality components.
- *Proper design and planning*.
- Redundancy of key equipment items.

C2-1.8.2 Equipment Redundancy

Components of the sewage pump station that *shall* be designed with redundancy in equipment to provide capacity for peak design flows include:

- Pumps and motors.
- Motor control center components.
- Instrumentation and control for pumps and motors.
- Power supply.
- Emergency storage in lieu of permanent standby power.

Sewage pumps and motors should be selected to provide one redundant unit that matches the largest pump and motor unit in the pump station, and should handle peak design flows with one of the largest units out of service.
Each pump and motor unit should have a separate electrical supply, motor starter, motor sensor and alarm, electrical components, and instrumentation and control components. Each wetwell bay should have an instrumentation and control module for operation of the pumps and alarm conditions as designed.

Power supply to most sewage pump stations should include the primary electrical feed as well as standby power. Standby power can include permanent generators, portable generators or secondary electrical feeds from an independent power grid.

Emergency storage should be included for all sewage pump stations that rely on portable engine generators for standby power, and should be considered for remote sewage pump stations where emergency response times may be long.

At locations where severe property damage could result from sewage backups caused by a pump station failure, it is recommended that the design include a manhole with a low elevation lid or an overflow pipe in the influent gravity sewage system.

C2-1.8.3 Emergency Power

All sewage pump stations should be designed with capability for emergency power in case the primary electrical feed is out of service. A portable engine generator unit that is plugged into a pigtail at the pump station commonly provides emergency power for small pump stations. Larger pump stations should have permanent engine generator units with automatic transfer switches to transfer the electrical feed from the primary to the standby unit when a power failure is detected by the instrumentation and control system. *The District shall determine if emergency power is required and the type of emergency power.*

Determining the engine generator's size should depend upon the requirements of starting and operating the pumps at peak possible load, and all ancillary equipment in the sewage pump station that could operate during a power outage.

A. Portable Engine Generators
   Portable engine generators can be used at sewage pump stations where the total electrical demand is provided for in the wetwell; however, larger portable generators can be used if an adequate transport vehicle is routinely available during a power failure. Portable engine generators should be trailer-mounted and include adequate fuel storage. A suitable towing vehicle should be available at all times. A pump station that relies on portable engine generators needs a pigtail or proper electrical connection point for the generator. Emergency generators and transfer switches must meet all state electrical standards.

Pump stations with portable engine generators shall be provided with auto transfer switch and connection for transfer of power.

Portable engine generators most commonly use gasoline engines, but are also available with diesel engines.

B. Permanent Engine Generators
Permanent engine generators are recommended for larger pump stations and permanent facilities. Automatic transfer switches provide for quick transitions to standby power when the primary power fails. Permanent engine generators commonly use gasoline, diesel or natural gas engines, depending on size.

Permanent engine generators should be located inside a building, or other weather-tight enclosure. Block heaters are recommended to ensure reliable startup in cold weather.

C. Fuel Storage
Fuel storage for both portable and permanent engine generators shall be adequate to operate the sewage pump station for a minimum of sixteen (16) continuous hours with all pumps operating simultaneously.

Above ground fuel storage is required to have liquid containment capability equal to the volume in the tank, and should be covered to prevent accumulation of precipitation. The fuel fill tube should be equipped to prevent overfilling of the tank.

New belowground fuel storage tanks will not be approved in the District.

A fuel gauge can be incorporated into the instrumentation system for remote readings of the fuel supply status.

C2-1.8.4 Bypass Capability

Pump stations shall be designed to eliminate any bypass due to power outage, mechanical failure or unusual flow regime. This is typically accomplished by some combination of the following:

- Flow storage.
- Standby electric generator.
- Portable electric generator.
- Power from two different electrical substations.
- Extra fitting on force main to allow quick connection for a portable pump.
- Design surcharge of gravity lines.

C2-1.8.5 Overflow Storage Capability

The wetwell and gravity sewer system shall have a minimum of two (2) hours peak flow detention time or a permanent standby emergency power generator (engine generator) shall be installed.

C2-1.8.6 Alarms and Telemetry

All sewage pump stations shall be equipped with sensors for key operational conditions and the alarm signals shall be connected to telemetry. The telemetry should send alarm signals to a location that is continuously monitored.

The telemetry units generally include the following:

- Radio controlled units

C2-2 SPECIAL DESIGN DETAILS (SEE PUMP STATION SECTION)

C2-2.1 General

This section describes special design details to be addressed for pump stations. *The District will determine the type of sewage pump station for each application. Generally, sewage pump stations will be either submersible (described in C2-2.4) or wetwell with a drywell (as described in C2-2.2).*

C2-2.1.1 Electrical Design

Electrical design for sewage pump stations shall conform to the National Electrical Code (NEC), National Electrical Safety Code (ANSI), and all federal, state and local codes.

Particular attention should be given during design to classifying the various enclosed spaces in the sewage pump station to ensure adequate ventilation, and using explosion-proof electrical equipment where necessary.

All electrical design shall meet the requirements of the District Design Specifications, Amendments to the Construction Specifications and Standard Drawings for sewage pump stations.

A. Instrumentation
Instrumentation at sewage pump stations should, at a minimum, include flow meters, pump run times, pressure gauges and voltage/ampere meters for the motors.

B. Alarms
Alarms at sewage pump stations should include, in generally decreasing order of importance, the following:

- High water.
- Low water.
- Power failure.
- Pump failure.
- Excessive run time.
- Surge control system failure.
- Engine generator failure.

As determined by the District Engineer:

- Fire alarm.
- Pump station intrusion.
- Drywell air quality sensors
- Sump pump alarm

C. Lighting
Sewage pump stations should include adequate lighting in all equipment areas to allow for repair and maintenance during non-daylight hours.
Automatic lights should be designed and placed to meet local and state standards. *See District Standard Drawings for lighting information.*

C2-2.1.2 Water Supply

When required by the *District* Engineer, water supply for sewage pump stations shall be provided and include a reduced pressure backflow preventer with double-check valves, with an independent relief between the valves. Cross-connection control shall meet the requirements of DOH. Refer to G2-2.2.1 for information on potable water supply connection.

C2-2.1.3 Corrosion Control

The design of the wetwell shall evaluate and compensate for the potential for hydrogen sulfide in the wetwell from sewage. If low initial flows, long travel times, or high sewage temperatures could cause significant concentrations of hydrogen sulfide, it is required that the concrete and steel structure in the wetwell be protected from corrosion. Protection can be provided with a liner or other means, such as high-rate ventilation at 30 air changes per hour with scrubbing of the exhaust through carbon canisters, or equivalent. Liners can be formed into the concrete or adhered to the concrete walls after they have cured.

C2-2.1.4 Temperature and Ventilation

Design of the sewage pump station shall also ensure that the temperature of the room (if applicable) or enclosure that the electrical and instrumentation equipment is within the equipment manufacturer's specifications on the hottest day of the year. Generally, the design of ventilation equipment should be adequate to maintain a temperature within the manufacturer's suggested operating range. The life of solid-state-based equipment, such as programmable logic controllers, variable frequency drives, telemetry equipment, and computers, will be increased if a lower maximum design temperature is used. Design of louvers for ventilating rooms that enclose engine generators should follow similar guidelines. Design of all sewage pump stations shall conform to the Washington State Energy Code as defined in Chapter 51-11 WAC and codified in Chapter 19.27A RCW.

C2-2.1.5 Equipment Removal and Replacement

The sewage pump station design, including doors, vaults and roof access panels, shall include the capability to remove or replace all major equipment items, including the following:

- Pumps and motors.
- Electrical panels.
- Valves.
- Surge control components.
- Engine generators.

For sewage pump stations with larger pumps and motors, permanent monorails and hoists *shall* be included with a lift rating at least equal to the largest piece of equipment. For smaller sewage pump stations, portable gantry-style hoists or truck-mounted hoists may be sufficient.

All access to sewage pump station wetwell and vault shall meet the requirements of the District Design Specifications, Amendments to the Construction Specifications and Standard Drawings.

C2-2.1.6 Accessibility

The sewage pump station site layout shall substantially conform to the District Standard Drawings and provide for easy access by maintenance vehicles to key equipment for repair, removal and replacement, including access to each piece of equipment. The sewage pump station site layout should provide for safe and convenient access by maintenance vehicles and personnel to key equipment for removal and replacement, including access to each piece of equipment listed in C2-2.1.5.

C2-2.1.7 Valves and Piping

It is necessary in all pump stations to provide a valve chamber for valves, piping, air and vacuum relief valves, and surge control components. Each pump discharge should include a check valve, an isolation valve and pressure gauge.

Sewage pump stations that discharge into long force mains in which there is high likelihood of grease buildup or where the force main will have low velocities should be equipped with valves, piping, and end cap for launching of a pig to remove buildups of undesirable materials in the force

main. Pig launchers typically include three valves so that a pig launcher can be isolated from the force main.

If required by the District Engineer, a pig launcher will be included in a sewage pump station design and special care needs to be given to designing the force main terminus to include a pig catcher and the ability to remove materials driven out of the force main by the pig. See C2-3.11 for additional information about pig launching and retrieval. *All valve and piping design shall meet the requirements of the District Design Specifications, Amendments to the Construction Specifications and Standard Drawings.*

C2-2.2 Wetwell/Drywell Pump Stations

Wetwell/drywell pump stations site the pumps below grade in a drywell immediately adjacent to the wetwell. Design should incorporate the latest standards from NFPA 820, the NEC and L&I confined space regulations (Chapter 296-62 WAC, Part M). To provide an unclassified space, the facility should provide complete separation between the wetwell and drywell, meeting requirements in NFPA 820. Continuous positive pressure air ventilation from a source of clean air, with effective safeguards against failure, should be provided in the drywell, in accordance with the NEC and NFPA 820. No transfer of air should occur between classified and unclassified spaces. Air quality in the drywell space should be tested and recorded on a regular basis, in accordance with Chapter 296-62 WAC, Part M.

The drywell should be provided with at least one sump pump and a float switch alarm.
Discharge should be into the wetwell or sewer pipe.

C2-2.3 Suction Lift Pump Stations

Suction lift pump stations incorporate self-priming pumps in order to locate the pumps above the water level and either eliminate or decrease the depth of the drywell. Priming tanks or vacuum priming systems are not recommended for raw, unscreened sewage on new installations. Maximum suction lift should not exceed the pump manufacturer's recommendations and should be based on a net positive suction calculation with a generous factor of safety. Typically suction lift should not exceed 15 feet.

An air release valve should be provided at the high point in the discharge piping and should vent into the wetwell above maximum water level.

Any structure housing the pumps or the motor control center should be physically separated from the wetwell and meet the requirements of NFPA 820 and NEC.

C2-2.4 Submersible Pump Stations

Submersible pump stations provide submersible pumps in the wetwell with the motor control center mounted above grade. Pumps should be readily removable and replaceable without dewatering the wetwell or requiring personnel to enter the wetwell. Check valves and isolation valves should be mounted in a separate vault outside the wetwell to facilitate access and suitable for protection against vandalism and the elements.

Control panels shall be physically separated from the wetwell, meet the requirements of the NEC, and be suitably protected from the weather, humidity, and vandalism. The pumps should be explosion-proof unless the control system can provide adequate assurance that pump motors in operation are submerged at all times. Electrical junction boxes should be easily accessible without entering the wetwell.

C2-2.5 Vertical Solids Handling Line Shaft Pumps

The District does not install Vertical Solids Handling Line Shaft pumps.

C2-3 FORCE MAINS

C2-3.0 Plans, Profiles, Construction Notes, Profiles and Record Drawings

A. *General.*

1. *Design Engineer shall call for pre-design locates from the NW Utility Notification Center at 1-800-424-5555. Design Engineer or Surveyor is responsible for field verification of location and elevations of facilities.*
2. *Plans, profiles, details and grading plans will be submitted to the District in PDF format for review of all new or extended sanitary sewers.*
3. *For the District's initial review, storm sewer plans and profiles must be included with the sanitary sewer plans and profiles for District review. Water distribution plans must be included with the sanitary sewer plans. The water distribution profile must be shown on the sanitary sewer profile.*
4. *After District approval of plans, profiles and details, the Design Engineer shall submit one (1) complete set of Plans and four (4) partial sets at least five (5) working days prior to the preconstruction conference. The partial sets shall include the signed coversheet, sanitary plans and profiles, and sanitary notes and detail sheets. The complete Plans shall also include all other road, storm, water and grading plans for the Work.*
5. *For projects that are the subject of a site plan or land division approved by Clark County or a City with land use authority, the approval of plans and specifications is valid for the period of the original site plan /land division approval.*
6. *Projects that are not the subject of other site plan/land division approvals will expire in accordance with the terms and conditions of the developer extension agreement. Plans that have expired may be submitted for re-approval; but are subject to additional review.*
7. *Text size shall be a minimum of 0.08".*

B. *Engineering Drawings - Plans. Plan sheets for force mains shall contain at least the following information:*

1. *A suitable title sheet with the name, address, telephone numbers, contact name, and e-mail addresses of the Owner, Developer (including contact name) and the Design Engineer; scale; north arrow; vicinity map; section, township and range; sheet index; revision box date; drawing number; the Design Engineer's Professional Civil Engineers State of Washington signed seal with date of signature; and District signature block per District Standard Drawings. Applicable sheets shall include a legend with symbols and abbreviations and general notes generic to all construction.*
2. *All elevations shall be based on Clark County Datum (NGVD 29(47)). The benchmark used to determine elevations shall be identified on the Plans.*
3. *District Standard Construction Notes for Force Mains (See Standard Drawings). These are minimum Construction Notes and special designs or conditions may require additional Construction Notes.*
4. *Horizontal dimensions from right-of-way, centerline of road, easement lines or property lines and other utilities or structures.*
5. *All existing survey monumentation within 100 feet of the project limits shall be shown.*
6. *Subtitles on each sheet describing the contents.*
7. *Adjacent streets, property lines, tax lot numbers and serial numbers or plat references.*
8. *All existing and proposed easements.*
9. *District Standard Drawings and details that apply to the project.*
10. *All force mains identified as "Public" or "Private." All private sanitary sewer lines and easements shall be labeled as "Private". If private force mains are required, all requirements of public force main plans and profiles must be met.*
11. *Each valve, air / vacuum valve, pressure cleanout, corporation stop, pressure service line, locate station and other appurtenance shall be stationed to facilitate checking the plans with profiles. Stationing shall be based on road stationing with the exception of pressure service lines [see 13 below].*
12. *Each valve, air / vacuum valve, and pressure cleanout shall be numbered as follows. The first downstream connection of a new force main with the existing force main shall be shown as the lowest*

alpha, numeric or alphanumeric prefix. The prefixes shall be consecutive along the main run of the force main for each intersection or branch of force mains. All branch force main intersections and appurtenances shall be identified with consecutive prefixes from the connection of the branch sanitary sewer pressure line to the main force main.

13. *All pressure service lines shall be stationed upstream from the nearest downstream force main intersection or main line valve.*

    Depths and lengths shall be shown at the end of each pressure service line. When practical, pressure service lines shall be at a right angle from the force main and at the center of the lot. For flag lots, pressure service lines shall be located a minimum of five (5) feet from the property line.

14. *Location of watercourses, wells, septic systems, stream and railroad crossings, water mains, gas mains, culverts, telephone, underground power, cable television and other utilities or structures based on best available information and field locates.*

15. *All existing gravel and hard surface paving including width(s).*

16. *Existing contours for the proposed development extending outside of the proposed development along existing, proposed or future roads. If site grading is anticipated, a final site contour map shall be provided. Contour interval shall not be greater than two (2) feet in elevation except in steep terrain where contours are not easily distinguished at two (2) foot intervals.*

17. *Plans shall be drafted at a scale that will be legible when the plans are reduced fifty (50) percent. If the entire project plan cannot be shown on one (1) sheet, a key map will be provided noting the sheet that each individual section of the plan is located. Where multiple sheets are used for plans and/or profiles, match lines will be shown. Where multiple sheets are used for plans, a master utility plan will be provided.*

18. *Sheet size shall be 24" x 36" or 22" x 34".*

19. *All new easements shall:*

    a. *Be a minimum of fifteen (15) feet in width for force mains eight (8) feet or less in depth. The width of the easement shall increase by two (2) feet for every one (1) foot in depth beyond eight (8) feet.*

    b. *Have the pressure sanitary sewer pipe centered in the easement.*

    c. *Be located on a single lot.*

    d. *Have description(s) submitted to the District in writing with a map in addition to platted easement(s). The District will complete the document and record the easement at the County.*

20. *Length, pipe-size and type of material for all sanitary sewers. (e.g., 400 LF, 3" Class 200 SDR 21 PVC)*

21. *Locations and elevations of existing septic tanks and drain fields and finished floor elevations for the existing building main floor and, if present, basement.*

C. *Engineering Drawings - Profiles. Profile sheets for sanitary sewer lines shall contain at least the following information:*

1. *Location of each valve, automatic air release valve, pressure cleanout, locate station and other appurtenances numbered and stationed as shown on the plans. Each valve, automatic air release valve, pressure cleanout, pressure service line, locate station and other appurtenances shall show finished grade elevation(s) and invert elevation(s).*

2. *All pressure service lines shall be shown and stationed upstream from the nearest downstream pressure sanitary sewer intersection or main line valve with lot number, station and invert elevation or depth.*

3. *Profiles of existing and proposed ground surface or road finished grade and force main invert(s) at each change in grade.*

4. *Force main size, type of material, slope and length between force main intersections, valves, pressure cleanouts, automatic air release valves, elbows, bedding class and backfill type.*

5. *Suitable title plate, scale, dates, drawing number, and the name, address, telephone number and the Design Engineer's Professional Civil Engineer's State of Washington signed seal.*
6. *Limits of existing or proposed gravel and hard surface paving.*
7. *Profiles shall be drafted to a vertical scale at one-tenth (1/10) of the horizontal scale unless steep terrain exists.*
8. *All storm drains, storm water quality facilities, storm drain detention and/or retention ponds, water or utility crossings of sanitary sewers shall be shown with elevations and vertical clearances. Profiles of any storm, water or other utility facilities if located within ten (10) horizontal feet of existing or proposed sanitary sewers.*
9. *All force mains shall be at a minimum depth of cover of three (3) feet.*
10. *All force mains shall have a positive slope in order to reduce the potential for trapping air in lines. Each run of force main should maintain a consistent positive (+) or negative (-) grade.*
11. *All force mains and pressure service lines installed (both public and private) shall include the installation of locate wire with appropriate locate access points. A continuous toning wire shall be attached to the top of the pressure service line. The toning wire shall end in the valve box with a minimum of a two (2) foot coil of wire. The toning wire shall be tested for continuity prior to acceptance.*

D. *Engineering Drawings - Record Drawing Plans and Profiles. Record Drawings for plan and profile sheets for sanitary sewer lines shall:*

1. *The record drawings shall be legible and complete Plans including all road, storm drainage, water supply and grading plans for the Work.*
2. *Be completed by the Design Engineer or Surveyor and submitted to the District prior to project acceptance by the District.*
3. *Be submitted in electronic form as a "PDF" file and a complete paper copy.*
4. *Be placed on the approved engineering drawings with the design date marked out and the Record Drawing date shown adjacent to design date.*
5. *Show all final stations of valves, air / vacuum valves, pressure cleanouts, corporation stops, pressure service line, locate stations and other appurtenances.*
6. *Show all final elevations of valves, air / vacuum valves, pressure cleanouts, pressure service line, locate stations and other appurtenances.*
7. *Show all changes made to pipe material, slope, length of pipe, finished grade, etc.*
8. *Show the distance from the back of curb or, if no curb, from the corporation stop to the end of the pressure service lines, depth, station and distance to the end of the pressure service lines from the force main.*
9. *Be clearly marked Record Drawings, with the drawing date updated.*
10. *Become the permanent property of the District.*

C2-3.1 Size and Alignment

Except for small grinder and effluent pump installations, piping for force mains should not be less than 4 inches in diameter. As a general rule, whenever the velocity exceeds 8 fps, a larger pipe should be used.

If the Design Engineer proposes horizontal or vertical curves, the request shall be reviewed and approved by the District. If the District approves horizontal or vertical curves in writing, the radius of curvature shall not exceed the manufacturer's limits.

C2-3.2 Velocity

At pumping capacity, a minimum self-scouring velocity of 2 fps should be maintained unless flushing facilities are provided. Velocity should not exceed 8 fps. Optimum velocities for reducing maintenance

costs and preventing accumulation of solids range between 3.5 and 5 fps. The Design Engineer shall submit calculations showing start-up and ultimate velocities.

C2-3.3 *Force main Appurtenances*

C2-3.3A Pressure Cleanouts

Pressure cleanouts shall be installed at the end of each force main. Pressure cleanouts shall comply with District Standard Drawings.

C2-3.3B Locator Stations

Locator stations shall be installed every 500 feet along the force main and at all horizontal bends. Locator stations shall comply with District Standard Drawings.

C2-3.3C Air / Vacuum Valves (AVV), Vacuum Release Valves, Combination Valves

Air / vacuum valves, vacuum release valves, and combination valves shall be installed at applicable points of the force main and shall comply with District Standard Drawings.

Design Engineer shall provide design calculations for size of air / vacuum valves, vacuum release valves, and combination valves for District review and approval. Air / vacuum valves, vacuum release valves, and combination valves shall be APCO or approved equal.

C2-3.4 Blow-Offs

Deleted

C2-3.5 Termination

The force main should enter the receiving manhole with its centerline horizontal and an elevation that will ensure a smooth transition of flow to the gravity flow section.
In no case, however, should the force main enter the gravity system at a point more than 1 foot above the flow line of the receiving manhole. The design should minimize turbulence at the point of discharge.

The receiving manhole shall be coated in accordance with C1-6.8 to prevent deterioration from hydrogen sulfide or other chemicals.

The receiving manhole shall be equipped with an odor control insert; Parson Environmental Odoreater or approved equal.

C2-3.6 Construction Methods and Materials

All force mains shall:

A. *Be designed to prevent damage from superimposed loads. Proper allowance for loads imposed on the pipe shall be calculated for the width and depth of the trench; and*

B. *Conform to Table C2-3; and*

C. *Have a minimum of three (3) feet depth of cover over the top of the pipe from finished grade or the flow line of a ditch; and*

D. *All force mains and pressure service lines installed (both public and private) shall include the installation of locate wire with appropriate locate access points. A continuous toning wire shall be attached to the top of the pressure service line. The toning wire shall end in the valve box with a minimum of a two (2) foot coil of wire. The toning wire shall be tested for continuity prior to acceptance.*

E. *Have a continuous three (3) inch wide green six (6) mil thick locator tape marked with three (3) inch high black letters every three (3) feet with "Warning – Buried Pressure Sewer". The locator tape shall be installed eighteen (18) inches above the force main.*

F. *Have a positive slope to minimize air pockets.*

Description	Technical Specification
Ductile Iron Pipe (DIP)	Standard Thickness Class 50, AWWA C151
Polyvinyl Chloride Pipe (PVC)	ASTM D2241, SDR 21, Class 200
Polyvinyl Chloride Pipe (PVC)	AWWA C900 or AWWA C905, SDR 18
High Density Polyethylene Pipe (HDPE)	PE3408, Minimum SDR 17, 100 psi, ASTM D-3350, PE: 345434C & ASTM D-1248, Type III, Class C, Category 5, grade P34
Fittings	Standard Thickness Class 50, AWWA C151 Shall conform and be compatible with pipe material

Table C2-3 Approved Materials for Force mains

Materials used for force mains include ductile iron, polyethylene and polyvinyl chloride (PVC). The pipe material and interior lining should be selected to adapt to local conditions, including industrial waste and soil characteristics, exceptionally heavy external loading, internal erosion, corrosion, and similar problems. The system design and surge allowances may preclude the use of some materials.

Installation specifications should contain appropriate requirements based on the criteria, standards, and requirements established by the industry in its technical publications. Requirements should be set forth in the specifications for the pipe and methods of backfilling to preclude damage to the pipe or its joints, impede future cleaning operations, and prevent excessive side pressures that may create ovulation of the pipe, or seriously impair flow capacity.

All pipes should be designed to prevent damage from superimposed loads. Proper allowance for loads imposed on the pipe should be calculated for the width and depth of the trench.

C2-3.7 Pressure Tests

All new force mains shall be pressure tested in accordance with Construction Specifications Sections 7-09.3(23) Hydrostatic Pressure Test and 7-09.3(23)A Testing Extensions.

C2-3.8 Connections

In order to avoid shearing force main pipes because of differential settlement, flex couplings should be used on force main pipes between the pump station structures, such as the pump station and the valve box. Flex couplings should also be used between the final pump station structure and the force main. Couplings shall be Dresser or approved equal.

C2-3.9 Surge Control

Hydraulic surges and transients (water hammer) are dependent on a force main's size, length, profile and construction materials. Surge analysis, possible causes and types of protection facilities for transient conditions are discussed in C2-1.5. Pipe pressure tests and thrust restraint should be based on maximum transient conditions, including an appropriate margin for safety.

C2-3.10 Thrust Restraint

Thrust forces in pressurized pipelines shall be restrained or anchored to prevent excessive movement and joint separation under all projected conditions.

Thrust restraint shall be mechanically restrained joints, Megalugs, or approved equal. The Design Engineer shall submit thrust restraint calculations for review and shall callout on the plans the required length of joint restraint.

C2-3.11 Pig Launching/Retrieval Facilities

Provisions for launching and retrieving cleaning pigs should be considered in the design of a force main. See C2-2.1.7 for a discussion of when pig-launching capability is advised. Pig launching facilities may be as simple as a pipe wye or more elaborate, with a special launch chamber, bypass piping and valves. In either case, provisions should be made for attaching gauges to monitor pressure.

Retrieval facilities may also be elaborate or simple. Elaborate retrieval devices are usually mirror images of the launch device; baskets, traps, or screens placed in the receiving manhole are among the simpler retrieval methods.

C2-4 REFERENCES

American National Standard Institute/Hydraulic Institute (ANSI/HI). Centrifugal Pumps-Nomenclature, Definitions, Application and Operation. 1994.

ANSI/HI. Centrifugal and Vertical Pumps—Definitions, Application and Operation. 1998.

ANSI/HI. Vertical Pumps—Nomenclature, Definitions, Application and Operation. 1994.

Metcalf & Eddy, Inc. Wastewater Engineering—Collection and Pumping of Wastewater. Third Edition, New York, NY: McGraw-Hill, Inc., 1991.

National Fire Protection Agency (NFPA) Standard 820. Standard for Fire Protection in Wastewater Treatment and Collection Facilities. 1995.

Prosser, M.J. The Hydraulic Design of Pump Sumps and Intakes. BHRA. 1977.

Sanks, Robert L., et al. Pumping Station Design. Second Edition. Butterworth-Heinemann Publishers. 1998.

Sanks, Robert L., et. al. Improvements in Pump Intake Basin Design. EPA/600/R-95/041. 1995.

Underwriters Laboratories 1207. Sewage Pumps for Use in Hazardous (Classified) Locations. 1996.

Water Environment Federation. Design of Wastewater and Stormwater Pump Stations. Manual of Practice FD-4. 1993.

APPENDIX A

GENERAL SPECIAL PROVISIONS

TABLE OF CONTENTS

FOR THE

CLARK REGIONAL WASTEWATER DISTRICT

GENERAL SPECIAL PROVISIONS

GENERAL SPECIAL PROVISIONS

(District April 2020)
The work on this project shall be accomplished in accordance with the Standard Specifications for Road, Bridge and Municipal Construction, 2020 edition, as issued by the Washington State Department of Transportation (WSDOT) and the American Public Works Association (APWA), Washington State Chapter (hereafter "Standard Specifications"). The Standard Specifications, as modified or supplemented by the Amendments to the Standard Specifications and these Special Provisions, all of which are made a part of the Contract Documents, shall govern all of the Work.

These General Special Provisions are from various sources, which may have project-specific fill-ins. Each Provision either supplements, modifies, or replaces the comparable Standard Specification or is a new Provision. The deletion, amendment, alteration, or addition to any subsection or portion of the Standard Specifications is meant to pertain only to that particular portion of the section, and in no way should it be interpreted that the balance of the section does not apply.

General Special Provision sources are differentiated as follows:

(date)	WSDOT General Special Provision
(date APWA GSP)	APWA General Special Provision
(date APWA GSP, modified District date)	*APWA General Special Provision modified*
(District date)	Clark Regional Wastewater District General Special Provision

All District modifications to the APWA GSP will be italicized.

Also incorporated into the General Special Provisions by reference are:

- Manual on Uniform Traffic Control Devices for Streets and Highways, currently adopted edition, with Washington State modifications, if any
- Standard Plans for Road, Bridge and Municipal Construction, WSDOT/APWA, current edition
- Clark Regional Wastewater District Standard Drawings

Contractor shall obtain copies of these publications, at Contractor's own expense.

DIVISION 1
GENERAL REQUIREMENTS

1-01 DEFINITIONS AND TERMS

1-01.3 Definitions
(January 4, 2016 APWA GSP)

Delete the heading **Completion Dates** and the three paragraphs that follow it, and replace them with the following:

Dates

Bid Opening Date
The date on which the Contracting Agency publicly opens and reads the Bids.

Award Date
The date of the formal decision of the Contracting Agency to accept the lowest responsible and responsive Bidder for the Work.

Contract Execution Date
The date the Contracting Agency officially binds the Agency to the Contract.

Notice to Proceed Date
The date stated in the Notice to Proceed on which the Contract Time begins.

Substantial Completion Date
The day the Engineer determines the Contracting Agency has full and unrestricted use and benefit of the facilities, both from the operational and safety standpoint, any remaining traffic disruptions will be rare and brief, and only minor incidental work, replacement of temporary substitute facilities, plant establishment periods, or correction or repair remains for the Physical Completion of the total Contract.

Physical Completion Date
The day all of the Work is physically completed on the project. All documentation required by the Contract and required by law does not necessarily need to be furnished by the Contractor by this date.

Completion Date
The day all the Work specified in the Contract is completed and all the obligations of the Contractor under the contract are fulfilled by the Contractor. All documentation required by the Contract and required by law must be furnished by the Contractor before establishment of this date.

Final Acceptance Date
The date on which the Contracting Agency accepts the Work as complete.

Supplement this Section with the following:

All references in the Standard Specifications, Amendments, or WSDOT General Special Provisions, to the terms “Department of Transportation”, “Washington State Transportation Commission”, “Commission”, “Secretary of Transportation”, “Secretary”, “Headquarters”, and “State Treasurer” shall be revised to read “Contracting Agency”.

All references to the terms “State” or “state” shall be revised to read “Contracting Agency”

unless the reference is to an administrative agency of the State of Washington, a State statute or regulation, or the context reasonably indicates otherwise.

All references to “State Materials Laboratory” shall be revised to read “Contracting Agency designated location”.

All references to “final contract voucher certification” shall be interpreted to mean the Contracting Agency form(s) by which final payment is authorized, and final completion and acceptance granted.

Additive
A supplemental unit of work or group of bid items, identified separately in the Bid Proposal, which may, at the discretion of the Contracting Agency, be awarded in addition to the base bid.

Alternate
One of two or more units of work or groups of bid items, identified separately in the Bid Proposal, from which the Contracting Agency may make a choice between different methods or material of construction for performing the same work.

Business Day
A business day is any day from Monday through Friday except holidays as listed in Section 1-08.5.

Contract Bond
The definition in the Standard Specifications for “Contract Bond” applies to whatever bond form(s) are required by the Contract Documents, which may be a combination of a Payment Bond and a Performance Bond.

Contract Documents
See definition for “Contract”.

Contract Time
The period of time established by the terms and conditions of the Contract within which the Work must be physically completed.

Notice of Award
The written notice from the Contracting Agency to the successful Bidder signifying the Contracting Agency’s acceptance of the Bid Proposal.

Notice to Proceed
The written notice from the Contracting Agency or Engineer to the Contractor authorizing and directing the Contractor to proceed with the Work and establishing the date on which the Contract Time begins.

Traffic
Both vehicular and non-vehicular traffic, such as pedestrians, bicyclists, wheelchairs, and equestrian traffic.

(District April 2020)
Delete the paragraph with the heading **Engineer** and replace it with the following:

Engineer
The District Engineer or designee.

Supplement this Section with the following:

Beaver Slide
Beaver slide refers to a smooth and continuous manhole channel that directs flow from influent sewers with an invert that is above the crown of the receiving sewer.

Building Sewer
See Private Side Sewer.

Clark Regional Wastewater District
The Clark Regional Wastewater District (District) is a municipal corporation in the State of Washington operating under RCW Title 57.

The District offices are located at 8000 NE 52nd Court, Vancouver, Washington 98665. The mailing address is PO Box 8979, Vancouver, Washington 98668-8979.

Design Engineer
The licensed engineer who signed and sealed the contract plans.

District or Owner or Contracting Agency
The contracting agency or authorized representative. The terms “District”, “Owner”, and “Contracting Agency” shall be synonymous.

DTF
Dry Film Thickness, mils.

Receiving Manhole
Receiving manholes are manholes with a pressure sewer main connection.

Sag
A sag in a sewer is also known as a belly. A sewer with a sag has negative slope along a section of the pipe length which results in a pooling area of water.

1-02 BID PROCEDURES AND CONDITIONS

1-02.1 Prequalification of Bidders
Delete this Section and replace it with the following:

1-02.1 Qualifications of Bidder
(January 24, 2011 APWA GSP)

Before award of a public works contract, a bidder must meet at least the minimum qualifications of RCW 39.04.350(1) to be considered a responsible bidder and qualified to be awarded a public works project.

1-02.1(1) Supplemental Qualifications Criteria
(July 31, 2017 APWA GSP, modified District April 2020)

In addition, the Contracting Agency has established Contracting Agency-specific and/or project-specific supplemental criteria, in accordance with RCW 39.04.350(3), for determining Bidder responsibility, including the basis for evaluation and the deadline for appealing a determination that a Bidder is not responsible. These criteria are contained in Section 1-02.14 of these Special Provisions.

1-02.2 Plans and Specifications
(June 27, 2011 APWA GSP)

Delete this section and replace it with the following:

Information as to where Bid Documents can be obtained or reviewed can be found in the Call for Bids (Advertisement for Bids) for the work.

After award of the contract, plans and specifications will be issued to the Contractor at no cost as detailed below:

To Prime Contractor	No. of Sets	Basis of Distribution
Reduced plans (11" x 17")	*** 1 ***	Furnished automatically upon award.
Contract Provisions	*** 1 ***	Furnished automatically upon award.
Large plans (e.g., 22" x 34")	*** 1 ***	Furnished only upon request.

Additional plans and Contract Provisions may be obtained by the Contractor from the source stated in the Call for Bids, at the Contractor's own expense.

1-02.4(1) General
(August 15, 2016 APWA GSP Option A, modified District April 2020)

The first sentence of the *paragraph that reads "Any prospective Bidder desiring…"* is revised to read:

Any prospective Bidder desiring an explanation or interpretation of the Bid Documents, must request the explanation or interpretation in writing soon enough to allow a written reply to reach all prospective Bidders before the submission of their Bids.

(District April 2020)
Delete the last two paragraphs and replace them with the following:

Prospective Bidders are advised that the Contracting Agency may include a partially completed Washington State Department of Ecology (Ecology) Transfer of Coverage (Ecology form ECY 020-87a) for the Construction Stormwater General Permit (CSWGP) as part of the Bid Documents. When the Contracting Agency requires the transfer of coverage of the CSWGP to the Contractor, an informational copy of the Transfer of Coverage and the associated CSWGP will be included in the appendices. As a condition of Section 1-03.3, the

Contractor is required to complete the Transfer of Coverage, submit the form to Ecology, and provide a copy of the submitted form to the Contracting Agency.

The Contracting Agency is responsible for compliance with the CSWGP until the end of day that the Contract is executed. Beginning on the day after the Contract is executed, the Contractor shall assume complete legal responsibility for compliance with the CSWGP and full implementation of all conditions of the CSWGP as they apply to the Contract Work. If the Contracting Agency has obtained the CSWGP after the Contract is executed, the Contractor shall assume complete legal responsibility for compliance with the CSWGP and full implementation of all conditions of the CSWGP immediately after the permit has been issued by Ecology.

1-02.4(2) Subsurface Information
(March 8, 2013 APWA GSP)

The second sentence in the first paragraph is revised to read:

The Summary of Geotechnical Conditions and the boring logs, if and when included as an appendix to the Special Provisions, shall be considered as part of the Contract.

1-02.5 Proposal Forms
(July 31, 2017 APWA GSP)

Delete this section and replace it with the following:

The Proposal Form will identify the project and its location and describe the work. It will also list estimated quantities, units of measurement, the items of work, and the materials to be furnished at the unit bid prices. The bidder shall complete spaces on the proposal form that call for, but are not limited to, unit prices; extensions; summations; the total bid amount; signatures; date; and, where applicable, retail sales taxes and acknowledgment of addenda; the bidder's name, address, telephone number, and signature; the bidder's UDBE/DBE/M/WBE commitment, if applicable; a State of Washington Contractor's Registration Number; and a Business License Number, if applicable. Bids shall be completed by typing or shall be printed in ink by hand, preferably in black ink. The required certifications are included as part of the Proposal Form.

The Contracting Agency reserves the right to arrange the proposal forms with alternates and additives, if such be to the advantage of the Contracting Agency. The bidder shall bid on all alternates and additives set forth in the Proposal Form unless otherwise specified.

1-02.6 Preparation of Proposal
(July 11, 2018 APWA GSP, modified District April 2020)

Supplement the second paragraph with the following:

4. If a minimum bid amount has been established for any item, the unit or lump sum price must equal or exceed the minimum amount stated.
5. Any correction to a bid made by interlineation, alteration, or erasure, shall be initialed by the signer of the bid.

Delete the last *three* paragraphs, and replace them with the following:

If no Subcontractor is listed, the Bidder acknowledges that it does not intend to use any Subcontractor to perform those items of work.

The Bidder shall submit with their Bid a completed Contractor Certification Wage Law Compliance form, provided by the Contracting Agency. Failure to return this certification as part of the Bid Proposal package will make this Bid Nonresponsive and ineligible for Award. A Contractor Certification of Wage Law Compliance form is included in the Proposal Forms.

The Bidder shall make no stipulation on the Bid Form, nor qualify the bid in any manner.

A bid by a corporation shall be executed in the corporate name, by the president or a vice president (or other corporate officer accompanied by evidence of authority to sign).

A bid by a partnership shall be executed in the partnership name and signed by a partner. A copy of the partnership agreement shall be submitted with the Bid Form if any UDBE requirements are to be satisfied through such an agreement.

A bid by a joint venture shall be executed in the joint venture name and signed by a member of the joint venture. A copy of the joint venture agreement shall be submitted with the Bid Form if any UDBE requirements are to be satisfied through such an agreement.

1-02.7 Bid Deposit
(March 8, 2013 APWA GSP, modified District April 2020)

Supplement this section with the following:

Bid bonds shall contain the following:

1. Contracting Agency-assigned number for the project;
2. Name of the project;
3. The Contracting Agency named as obligee;
4. The amount of the bid bond stated either as a dollar figure or as a percentage which represents five percent of the maximum bid amount that could be awarded;
5. Signature of the bidder's officer empowered to sign official statements. The signature of the person authorized to submit the bid *shall* agree with the signature on the bond, and the title of the person must accompany the said signature;
6. The signature of the surety's officer empowered to sign the bond and the power of attorney.

If so stated in the Contract Provisions, bidder must use the bond form included in the Contract Provisions.

If so stated in the Contract Provisions, cash will not be accepted for a bid deposit.

1-02.9 Delivery of Proposal
(District April 2020)

Delete this section and replace it with the following:

Each Proposal shall be submitted in a sealed envelope, with the Project Name and Project Number as stated in the Call for Bids clearly marked on the outside of the envelope, or as otherwise required in the Bid Documents, to ensure proper handling and delivery.

The Contracting Agency will not open or consider any Bid Proposal that is received after the time specified in the Call for Bids for receipt of Bid Proposals, or received in a location other than that specified in the Call for Bids.

1-02.10 Withdrawing, Revising, or Supplementing Proposal
(July 23, 2015 APWA GSP)

Delete this section, and replace it with the following:

After submitting a physical Bid Proposal to the Contracting Agency, the Bidder may withdraw, revise, or supplement it if:

1. The Bidder submits a written request signed by an authorized person and physically delivers it to the place designated for receipt of Bid Proposals, and
2. The Contracting Agency receives the request before the time set for receipt of Bid Proposals, and
3. The revised or supplemented Bid Proposal (if any) is received by the Contracting Agency before the time set for receipt of Bid Proposals.

If the Bidder's request to withdraw, revise, or supplement its Bid Proposal is received before the time set for receipt of Bid Proposals, the Contracting Agency will return the unopened Proposal package to the Bidder. The Bidder must then submit the revised or supplemented package in its entirety. If the Bidder does not submit a revised or supplemented package, then its bid shall be considered withdrawn.

Late revised or supplemented Bid Proposals or late withdrawal requests will be date recorded by the Contracting Agency and returned unopened. Mailed, emailed, or faxed requests to withdraw, revise, or supplement a Bid Proposal are not acceptable.

1-02.13 Irregular Proposals
(December 19, 2019 APWA GSP)

Delete this section and replace it with the following:

1. A Proposal will be considered irregular and will be rejected if:
   a. The Bidder is not prequalified when so required;
   b. The authorized Proposal form furnished by the Contracting Agency is not used or is altered;
   c. The completed Proposal form contains any unauthorized additions, deletions, alternate Bids, or conditions;
   d. The Bidder adds provisions reserving the right to reject or accept the award, or enter into the Contract;
   e. A price per unit cannot be determined from the Bid Proposal;
   f. The Proposal form is not properly executed;
   g. The Bidder fails to submit or properly complete a Subcontractor list, if applicable, as required in Section 1-02.6;

h. The Bidder fails to submit or properly complete an Underutilized Disadvantaged Business Enterprise Certification, if applicable, as required in Section 1-02.6;
i. The Bidder fails to submit written confirmation from each UDBE firm listed on the Bidder's completed UDBE Utilization Certification that they are in agreement with the bidder's UDBE participation commitment, if applicable, as required in Section 1-02.6, or if the written confirmation that is submitted fails to meet the requirements of the Special Provisions;
j The Bidder fails to submit UDBE Good Faith Effort documentation, if applicable, as required in Section 1-02.6, or if the documentation that is submitted fails to demonstrate that a Good Faith Effort to meet the Condition of Award was made;
k. The Bidder fails to submit a UDBE Bid Item Breakdown form, if applicable, as required in Section 1-02.6, or if the documentation that is submitted fails to meet the requirements of the Special Provisions;
l. The Bidder fails to submit UDBE Trucking Credit Forms, if applicable, as required in Section 1-02.6, or if the documentation that is submitted fails to meet the requirements of the Special Provisions;
m. The Bid Proposal does not constitute a definite and unqualified offer to meet the material terms of the Bid invitation; or
n. More than one Proposal is submitted for the same project from a Bidder under the same or different names.

2. A Proposal may be considered irregular and may be rejected if:
   a. The Proposal does not include a unit price for every Bid item;
   b. Any of the unit prices are excessively unbalanced (either above or below the amount of a reasonable Bid) to the potential detriment of the Contracting Agency;
   c. Receipt of Addenda is not acknowledged;
   d. A member of a joint venture or partnership and the joint venture or partnership submit Proposals for the same project (in such an instance, both Bids may be rejected); or
   e. If Proposal form entries are not made in ink.

1-02.14 Disqualification of Bidders
(May 17, 2018 APWA GSP, Option A)

Delete this Section and replace it with the following:

A Bidder will be deemed not responsible if the Bidder does not meet the mandatory bidder responsibility criteria in RCW 39.04.350(1), as amended.

The Contracting Agency will verify that the Bidder meets the mandatory bidder responsibility criteria in RCW 39.04.350(1). To assess bidder responsibility, the Contracting Agency reserves the right to request documentation as needed from the Bidder and third parties concerning the Bidder's compliance with the mandatory bidder responsibility criteria.

If the Contracting Agency determines the Bidder does not meet the mandatory bidder responsibility criteria in RCW 39.04.350(1) and is therefore not a responsible Bidder, the Contracting Agency shall notify the Bidder in writing, with the reasons for its determination. If the Bidder disagrees with this determination, it may appeal the determination within two (2) business days of the Contracting Agency's determination by presenting its appeal and any additional information to the Contracting Agency. The Contracting Agency will consider the appeal and any additional information before issuing its final determination. If the final

determination affirms that the Bidder is not responsible, the Contracting Agency will not execute a contract with any other Bidder until at least two business days after the Bidder determined to be not responsible has received the Contracting Agency's final determination.

1-02.15 Pre Award Information
(August 14, 2013 APWA GSP)

Revise this section to read:

Before awarding any contract, the Contracting Agency may require one or more of these items or actions of the apparent lowest responsible bidder:

1. A complete statement of the origin, composition, and manufacture of any or all materials to be used,
2. Samples of these materials for quality and fitness tests,
3. A progress schedule (in a form the Contracting Agency requires) showing the order of and time required for the various phases of the work,
4. A breakdown of costs assigned to any bid item,
5. Attendance at a conference with the Engineer or representatives of the Engineer,
6. Obtain, and furnish a copy of, a business license to do business in the city or county where the work is located.
7. Any other information or action taken that is deemed necessary to ensure that the bidder is the lowest responsible bidder.

1-03 AWARD AND EXECUTION OF CONTRACT

1-03.1 Consideration of Bids
(January 23, 2006 APWA GSP)

Revise the first paragraph to read:

After opening and reading proposals, the Contracting Agency will check them for correctness of extensions of the prices per unit and the total price. If a discrepancy exists between the price per unit and the extended amount of any bid item, the price per unit will control. If a minimum bid amount has been established for any item and the bidder's unit or lump sum price is less than the minimum specified amount, the Contracting Agency will unilaterally revise the unit or lump sum price, to the minimum specified amount and recalculate the extension. The total of extensions, corrected where necessary, including sales taxes where applicable and such additives and/or alternates as selected by the Contracting Agency, will be used by the Contracting Agency for award purposes and to fix the Awarded Contract Price amount and the amount of the contract bond.

1-03.3 Execution of Contract
(District April 2020)

Revise this section to read:

Copies of the Contract Provisions, including the unsigned Form of Contract, will be available for signature by the successful bidder on the first business day following award. The number of copies to be executed by the Contractor will be determined by the Contracting Agency.

Within 10 calendar days after the award date, the successful bidder shall return the signed Contracting Agency-prepared contract, an insurance certification as required by Section 1-07.18, a satisfactory bond as required by law and Section 1-03.4, and a copy of the Transfer of Coverage form for the Construction Stormwater General Permit. Before execution of the contract by the Contracting Agency, the successful bidder shall provide any pre-award information the Contracting Agency may require under Section 1-02.15.

Until the Contracting Agency executes a contract, no proposal shall bind the Contracting Agency nor shall any work begin within the project limits or within Contracting Agency-furnished sites. The Contractor shall bear all risks for any work begun outside such areas and for any materials ordered before the contract is executed by the Contracting Agency.

If the bidder experiences circumstances beyond their control that prevents return of the contract documents within the calendar days after the award date stated above, the Contracting Agency may grant up to a maximum of 10 additional calendar days for return of the documents, provided the Contracting Agency deems the circumstances warrant it.

1-03.4 Contract Bond
(July 23, 2015 APWA GSP)

Delete the first paragraph and replace it with the following:

The successful bidder shall provide executed payment and performance bond(s) for the full contract amount. The bond may be a combined payment and performance bond; or be separate payment and performance bonds. In the case of separate payment and performance bonds, each shall be for the full contract amount. The bond(s) shall:

1. Be on Contracting Agency-furnished form(s);
2. Be signed by an approved surety (or sureties) that:
    a) Is registered with the Washington State Insurance Commissioner, and
    b) Appears on the current Authorized Insurance List in the State of Washington published by the Office of the Insurance Commissioner,
3. Guarantee that the Contractor will perform and comply with all obligations, duties, and conditions under the Contract, including but not limited to the duty and obligation to indemnify, defend, and protect the Contracting Agency against all losses and claims related directly or indirectly from any failure:
    a) of the Contractor (or any of the employees, subcontractors, or lower tier subcontractors of the Contractor) to faithfully perform and comply with all contract obligations, conditions, and duties, or
    b) of the Contractor (or the subcontractors or lower tier subcontractors of the Contractor) to pay all laborers, mechanics, subcontractors, lower tier subcontractors, material person, or any other person who provides supplies or provisions for carrying out the work;
4. Be conditioned upon the payment of taxes, increases, and penalties incurred on the project under titles 50, 51, and 82 RCW; and
5. Be accompanied by a power of attorney for the Surety's officer empowered to sign the bond; and
6. Be signed by an officer of the Contractor empowered to sign official statements (sole proprietor or partner). If the Contractor is a corporation, the bond(s) must be signed by the president or vice president, unless accompanied by written proof of the authority of the

individual signing the bond(s) to bind the corporation (i.e., corporate resolution, power of attorney, or a letter to such effect signed by the president or vice president).

Add the following new section:

1-03.4(1) Retainage in Lieu of Contract Bond
(May 17, 2018 APWA GSP)

For contracts of $50,000 or less, the Contractor may, at the Contractor's option, authorize the Contracting Agency to retain fifty percent (50%) of the contract amount in lieu of furnishing a performance and/or payment bond. If the Contractor elects this option, the retainage shall be held for a period of thirty (30) days after the date of final acceptance, or until receipt of all necessary releases from the Departments of Revenue and of Labor and Industries and settlement of any liens filed under RCW 60.28, whichever is later. The Contractor must advise the Contracting Agency in writing of the Contractor's election to authorize retainage in lieu of a bond, at the time of execution of the Contract.

In choosing this option, the Contractor agrees that if the Contractor, its heirs, executors, administrators, successors, or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and agreements in the Contract, and shall faithfully perform all the provisions of such contract and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of the Contract that may hereafter be made, at the time and in the manner therein specified, and shall pay all laborers, mechanics, subcontractors, and material suppliers, and all persons who shall supply such person or persons, or subcontractors, with provisions and supplies for the carrying on of such work, on his or her part, and shall indemnify and save harmless the Contracting Agency, its officers and agents from any claim for such payment, then the funds retained in lieu of a performance bond shall be released at the time provided above; otherwise, the funds shall be retained until the Contractor fulfills the said obligations.

1-03.7 Judicial Review
(November 30, 2018 APWA GSP)

Revise this section to read:

Any decision made by the Contracting Agency regarding the Award and execution of the Contract or Bid rejection shall be conclusive subject to the scope of judicial review permitted under Washington Law. Such review, if any, shall be timely filed in the Superior Court of the county where the Contracting Agency headquarters is located, provided that where an action is asserted against a county, RCW 36.01.050 shall control venue and jurisdiction.

1-04 SCOPE OF THE WORK

1-04.2 Coordination of Contract Documents, Plans, Special Provisions, Specifications, and Addenda
(District April 2020)

Revise the second paragraph to read:

Any inconsistency in the parts of the Contract shall be resolved by following this order of precedence (e.g., 1 presiding over 2, 2 over 3, 3 over 4, and so forth):

1. Addenda,
2. Proposal Form,
3. Special Provisions,
4. Contract Plans,
5. District General Special Provisions
6. Amendments to the Standard Specifications
7. Standard Specifications,
8. District Standard Drawings,
9. Standard Plans, and
10. All applicable codes, permits, and regulations.

1-04.5 Procedure and Protest by the Contractor
(District April 2020)

Replace the first and second paragraphs and subsections 1 and 2(a) of the third paragraph of this Section with the following:

The Contractor accepts all requirements of a change order by: (1) endorsing it, (2) writing a separate acceptance, or (3) not protesting in the way this Section provides. A change order that is not protested as provided in this Section shall be full payment and final settlement of all claims for Contract Time and for all costs of any kind, including costs of delays, related to any Work either covered or affected by the change.

By not protesting as this Section provides, the Contractor waives any claim or entitlement to additional compensation, adjustment to the Contract Price, adjustment to the Contract Time, and any other legal or equitable relief. Also, by not protesting as provided by this Section the Contractor thereby accepts any written or oral order, change order, direction, instruction, interpretation, and determination issued by the Engineer.

If an occurrence, event, or action occurs whereby the Contractor believes it has or will have a right to additional compensation, adjustment to the Contract Price, adjustment to the Contract Time, legal or equitable relief, damages, or any modification or equitable adjustment of the terms of the Contract, or if the Contractor is in disagreement with anything required in a change order, another written order, an oral order, determination, or any other action by the Engineer, the Contractor shall:

1. Immediately give a signed written notice of protest to the Engineer or the Engineer's field Inspectors before doing any Work related to the occurrence, event, or action that is the subject of the protest. In all cases, the notice of protest must be given within ten (10) calendar days of the occurrence, event, or action that is the subject of the protest. The notice of protest must include the date and description of the event, occurrence, or action together with a statement describing the anticipated effect of the event, occurrence, or action upon the Work and the Contract.

2. Supplement the written protest within fourteen (14) calendar days with a written statement and supporting documents providing the following:
   a) The date and nature of the occurrence, event, action, order, direction, instruction, interpretation, or determination that is the subject of the protest;

1-04.6 Variation in Estimated Quantities
(May 25, 2006 APWA GSP)

Supplement this Section with the following:

The quantities for *** have been entered into the Proposal only to provide a common proposal for bidders. Actual quantities will be determined in the field as the work progresses, and will be paid at the original bid price, regardless of final quantity. These bid items shall not be subject to the provisions of 1-04.6 of the Standard Specifications.

1-05 CONTROL OF WORK

1-05.3 Plans and Working Drawings
Section 1-05.3 is supplemented with the following:

(District April 2020)
The Contractor shall have a copy of the current Clark Regional Wastewater District General Special Provisions and Standard Plans on the project site.

Add the following new sub-section:

(*District April 2020*)

1-05.4(1) Project Survey
The Contractor shall furnish all the project survey. This shall include but not be limited to staking and final survey in accordance with Section 1-05.17.

The Design Engineer will determine what stakes are necessary to construct the project and at what intervals they shall be staked for each type of work. The Contractor shall assume full responsibility for the interpretation of these stakes and measurements from these hubs, stakes, or marks. If the Contractor notices any discrepancies in line or grade, he shall bring them to the immediate attention of the Design Engineer, prior to constructing the affected work.

1-05.7 Removal of Defective and Unauthorized Work
(October 1, 2005 APWA GSP)

Supplement this section with the following:

If the Contractor fails to remedy defective or unauthorized work within the time specified in a written notice from the Engineer, or fails to perform any part of the work required by the Contract Documents, the Engineer may correct and remedy such work as may be identified in the written notice, with Contracting Agency forces or by such other means as the Contracting Agency may deem necessary.

If the Contractor fails to comply with a written order to remedy what the Engineer determines to be an emergency situation, the Engineer may have the defective and unauthorized work corrected immediately, have the rejected work removed and replaced, or have work the Contractor refuses to perform completed by using Contracting Agency or other forces. An

emergency situation is any situation when, in the opinion of the Engineer, a delay in its remedy could be potentially unsafe, or might cause serious risk of loss or damage to the public.

Direct or indirect costs incurred by the Contracting Agency attributable to correcting and remedying defective or unauthorized work, or work the Contractor failed or refused to perform, shall be paid by the Contractor. Payment will be deducted by the Engineer from monies due, or to become due, the Contractor. Such direct and indirect costs shall include in particular, but without limitation, compensation for additional professional services required, and costs for repair and replacement of work of others destroyed or damaged by correction, removal, or replacement of the Contractor's unauthorized work.

No adjustment in Contract Time or compensation will be allowed because of the delay in the performance of the work attributable to the exercise of the Contracting Agency's rights provided by this Section.

The rights exercised under the provisions of this section shall not diminish the Contracting Agency's right to pursue any other avenue for additional remedy or damages with respect to the Contractor's failure to perform the work as required.

1-05.10 Guarantees

Section 1-05.10 is supplemented with the following:

(District April 2020)

The Work shall be guaranteed for a period of one (1) year from the date of the District letter of acceptance for the Work. Prior to the expiration of the one (1) year guarantee, the District will conduct a guarantee inspection and, if defects are found by the District, those items required to be repaired shall have a new guarantee of one (1) year from the acceptance of the correction of the defects by the Contractor and acceptance of the correction of the defects in writing by the District. The maximum time for a project warranty shall be two (2) years from the original acceptance date of the Work. For side sewer installations, the guarantee period shall be a minimum of 2 years.

Contractor agrees to return to the Project in accordance with Section 1-05.12(1) without charge to the District. This obligation to return to the project and correct defects or failure of performance is in addition to all other warranties and obligations under the terms of the Contract including but not limited to manufacturer's warranties and the Contractor's warranty and obligation that the work performed and materials supplied meet or exceed the quality and performance required by the Contract Documents.

1-05.11 Final Inspection

Delete this section and replace it with the following:

1-05.11 Final Inspections and Operational Testing

(October 1, 2005 APWA GSP)

1-05.11(1) Substantial Completion Date

When the Contractor considers the work to be substantially complete, the Contractor shall so notify the Engineer and request the Engineer establish the Substantial Completion Date. The Contractor's request shall list the specific items of work that remain to be completed in order to reach physical completion. The Engineer will schedule an inspection of the work with the

Contractor to determine the status of completion. The Engineer may also establish the Substantial Completion Date unilaterally.

If, after this inspection, the Engineer concurs with the Contractor that the work is substantially complete and ready for its intended use, the Engineer, by written notice to the Contractor, will set the Substantial Completion Date. If, after this inspection the Engineer does not consider the work substantially complete and ready for its intended use, the Engineer will, by written notice, so notify the Contractor giving the reasons therefore.

Upon receipt of written notice concurring in or denying substantial completion, whichever is applicable, the Contractor shall pursue vigorously, diligently and without unauthorized interruption, the work necessary to reach Substantial and Physical Completion. The Contractor shall provide the Engineer with a revised schedule indicating when the Contractor expects to reach substantial and physical completion of the work.

The above process shall be repeated until the Engineer establishes the Substantial Completion Date and the Contractor considers the work physically complete and ready for final inspection.

1-05.11(2) Final Inspection and Physical Completion Date

When the Contractor considers the work physically complete and ready for final inspection, the Contractor by written notice, shall request the Engineer to schedule a final inspection. The Engineer will set a date for final inspection. The Engineer and the Contractor will then make a final inspection and the Engineer will notify the Contractor in writing of all particulars in which the final inspection reveals the work incomplete or unacceptable. The Contractor shall immediately take such corrective measures as are necessary to remedy the listed deficiencies. Corrective work shall be pursued vigorously, diligently, and without interruption until physical completion of the listed deficiencies. This process will continue until the Engineer is satisfied the listed deficiencies have been corrected.

If action to correct the listed deficiencies is not initiated within 7 days after receipt of the written notice listing the deficiencies, the Engineer may, upon written notice to the Contractor, take whatever steps are necessary to correct those deficiencies pursuant to Section 1-05.7.

The Contractor will not be allowed an extension of Contract Time because of a delay in the performance of the work attributable to the exercise of the Engineer's right hereunder.

Upon correction of all deficiencies, the Engineer will notify the Contractor and the Contracting Agency, in writing, of the date upon which the work was considered physically complete. That date shall constitute the Physical Completion Date of the contract, but shall not imply acceptance of the work or that all the obligations of the Contractor under the contract have been fulfilled.

1-05.11(3) Operational Testing

It is the intent of the Contracting Agency to have at the Physical Completion Date a complete and operable system. Therefore when the work involves the installation of machinery or other mechanical equipment; street lighting, electrical distribution or signal systems; irrigation systems; buildings; or other similar work it may be desirable for the Engineer to have the Contractor operate and test the work for a period of time after final inspection but prior to the

physical completion date. Whenever items of work are listed in the Contract Provisions for operational testing they shall be fully tested under operating conditions for the time period specified to ensure their acceptability prior to the Physical Completion Date. During and following the test period, the Contractor shall correct any items of workmanship, materials, or equipment which prove faulty, or that are not in first class operating condition. Equipment, electrical controls, meters, or other devices and equipment to be tested during this period shall be tested under the observation of the Engineer, so that the Engineer may determine their suitability for the purpose for which they were installed. The Physical Completion Date cannot be established until testing and corrections have been completed to the satisfaction of the Engineer.

The costs for power, gas, labor, material, supplies, and everything else needed to successfully complete operational testing, shall be included in the unit contract prices related to the system being tested, unless specifically set forth otherwise in the proposal.

Operational and test periods, when required by the Engineer, shall not affect a manufacturer's guaranties or warranties furnished under the terms of the contract.

Add the following new section:

1-05.12(1) Guarantee Period
(District April 2020)

The Contractor shall return to the project and repair or replace all defects in workmanship and material discovered within the guarantee period. The guarantee period shall commence after Final Acceptance of the Work and be two (2) years for side sewer installations and one (1) year for all other Work. The Contractor shall start work to remedy any such defects within 7 calendar days of receiving Contracting Agency's written notice of a defect, and shall complete such work within the time stated in the Contracting Agency's notice. In case of an emergency, where damage may result from delay or where loss of services may result, such corrections may be made by the Contracting Agency's own forces or another contractor, in which case the cost of corrections shall be paid by the Contractor. In the event the Contractor does not accomplish corrections within the time specified, the work will be otherwise accomplished and the cost of same shall be paid by the Contractor.

When corrections of defects are made, the Contractor shall then be responsible for correcting all defects in workmanship and materials in the corrected work for one year after acceptance of the corrections by Contracting Agency.

This guarantee is supplemental to and does not limit or affect the requirements that the Contractor's work comply with the requirements of the Contract or any other legal rights or remedies of the Contracting Agency.

1-05.13 Superintendents, Labor and Equipment of Contractor
(August 14, 2013 APWA GSP)

Delete the sixth and seventh paragraphs of this section.

1-05.15 Method of Serving Notices
(March 25, 2009 APWA GSP)

Revise the second paragraph to read:

All correspondence from the Contractor shall be directed to the Project Engineer. All correspondence from the Contractor constituting any notification, notice of protest, notice of dispute, or other correspondence constituting notification required to be furnished under the Contract, must be in paper format, hand delivered or sent via mail delivery service to the Project Engineer's office. Electronic copies such as e-mails or electronically delivered copies of correspondence will not constitute such notice and will not comply with the requirements of the Contract.

Add the following new sections:

1-05.16 Water and Power
(October 1, 2005 APWA GSP)

The Contractor shall make necessary arrangements, and shall bear the costs for power and water necessary for the performance of the work, unless the contract includes power and water as a pay item.

1-05.17 Record Drawings
(District April 2020)

The Contractor shall maintain one set of full-size plans for Record Drawings, updated with clear and accurate red-lined field revisions on a daily basis, and within 2 business days after receipt of information that a change in Work has occurred. The Contractor shall not conceal any work until the required information is recorded.

This Record Drawing set shall be used for this purpose alone, shall be kept separate from other Plan sheets, and shall be clearly marked as Record Drawings. These Record Drawings shall be kept on site at the Contractor's field office, and shall be available for review by the Contracting Agency at all times. The Contractor shall bring the Record Drawings to each progress meeting for review.

The preparation and upkeep of the Record Drawings is to be the assigned responsibility of a single, experienced, and qualified individual. The quality of the Record Drawings, in terms of accuracy, clarity, and completeness, is to be adequate to allow the Contracting Agency to modify the computer-aided drafting (CAD) Contract Drawings to produce a complete set of Record Drawings for the Contracting Agency without further investigative effort by the Contracting Agency.

The Record Drawing markups shall document all changes in the Work, both concealed and visible. Items that must be shown on the markups include but are not limited to:

- Actual dimensions, arrangement, and materials used when different than shown in the Plans.
- Changes made by Change Order or Field Order.
- Changes made by the Contractor.
- Accurate locations of storm sewer, sanitary sewer, water mains and other water appurtenances, structures, conduits, light standards, vaults, width of roadways, sidewalks, landscaping areas, building footprints, channelization and pavement markings, etc. Include pipe invert elevations, top of castings (manholes, inlets, etc.).

The Contracting Agency will provide the elevations at the tolerances the Contracting Agency requires for the Record Drawings. Post-construction survey for record drawings shall be provided by the Contractor and be completed by a third-party surveyor. Survey results shall be submitted for review and approval prior to any paving activities.

When the Contract calls for the Contractor to do surveying/staking, the applicable tolerance limits include, but are not limited to the following:

	Vertical	Horizontal
As-built sanitary & storm invert and grate elevations	± 0.01 foot	± 0.01 foot
As built monumentation	± 0.001 foot	± 0.001 foot
As-built waterlines, inverts, valves, hydrants	± 0.10 foot	± 0.10 foot
As-built ponds/swales/water features	± 0.10 foot	± 0.10 foot
As-built buildings (fin. Floor elev.)	± 0.01 foot	± 0.10 foot
As-built gas lines, power, TV, Tel, Com	± 0.10 foot	± 0.10 foot
As-built signs, signals, etc.	N/A	± 0.10 foot

Making Entries on the Record Drawings:

- Use erasable colored pencil (not ink) for all markings on the Record Drawings, conforming to the following color code:
- Additions - Red
- Deletions - Green
- Comments - Blue
- Dimensions - Graphite
- Provide the applicable reference for all entries, such as the change order number, the request for information (RFI) number, or the approved shop drawing number.
- Date all entries.
- Clearly identify all items in the entry with notes similar to those in the Contract Drawings (such as pipe symbols, centerline elevations, materials, pipe joint abbreviations, etc.).

The Contractor shall certify on the Record Drawings that said drawings are an accurate depiction of built conditions and in conformance with the requirements detailed above. The Contractor shall submit final Record Drawings to the Contracting Agency. Contracting Agency acceptance of the Record Drawings is one of the requirements for achieving Physical Completion.

Payment will be made for the following bid item:

Record Drawings (Minimum Bid $ 1,000)	Lump Sum

Payment for this item will be made on a prorated monthly basis for work completed in accordance with this section up to 75% of the lump sum bid. The final 25% of the lump sum item will be paid upon submittal and approval of the completed Record Drawings set prepared in conformance with these Special Provisions.

A minimum bid amount has been entered in the Bid Proposal for this item. The Contractor must bid at least that amount.

1-06 CONTROL OF MATERIAL

1-06.1(4) Fabrication Inspection Expense

Revise the first sentence of the first paragraph with the following:

(District April 2020)
In the event the Contractor elects to have items fabricated beyond 300 miles from Vancouver, Washington, the Contracting Agency will deduct from monies due or that may become due to the Contractor all costs to perform plant approval and fabrication acceptance inspection for the items listed in Table 1 and costs for initial plant approval for items listed in Table 2.

1-06.2(1) Samples and Tests for Acceptance

Section 1-06.2(1) is supplemented as follows:

(District April 2020)
The Contractor shall coordinate all testing activities.

Material sampling for testing may be performed up to and including the point of incorporation of the respective material into the project. The definition of “qualified testing personnel and calibrated or verified equipment” shall not be referenced to the WAQTC requirements.

The Contractor shall provide passing material test results and maximum density data to the Engineer for all sources and materials proposed for backfill, crushed surfacing, and HMA at least seven (7) calendar days prior to incorporating into the work.

The Contractor shall provide passing test results performed by an independent testing firm for compaction of all bedding, trench backfill, crushed surfacing, hot mix asphalt, and concrete within seven (7) calendar days of installation. The Contractor shall submit the name and contact information for the independent testing firm prior to any testing. The Contractor shall provide forty-eight (48) hour notification to the Contracting Agency prior to completing Work which requires quality assurance testing. Where applicable, work and materials shall only be buried with the consent of the Engineer.

If a material fails to meet specifications, and a re-test is performed on material from the same source the re-testing shall be at the Contractor’s expense.

Required material testing includes but shall not be limited to the following:

Material	Test Goal and Type	Minimum Testing Frequency
Pipe Bedding	90% Compaction per AASHTO T 180	One (1) test per 400 LF of trench

Trench Backfill	95% Compaction per AASHTO T 180 (crushed agg.) 90% Compaction per AASHTO T 99 (native)	Two (2) tests per 200 LF of trench: one (1) test at 2-foot depth; and one (1) test at 4-foot depth or 1 foot above the pipe zone, whichever is less. At a minimum for gravity sewer, one set of two tests shall be completed between all structures.
Crushed Surfacing	95% Compaction per AASHTO T 180	One (1) test per 200 LF of trench at top of base rock
Hot Mix Asphalt (for permanent pavement restoration only)	92% Compaction per AASHTO T 209	One (1) test per 200 LF of trench for each lift of pavement
Portland Cement Concrete	4000 PSI Unconfined Compressive Strength per WSDOT FOP T23	One (1) sample per 20 CY (maximum of one (1) sample per truck) of Portland cement concrete placed. Each sample shall consist of three (3) cylinders. One (1) cylinder shall be tested at 7 days, two (2) cylinders shall be tested at 28 days.

1-06.2(2) Statistical Evaluation of Materials for Acceptance
(District April 2020)
Section 1-06.2(2) shall not apply to this project.

1-06.6 Recycled Materials
(January 4, 2016 APWA GSP)

Delete this section, including its subsections, and replace it with the following:

The Contractor shall make their best effort to utilize recycled materials in the construction of the project. Approval of such material use shall be as detailed elsewhere in the Standard Specifications.

Prior to Physical Completion, upon request, the Contractor shall report the quantity of recycled materials that were utilized in the construction of the project for each of the items listed in Section 9-03.21. The report shall include hot mix asphalt, recycled concrete aggregate, recycled glass, steel furnace slag and other recycled materials (e.g. utilization of on-site material and aggregates from concrete returned to the supplier). The Contractor's report shall be provided on DOT form 350-075 Recycled Materials Reporting.

1-07 LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

1-07.1 Laws to be Observed
(October 1, 2005 APWA GSP)

Supplement this section with the following:

In cases of conflict between different safety regulations, the more stringent regulation shall apply.

The Washington State Department of Labor and Industries shall be the sole and paramount administrative agency responsible for the administration of the provisions of the Washington Industrial Safety and Health Act of 1973 (WISHA).

The Contractor shall maintain at the project site office, or other well-known place at the project site, all articles necessary for providing first aid to the injured. The Contractor shall establish, publish, and make known to all employees, procedures for ensuring immediate removal to a hospital, or doctor's care, persons, including employees, who may have been injured on the project site. Employees shall not be permitted to work on the project site before the Contractor has established and made known procedures for removal of injured persons to a hospital or a doctor's care.

The Contractor shall have sole responsibility for the safety, efficiency, and adequacy of the Contractor's plant, appliances, and methods, and for any damage or injury resulting from their failure, or improper maintenance, use, or operation. The Contractor shall be solely and completely responsible for the conditions of the project site, including safety for all persons and property in the performance of the work. This requirement shall apply continuously, and not be limited to normal working hours. The required or implied duty of the Engineer to conduct construction review of the Contractor's performance does not, and shall not, be intended to include review and adequacy of the Contractor's safety measures in, on, or near the project site.

1-07.2 State Sales Tax

Delete this section, including its sub-sections, in its entirety and replace it with the following:

1-07.2 State Sales Tax

(June 27, 2011 APWA GSP)

The Washington State Department of Revenue has issued special rules on the State sales tax. Sections 1-07.2(1) through 1-07.2(3) are meant to clarify those rules. The Contractor should contact the Washington State Department of Revenue for answers to questions in this area. The Contracting Agency will not adjust its payment if the Contractor bases a bid on a misunderstood tax liability.

The Contractor shall include all Contractor-paid taxes in the unit bid prices or other contract amounts. In some cases, however, state retail sales tax will not be included. Section 1-07.2(2) describes this exception.

The Contracting Agency will pay the retained percentage (or release the Contract Bond if a FHWA-funded Project) only if the Contractor has obtained from the Washington State Department of Revenue a certificate showing that all contract-related taxes have been paid (RCW 60.28.051). The Contracting Agency may deduct from its payments to the Contractor any amount the Contractor may owe the Washington State Department of Revenue, whether the amount owed relates to this contract or not. Any amount so deducted will be paid into the proper State fund.

1-07.2(1) State Sales Tax — Rule 171

WAC 458-20-171, and its related rules, apply to building, repairing, or improving streets, roads, etc., which are owned by a municipal corporation, or political subdivision of the state, or by the United States, and which are used primarily for foot or vehicular traffic. This includes

storm or combined sewer systems within and included as a part of the street or road drainage system and power lines when such are part of the roadway lighting system. For work performed in such cases, the Contractor shall include Washington State Retail Sales Taxes in the various unit bid item prices, or other contract amounts, including those that the Contractor pays on the purchase of the materials, equipment, or supplies used or consumed in doing the work.

1-07.2(2) State Sales Tax — Rule 170

WAC 458-20-170, and its related rules, apply to the constructing and repairing of new or existing buildings, or other structures, upon real property. This includes, but is not limited to, the construction of streets, roads, highways, etc., owned by the state of Washington; water mains and their appurtenances; sanitary sewers and sewage disposal systems unless such sewers and disposal systems are within, and a part of, a street or road drainage system; telephone, telegraph, electrical power distribution lines, or other conduits or lines in or above streets or roads, unless such power lines become a part of a street or road lighting system; and installing or attaching of any article of tangible personal property in or to real property, whether or not such personal property becomes a part of the realty by virtue of installation.

For work performed in such cases, the Contractor shall collect from the Contracting Agency, retail sales tax on the full contract price. The Contracting Agency will automatically add this sales tax to each payment to the Contractor. For this reason, the Contractor shall not include the retail sales tax in the unit bid item prices, or in any other contract amount subject to Rule 170, with the following exception.

Exception: The Contracting Agency will not add in sales tax for a payment the Contractor or a subcontractor makes on the purchase or rental of tools, machinery, equipment, or consumable supplies not integrated into the project. Such sales taxes shall be included in the unit bid item prices or in any other contract amount.

1-07.2(3) Services

The Contractor shall not collect retail sales tax from the Contracting Agency on any contract wholly for professional or other services (as defined in Washington State Department of Revenue Rules 138 and 244).

1-07.3 Fire Prevention and Merchantable Timber Requirements
(District April 2020)

Delete this section, including its subsections.

1-07.4 Sanitation
Section 1-07.4 is supplemented with the following:

(District April 2020)
Portable Toilet Facility
The Contractor shall supply at least one portable toilet on the job site at all times when the Contractor has any employees on the job site performing contract work. Portable toilets shall be serviced on a weekly basis.

This item shall be included in the bid item for mobilization. An amount approximating the actual cost per week will be subtracted from the bid item for mobilization for each week the portable toilet is not supplied on the job site or serviced on a weekly basis.

1-07.6 Permits and Licenses
Section 1-07.6 is supplement with the following:

(District April 2020)
The Contractor shall furnish one copy of all required permits to the Engineer and shall have a copy of all required permits on the project site at all times and available for inspection upon request of the Engineer.

1-07.7 Load Limits
Section 1-07.7 is supplemented with the following:

(District April 2020)
The Contractor shall, at the Contractor's expense, make all arrangements for the use of haul routes including all necessary local permits.

1-07.9(5) Required Documents
(January 3, 2020 APWA GSP)

Delete this section and replace it with the following:

General
All “Statements of Intent to Pay Prevailing Wages”, “Affidavits of Wages Paid” and Certified Payrolls, including a signed Statement of Compliance for Federal-aid projects, shall be submitted to the Engineer and the State L&I online Prevailing Wage Intent & Affidavit (PWIA) system.

Intents and Affidavits
On forms provided by the Industrial Statistician of State L&I, the Contractor shall submit to the Engineer the following for themselves and for each firm covered under RCW 39.12 that will or has provided Work and materials for the Contract:

1. The approved “Statement of Intent to Pay Prevailing Wages” State L&I’s form number F700-029-000. The Contracting Agency will make no payment under this Contract until this statement has been approved by State L&I and reviewed by the Engineer.

2. The approved “Affidavit of Prevailing Wages Paid”, State L&I’s form number F700-007-000. The Contracting Agency will not grant Completion until all approved Affidavit of Wages paid for the Contractor and all Subcontractors have been received by the Engineer. The Contracting Agency will not release to the Contractor any funds retained under RCW 60.28.011 until “Affidavit of Prevailing Wages Paid” forms have been approved by State L&I and all of the approved forms have been submitted to the Engineer for every firm that worked on the Contract.

The Contractor is responsible for requesting these forms from State L&I and for paying any fees required by State L&I.

Certified Payrolls

Certified payrolls are required to be submitted by the Contractor for themselves, all Subcontractors and all lower tier subcontractors. The payrolls shall be submitted weekly on all Federal-aid projects and no less than monthly on State funded projects.

Penalties for Noncompliance
The Contractor is advised, if these payrolls are not supplied within the prescribed deadlines, any or all payments may be withheld until compliance is achieved. In addition, failure to provide these payrolls may result in other sanctions as provided by State laws (RCW 39.12.050) and/or Federal regulations (29 CFR 5.12).

1-07.13 Contractor's Responsibility for Work

1-07.13(4) Repair of Damage
Section 1-07.13(4) is revised to read:

(District April 2020)
The Contractor shall promptly repair all damage to either temporary or permanent work as directed by the Engineer. For damage qualifying for relief under Sections 1-07.13(1), 1-07.13(2) or 1-07.13(3), payment will be made in accordance with Section 1-04.4. Payment will be limited to repair of damaged work only. No payment will be made for delay or disruption of work.

1-07.17 Utilities and Similar Facilities
Section 1-07.17 is supplemented with the following:

(District April 2020)
Locations and dimensions of existing utilities shown on the Plans are in accordance with available information. Existing subsurface utilities on the Plans are based on field design locate data provided by the individual utilities through the Utility Notification Center. The actual location could deviate from that which is shown.

The District will not be held responsible for locations of existing utilities marked on the plans. The Contractor shall be responsible for verifying depths and locations of all existing utilities.

The following addresses and telephone numbers of utility companies known or suspected of having facilities within the project limits are supplied for the Contractor's convenience:

Clark Regional Wastewater District
8000 NE 52nd Court
PO Box 8979
Vancouver, WA 98668-8979
(360) 750-5876

Clark County
Operations Center
4700 NE 78th Street
Vancouver, WA 98665
(360) 397-2446

City of Vancouver
Engineering, Marine Park
4500 Columbia Way
Vancouver, WA 98668
(360) 487-7130
24 Hour: (360) 693-9302
(for emergencies)

Clark Public Utilities
Electric and Water Department
8600 NE 117th Avenue
PO Box 8900
Vancouver, WA 98668
Electric: (360) 992-8819
Water: (360) 992-8022

Washington State Department of Transportation
Southwest Region
11018 NE 51st Circle
PO Box 1709
Vancouver, WA 98668-1709
(360) 905-2299

Williams Gas Pipeline-West
NW Pipeline Corporation
8907 NE 219th Street
Battle Ground, WA 98604
(360) 687-3156

City of Battle Ground
1308 S.E. Grace Ave.
Battle Ground, WA 98604
(360) 342-5070

Northwest Natural
6600 NE 112th Court, Suite 101 Bldg. F
Vancouver, WA 98662
(360) 571-5465

Comcast Cable Services
Vancouver/Clark County
6916 NE 40th Street
Vancouver, WA 98661
(360) 891-3204

AT&T
AT&T Cable Maintenance
11241 Willows RD N.E. Suite 130
Redmond WA 98052
(425) 896-9830

TDS Telecom
210 East 4 Street
PO Box 218
La Center, WA 98629
(360) 263-2191

Qwest Communications
Engineering Department
4501 NE Minnehaha Building II
Vancouver, WA 98663
(360) 699-3546

Century Tel
805 Broadway Street
Vancouver, WA 98660-3213
(360) 905-5800

Washington State University
14204 NE Salmon Creek Ave
Vancouver, WA 98686
(360) 546-9000

The Contractor shall call the Northwest Utility Notification Center (One Call Center), for field location of utilities. The telephone number for the One Call Center for this project is 1-800-424-5555. No excavation shall begin until all known facilities, in the vicinity of the excavation area, have been located and marked.

1-07.18 Public Liability and Property Damage Insurance

Delete this section in its entirety, and replace it with the following:

1-07.18 Insurance
(January 4, 2016 APWA GSP, modified)

1-07.18(1) General Requirements

1. The Contractor shall procure and maintain the insurance described in all subsections of section 1-07.18 of these Special Provisions, from insurers with a current A. M. Best rating of not less than A-: VII and licensed to do business in the State of Washington. The Contracting Agency reserves the right to approve or reject the insurance provided, based on the insurer's financial condition.

2. The Contractor shall keep this insurance in force without interruption from the commencement of the Contractor's Work through the term of the Contract and for thirty (30) days after the Physical Completion date, unless otherwise indicated below.

3. If any insurance policy is written on a claims made form, its retroactive date, and that of all subsequent renewals, shall be no later than the effective date of this Contract. The policy shall state that coverage is claims made, and state the retroactive date. Claims-made form coverage shall be maintained by the Contractor for a minimum of 36 months following the Completion Date or earlier termination of this Contract, and the Contractor shall annually provide the Contracting Agency with proof of renewal. If renewal of the claims made form of coverage becomes unavailable, or economically prohibitive, the Contractor shall purchase an extended reporting period ("tail") or execute another form of guarantee acceptable to the Contracting Agency to assure financial responsibility for liability for services performed.

4. The Contractor's Automobile Liability, Commercial General Liability and Excess or Umbrella Liability insurance policies shall be primary and non-contributory insurance as respects the Contracting Agency's insurance, self-insurance, or self-insured pool coverage. Any insurance, self-insurance, or self-insured pool coverage maintained by the Contracting Agency shall be excess of the Contractor's insurance and shall not contribute with it.

5. The Contractor shall provide the Contracting Agency and all additional insureds with written notice of any policy cancellation, within two business days of their receipt of such notice.

6. The Contractor shall not begin work under the Contract until the required insurance has been obtained and approved by the Contracting Agency.

7. Failure on the part of the Contractor to maintain the insurance as required shall constitute a material breach of contract, upon which the Contracting Agency may, after giving five business days' notice to the Contractor to correct the breach, immediately terminate the Contract or, at its discretion, procure or renew such insurance and pay any and all premiums in connection therewith, with any sums so expended to be repaid to the Contracting Agency on demand, or at the sole discretion of the Contracting Agency, offset against funds due the Contractor from the Contracting Agency.

8. All costs for insurance shall be incidental to and included in the unit or lump sum prices of the Contract and no additional payment will be made.

9. Products and Completed Operations coverage shall be provided for a period of 3 years following Substantial Completion of the Work.

1-07.18(2) Additional Insured

All insurance policies, with the exception of Workers Compensation, and of Professional Liability and Builder's Risk (if required by this Contract) shall name the following listed entities as additional insured(s) using the forms or endorsements required herein:

- the Contracting Agency and its officers, elected officials, employees, agents, and volunteers

The above-listed entities shall be additional insured(s) for the full available limits of liability maintained by the Contractor, irrespective of whether such limits maintained by the Contractor are greater than those required by this Contract, and irrespective of whether the Certificate of Insurance provided by the Contractor pursuant to 1-07.18(4) describes limits lower than those maintained by the Contractor.

For Commercial General Liability insurance coverage, the required additional insured endorsements shall be at least as broad as ISO forms CG 20 10 10 01 for ongoing operations and CG 20 37 10 01 for completed operations.

1-07.18(3) Subcontractors

The Contractor shall cause each Subcontractor of every tier to provide insurance coverage that complies with all applicable requirements of the Contractor-provided insurance as set forth herein, except the Contractor shall have sole responsibility for determining the limits of coverage required to be obtained by Subcontractors.

The Contractor shall ensure that all Subcontractors of every tier add all entities listed in 1-07.18(2) as additional insureds, and provide proof of such on the policies as required by that section as detailed in 1-07.18(2) using an endorsement as least as broad as ISO CG 20 10 10 01 for ongoing operations and CG 20 37 10 01 for completed operations.

Upon request by the Contracting Agency, the Contractor shall forward to the Contracting Agency evidence of insurance and copies of the additional insured endorsements of each Subcontractor of every tier as required in 1-07.18(4) Verification of Coverage.

1-07.18(4) Verification of Coverage

The Contractor shall deliver to the Contracting Agency a Certificate(s) of Insurance and endorsements for each policy of insurance meeting the requirements set forth herein when the Contractor delivers the signed Contract for the work. Failure of Contracting Agency to demand such verification of coverage with these insurance requirements or failure of Contracting Agency to identify a deficiency from the insurance documentation provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

Verification of coverage shall include:

1. An ACORD certificate or a form determined by the Contracting Agency to be equivalent.
2. Copies of all endorsements naming Contracting Agency and all other entities listed in 1-07.18(2) as additional insured(s), showing the policy number. The Contractor may submit a copy of any blanket additional insured clause from its policies instead of a separate endorsement.
3. Any other amendatory endorsements to show the coverage required herein.
4. A notation of coverage enhancements on the Certificate of Insurance shall <u>not</u> satisfy these requirements – actual endorsements must be submitted.

Upon request by the Contracting Agency, the Contractor shall forward to the Contracting Agency a full and certified copy of the insurance policy(s). If Builders Risk insurance is required on this Project, a full and certified copy of that policy is required when the Contractor delivers the signed Contract for the work.

1-07.18(5) Coverages and Limits

The insurance shall provide the minimum coverages and limits set forth below. Contractor's maintenance of insurance, its scope of coverage, and limits as required herein shall not be construed to limit the liability of the Contractor to the coverage provided by such insurance, or otherwise limit the Contracting Agency's recourse to any remedy available at law or in equity.

All deductibles and self-insured retentions must be disclosed and are subject to approval by the Contracting Agency. The cost of any claim payments falling within the deductible or self-insured retention shall be the responsibility of the Contractor. In the event an additional insured incurs a liability subject to any policy's deductibles or self-insured retention, said deductibles or self-insured retention shall be the responsibility of the Contractor.

1-07.18(5)A Commercial General Liability

Commercial General Liability insurance shall be written on coverage forms at least as broad as ISO occurrence form CG 00 01, including but not limited to liability arising from premises, operations, stop gap liability, independent contractors, products-completed operations, personal and advertising injury, and liability assumed under an insured contract. There shall be no exclusion for liability arising from explosion, collapse or underground property damage.

The Commercial General Liability insurance shall be endorsed to provide a per project general aggregate limit, using ISO form CG 25 03 05 09 or an equivalent endorsement.

Contractor shall maintain Commercial General Liability Insurance arising out of the Contractor's completed operations for at least three years following Substantial Completion of the Work.

Such policy must provide the following minimum limits:

$1,000,000	Each Occurrence
$2,000,000	General Aggregate
$2,000,000	Products & Completed Operations Aggregate
$1,000,000	Personal & Advertising Injury each offense
$1,000,000	Stop Gap / Employers' Liability each accident

1-07.18(5)B Automobile Liability

Automobile Liability shall cover owned, non-owned, hired, and leased vehicles; and shall be written on a coverage form at least as broad as ISO form CA 00 01. If the work involves the transport of pollutants, the automobile liability policy shall include MCS 90 and CA 99 48 endorsements.

Such policy must provide the following minimum limit:

$1,000,000	Combined single limit each accident

1-07.18(5)C Workers' Compensation

The Contractor shall comply with Workers' Compensation coverage as required by the Industrial Insurance laws of the State of Washington.

1-07.18(5)D Excess or Umbrella Liability

(January 4, 2016 APWA GSP)

The Contractor shall provide Excess or Umbrella Liability insurance with limits of not less than $1 Million Dollars ($1,000,000) each occurrence and annual aggregate. This excess or umbrella liability coverage shall be excess over and as least as broad in coverage as the Contractor's Commercial General and Auto Liability insurance.

All entities listed under 1-07.18(2) of these Special Provisions shall be named as additional insureds on the Contractor's Excess or Umbrella Liability insurance policy.

This requirement may be satisfied instead through the Contractor's primary Commercial General and Automobile Liability coverages, or any combination thereof that achieves the overall required limits of insurance.

1-07.18(5)K Professional Liability
(January 4, 2016 APWA GSP)
The Contractor and/or its Subcontractor(s) and/or its design consultant providing construction management, value engineering, or any other design-related non-construction professional services shall provide evidence of Professional Liability insurance covering professional errors and omissions.

Such policy shall provide the following minimum limits:

$1,000,000 per claim and annual aggregate

If the scope of such design-related professional services includes work related to pollution conditions, the Professional Liability insurance shall include coverage for Environmental Professional Liability.

If insurance is on a claims made form, its retroactive date, and that of all subsequent renewals, shall be no later than the effective date of this Contract.

1-07.23 Public Convenience and Safety
Section 1-07.23 is supplemented as follows:

(District April 2020)
Open trenches within the traveled way shall have a steel plate cover placed and anchored over them. A wedge of suitable material shall be placed for a smooth transition between the roadway pavement and the plate as required. Warning signs shall be installed to alert motorists of the plate(s).

1-07.24 Rights of Way
(July 23, 2015 APWA GSP)

Delete this section and replace it with the following:

Street Right of Way lines, limits of easements, and limits of construction permits are indicated in the Plans. The Contractor's construction activities shall be confined within these limits, unless arrangements for use of private property are made.

Generally, the Contracting Agency will have obtained, prior to bid opening, all rights of way and easements, both permanent and temporary, necessary for carrying out the work.

Exceptions to this are noted in the Bid Documents or will be brought to the Contractor's attention by a duly issued Addendum.

Whenever any of the work is accomplished on or through property other than public Right of Way, the Contractor shall meet and fulfill all covenants and stipulations of any easement agreement obtained by the Contracting Agency from the owner of the private property. Copies of the easement agreements may be included in the Contract Provisions or made available to the Contractor as soon as practical after they have been obtained by the Engineer.

Whenever easements or rights of entry have not been acquired prior to advertising, these areas are so noted in the Plans. The Contractor shall not proceed with any portion of the work in areas where right of way, easements or rights of entry have not been acquired until the Engineer certifies to the Contractor that the right of way or easement is available or that the right of entry has been received. If the Contractor is delayed due to acts of omission on the part of the Contracting Agency in obtaining easements, rights of entry or right of way, the Contractor will be entitled to an extension of time. The Contractor agrees that such delay shall not be a breach of contract.

Each property owner shall be given 48 hours notice prior to entry by the Contractor. This includes entry onto easements and private property where private improvements must be adjusted.

The Contractor shall be responsible for providing, without expense or liability to the Contracting Agency, any additional land and access thereto that the Contractor may desire for temporary construction facilities, storage of materials, or other Contractor needs. However, before using any private property, whether adjoining the work or not, the Contractor shall file with the Engineer a written permission of the private property owner, and, upon vacating the premises, a written release from the property owner of each property disturbed or otherwise interfered with by reasons of construction pursued under this contract. The statement shall be signed by the private property owner, or proper authority acting for the owner of the private property affected, stating that permission has been granted to use the property and all necessary permits have been obtained or, in the case of a release, that the restoration of the property has been satisfactorily accomplished. The statement shall include the parcel number, address, and date of signature. Written releases must be filed with the Engineer before the Completion Date will be established.

1-08 PROSECUTION AND PROGRESS

Add the following new section:

1-08.0 Preliminary Matters
(May 25, 2006 APWA GSP)

Add the following new section:

1-08.0(1) Preconstruction Conference
(October 10, 2008 APWA GSP)

Prior to the Contractor beginning the work, a preconstruction conference will be held between the Contractor, the Engineer and such other interested parties as may be invited. The purpose of the preconstruction conference will be:

1. To review the initial progress schedule;
2. To establish a working understanding among the various parties associated or affected by the work;
3. To establish and review procedures for progress payment, notifications, approvals, submittals, etc.;
4. To establish normal working hours for the work;
5. To review safety standards and traffic control; and
6. To discuss such other related items as may be pertinent to the work.

The Contractor shall prepare and submit at the preconstruction conference the following:

1. A breakdown of all lump sum items;
2. A preliminary schedule of working drawing submittals; and
3. A list of material sources for approval if applicable.

(District April 2020)
The Contractor shall request the preconstruction conference a minimum of 10 calendar days prior to the start of construction. The actual date of the preconstruction conference will depend on availability of District staff and the various parties associated with the work.

Add the following new section:

1-08.0(2) Hours of Work
(District April 2020)

Except in the case of emergency or unless otherwise approved by the Contracting Agency, the normal straight time working hours for the contract shall be any consecutive 8-hour period between 8:00 a.m. and 5:00 p.m. of a working day with a maximum 1-hour lunch break and Monday through Friday work week. The normal straight time 8-hour working period for the contract shall be established at the preconstruction conference or prior to the Contractor commencing the work.

If a Contractor desires to perform work on holidays, Saturdays, Sundays, or before 8:00 a.m. or after 5:00 p.m. on any day, the Contractor shall apply in writing to the Engineer for permission to work such times. Permission to work longer than an 8-hour period between 8:00 a.m. and 5:00 p.m. is not required. Such requests shall be submitted to the Engineer no later than noon on the working day prior to the day for which the Contractor is requesting permission to work.

The Contractor shall comply with local ordinances, including Chapter 9.14 of the Clark County Code governing Public Disturbance Noises and any applicable permit conditions. Normal hours of work are limited from 7:00 AM to 10:00 PM. The Contractor has full responsibility for confining his operations to these hours and obtaining any needed waivers. Permission to work outside these hours may be granted on a case-by-case basis upon application to the Clark County Public Works Director, through the Engineer. Approval to continue work during these hours may be revoked at any time the Contractor exceeds the noise control regulations or complaints are received from the public or adjoining property owners regarding the noise or light glare from the Contractor's operations. The Contractor shall have no claim for damages or delays should such permission be revoked for these reasons.

Permission to work Saturdays, Sundays, holidays or other than the agreed upon normal straight time working hours Monday through Friday may be given subject to certain other

conditions set forth by the Engineer. These conditions may include but are not limited to: requiring the Engineer or such assistants as the Engineer may deem necessary to be present during the work; requiring the Contractor to reimburse the Contracting Agency for the costs in excess of straight-time costs for Contracting Agency employees who worked during such times, on non-Federal aid projects; considering the work performed on Saturdays, Sundays, and holidays as working days with regards to the Contract Time. Assistants may include, but are not limited to, survey crews; inspectors; and other Contracting Agency employees when in the opinion of the Engineer, such work necessitates their presence.

Add the following new section:

1-08.0(3) Reimbursement for Overtime Work of Contracting Agency Employees
(District April 2020)

Where the Contractor elects to work on a Saturday, Sunday, or holiday, or longer than an 8-hour work shift on a regular working day, as defined in the Standard Specifications, such work shall be considered as overtime work. On all such overtime work an inspector will be present, and a survey crew may be required at the discretion of the Engineer. In such case, the Contracting Agency may deduct from amounts due or to become due to the Contractor for the costs in excess of the straight-time costs for employees of the Contracting Agency required to work overtime hours.

The minimum overtime pay is two (2) hours at one and one-half (1½) time District rates on weekdays (before or after normal work hours), Saturday, Sunday, or holidays. District rate is $125.00 per hour.

The Contractor by these specifications does hereby authorize the Engineer to deduct such costs from the amount due or to become due to the Contractor.

1-08.1 Subcontracting
(May 30, 2019 APWA GSP, Option B)

Delete the ninth paragraph, beginning with “On all projects, the Contractor shall certify…”.

1-08.3(2)A Type A Progress Schedule
(March 13, 2012 APWA GSP)

Revise this section to read:

The Contractor shall submit 3 copies of a Type A Progress Schedule no later than at the preconstruction conference, or some other mutually agreed upon submittal time. The schedule may be a critical path method (CPM) schedule, bar chart, or other standard schedule format. Regardless of which format used, the schedule shall identify the critical path. The Engineer will evaluate the Type A Progress Schedule and approve or return the schedule for corrections within 15 calendar days of receiving the submittal.

1-08.3(2)D Weekly Look-Ahead Schedule
(District April 2020)

Revise this section to read:

Each week that Work will be performed, the Contractor shall submit a 3-Week Look-Ahead Schedule showing the Contractor's and all Subcontractors' proposed Work activities for the next three weeks. The 3-Week Look-Ahead Schedule shall include the description, duration and sequence of Work, along with the planned hours of Work. This schedule may be a network schedule, bar chart, or other standard schedule format. The Weekly Look-Ahead Schedule shall be submitted to the Engineer by the midpoint of the week preceding the scheduled Work or some other mutually agreed upon submittal time.

Revise this section including the title to read:

1-08.4 Notice to Proceed and Prosecution of the Work
Delete this section and replace it with the following:

1-08.4 Notice to Proceed and Prosecution of Work
(July 23, 2015 APWA GSP)

Notice to Proceed will be given after the contract has been executed and the contract bond and evidence of insurance have been approved and filed by the Contracting Agency. The Contractor shall not commence with the work until the Notice to Proceed has been given by the Engineer. The Contractor shall commence construction activities on the project site within ten days of the Notice to Proceed Date, unless otherwise approved in writing. The Contractor shall diligently pursue the work to the physical completion date within the time specified in the contract. Voluntary shutdown or slowing of operations by the Contractor shall not relieve the Contractor of the responsibility to complete the work within the time(s) specified in the contract.

When shown in the Plans, the first order of work shall be the installation of high visibility fencing to delineate all areas for protection or restoration, as described in the Contract. Installation of high visibility fencing adjacent to the roadway shall occur after the placement of all necessary signs and traffic control devices in accordance with 1-10.1(2). Upon construction of the fencing, the Contractor shall request the Engineer to inspect the fence. No other work shall be performed on the site until the Contracting Agency has accepted the installation of high visibility fencing, as described in the Contract.

1-08.5 Time for Completion
(September 12, 2016 APWA GSP, Option A, modified District April 2020)

Revise the third and fourth paragraphs to read:

Contract Time shall begin on the first working day following the Notice to Proceed Date.

Each working day shall be charged to the contract as it occurs, until the contract work is physically complete. If substantial completion has been granted and all the authorized working days have been used, charging of working days will cease. If the Contractor is approved to work 10 hours a day and 4 days a week (a 4-10 schedule) and the fifth day of the week in which a 4-10 shift is worked would ordinarily be charged as a working day then the fifth day of that week will be charged as a working day whether or not the Contractor works on that day.

Revise the sixth paragraph to read:

The Engineer will give the Contractor written notice of the completion date of the contract after all the Contractor's obligations under the contract have been performed by the Contractor. The following events must occur before the Completion Date can be established:

1. The physical work on the project must be complete; and
2. The Contractor must furnish all documentation required by the contract and required by law, to allow the Contracting Agency to process final acceptance of the contract. The following documents must be received by the Project Engineer prior to establishing a completion date:
   a) Certified Payrolls (per Section 1-07.9(5)).
   b) Material Acceptance Certification Documents.
   c) Monthly Reports of Amounts Credited as DBE Participation, as required by the Contract Provisions.
   d) Final Contract Voucher Certification.
   e) Copies of the approved "Affidavit of Prevailing Wages Paid" for the Contractor and all Subcontractors.
   f) Property owner releases per Section 1-07.24.

Section 1-08.5 is supplemented with the following:

(District April 2020)
This project shall be physically completed within ***___*** **working days**.

1-08.9 Liquidated Damages
(August 14, 2013 APWA GSP, modified District April 2020)

Revise the fourth paragraph to read:

When the Contract Work has progressed to Substantial Completion as defined in the Contract, the Engineer may determine that the work is Substantially Complete. The Engineer will notify the Contractor in writing of the Substantial Completion Date. For overruns in Contract Time occurring after the *Substantial Completion* date, the formula for liquidated damages shown above will not apply. For overruns in Contract Time occurring after the Substantial Completion Date, liquidated damages shall be assessed on the basis of direct engineering and related costs assignable to the project until the actual Physical Completion Date of all the Contract Work. The Contractor shall complete the remaining Work as promptly as possible. Upon request by the Project Engineer, the Contractor shall furnish a written schedule for completing the physical Work on the Contract.

1-09 MEASUREMENT AND PAYMENT

1-09.2(5) Measurement
(May 2, 2017 APWA GSP)

Revise the first paragraph to read:

Scale Verification Checks – At the Engineer's discretion, the Engineer may perform verification checks on the accuracy of each batch, hopper, or platform scale used in weighing contract items of Work.

1-09.9 Payments
(March 13, 2012 APWA GSP)

Delete the first four paragraphs and replace them with the following:

The basis of payment will be the actual quantities of Work performed according to the Contract and as specified for payment.

The Contractor shall submit a breakdown of the cost of lump sum bid items at the Preconstruction Conference, to enable the Project Engineer to determine the Work performed on a monthly basis. A breakdown is not required for lump sum items that include a basis for incremental payments as part of the respective Specification. Absent a lump sum breakdown, the Project Engineer's determination of the cost of work shall be final.

Progress payments for completed work and material on hand will be based upon progress estimates prepared by the Engineer. A progress estimate cutoff date will be established at the preconstruction conference.

The initial progress estimate will be made not later than 30 days after the Contractor commences the work, and successive progress estimates will be made every month thereafter until the Completion Date. Progress estimates made during progress of the work are tentative, and made only for the purpose of determining progress payments. The progress estimates are subject to change at any time prior to the calculation of the final payment.

The value of the progress estimate will be the sum of the following:

1. Unit Price Items in the Bid Form — the approximate quantity of acceptable units of work completed multiplied by the unit price.
2. Lump Sum Items in the Bid Form — based on the approved Contractor's lump sum breakdown for that item, or absent such a breakdown, based on the Engineer's determination.
3. Materials on Hand — 100 percent of invoiced cost of material delivered to Job site or other storage area approved by the Engineer.
4. Change Orders — entitlement for approved extra cost or completed extra work as determined by the Engineer.

Progress payments will be made in accordance with the progress estimate less:

1. Retainage per Section 1-09.9(1), on non FHWA-funded projects;
2. The amount of progress payments previously made; and
3. Funds withheld by the Contracting Agency for disbursement in accordance with the Contract Documents.

Progress payments for work performed shall not be evidence of acceptable performance or an admission by the Contracting Agency that any work has been satisfactorily completed. The determination of payments under the contract will be final in accordance with Section 1-05.1.

1-09.11(3) Time Limitation and Jurisdiction
(November 30, 2018 APWA GSP)

Revise this section to read*:*

For the convenience of the parties to the Contract it is mutually agreed by the parties that any claims or causes of action which the Contractor has against the Contracting Agency arising from the Contract shall be brought within 180 calendar days from the date of final acceptance (Section 1-05.12) of the Contract by the Contracting Agency; and it is further agreed that any such claims or causes of action shall be brought only in the Superior Court of the county where the Contracting Agency headquarters is located, provided that where an action is asserted against a county, RCW 36.01.050 shall control venue and jurisdiction. The parties understand and agree that the Contractor's failure to bring suit within the time period provided, shall be a complete bar to any such claims or causes of action. It is further mutually agreed by the parties that when any claims or causes of action which the Contractor asserts against the Contracting Agency arising from the Contract are filed with the Contracting Agency or initiated in court, the Contractor shall permit the Contracting Agency to have timely access to any records deemed necessary by the Contracting Agency to assist in evaluating the claims or action.

1-09.13(3) Claims $250,000 or Less
(October 1, 2005 APWA GSP)

Delete this section and replace it with the following:

The Contractor and the Contracting Agency mutually agree that those claims that total $250,000 or less, submitted in accordance with Section 1-09.11 and not resolved by nonbinding ADR processes, shall be resolved through litigation unless the parties mutually agree in writing to resolve the claim through binding arbitration.

1-09.13(3)A Administration of Arbitration
(November 30, 2018 APWA GSP)

Revise the third paragraph to read:

The Contracting Agency and the Contractor mutually agree to be bound by the decision of the arbitrator, and judgment upon the award rendered by the arbitrator may be entered in the Superior Court of <u>the county in which the Contracting Agency's headquarters is located, provided that where claims subject to arbitration are asserted against a county, RCW 36.01.050 shall control venue and jurisdiction of the Superior Court</u>. The decision of the arbitrator and the specific basis for the decision shall be in writing. The arbitrator shall use the Contract as a basis for decisions.

1-10 TEMPORARY TRAFFIC CONTROL

1-10.1(2) Description
Section 1.10.1(2) is supplemented with the following:

(District April 2020)

The Contractor shall provide temporary traffic control for all required inspections until the District issues physical completion.

1-10.2(2) Traffic Control Plans

Section 1.10.2(2) is supplemented with the following:

(District April 2020)

The Contractor's proposed traffic control plan(s) or any proposed modified plan(s) shall be submitted to the Engineer, and the appropriate agency, for review and approval at least seven (7) calendar days in advance of the time the new plan is to be implemented. No work can commence on the project until the traffic control plans submitted by the Contractor have been approved and all required traffic control devices are in place. All traffic control plans shall conform to Section 1-10.2(3).

Traffic control plans shall at a minimum be site specific, to scale, showing all project details and all details necessary to handle traffic through the construction area. These shall include, but not be limited to, traffic flow, beginning and ending tapers, travel lanes and widths, effects on intersections, signs, flagger locations, duration, location and type of all traffic control devices. In addition, the traffic control plan shall indicate the intended method of informing adjacent properties of any required detour.

When the Work occurs within the Clark County right of way, the traffic control plan shall be approved in writing by Clark County and a copy provided to the Engineer at least three (3) working days before start of Work.

When the Work occurs within a State of Washington right of way, the traffic control plan shall be approved by WSDOT and a copy provided to the Engineer at least three (3) working days before start of Work.

When the Work occurs on a route used by the Vancouver, Evergreen, Battle Ground, Hockinson, or Ridgefield School Districts or C-Tran, the Contractor shall notify the affected agency(ies) at least five (5) working days before construction commences on the Work. The same notification will be given to Clark County Regional Emergency Services (CRESA). The Contractor shall coordinate all work with the affected agency(ies) weekly.

C-Tran
Fixed Route Services Manager
PO Box 2529
Vancouver, WA 98668-2529
(360) 696-4494

The Ridgefield School District
KWRL Cooperative Transport Center
PO Box 370
Woodland, WA 98674
(360) 225-6105

The Evergreen School District
Transportation Department
Safety Trainer
PO Box 8910
Vancouver, WA 98668-8910
(360) 604-4950

The Battle Ground School District
Assistant Administrator
Operations Service
PO Box 200
Battle Ground, WA 98604-0200
(360) 885-6677

The Vancouver School District
Transportation Department
2501 Stapleton Road
Vancouver, WA 98661
(360) 697-7237

Hockinson School District
17912 NE 159th St
Brush Prairie, WA 98606-9613
(360) 448-6400

Clark County Regional Emergency Services
Agency (CRESA)
710 West 13th Street
Vancouver, WA 98660
(360) 737-1911

Clark County Public Works
Operations Center
4700 NE 78th St
Vancouver, WA 98665
(360) 397-2446

DIVISION 2
EARTHWORK

2-02 REMOVAL OF STRUCTURES AND OBSTRUCTIONS

2-02.1 Description
Section 2-02.1 is supplemented with the following:

(District April 2020)
This Work also includes removing and disposing of, or salvaging, existing manholes, vaults, and other structures as shown on the Plans. The Work also includes the backfilling of trenches, holes, or pits that result from such removal.

2-02.4 Vacant
Section 2-02.4 including the title is revised to read:

2-02.5 Payment
Section 2-02.5 is supplemented with the following:

(District April 2020)
"Removal of _____", each.
The unit Contract price per each for removal of structures of the kind specified shall be full pay for all costs in connection with removing, disposing of, or salvaging the materials as shown on the Plans, and backfilling of trenches, holes, or pits that result from such removal.

2-03 ROADWAY EXCAVATION AND EMBANKMENT

2-03.3(7)C Contractor-Provided Disposal Site
Replace the first paragraph with:

(District April 2020)
The Contracting Agency has not provided a waste site for the disposal of excess materials and debris. The Contractor shall arrange for disposal of excess excavation or other materials at no expense to the Contracting Agency.

2-09 STRUCTURE EXCAVATION

2-09.3(1)C Removal of Unstable Base Material
The first sentence of the second paragraph is revised to read:

(District April 2020)
Gravel backfill for replacement of unstable base material shall meet the requirements of Section 9-03.9(1) or 9-03.12 as directed by the Engineer.

2-09.3(1)D Disposal of Excavated Material
The second paragraph is revised to read:

(District April 2020)
All costs associated with disposing of excavated material shall be a necessary part of the Work and included in the unit contract price for the structure.

2-09.3(1)E Backfilling

The first paragraph is revised to read:

(District April 2020)
All costs associated with furnishing and installing backfill material of openings dug for structures shall be a necessary part of the Work and included in the unit contract price for the structure.

Backfill materials and compaction shall conform to the Plans, District Standard Drawings, and Agency utility permits when in right of way, whichever is more restrictive.

2-09.4 Measurement
Section 2-09.4 is supplemented with the following:

(District April 2020)
There shall be no measurement for structure excavation. Compensation for structure excavation, hauling and disposal of excavated material, and for backfilling shall be included in the payment for the various items for which the excavation is done.

2-09.5 Payment
Section 2-09.5 is deleted in its entirety and replaced with the following:

(District April 2020)
No separate payment will be made for structure excavation, haul, disposal of structure excavation, or backfilling for pipes or structures.

DIVISION 5
SURFACE TREATMENTS AND PAVEMENTS

5-04 HOT MIX ASPHALT (HMA)

5-04.3(4)C Pavement Repair

Section 5-04.3(4)C is supplemented with the following:

(District April 2020)

Sawcuts

For trenches and other drainage and utility work, make sawcuts as follows:

Prior to placing pavement, the Contractor shall remove the existing edge a minimum of one (1) foot beyond where any sloughing has occurred or as marked by the Engineer under the existing pavement by sawing the existing pavement vertically and in a straight line along the cut lines indicated. The cut shall be a sufficient distance from the area of excavation to remove broken or damaged pavement and to expose voids under the pavement.

Pavement edges on opposite sides of trenches shall be cut parallel to each other unless otherwise directed.

Pavement repair and restoration for installation of Structures shall be roughly rectangular or square. Where side sewers join the mainline pipe at a right angle, both corners of the pavement edge shall make an approximate angle with the mainline axis of either 90 degrees or 45 degrees.

Pavement Repair & Trench Restoration

Pavement repair and trench restoration shall be in accordance with the utility permit(s) and the following:

Where traffic will pass over backfilled trenches before they are paved, the top of the trench shall be maintained in a condition that will allow normal vehicular movement to safely continue. Access driveways must be provided where needed. Cleanup operations shall follow immediately behind backfilling, and the work site shall be kept in a safe, orderly condition at all times.

After completing the structure or pipe installation, backfilling, and compaction, the Contractor shall place crushed surfacing base course or CDF and HMA Cl. ½" PG 64-22 per the Plan details and utility permit(s).

1. Pavement shall be placed in two or more lifts. The compacted depth of each lift shall be no less than 0.15 foot or no greater than 0.30 foot for HMA Cl. ½" PG 64-22.
2. A trench width of less than 5 feet may be hand raked.
3. Widths five (5) feet to eight (8) feet shall be placed with a Layton box or equal, and widths greater than eight (8) feet that are less than two hundred (200) feet in length shall be placed with a Layton box or self-propelled paving machine.
4. A width greater than eight (8) feet and over two hundred (200) feet in length shall be placed with a self-propelled paving machine.
5. Compaction requirements: The in-place pavement density shall be at least 92% of theoretical maximum per WSDOT Test Method 705.

Pavement surface smoothness will be measured for acceptance according to Section 5-04.3(13).

5-04.4 Measurement

Section 5-04.4 is supplemented with the following:

(District April 2020)

No separate measurement will be made for supplying and placing asphalt for tack coat, HMA for preleveling, joint sealing, and any materials to provide a smooth transition from a paved to unpaved surface.

Sawcuts made for restoration of trenches, drainage items, utilities or other work shall be included in the work involved, and no separate measurement will be made.

DIVISION 7
DRAINAGE STRUCTURES, STORM SEWERS, SANITARY SEWERS, WATER MAINS, AND CONDUITS

7-05 MANHOLES, INLETS, CATCH BASINS, AND DRYWELLS

7-05.2 Materials

Section 7-05.2 material list is supplemented with the following:

(District April 2020)

Commercial Concrete	6-02.3(2)B
Manhole External Seals	9-04.13
Manhole Boots	9-04.14
Penetration Seal	9-04.15
Joint Sealant	9-04.16
Manhole Marker	9-04.17
Manhole Coating	9-26.4
Manhole Inflow Dishes	9-05.15(4)
Vented Manhole Inflow Dishes	9-05.15(4)A
Locator Station	9-05.30(3)
Inside Drop Bowl	9-05.40
Chimney Seals	9-05.60
Polypropylene Grade Rings	9-05.70
Odor Control Insert	9-05.90

7-05.3 Construction Requirements

Section 7-05.3 is supplemented with the following:

(District April 2020)

Manholes shall not have the edges of manhole casting and cover within three (3) feet of the curb gutter without written approval of the Engineer. All castings within three (3) feet of the curb gutter shall have inflow dishes.

The fourth paragraph is revised to read:

Flow channels in manholes shall be shaped and sloped to provide a smooth transition between the inlet and outlet sanitary sewer lines and minimize turbulence. The channels shall conform accurately to the sewer grade and the channel height shall be one-half of the pipe diameter and the channel width shall be equivalent to the pipe diameter. Finished channels shall be within plus or minus one-quarter (± ¼) of an inch horizontally and plus or minus one-eighth (± 1/8) of an inch vertically. Channel material shall be commercial concrete meeting requirements in Section 6-02.3(2)B. Beaver slides shall be required for influent pipe pipes with inverts above the crown of the receiving sewer.

The fifth paragraph is revised to read:

Ladder rungs shall be grouted in the precast concrete walls. Rungs shall be uniformly spaced at 12-inches and be vertically aligned. No rungs shall be installed in adjustment rings or within four inches of the top of a cone section. The maximum distance between the finished rim elevation and the first ladder rung shall not exceed twenty-one (21) inches. Damaged or missing rungs shall be replaced by a qualified manufacturer's representative.

The sixth paragraph is revised to read:

All penetrations into manholes shall be made with a coring saw designed to provide a smooth opening for the installation of a flexible pipe to manhole connector.

The following new paragraph is added after the eighth paragraph:

In lieu of rubber or flexible plastic gaskets, a butyl rubber joint sealant may be installed at each precast manhole joint. Where joint sealant is installed, a minimum of one row of joint sealant shall be installed around the circumference of the manhole joint in accordance with the manufacturer's recommendations.

The following new sentence is added to the end of the tenth and eleventh paragraphs:

Manhole boots shall be installed at all connections to manholes two inches and larger in diameter. Penetration seals shall be installed at all connections smaller than two inches in diameter.

Paragraph thirteen shall be revised to read:

Manholes shall be watertight. Where shown on the plans or when groundwater is present as determined by the Engineer, manhole external seals shall be installed over all joints. The Contractor shall have available on site, and strictly follow, the manufacturer's installation instructions.

All manholes installed within pervious pavement shall have all joints from the top of the cone section to the rim externally sealed with manhole external seals.

All manhole joints and openings shall be filled with mortar. All manhole interiors (including joints) shall have the void between the pipe and the boot and openings filled with mortar and trowelled to a smooth finish.

Mortar shall meet the requirements of Section 9-20.4 Mortar, or approved equal, and shall be trowel applied.

All manholes located in non-travelways shall have a manhole marker installed within five (5) feet of the manhole cover.

The second sentence of paragraph 16 is deleted and replaced with:

Cast-in-place manhole bases are not allowed, except where approved by the Engineer.

7-05.3(1) Adjusting Manholes and Catch Basins to Grade

Section 7-05.3(1) is supplemented with the following:

(District April 2020)

Adjustment of the manhole cover casting shall be made with District approved steel, polypropylene, or fiber reinforced concrete adjustment rings unless previously approved in writing by the Engineer. All castings will be set to finished grade with mortar or polypropylene rings. Rocks, wood shims and similar materials shall not be used to adjust castings or risers.

The top of existing manholes, drywells, and catch basins within the paved area, shall be adjusted by the following methods to the required elevation. The Contractor shall obtain the Engineer's approval as to the method of adjustment:

Method 1. Adding or removing grade rings; or

Method 2. Replacing cones with a flat top and adjustment rings, or replacing manhole sections with longer or shorter sections and final adjustment of the rim.

The tops of new manholes and drywells within the paved area, shall be adjusted as shown on the Plans.

Grout shall be placed between each fiber reinforced concrete adjustment ring. An adhesive shall be used in accordance with the manufacturer's recommendations for polypropylene grade rings. Contractor shall use the minimum number of grade rings possible.

7-05.3(3) Connections to Existing Manholes

The following new sentence is added to the end of the first paragraph:

(District April 2020)

All connections to existing manholes shall be cored and booted. The manhole shall be core drilled with a coring machine and a manhole boot shall be installed. If a stub exists without a boot, the Contractor shall remove the stub and install a boot as per the requirements of this section.

The Contractor shall remove, replace, or adjust existing stub outs as required to achieve the grades shown on the Plans.

Replace the last sentence of the first paragraph with the following:

The Contractor shall re-channel any existing manhole where a new connection is made. Rechanneling includes removing the existing channel and installing a new channel per this Section.

7-05.3(4) Drop Manhole Connection

Replace this section with the following:

No outside drops are permitted. Where influent sewer inverts exceed 18 inches above the invert of the receiving sewer, or where identified on the plans, an inside drop bowl assembly shall be installed in accordance with the Plans and the manufacturer's recommendations. A maximum of one (1) inside drop is allowed for 48-inch manholes. A maximum of two (2) inside drops are allowed for manholes 60-inches in diameter and larger.

Section 7-05.3 is supplemented with the following new sections:

(District April 2020)

7-05.3(5) Vacuum Test for Manholes

The Contractor shall provide for vacuum testing of manholes. Testing will be required for fifty (50) percent of the manholes in the Work but not less than one (1) manhole. All manholes with three (3) or more lateral penetrations shall be vacuum tested. The manholes to be tested will be selected by the Inspector. If any of the manholes fail the vacuum test, two additional manholes shall be tested for each failed manhole. In addition, the failed manhole must be

repaired and pass the vacuum test. Vacuum testing will occur following all adjustment and final paving.

The Contractor shall provide a minimum of two (2) working days notice to the Inspector to schedule manhole vacuum testing observation.

Sanitary sewer manholes shall be vacuum tested by evacuating the manhole to minus ten (-10) inches of mercury (Hg). After the minus ten (-10) inches of mercury (Hg) has been attained, the vacuum test will continue for one (1) minute. The loss of vacuum shall be less than one (1) inch of mercury (Hg).

7-05.3(6) Receiving Manholes
Receiving manholes shall be coated in accordance with this section and be equipped with an odor control insert.

7-05.3(7) Manhole Coating

7-05.3(7)A General
Where shown in the Plans, or where directed by the Engineer, interior manhole coating shall be applied in accordance with the manufacturer's requirements.

7-05.3(7)B Submittals
1. Technical data sheet and MSDS for each product proposed.
2. Documentation showing the installer meets the minimum experience requirements and is currently certified by the coating manufacturer as listed in the Qualification requirements specified herein.
3. Written warranty.

7-05.3(7)C Qualifications
The applicator shall be certified by the product manufacturer and shall have completed manhole rehabilitation of at least ten (10) sanitary sewer manholes in the last 2 years using the system and materials proposed for use in performing the Work. If the Contractor does not have the experience, the coating work shall be supervised by a manufacturer's representative who has been responsible for rehabilitating a minimum of ten (10) manholes using the proposed manufacturer's manhole lining process at no additional cost to the District.

7-05.3(7)D Warranty
Coating system failure is defined as blistering, cracking, embrittlement, softening, or failure to adhere to the substrate. In addition, failure of the coating system will be deemed to have occurred if the protective system fails to:
1. Prevent the internal damage or corrosion of the underlying structure due to bacteriological, chemical, gaseous (hydrogen sulfide), erosive and abrasive attack, including internal damage or corrosion incurred from vibration, stress cracking, and access induced mechanical impact (mechanical impact caused by accessing the structure). It does not include excessive atypical non-wastewater induced chemical abuse or atypical acts of God which cause structural damage.
2. Seal and protect the substrate and environment from contamination by the wastewater effluent (e.g., exfiltration).
3. Seal and protect the manhole from groundwater infiltration and root intrusion.

Contractor and Manufacturer shall guarantee material and application of material against failure for a period of ten years from the date of final acceptance of the project. Contractor and Manufacturer shall, within a reasonable time after receipt of written notice thereof, repair defects in materials or workmanship which have developed and may develop during said 10-year period, and any damage to other work caused by such defects or the repairing of same, at his own expense and without cost to the District.

7-05.3(7)E Preparation

The Contractor shall be responsible for bypassing sewer flow around the Work and dewatering manholes as required to ensure that the liquid flow is maintained below the surfaces to be coated and that concrete moisture levels meet the manufacturer's requirements. All extraneous flows into the structures at or above the area coated shall be plugged and/or diverted until the epoxy coating has set hard to the touch.

Remove all manhole steps prior to cleaning. Unless otherwise directed by the Engineer, manhole steps shall be cut flush with the manhole wall. Voids or holes remaining from removal of the steps shall be filled and troweled flush with the wall using a manhole repair material.

Infiltration shall be stopped and dried by using a material that is compatible with the repair and coating materials.

Prior to commencing surface preparation the Contractor shall inspect all surfaces specified to receive the coating and report to the Engineer a minimum of 10 days prior to work of any noticeable disparity in the site, structure, or surfaces which may interfere with the work, use of materials or procedures as specified herein.

7-05.3(7)F Visual Inspection

At certain hold points in the coating application process, the Contractor shall request approval from the Engineer, to proceed with the next stage of the installation. The following are the designated inspection hold points for each installation:

1. Completion of surface repairs, re-profiling, and preparation
2. Completion of epoxy coating
3. Completion of testing

The Contractor shall provide 24 hour notice that approval of an inspection hold point is needed. The Engineer shall respond to the approval request within 12 hours. Visual inspection shall include:

1. Zero groundwater infiltration
2. All pipe connections shall be open and clear
3. No cracks, voids, dry spots, delamination or other types of defects shall be visible

7-05.3(7)G Surface Preparation

Concrete surfaces to receive repair materials and/or epoxy coating shall be cleaned and abraded to produce a sound surface with adequate profile and porosity to provide a strong bond between the protective coating and substrate. Concrete surfaces shall be prepared initially by cleaning with pressurized water cleaning, after which, abrasive blast or high pressure water blasting or other manufacturer approved method, shall be used to remove all foreign material and/or other contaminants to achieve sound and alkaline concrete surface. Final surface must be rinsed to remove dust and other blasting contaminants from the surface. Applicator shall notify Owner of any noticeable disparity in the surfaces which may interfere with the proper preparation or application of the repair mortar and protective coating.

Areas with exposed rebar shall be first prepared by abrasive blasting all exposed reinforcing steel surfaces to remove all contaminants and corrosion products. Reinforcing steel shall be treated with two 20 mil (wet) coat of corrosion inhibitor in accordance with the manufacturer's recommendations.

Annular spaces between the manhole cone or chimney and the bottom of the manhole frame shall be packed with repair material. Voids or gaps in the manhole chimney, cone, or barrel shall be filled with repair material. Restore the manhole profile surface to the original thickness using manhole repair material. The restored manhole profile shall have a uniform thickness.

Prior to application of coatings, test existing wall surface to determine if pH, profile and moisture content of the concrete are within Manufacturer's published recommendations and requirements.

7-05.3(7)H Application of Repair Materials

Repair materials shall be used to fill in bugholes, spalled concrete, and smooth deteriorated concrete surfaces less than 0.125 inches (less than 1/8 inch). Repair materials shall also be used to restore deteriorated concrete exposing reinforcing bars (rebars) and/or areas deemed a structural concern, areas of high humidity, moisture (moisture in concrete above 90 percent), active leaks, and areas where concrete cannot be dried, or stay dry, long enough for topcoating.

Materials shall be applied in accordance with the manufacturer recommendations and thickness shall be based on resurfacing in order to fill the profile of deteriorated concrete, eliminate peaks and valleys of deteriorated concrete, and repair areas of spalls, cracks, and bugholes in order to achieve a smooth finished profile.

Prepared areas where structural steel has been exposed or removed shall then be repaired with material(s) specified herein.

Areas where high moisture levels are detected in the concrete at a 90 percent or above and/or where wetness occurs from splashing or similar shall be repaired with specified materials listed herein.

The repair materials shall be permitted to cure according to manufacturer recommendations. Any evidence of contamination or laitance following the application of repair materials shall be removed by additional abrasive blasting, shotblasting or other approved method.

7-05.3(7)I Application of Epoxy Coating

Prior to applying epoxy coating, the following shall be checked:

- Soundness test: Upon completion of initial surface preparation, the Engineer shall make a visual examination of the surfaces that were prepared to identify areas requiring additional preparation. A screwdriver shall be used to scratch the surface. Should the screwdriver easily remove or dig into any portion of the surface, further preparation shall be required. Retest until a screwdriver cannot easily scratch the surface. No leaks may be present prior to commencing and during coating work.
- Temperature: Temperature of the surface to be coated shall be maintained within the manufacturer's recommendations throughout the application and curing. Where varying surface temperatures do exist, coating installation shall be scheduled when

the temperature is falling versus rising. Record air temperature inside the manhole and prevailing weather conditions at the time of coating application.

- Sunlight exposure: Prior to and during application, care shall be taken to avoid exposure of direct sunlight or other intense heat source to the structure being coated. Specified surfaces shall be shielded to avoid exposure of direct sunlight or other intense heat source.
- Moisture: Applicator shall have a concrete moisture meter on-site to record percent (%) levels before applying epoxy coating. Applicator shall place puncture sensory pins into the surface in at least one location per every one hundred (100) square feet.

Application procedures shall conform to the recommendations of the structural epoxy coating manufacturer, including material handling, mixing, safety, and application equipment. Lining shall be monolithic, beginning on the metal right below the cover ring, and go all the way down to cover the bench, unless otherwise directed by the Engineer. The manhole channel shall not be coated. Appropriate care shall be taken to seal around all pipes and openings.

Application for new structures shall cover all specified surfaces to a minimum dry film thickness of 80 mils (1/12 inch). Application for existing structures shall cover all specified surfaces to a minimum dry film thickness of 125 mils (1/8 inch). During application, Applicator shall regularly perform and record epoxy coating thickness readings with a wet film thickness gage to ensure uniform thickness during application. Test a minimum of three equally spaced points around the circumference of the manhole wall. Conduct tests every 10 vertical feet but at a minimum at 1-foot below the frame, at the center of the riser, and at the base of the manhole.

Top coating or additional coats of the epoxy coating shall occur as soon as the prior coat becomes tack free.

7-05.3(7)J Testing and Inspection

Adhesion Testing - Perform minimum of one (1) uni-axial pull-off adhesion test for each coated manhole. Remove and replace areas not meeting required 150 psi at 28 days minimum adhesion requirement (or resulting in substrate failure). Testing shall be conducted in accordance with ASTM D4541 as modified herein. The Engineer shall select the areas to be tested. A minimum of three, 20 mm dollies shall be affixed to the coated surface at the cone area, mid-section and at the bottom of the structure. The adhesive used to attach the dollies to the coating shall be rapid setting with tensile strengths in excess of the coating product and permitted to cure in accordance with manufacturer recommendations. The coating and dollies shall be adequately prepared to receive the adhesive. Failure of the dolly adhesive shall be deemed a non-test and require retesting. Prior to performing the pull test, the coating shall be scored to within 30 mils of the substrate by mechanical means without disturbing the dolly or bond within the test area. Two of the three adhesion pulls shall exceed 200 psi or concrete failure with more than 50 percent of the subsurface adhered to the coating. Should a structure fail to achieve two successful pulls as described above, additional testing shall be performed at the discretion of the Engineer. Any areas detected to have inadequate bond strength shall be evaluated by the Engineer. Further bond tests may be performed in that area to determine the extent of potentially deficient bonded area and repairs shall be made by Contractor.

Holiday (Spark) Testing - Perform holiday detection on all surfaces coated with the epoxy coating. After the epoxy coating has set hard to the touch, surfaces shall first be dried, an

induced holiday shall then be made on to the coated concrete surface and shall serve to determine the minimum/maximum voltage to be used to test the coating for holidays at that particular area. The spark tester shall be initially set at 100 volts per 1 mil (25 microns) of film thickness applied but may be adjusted as necessary to detect the induced holiday (refer to NACE RPO188-99). All detected holidays shall be marked by the coating manufacturer's approved marking methods and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, additional epoxy coating material can be hand applied to the repair area. All touch-up/repair procedures shall follow the coating manufacturer's recommendations.

Visual Inspection - A final visual inspection shall be made by the Engineer. Any deficiencies in the finished coating shall be marked and repaired according to the procedures set forth in this section.

7-05.4 Measurement

The first paragraph is revised to read:

(District April 2020)
Manholes will be measured per each.

Section 7-05.4 is supplemented with the following:

(District April 2020)
Trench Safety System will be measured as a separate item per Section 7-08.4 of these provisions.

Manhole coating will be measured per vertical foot from the lowest invert elevation to the rim elevation within each manhole coated.

7-05.5 Payment

Section 7-05.5 is supplemented with the following:

(District April 2020)
"Manhole ___ In. Diam. Type ___", per each.
The unit contract price per each for "Manhole ___ In. Diam. Type ___" shall be full compensation to furnish a completed installation, including excavating, bedding, shoring, , furnishing and installing the manhole including all seals, channelizing, mortar, manhole markers, odor control inserts, backfilling, compacting, adjusting to grade, extending or cutting and connecting existing sanitary sewer pipes to new manholes, inflow dishes, and testing.

"Manhole Coating", per vertical foot.
The unit contract price per vertical foot for "Manhole Coating" shall be full compensation to furnish all materials, equipment and labor necessary to apply a complete coating of the interior of the manhole, excluding the channel. No separate payment will be made for water, flow control, preparation of manhole, stopping minor infiltration, testing, recordings and reproductions, cleanup, and all other items and incidentals required to complete the work as specified and shown.

Where pipe connections are to be made to existing sanitary manholes all work and material involved, including fittings, removing existing stubs when required, manhole rechanneling, coring, and booting, will be included in the item "Connection to Drainage Structure", per each.

If the Engineer directs installation of manhole external seals not shown on the plans, it shall be paid by agreed price or by force account.

7-08 GENERAL PIPE INSTALLATION REQUIREMENTS

7-08.2 Materials

Section 7-08.2 is supplemented with the following:

(District April 2020)

Gravel Borrow	9-03.14(1)
Crushed Surfacing Base Course	9-03.9(3)
Gravel Backfill for Pipe Zone Bedding	9-03.12(3)
Quarry Spalls	9-13.1(5)
Ballast	9-03.9(1)

7-08.3(1) Excavation and Preparation of Trench

Section 7-08.3(1) is supplemented with the following:

7-08.3(1)A Trenches

The following is added to the second paragraph:

(District April 2020)

Trenching machines are not allowed unless approved in writing by the Engineer. If trenching machines are allowed by the Engineer and the local jurisdiction, trench restoration shall meet Section 5-04.3(4)C.

The last line in the third paragraph is deleted.

The last sentence of the sixth paragraph is revised to read:

(District April 2020)

The trench foundation shall be backfilled to the bottom of the pipe zone with gravel backfill for pipe zone bedding, crushed surfacing base course, ballast, or quarry spalls with a maximum size of four (4) inch, as directed by the Engineer, and compacted to form a uniformly dense, unyielding foundation.

7-08.3(1)B Shoring

Section 7-08.3(1)B is supplemented with the following:

(District April 2020)

Shoring shall be designated as “Trench Safety System”.

7-08.3(1)C Bedding the Pipe

Section 7-08.3(1)C is supplemented with the following:

(District April 2020)

Pipe zone bedding material shall be crushed surfacing base course for pipe depths greater than 13 feet measured from the pipe invert elevation to the final grade.

Section 7-08.3(1) is supplemented with the following subsection:

7-08.3(1)D Dewatering

When groundwater is present, the Contractor shall provide a dewatering system of sufficient size and capacity necessary to lower and maintain the groundwater table to an elevation of at

least 1 foot below either the lowest foundation subgrade or the bottom of trench, whichever is lower, to permit the Work to be performed under dry conditions.

The Contractor shall submit a dewatering plan that includes the following:

- Site plan that includes the proposed layout of the temporary dewatering system including discharge location(s)
- Manufacturer data sheets for proposed temporary dewatering equipment and piping

Water from dewatering shall not be allowed to enter into the new or existing sanitary sewer system. If dewatering is necessary, a dewatering plan shall be reviewed by the Engineer and approved by the local jurisdiction and included with the approved erosion control plan as described in section 8-01.1. The Contractor shall be responsible for complying with all dewatering requirements as described in RCW 18.104.

Under unusual circumstances, the Contractor can request that the District allow disposal of water to sanitary sewers by submitting a Clark Regional Wastewater District Construction Wastewater Discharge Application. The Contractor shall outline all of the options explored and reasons for rejection of each option. The Contractor may request a copy of the application from the District. The District will respond in writing and the District's decision will be final.

7-08.3(2)B Pipe Laying – General

Section 7-08.3(2)B is supplemented with the following:

(District April 2020)

Sags in sewer pipe 10-inches and less in diameter shall not exceed one-half (½) of an inch. Sags in sewer pipe 12-inches and greater in diameter shall not exceed three-quarters (¾) of an inch.

7-08.3(3) Backfilling

Section 7-08.3(3) is supplemented with the following:

The second paragraph is revised to read:

(District April 2020)

Pipe zone backfill shall be gravel backfill for pipe zone bedding, or crushed surfacing base course for pipe depths greater than 13 feet measured from the pipe invert elevation to the final grade, unless otherwise shown on the Plans.

The last two sentences in the fourth paragraph are revised to read:

(District April 2020)

Trench zone backfill material for backfill above the pipe zone shall be gravel borrow unless otherwise shown on the Plans or as required by the local jurisdiction.

The following new paragraph is added to this section:

(District April 2020)

The Contractor shall submit maximum density and optimum moisture content data as required in section 2-03.3(14)D at least seven (7) calendar days prior to any backfilling operations. Test results shall not be more than two (2) months old.

The following new paragraphs are added to this section:

(District April 2020)
Clay dams shall be installed where shown on the Plans. The Contractor shall submit the material to be used, including the specified bentonite mix ratio, and the method of installation in accordance to Section 1-06.

Where indicated on the Plans, a continuous toning wire shall be attached to the top of the sewer pipe. A minimum of a six (6) foot coil of wire shall be left in a locator station at each structure (manholes, cleanouts, vaults, etc.). The toning wire shall be tested for and have continuity prior to acceptance.

7-08.4 Measurement
Section 7-08.4 is supplemented with the following:

(District April 2020)
Trench safety system will be measured per linear foot, for trench over four feet in depth where an adequate trench safety system is provided.

There will be no separate measurement for trench excavation, backfill placed to the finished grade of the trench testing, and CCTV inspection, in the installation of drain, culvert, storm sewer, waterline and sanitary sewer pipes.

Clay Dams will be measured per each.

No specific unit of measurement will apply to the item “Dewatering”.

7-08.5 Payment
Section 7-08.5 is supplemented with the following:

(District April 2020)
“Trench Safety System”, per linear foot.
The unit contract price per linear foot for “Trench Safety System” shall be full compensation for all work involved to furnish and install trench safety systems per local, state, and federal requirements.

The costs of trench safety systems shall not be considered as incidental to any other contract item. Any bid under $1 per linear foot will be considered unrealistic. If the Contractor’s bid is less than the minimum specified amount, the Contracting Agency will unilaterally revise the bid amount to the minimum specified amount and recalculate the Contractor’s total bid amount. The corrected total bid amount will be used by the Contracting Agency for award purposes and to fix the amount of the contract bond.

“Clay Dams”, per each.
The unit contract price per each for “Clay Dams” shall be full compensation for all materials, labor and equipment to provide a complete installation.

“Dewatering”, by force account.
All costs for materials, labor, and work required to furnish, install, operate, maintain, and remove dewatering wells, pumping equipment, piping, and all other items necessary to dewater the site to conduct the work as specified will be paid for by force account as specified in Section 1-09.6. For the purpose of providing a common Proposal for all Bidders, the District has entered an amount in the Proposal to become a part of the total Bid by the Contractor.

When the Contract does not include dewatering as a pay item, dewatering shall be incidental to construction. All costs shall be included in the other Contract pay items.

7-09 WATER MAINS

7-09.1 Description

Section 7-09.1 is supplemented as follows:

(District April 2020)

This Work consists of constructing sanitary pressure mains in accordance with the Plans, these Standard Specifications, the Special Provisions, and the Standard Plans, at the location shown on the Plans.

7-09.1(1) Definitions

Section 7-09.1(1) is supplemented as follows:

(District April 2020)

All references to “water main” shall also mean “sanitary pressure main”.

7-09.2 Materials

Section 7-09.2 materials list is supplemented as follows:

(District April 2020)

Toning Wire and Splices	9-05.30(1)
Marker Balls	9-05.30(2)
Air/Vacuum Valve	9-30.3(7)A

Sanitary pressure mains shall be PVC per 9-30.1(5). Pipe fittings for sanitary pressure mains shall be of the same material as the main.

7-09.3(7) Trench Excavation

Section 7-09.3(7) is revised to read:

(District April 2020)

Trench excavation shall be in accordance to Section 7-08. All sanitary pressure mains shall have toning wire installed. Marker balls shall be installed at the end of all pressure service connections.

7-09.3(20) Detectable Marking Tape

Section 7-09.3(20) is supplemented as follows:

(District April 2020)

Detectable marking tape shall be installed over nonmetallic pressure sewer lines. The tape shall be placed approximately eighteen (18) inches above the top of the line and shall extend its full length.

7-09.3(21) Concrete Thrust Blocking

Section 7-09.3(21) is supplemented as follows:

(District April 2020)

Concrete thrust blocking shall be used for restraining existing pipe and existing pipe joints only. Mechanical joint restraints shall be used for all new construction.

Concrete thrust blocking shall be poured in place.

Section 7-09.3(21) is supplemented with the following new subsection:

7-09.3(21)A Joint Restraints
Joint restraints shall be installed at all bends, tees, dead ends, and crosses and where shown on the Plans. The fitting and the first adjacent pipe joint shall be restrained with joint restraints. Additional pipe joints shall be restrained where shown on the Plans. In addition to the fitting, all pipe joints between fittings for vertical offsets shall be restrained.

7-09.3(23) Hydrostatic Pressure Test
Section 7-09.3(23) is supplemented as follows:

(District April 2020)
Delete first sentence of first paragraph and replace with:

All sanitary pressure mains and appurtenances shall be tested at one hundred fifty (150) pounds per square inch for fifteen (15) minutes with no pressure loss. The Contractor is responsible for furnishing water for pressure testing.

The seventh, eighth, and ninth paragraphs beginning with “The quantity of water…” or ending with “15-minute test period.” is revised to read:

There shall be no loss in pressure during the 15-minute test period.

Delete the first sentence of the twelfth paragraph beginning with “Tests shall be made with…” and replace with:

Testing shall be done against the pump station gate valve or a pressure main in-line valve.

7-09.3(23)A Testing Extensions from Existing Mains
Section 7-09.3(23)A is supplemented as follows:

(District April 2020)
Delete “, pre-chlorinated” from the first sentence of the first paragraph.

Delete “, pre-chlorinated” from the last sentence of the third paragraph.

7-09.3(24) Disinfection of Water Mains
Section 7-09.3(24) is deleted.

Section 7-09.3 is supplemented with the following new subsections:

(District April 2020)
7-09.3(25) Pigging
The contractor shall be responsible for pigging all new sanitary pressure mains. Pigging shall be done with a medium density polyurethane pig the same diameter as the main, and shall be done as many times as necessary until the resulting flow is free from gravel, rock and debris.

7-09.3(26) Toning Wire and Splices
A continuous toning wire shall be attached to the top of all sanitary pressure mains and service connections. A minimum of a three (3) foot coil of wire shall be left in each access point

(vaults, locate stations, AVVs, end of service connections, etc.). The toning wire shall be tested for and have continuity prior to acceptance.

7-09.3(27) Locate Stations
Locate stations shall be constructed at the locations shown on the Plans and a minimum of 500 feet along the sanitary pressure main and at all bends. Locate stations shall be constructed in accordance to the Standard Plans.

7-09.3(28) Pressure Cleanouts
Pressure cleanouts shall be constructed at the locations shown on the Plans and in accordance to the Standard Plans.

7-09.3(29) Air/Vacuum Valve Assemblies
Air/vacuum valve assemblies shall be installed at the locations shown on the Plans and in accordance to the Standard Plans.

7-09.4 Measurement
Section 7-09.4 is supplemented as follows:

(District April 2020)
Locate stations will be measured per each.

Pressure cleanouts will be measured per each.

Air/Vacuum valve assemblies will be measured per each.

7-09.5 Payment
Section 7-09.5 is supplemented as follows:

(District April 2020)
"_____Sanitary Pressure Main _____In. Diam.", per linear foot.
The unit Contract price per linear foot for each size and kind of "_____Sanitary Pressure Main _____In. Diam." shall be full pay for all Work to complete the installation of the sanitary pressure main including but not limited to trench excavation, bedding, laying and jointing pipe and fittings, backfilling, concrete thrust blocking, joint restraints, testing, pigging, toning wire, marking tape, and cleanup.

"Locate Station", per each.
The unit Contract price for "Locate Station" shall be full pay for all work to furnish and construct the locate station in-place, including but not limited to excavating, backfilling, pipe and fittings, valve box and cover, and cleanup.

"Pressure Cleanout", per each.
The unit Contract price per each for "Pressure Cleanout" shall be full compensation for all work to furnish and construct the cleanout complete in-place, including excavating, backfilling, pipe, cover, plugs, fittings, and connections.

"Air/Vacuum Valve Assembly", per each.
The unit Contract price per each for "Air/Vacuum Valve Assembly" shall be full compensation for all work to furnish and construct the assembly complete in-place, including the manhole, excavating, backfilling, the valve, pipe, cover, plugs, fittings, and connections.

7-17 SANITARY SEWERS

7-17.2 Materials

Section 7-17.2 is supplemented as follows:

(District April 2020)

Toning Wire and Splices	9-05.30(1)
Marker Balls	9-05.30(2)
Locator Station	9-05.30(3)
Polyvinyl Chloride (PVC) Pressure Pipe (4-inches and over)	9-30.1(5)A

Delete all references to Vitrified Clay.

7-17.3 Construction Requirements

Section 7-17.3 is supplemented as follows:

(District April 2020)

Contractor shall maintain sewer service at all times and assume all responsibility for damages resulting from overflows and backups. Contractor shall assume all responsibility for maintenance and operation of the pump station and sewer bypasses from the beginning of construction until operational transfer is completed. Contractor shall submit a sewerage facility management plan detailing sequencing and means and methods for providing continuous sewerage service.

7-17.3(1) Protection of Existing Sewerage Facilities

Section 7-17.3(1) is supplemented with the following:

(District April 2020)

For all new construction, upon the Contractor connecting to the existing system, the Contractor shall install a plug at the first available manhole where pumping can be done to clean the new line.

Following completion of the corrections required by the Inspector's pre-television punch list, the Contractor shall flush, clean and pump flushing water out of the system in the presence of the Inspector.

At any time during the construction activity, the Inspector may require, at the Contractors expense that the existing sewerage facility be flushed clean and the water be removed from the system in the presence of the inspector. Water shall not enter the existing sanitary sewer system.

For construction on existing facilities, the Contractor is responsible for maintaining sewer service and shall provide, operate, maintain, and respond to a fully redundant temporary bypass pumping system in accordance with 7-17.3(5).

7-17.3(2) Cleaning and Testing

7-17.3(2)A General

Section 7-17.3(2)A is supplemented with the following:

Delete the first paragraph and replace with:

(District April 2020)
Sanitary sewers and appurtenances shall be cleaned and tested by the low-pressure air method after backfilling. The Contractor shall provide a minimum of five (5) working days notice to the District Inspector to schedule testing. The low-pressure air test shall utilize no more than a 0-6-pound gauge and meet requirements of 7-17.3(2)F.

Delete the first two sentences of the second paragraph.

Replace the first two sentences of the fourth paragraph with the following:

(District April 2020)
Testing of side sewers shall be per 7-18.3(3).

7-17.3(2)B Exfiltration Test
Section 7-17.3(2)B is deleted.

7-17.3(2)C Infiltration Test
Section 7-17.3(2)C is deleted.

7-17.3(2)D Other Test Allowances
Section 7-17.3(2)D is deleted.

7-17.3(2)G Deflection Test for Thermoplastic Pipe
The first sentence is revised to read:

(District April 2020)
Sanitary sewers will be required to pass a deflection (5% mandrel) test for all thermoplastic pipe six (6) inches or more in diameter.

7-17.3(2)H Television Inspecting
Section 7-17.3(2)H is supplemented with the following:

The first paragraph is revised to read:

(District April 2020)
All sanitary sewer lines shall be inspected by the use of a closed-circuit television camera before final acceptance. The TV inspection operator shall be PACP-certified.

Television inspections shall be performed after placement of backfill, base rock, completion of manhole channeling, installation of castings and prior to final paving. The Contractor shall run water through the line to be tested immediately prior to the television testing.

Sags in sewer pipe shall meet the requirements of Section 7-08.3(2)B. The Contractor shall correct any variations that exceed the tolerances in Section 7-08.3(2)B. The Contractor shall remove and replace any pipe with manufacturing defects or damage identified during the television testing at no expense to the Contracting Agency.

The Contractor shall use District manhole identification numbers, when shown on the plans, for the inspection and database files.

The Contractor shall submit a copy of the final video inspections on the District's file sharing site, a portable USB hard disk drives (HDD) or a DVD. To use the file sharing site, the Contractor shall provide e-mail addresses for staff needing access. When requested by the District, the Contractor shall also submit a database for the video inspections. Files shall be

delivered within ten (10) days of the inspection. All video and database products shall meet the following requirements:

1. Functional requirements of the video inspection software:
   a) The software shall be NASSCO PACP-certified (version 7) and conform to its pipeline assessment procedures.
   b) Software shall export to a PACP (MDB) format (version 7).
2. Database structure and requirements:
   a) The Contractor shall use the District's GIS pipe and manhole nomenclature when shown on the plans. Each sewer segment, which extends from node to node, not necessarily from manhole to manhole, as identified on the contract drawings, shall have a separate video file. If field conditions result in multiple videos for a single sewer segment, the videos shall be combined into a single video file for the database.
   b) These videos shall be linked to a single open-architecture database file. The database file must include fields as required by PACP.
   c) All videos linked to the database shall be saved in a subfolder named "Videos" (as opposed to a separate folder for each video).

Acceptance of the inspections shall be based on the Engineer's verification that the quality and format of the video and database (when requested) meets the requirements of the specification and the successful upload of the database file and videos into the District's software.

Section 7-17.3(2) is supplemented with the following new subsection:

(District April 2020)

7-17.3(2)l Cleaning of Existing Sewers

Cleaning of the sewer pipe with high-velocity jetting and vacuum equipment shall be considered minimum. If debris and deposits are not removed with standard high-velocity jetting, other equipment may be necessary to clean the pipe as required by this section. Contractor may propose alternative techniques subject to approval by the Engineer. Heavy debris accumulation may be encountered, and rodding or bucketing is possible.

Contractor shall utilize temporary bypass pumping and flow control as required. The work shall be conducted in a manner that prevents blockage and minimizes surcharging in the sewer structures, connecting pipelines, and service laterals.

In the event of a sanitary sewer overflow or sewer backup resulting from the cleaning and inspection activities, the costs of all fines imposed by the Washington Department of Ecology or other regulatory agencies, cleanup, repair to damaged public and personal property, inconvenience expenses, and any additional direct or indirect expenses shall be the sole responsibility of the Contractor.

Sewer Cleaning

Contractor shall begin cleaning at upstream segments and proceed to downstream segments. No sewer cleaning shall take place in a particular sewer segment until all upstream pipe segments have been cleaned. If cleaning is done in a downstream pipe segment before upstream segments in order to facilitate overall cleaning operations, the segment shall be re-cleaned at no additional cost, after all pipes upstream of that segment have been cleaned, unless the Engineer determines that debris capture at all upstream segments is implemented effectively.

If cleaning of an entire line section cannot be successfully performed from one manhole, the equipment shall be set up at the other manhole and cleaning again attempted. If, again, successful cleaning cannot be performed or the equipment fails to traverse the entire pipe section, Contractor shall notify Engineer before proceeding with any further work in that section of line.

Where bucketing is warranted, bucket machines shall be used to remove the major portion of debris. Bucket operations shall proceed in the upstream direction in one sewer reach at a time. The operation shall continue until the buckets can pass the entire reach with minimum collection of debris. Upon completion, the line shall be hydraulically cleaned.

Contractor shall use winching equipment that does not damage the existing pipeline or manholes.

Remove all roots by suitable mechanical cutting devices or by hydraulic procedures such as with high-pressure jet cleaners. No roots longer than 1/2-inch shall remain following root removal procedures.

Contractor shall remove all grease greater than 1/4-inch in thickness and use suitable hydraulic, chemical, or mechanical cutting devices to remove grease but not damage the existing pipe.

Any sediment or debris from cleaning operations larger than U.S. #8 sieve shall not be deposited downstream in the sewer main. Contractor shall remove all bricks, rocks, debris, sludge, dirt, sand, grease, roots, and other materials from the sewer and manhole and collect and remove the resulting debris from the downstream manholes of the pipeline sections being cleaned. When removing materials from manholes, Contractor shall return the discharge and drainage liquid stream to the downstream sewer for disposal. Contractor is responsible for decanting any excess wastewater back into the sanitary sewer system before transporting the solid waste to the District's facilities or disposal sites. The decanted liquid stream must contain less than 1 percent solids by volume. All solids and semi-solids shall be placed in a container that is certified for transport of this material. Containers shall be watertight so that no spillage or leakage will occur, covered to minimize odors, and disposed of by Contractor. Contractor is responsible for all operations and costs associated with removal, transportation, and disposal of debris collected during the cleaning operations. All trucks shall meet existing roadway weight restrictions and follow existing traffic and speed regulations. Contractor shall keep the work area and haul route neat and clean and shall bear all responsibility for cleanup of any spill that occurs during the loading and transport of the sewer cleaning debris to and from the disposal site.

Passing of material larger than US #8 sieve from the sewer segment(s) to be cleaned to downstream segments shall not be permitted. In the event that sludge, dirt, sand, rocks, grease, mineral deposits, or other solid or semi-solid material or debris resulting from the cleaning operation are observed and/or detected by the District as passing to downstream sewer segment(s), Contractor shall be responsible for cleaning the downstream sewer segments in their entirety at no additional cost to the District.

Where vactor trucks have no direct access to manholes, debris must be removed by other methods, i.e. shovels and buckets.

Under no circumstances shall sewage or solids be dumped onto the ground surface, street, stream, ditches, catch basins, or storm drains. If sewage is spilled, discharged, leaked, or otherwise deposited in the open environment, Contractor shall be responsible for any cleanup and disinfection of the affected area. Contractor shall comply with all local, state, and federal regulatory requirements regarding spills and illegal dumping. Improper disposal of sewage or solids removed from the sewers may subject Contractor to fines imposed by District or other regulatory entities. In addition, Contractor may be subject to civil and/or criminal penalties for improper handling or disposal of removed materials under the law.

Contractor shall be responsible for all application and disposal fees.

Verification of Cleaning
The Contractor shall visually demonstrate results of the cleaning effort by internal video inspection in accordance with the requirements set forth in 7-17.3(2)H. If debris or obstructions exist that prohibit the Work, the Contractor shall re-clean and re-inspect the pipeline segment at no additional cost to the District.

Section 7-17.3 is supplemented with the following new subsections:

(District April 2020)
7-17.3(3) Toning Wire and Splices
Where shown on the Plans, a continuous toning wire shall be attached to the top of the sanitary sewer. The toning shall be continuous between manholes, and enter each manhole and connect to a locator station as shown on the Standard Plans. The toning wire shall be tested for and have continuity prior to acceptance.

7-17.3(4) Marker Balls
Where indicated on the Plans, marker balls shall be installed according to manufacturer's recommendations and according to the following requirements:

- Install marker balls directly above the pipe alignment at a depth no less than 2.5 feet and no more than 3 feet below final surface grade.
- Install marker balls during trench backfill operations by placing the marker ball in compacted backfill. Cover marker ball with a minimum of 6 inches of backfill and compact backfill before continuing trench backfill operations.
- Install marker balls directly above connection points, termination points and all fitting locations, and at a minimum spacing of 50 linear feet on sewers with a straight horizontal alignment.
- Install marker balls on new or reconstructed sewer service laterals, directly above the centerline of the end of the lateral at the curb, property line or other end of lateral location, as directed.
- Install marker balls directly above every alignment change along sewer mains and service laterals.
- Install marker balls directly above manholes with buried covers.

7-17.3(5) Bypass Pumping
Bypass pumping systems shall be installed as needed to maintain sanitary sewer service during construction. Contractor is responsible for bypass pumping each lateral directly connected to pipes being restored or laterals that cannot be bypassed at manholes.

Bypass pipe for uplands and roadways shall be HDPE pipe with quick-connect couplings or a District-approved equal. If the bypass pipe is routed thru environmentally sensitive areas such

as wetlands or if the stormwater system is used for bypass pumping, continuous fused-joint HDPE pipe is required thru the system.

The Contractor shall submit a Bypass Pumping Plan and an Emergency Response Plan for approval. No construction activities may start prior to the Contractor receiving the Engineer's written approval of the bypass pumping plan. A bypass pumping plan is required for each set-up and shall include, at a minimum, the following information:

1. A plan view of the diversion facilities on a site map, including location of pumps, suction and discharge manholes, and layout of discharge piping (may be included as part of the Staging Area Plan).
2. Pump types, sizes, capacities, and placement, for both primary and standby pumps
3. Diversion pipe size and type.
4. Design calculations proving the adequacy of the system and selected equipment
5. Power supplies, including standby power source.
6. Method of damming the flow.
7. Staffing plan including names and telephone numbers of the attendants.
8. Approved traffic control plans for bypass piping, including managing pedestrian and ADA access around bypass lines.

The Emergency Response Plan shall include measures that will be taken in the event of a sanitary sewer overflow. In the event of a sanitary sewer overflow or sewer backup resulting from any construction activity, including but not limited to a failure of the bypass pumping system or damage to an existing sewer, the costs of all fines imposed by the regulatory agencies, cleanup, repair to damaged public and personal property, inconvenience expenses, and any additional direct or indirect expenses shall be the sole responsibility of the Contractor. The Contractor shall immediately contact the District on-call emergency personnel and the District's project inspector if the Contractor experiences a sewer spill or believes that an unexpected circumstance may lead to a pumping system failure and subsequent spill.

Contractor shall conduct the Work to avoid bypass pumping during non-working hours as described in Section 1-08.0(2). The Contractor shall provide continuous monitoring by a designated pump tender during all pumping operations. The pump tender shall have demonstrable ability and knowledge of the pumping system to maintain continuous operation and make repairs and/or pump replacement if required. An emergency spill kit shall be on site at all times. A spill containment pad is required for all gasoline or diesel-powered pumps and/or generators.

7-17.3(5)A Flow Data

See plans for flow data.

7-17.3(5)B Testing

Prior to use, all bypass piping shall be hydrostatically tested to a pressure of 50 pounds per square inch (psi) or twice the maximum operating pressure, whichever is greater. The Contractor shall supply a pumping system of appropriate capacity to manage and convey existing flow conditions, plus additional flows that may occur either during or following wet-weather events.

7-17.3(5)C Backup Pumps and Staging

The Contractor shall maintain a backup pump(s) of equal capacity and configure the pump(s) such that the backup pump(s) is continually connected to the bypass system, operates automatically in the event of a failure of the primary pump(s), and initiates an autodialer call-out to the Contractor upon startup.

7-17.4 Measurement

Section 7-17.4 is supplemented as follows:

(District April 2020)
Trench Safety System and Dewatering will be measured as a separate item per Section 7-08.4.

No specific unit of measurement shall apply to the lump sum item of temporary bypass pumping system.

There will be no separate measurement for toning wire, marker balls, cleaning of sewers, connection to existing sewers, testing, CCTV inspection, and removal of existing pipe and structures to install the sewers as shown in the contract plans.

7-17.5 Payment

Section 7-17.5 is supplemented as follows:

(District April 2020)
"____ Sanitary Sewer Pipe ____ In. Diam.", per linear foot.
The unit Contract price per linear foot for sewer pipe of the kind and size specified shall be full compensation for furnishing, hauling, and assembling in place the completed installation including all bypass pumping, connection to existing sewer lines, removal of existing pipe and structures as required to install the sewers as shown in the contract plans, wyes, tees, special fittings, joint materials, pipe zone and trench zone backfill material, toning wire, marker balls, pipe testing and final, CCTV inspection, and adjustment of inverts to manholes for completion of the installation to the required lines and grades.

"Temporary Bypass Pumping System", lump sum.
The lump sum Contract price for "Sanitary Sewer Bypass Pumping" shall be full compensation for all cost to pump or otherwise divert sewage around the sewerage facilities being rehabilitated, installed, repaired, replaced, or tested. There will be no separate payment for installation of cleanouts that are installed for the purposes of bypass pumping.

There will be no separate payment for cleaning of sanitary sewers.

7-18 SIDE SEWERS

7-18.2 Materials

Section 7-18.2 is supplemented as follows:

(District April 2020)

Toning Wire and Splices	9-05.30(1)
Marker Balls	9-05.30(2)

All fittings shall be rigid.

7-18.3 Construction Requirements

7-18.3(1) General

Section 7-18.3(1) is supplemented as follows:

(District April 2020)

Side sewers shall have a minimum vertical clearance of one (1) foot from storm sewers at all crossings.

Side sewers shall have a minimum horizontal separation from any water service of at least two (2) feet. The side sewer and water service shall be constructed in a separate trench.

Side sewers shall be eighteen (18) inches below any water service or water line for crossings, or be constructed of ductile iron pipe and a full-length pipe centered on the crossing.

Surface water, mud, construction materials or other debris shall not enter the side sewers.

All connections to existing concrete pipe or 6-inch sewer mains shall be installed by the Contractor using a PVC wye and two Fernco fittings.

All connections to existing PVC sewer mains 8-inches in diameter or larger will be made by the District unless otherwise approved by the District. The Contractor shall submit a "Tap Request" form and pay the District fee prior to the District installing the tap. The form and fee information is available at: https://www.crwwd.com/forms/ . The Contractor shall provide a trench with access to the line opening of a minimum of four (4) feet wide and four (4) feet long for the District. The shoring shall extend a minimum of one foot to the backside of the tap and a minimum of three feet to the service side of the tap and fully expose the existing sewer main. The trench shall meet all WISHA requirements. The Contractor shall notify the District a minimum of two (2) working days prior to the Date of Requested Tap.

The Contractor shall protect existing curb to the extent practical. Any damaged curb shall be replaced in accordance to local jurisdiction requirements at no cost to the Contracting Agency.

Where required on the plans, marker balls shall be installed at the end of service connections.

Where new curb is being installed, all side sewer locations shall be indicated on the curb by an imbedded concrete "S" stamped into the face of the curb directly above the side sewer. The stamp shall be a minimum of 3 inches in height.

7-18.3(2) Fittings

Section 7-18.3(2) is supplemented as follows:

(District April 2020)

Transition from DIP laterals within the public right of way to ABS laterals on private property shall be through the use of rigid stainless steel Fernco fitting or approved equal.

7-18.3(3) Testing

Delete second paragraph and replace with:

(District April 2020)

All side sewers constructed in conjunction with the sewer main, for purposes of testing as specified in Section 7-17, shall be capped at the end of the side sewer and be tested with the sewer main. Caps shall be the same material as the pipe and be adequate to meet the test requirements of Section 7-17. PVC or ABS caps shall be glued.

Delete the third paragraph.

7-18.3(4) Extending Side Sewers into Private Property

Section 7-18.3(4) is supplemented as follows:

(District April 2020)
Side sewers shall not be extended beyond the end of the public side sewer until a permit is received from the District and all District fees have been paid.

Side sewers extending into private property shall meet the requirements of the side sewer permit.

The Contractor shall abandon all septic tanks in accordance with state and local codes. The Contractor shall coordinate as needed with the local jurisdiction's health department

Side sewers serving commercial buildings or multifamily developments may be completed and connected to the monitoring manhole or the public side sewer with approval of the Engineer if the monitoring manhole is located within ten (10) feet of the end of the public side sewer. The Contractor shall install a plug in the outlet pipe of the monitoring manhole and the plug shall not be removed until the Inspector accepts the public and private portions of the sanitary sewer system.

7-18.3(5) End Pipe Marker
Section 7-18.3(5) is revised to read:

(District April 2020)
Side sewers must be marked with a 2x4 board. The board shall be ten (10) feet in length when possible. If the board is not ten (10) feet long, the Contractor shall mark the actual length on the board within six (6) inches of the top and on both sides. The toning wire shall be brought to the surface and wrapped securely around the 2x4 board. Each end of the board will be painted green for two (2) feet. All markers shall remain in place until after roads and curbs are constructed and final as built drawings are completed, submitted and accepted by the District. If the pipe end markers are destroyed or removed before as built measurements are completed, Contractor shall expose the end of the side sewer for record drawing measurements and replace the marker.

Section 7-18.3 is supplemented with the following new subsection:

(District April 2020)
7-18.3(6) Toning Wire and Splices
A continuous toning wire shall be attached to the top of the side sewer. A minimum of a two (2) foot coil of wire shall be wrapped around each cleanout or end pipe marker and around the sewer main at the connection point.

7-18.5 Payment
Section 7-18.5 is supplemented as follows:

(District April 2020)
The unit Contract price per linear foot for sewer pipe of the various kind and size specified shall be full pay for all Work required for the completion of the installation including fittings, end pipe marker, marker balls, and toning wire.

7-19 SEWER CLEANOUTS

7-19.2 Material
Add the following to the end of the sentence:

(District April 2020)
"and the Standard Plans"

7-19.3 Construction Requirements

Section 7-19.3 is revised to read:

(District April 2020)
All cleanouts shall have the invert elevation verified and reported to the Engineer prior to backfilling.

All cleanouts shall be extended to grade.

All cleanouts at the property line shall have an electronic marker attached to the cleanout cap. The electronic marker will be furnished by the Inspector.

7-19.5 Payment

Section 7-19.5 is supplemented as follows:

(District April 2020)
"Cleanout ____ In. Diam.", per each
The unit Contract price per each for cleanouts shall be full compensation for furnishing and placing the wye, pipe, pipe bends, pipe plug, castings, collar, concrete pad, toning wire, installation of the District furnished locator marker, and testing as specified herein and as shown on the Standard Plan.

"Sanitary Stub Marker ____ In. Diam.", per each
The unit Contract price per each for stub marker shall be full compensation for furnishing and placing the tee, pipe, pipe bends, pipe plug, castings, collar, concrete pad, toning wire, installation of the District furnished locator marker, and testing as specified herein and as shown on the Standard Plan.

DIVISION 8
MISCELLANEOUS CONSTRUCTION

8-01 EROSION CONTROL AND WATER POLLUTION CONTROL

8-01.4 Measurement
Section 8-01.4 is supplemented as follows:

(District April 2020)
No specific unit of measurement will apply to the lump sum item of "Erosion Control and Water Pollution Control".

8-01.5 Payment
Section 8-01.5 is supplemented as follows:

(District April 2020)
"Erosion Control and Water Pollution Control", lump sum.
The lump sum Contract payment shall be full compensation for maintenance and removal of erosion and water pollution control devices including removal and disposal of sediment, stabilization and rehabilitation of soil disturbed by these activities, and any additional Work deemed necessary by the Engineer to control erosion and water pollution.

8-02 ROADSIDE RESTORATION

8-02.1 Description
Section 8-02.1 is supplemented as follows:

(District April 2020)
This Work consists of in-kind restoration of all disturbed areas between the edge of pavement or curb, and the limits of construction.

8-02.4 Measurement
Section 8-02.4 is revised to read:

(District April 2020)
When the Bid Proposal contains the item "Roadside Restoration" there will be no measurement of unit items for Work defined in Section 8-02.

No specific unit of measurement will apply to the lump sum item of "Roadside Restoration."

8-02.5 Payment
Section 8-02.5 is revised to read:

(District April 2020)
"Roadside Restoration", lump sum.
The lump sum Contract payment shall be full compensation for all costs incurred by the Contractor in performing the Contract Work defined in Section 8-02.

DIVISION 9
MATERIALS

9-04 JOINT SEALING MATERIALS

Section 9-04 supplemented with the following new sections:

(District April 2020)

9-04.13 Manhole External Seals

Manhole external seals shall be NPC External Joint Seal (seven and one-half (7.5) inch width), Cretex Wrap as manufactured by Cretex Specialty Products, Boa-Tape (twelve (12) inch width) by GPT, or approved equal.

External joint seal shall meet the requirements of ASTM C923-02 or C877. Any metal components shall be 316 stainless steel.

9-04.14 Manhole Boots

Manhole boots shall be NPC Kor-N-Seal 106 Series or 206 Series pipe-to-manhole connector, Press-Seal Gasket Corporation PSX Direct Drive Flexible Pipe-to-Structure Connectors, or approved equal.

Manhole boots shall be meet the requirements of ASTM C923 consisting of a flexible rubber seal and stainless-steel compression and expander bands with take-up assemblies.

9-04.15 Penetration Seals

Penetrations seals shall be modular, mechanical seals, consisting of rubber links. The links shall be shaped to continuously fill the annular space between the pipe and the wall opening. Penetration seals shall be PSI-Thunderline/ Link-Seal® Modular Seal as manufactured by Pipeline Seal & Insulator, Inc., Houston, TX, or approved equal.

9-04.16 Joint Sealant

Joint sealant shall be a rubber-based flexible rope gasketing material meeting requirements of ASTM C990 and AASHTO M-198. The sealant shall be temperature stable and be suitable for pipes, manholes, and underground vaults. Sealants shall be Kent Seal Butyl Sealant manufactured by Hamilton Kent, CS-102 Butyl Rubber Sealant by Conseal, by or approved equal.

9-04.17 Manhole Marker

Manhole markers shall be a triangular post with a colored cap. The marker shall be UV stable and be mounted on a secured post. The marker shall be white in color with a green sticker that identifies the utility as “SEWER”. Marker shall be TriView by Rhinomarkers or approved equal.

9-05 DRAINAGE STRUCTURES AND CULVERTS

9-05.12(1) Solid Wall PVC Culvert Pipe, Solid Wall PVC Storm Sewer Pipe, and Solid Wall PVC Sanitary Sewer Pipe

Section 9-05.12(1) is supplemented with the following:

(District April 2020)

All sanitary sewer pipe shall be green in color.

For pipe sizes up to 15 inches: ASTM D 3034 SDR 35.

For pipe sizes under 6 inches the following may be used: ASTM D 3034 SDR 35 or Schedule 40 conforming to ASTM D1785 specifications. Solvent weld socket type fittings shall be PVC Schedule 40 conforming to ASTM D2466 specifications. Threaded fittings shall be PVC Schedule 80 conforming to ASTM D2464 specifications. Solvent cement joints shall be made in a two-step process using primer manufactured for thermoplastic piping systems and solvent cement conforming to ASTM D 2564.

9-05.14 ABS Composite Sewer Pipe

Section 9-05.14 is supplemented with the following:

(District April 2020)
This material shall not be used in District projects unless shown on the plans.

9-05.15(1) Manhole Ring and Cover

Section 9-05.15(1) is supplemented with the following:

(District April 2020)
All manhole rings and covers shall be as specified on the Plans.

All hardware for locking manhole covers and watertight covers shall be made from stainless steel meeting the Specifications of ASTM A 304.

Locking and watertight covers shall accommodate standard manhole vacuum testing equipment.

Composite lids, when specified on the Plans, shall be made of fiber reinforced polymer and be rated for H20 loading. The manhole shall have a 24” diameter clear opening with two paddle locks. The manhole cover shall be the 2600 series frame and cover assembly manufactured by EJ or approved equal.

Section 9-05 is supplemented with the following subsections:

(District April 2020)
9-05.15(4) Manhole Inflow Dishes

Manhole inflow dishes shall be manufactured from a durable High-Density Polyethylene Copolymer material that meets ASTM D-1248 Class A, Category 5, Type III Specification. The material shall have a minimum impact brittleness temperature of 180 degrees Fahrenheit in accordance with ASTM D 746-70.

Manhole inflow dishes shall be a uniform 1/8" in thickness.

The manhole inflow dishes shall be manufactured to fit the manhole frames they are to be installed in.

Two 3/16” holes shall be installed 180 degrees apart and approximately 1” from the top of the insert.

Manhole inflow dishes shall be Style B Cretex Inflow Dish by Cretex Specialty Products or approved equal.

9-05.15(4)A Vented Manhole Inflow Dishes

Vented manhole inflow dishes shall be meet the requirements of Section 9-05.15((4) for manhole inflow dishes. Vents shall consist of a valve or valves manufactured of a Polypropylene Ethylene compound that are corrosion and wear resistant. The valve or valves shall be designed to release gas pressure at approximately 1 psi, and vacuum pressure at approximately 2 psi. The inflow dish valve(s) material shall be unaffected by temperatures within a range of –70 to 350 degrees Fahrenheit. The valve shall be the diffuser valve by Cretex Specialty Products or approved equal.

9-05.30 Vacant

Section 9-05.30 including the title is revised to read:

(District April 2020)

9-05.30 Locate Devices

9-05.30(1) Toning Wire and Splices

(District April 2020)

Toning wire shall be coated #12 HMWPE coated solid copper toning wire manufactured by Kris-Tech Wire or approved equal.

All splices will be made using a Direct Bury Splice Kit 600 Volts by 3M or approved equal.

9-05.30(2) Marker Balls

(District April 2020)

Marker balls shall be Omni Marker Model 162, or approved equal. Marker balls shall:

- Be green in color,
- Maximum 4.5 inches in diameter,
- Made with exterior material of HDPE,
- Be locatable with standard electronic marker locating devices at a depth up to 5 feet,
- Produce a spherical RF field regardless of orientation, and
- Contain no floating or movable parts, and no batteries or active components.

9-05.30(3) Locator Station

(District April 2020)

Locator stations shall be Single (5 lead) FlangeFink® locator stations manufactured by Cott Manufacturing or approved equal. Locator station shall be Lexan® polycarbonate, green in color, with terminals suitable for #12 AWG leads. Use single (2 lead) locator stations with two terminals, one for ground wire and one for toning wire, when only one toning wire is terminated in manhole. Use multi-lead locator stations with the appropriate number of terminals when 2 or more toning wire leads are terminated in manhole.

9-05.40 Vacant

Section 9-05.40 including the title is revised to read:

(District April 2020)

9-05.40 Inside Drop Manhole Assemblies

The inside drop assembly shall be fabricated from marine grade fiberglass and be provided with 316 stainless steel clamping pipe supports, nuts, and bolts. Inside drop bowl shall be Reliner Inside Drop Bowl, by Reliner/Duran Inc. or approved equal. Hoods shall not be supplied unless shown on the plans.

9-05.50 Precast Concrete Drainage Structures

9-05.50(1) Fabrication Tolerances and Requirements

Section 9-05.50(1) is supplemented with the following:

(District April 2020)

The manufacturing plant for precast concrete units shall be certified by the Precast/Prestressed Concrete Institute's Plant Certification Program for the type of precast member to be produced, or the National Precast Concrete Association's Plant Certification Program or be an International Congress Building Officials or International Code Council Evaluation Services recognized fabricator of structural precast concrete products, and shall be approved by WSDOT as a Certified Precast Concrete Fabricator prior to the start of production.

Precast units shall be certified by the manufacturer prior to shipment that all materials conform to WSDOT and District specifications. The Contractor shall provide the District with the manufacturer's certification.

9-05.50(6) Vacant

Section 9-05.50(6) including the title is revised to read:

(District April 2020)

9-05.50(6) Precast Concrete Wet Wells

Precast concrete wet wells shall meet the requirements of ASTM 478 for precast reinforced concrete manhole sections. Concrete shall be Class 4000 minimum.

The Contractor shall provide shop drawings for all components, including the concrete wet well, lid, and access hatch conforming to the dimensions shown on the plans. The shop drawings shall show placement of reinforcing steel, knock outs, hatch placement, drain location, and any other appurtenances.

The wall thickness shall be a minimum of 9 inches and shall include steel reinforcement conforming to ASTM A-706. The precast top slab shall be H-20 rated.

The barrel sections of the wet well shall be linked with a single offset joint with a butyl rubber joint sealant. A minimum of two rows of the joint sealant shall be installed around the full circumference of the barrel sections. The joint sealant shall cover the surface of the annular space of the joint and shall be installed per manufacturer recommendations.

All hardware inside the wet well shall be 316 stainless steel.

The pump discharge bases shall be poured into the wet well base section at the time of fabrication to provide a complete and integrated installation.

9-05.50(7) Vacant

Section 9-05.50(7) including the title is revised to read:

(District April 2020)

9-05.50(7) Precast Valve Vaults

The Contractor shall provide shop drawings for all components, including the concrete box, lid, and access hatch conforming to the dimensions shown on the plans. The shop drawings shall show placement of reinforcing steel, knock outs, hatch placement, drain location, and any other appurtenances.

Precast valve vaults shall conform to the following:

Concrete	Section 6-02
Reinforcing Steel	Section 9-07
Loading	AASHTO H-20, ASTM C-857, ASTM C-858, or as shown on the Plans
Lid	Section 9-05(15)5
Bolts, Nuts, Washers	ASTM F 593 or A 193, type 304 or 316
Ladder	Permanently mounted, telescoping, galvanized, installed as shown on the Standard Drawing and meeting WISHA specifications
Penetrations	Core drilled
Floor	Floor shall be sloped minimum 2% to floor drain

Exterior surfaces of the concrete vault shall have an external damp proof coating per Section 9-08.9.

9-05.50(8) Vacant

Section 9-05.50(8) including the title is revised to read:

(District April 2020)

9-05.50(8) Access Hatches

Access hatches shall be fabricated aluminum to support an H-20 wheel load with a maximum deflection of 1/150th of the span. Door size shall be as shown on the plans. A non-slip coating meeting ADA and OSHA requirements are required for access hatches in pedestrian travel-ways.

Doors shall be of ¼" aluminum diamond plate and capable of transferring the load bearing to the ¼" extruded aluminum channel frame that has a 1-1/4" anchor flange around the perimeter, and is equipped with a neoprene gasket for a weather tight seal and side bottom outlet 1 ½" aluminum IPS threaded drain coupling outlet integrated into the frame. Panel springs shall be enclosed in telescopic stainless-steel tubes which makes the movement of the hatch cover easy, smooth and controlled through both opening and closing. When the door leaf is opened in a vertical position, it shall automatically lock into place with a hold open arm that has a release handle.

The door shall be equipped with heavy stainless-steel hinges and pivots. The door latches shall shut with a stainless-steel snap lock equipped with lock hasp. Hardware used on all hatch covers is stainless steel, 300 series. Factory finish is a mill finish.

Hatches for the wet well and valve vault shall include an aluminum safety grate system designed to combine covering of the opening, fall through protection per OSHA standard 1910.23, and controlled confined space entry per OSHA standard 1910.146. Design must

assure that the fall through protection is in place before the doors can be closed, thereby protecting the next operator. Each grate shall be provided with a permanent hinging system, which will lock the grate in the 90-degree position once opened. The grate shall be able to operate independently. Each grate shall have a 316 stainless steel opening arm, with a red vinyl grip handle, which will allow opening the grate. The opening arm shall also be equipped with a controlled confined space entry lock. Grate shall be coated with an OSHA type safety orange color. The aluminum safety grates shall receive a two-coat powder coat system, applied by the electrostatic spray process.

Access hatches for use on wet wells shall be able to accommodate Flygt pump guide brackets, lifting chain, and cable hook accessories.

The hatch shall be equipped with a drain coupling that collects water from the channel of the frame and diverts it away from the hatch structure.

Hatches shall be manufactured by East Jordan Iron Works or approved equal.

Section 9-05 is supplemented with the following new subsections:

(District April 2020)

9-05.60 Chimney Seals

Manhole chimney seals shall be designed to prevent leakage of water and seal the existing manhole coating system at the chimney. The seal shall have an internal flexible rubber sleeve and extension(s) where necessary and expansion bands. The flexible rubber sleeve and extensions shall be extruded or molded from a high-grade rubber compound conforming to the applicable material requirements of ASTM C-923, with a minimum 1500 psi tensile strength, maximum 18 percent compression set and a hardness (durometer) of 48±5. The rubber sleeve shall be double, triple or quadruple pleated with a minimum unexpanded vertical height of 8 inches, 10 inches or 13 inches respectively and a minimum thickness of 3/16 inches. The top and bottom section of the sleeve that compresses against the manhole frame casting and the chimney/cone shall have an integrally formed expansion band recess and a series of sealing fins to facilitate a watertight seal. These sealing fins shall have teardrop holes or air pockets to allow the sealing area to conform to minor surface irregularities that may be encountered. The top section of the extension shall have a minimum thickness of 3/32 inches and shall be shaped to fit into the bottom band recess of the sleeve under the bottom chimney seal band and the remainder of the extension shall have a minimum thickness of 3/16 inches. The bottom section of the extension shall contain an integrally formed expansion band recess and multiple sealing fins matching that of the rubber sleeve. Any splice used to fabricate the sleeve and extension shall be hot vulcanized and have a strength such that the sleeve shall withstand a 180-degree bend with no visible separation. The expansion bands used to compress the sleeve against the manhole shall be integrally formed from 16-gauge stainless steel conforming to the applicable material requirements of ASTM C-923, Type 304, with no welded attachments and shall have a minimum width of 1-3/4 inches. The bands shall have a minimum adjustment range of 2-1/2 diameter inches and the mechanism used to expand the band shall have the capacity to develop the pressures necessary to make a watertight seal. The band shall be permanently held in place with a positive locking mechanism which secures the band in its expanded position after tightening.

An acceptable product is Internal Chimney Seal by Cretex Specialty Products or approved equal.

9-05.70 Polypropylene Grade Rings

Expanded Polypropylene (EPP) grade rings shall conform to ASTM D-3575 and have a traffic rating compliant with AASTHO M-306 H-20, HS-20, H-25 and HS-25. EPP grade rings shall be available in ¼" height increments from ¾" to 2 ½" and in 4" and 6" heights. The rings shall be manufactured using a high compression molding process.

An acceptable product is Pro-Ring by Cretex Specialty Products or approved equal.

An adhesive or sealant approved by the grade ring manufacturer shall be used for all installations. The sealant shall meet the requirements of ASTM C920, Type S, Grade NS, Class 25, Uses NT, T, M, G, A, and O.

9-05.80 Adjustable Pipe Saddle Support

Adjustable pipe saddle support shall be 316 stainless steel. Adjustment shall be made by turning the locknut nipple and shall support pipes 2-1/2" through 36". The pipe support shall be Figure 264 by Anvil or approved equal.

9-05.90 Odor Control Manhole Insert

Odor control manhole inserts shall be polyethylene and have a canister with a capacity for 20 pounds of activated carbon. The insert shall have a one-way valve that allows water to drain but no air to pass through. Odor control manhole inserts shall be Odoreater Manhole Inserts by Parson Environmental or approved equal.

9-08 PAINTS AND RELATED MATERIALS

Section 9-08 is supplemented with the following new subsection:

(District April 2020)

9-08.9 Pump Station Coating and Finishes

9-08.9(1) General

Item	Coating System	Minimum Coating Requirements
Ductile Iron Pipe and Fittings – Non buried	Epoxy Coating (9-08.9(2))	2 Coats, DFT : 6-9
Wet Well	Manhole Coating (9-26.4)	Per 7-05.3(6)
Vault(s)	Concrete Damp Proofing (9-08.9(3)	2 Coats, DFT: 8-16
Untreated Wood	Wood Primer (9-08.9(3)A) Acrylic Paint (9-08.9(3)B)	1 Coat, DFT: 2.3 1 Coat, DFT: 2-4

The Contractor shall submit the following for all products:

1. Product data sheet
2. Manufacturer surface preparation requirements

The Contractor shall be responsible for ensuring the primer and coating systems are compatible. Primer that is not compatible with the coating system shall be removed and surface prepared in accordance with the coating system manufacturer guidelines.

The Contractor shall be responsible for ensuring the manufacturers guidelines for surface preparation is adhered to.

9-08.9(2) Pipe Epoxy Coating

The epoxy coating shall be a high solids epoxy phenalkamine appropriate for immersion and atmospheric service. The epoxy shall be an anti-corrosive coating that is self-priming and tolerant to damp surfaces. Epoxy shall be gray in color and be the N11A00450 Seaguard 6100 by Sherwin Williams or approved equal.

9-08.9(3) Concrete Damp Proofing

The epoxy shall be a black polyamide epoxy meeting requirements of AWWA C-210. The epoxy shall be B36B00060 Targuard Coal Tar Epoxy by Sherwin Williams or approved equal.

9-08.9(4) Wood Exterior

9-08.9(4)A Wood Primer

The primer shall be white in color and be designed to protect the wood from tannin, water, and other stains and shall resist mildew. The primer shall be Y21W08020 Exterior Oil-Based Wood Primer by Sherwin Williams or approved equal.

9-08.9(4)B Acrylic Paint

The paint shall be 100% acrylic designed for interior and exterior applications and be chemical resistant and flash rust/early rust resistant. The paint shall be B66W01661 Pro Industrial Acrylic, color: SW6927 Greenbelt, by Sherwin Williams or approved equal.

9-15 IRRIGATION SYSTEM

9-15.18 Detectable Marking Tape

Section 9-15.18 is supplemented with the following:

(District April 2020)

Detectable marking tape for sanitary sewer shall be a continuous, reflective, three (3) inch wide, green, six (6) mil thick, and marked every three (3) feet with “CAUTION BURIED PRESSURE SEWER BELOW”.

9-16 FENCE AND GUARDRAIL

9-16.1 Chain Link Fence and Gates

9-16.1(1) General

Section 9-16.1(1) is supplemented as follows:

(District April 2020)

The chain link fabric, tie wires, and hog rings shall black PVC coated per ASTM F668 Class 2b (Fused and adhered to metallic coated steel wire).

9-16.1(1)A Post Material for Chain Link Fence

Section 9-16.1(1)A is supplemented as follows:

(District April 2020)

Posts shall be round.

Fence posts, rails, gates, and hardware shall be powder coated black in accordance with Section 6-07 of the Standard Specifications.

9-26 EPOXY RESINS

Section 9-26 supplemented with the following new sections:

(District April 2020)

9-26.4 Manhole Coating

9-26.4(1) General

This section covers the protective coatings for concrete structures. Coat concrete walls and base/invert for the concrete manholes or other structures with Raven 405 epoxy lining, or approved equal.

9-26.4(2) Coating System

Interior Concrete Surface Coatings shall consist of the following:

1. Epoxy Lining:

   RAVEN LINING SYSTEMS= 405 epoxy coating system.

Product type	Amine cured epoxy
Color	(to be selected)
Solids Content (vol %)	100
Mix Ratio	3:1
Compressive Strength, psi	12,000 ASTM D695
Tensile Strength, psi	6,500 ASTM D638
Tensile Elongation. Va	1.53% ASTM D638
Flexural Modulus, psi	12,000 ASTM D695
Hardness, Type D	80 ASTM D2240
Bond Strength - Concrete	Greater than Tensile Strength of Concrete, (achieved by a pull test)

2. Protective Coating Application Equipment: Manufacturer approved heated plural component spray equipment shall be used in the application of the specified protective coating.

9-26.5 Corrosion Inhibitor for Reinforced Steel

The corrosion inhibitor shall be a water-based epoxy resin, anti-corrosion coating and bonding agent such as Armatec 110 EpoCem, manufactured by the Sika Corporation, or approved equal.

9-26.6 Fillers, Patching, and Resurfacing Materials (less than 0.125 inches)

1. Epoxy fillers and patching material shall be used to fill in bugholes, spalled concrete, smooth deteriorated concrete surfaces less than 0.125 inches (less than 1/8 inch). Epoxy fillers and patching material shall also be used to restore deteriorated concrete exposing reinforcing bars (rebars) and/or areas deemed a structural concern, areas of high humidity and moisture (moisture in concrete above 90 percent) and areas where concrete cannot be dried, or stay dry, long enough for topcoating.
2. Material must have excellent moisture tolerance and be able to adhere to wet concrete.
3. Material must be able to be a stand-alone system in the event that limitations of certain environments prevent the ability to topcoat. Therefore, filler and patching material must be

able to withstand wastewater environments with similar chemical resistance expected of an epoxy topcoat.

4. Filler and patching material must be compatible with other specified and approved repair coating material and final topcoat epoxy coating.
5. Specified materials shall be Epoxytec CPP Gel (#C311) by Epoxytec International, Inc., or approved equal.

9-30 WATER DISTRIBUTION MATERIALS

9-30.1(1) Ductile Iron Pipe

Section 9-30.1(1) is supplemented with the following:

(District April 2020)
The exterior pipe coating for buried pipe shall be the standard bitumastic coating.

The exterior pipe coating for non-buried pipe shall be per Section 9-08.9. The Contractor shall confirm that the primer and topcoat materials are compatible.

9-30.1(5) Polyvinyl Chloride (PVC)

9-30.1(5)A Polyvinyl Chloride (PVC) Pipe (4 Inches and Over)

Section 9-30.1(5)A is supplemented with the following:

(District April 2020)
All sanitary sewer pipe shall be green in color and have a minimum Dimensional Ratio (DR) of 18 (Pressure Class 235).

9-30.1(6) Polyvinyl Chloride (PVC) Pipe (4 Inches and Over)

Section 9-30.1(6) is supplemented with the following:

(District April 2020)
PE pressure pipe for sanitary sewer pipe shall meet the requirements of ANSI/AWWA C906. Pipe materials shall be high-density polyethylene PE3408 conforming to a minimum cell class 345434C in accordance with ASTM D3350. Pipe diameter shall be iron pipe size in accordance with Table 3 and Table 4 of ANSI/AWWA C906. Pipe pressure class shall be as listed in Table 5 of ANSI/AWWA C906 for DR 17 PE 3408 material.

Sanitary sewer pipe color identification to identify pipe service is required. Stripes or colored exterior pipe product shall be green for wastewater/sewage.

9-30.2 Fittings

9-30.2(1) Ductile Iron Pipe

Section 9-30.2(1) is supplemented with the following:

(District April 2020)
Ductile iron fittings in non-buried applications shall be coated per Section 9-08.9.

9-30.2(5) Polyvinyl Chloride (PVC) Pipe

Section 9-30.2(5) is revised to read the following:

(District April 2020)
PVC fittings shall have a minimum DR of 18 and meet requirements of AWWA C900.

9-30.2(6) Restrained Joints
Section 9-30.2(6) is supplemented with the following:

(District April 2020)
Restraint for mechanical joints in AWWA C900 PVC pipe systems shall consist of the following: The restraint shall be manufactured of ductile iron conforming to ASTM A536. A split serrated ring shall be used to grip the pipe in conjunction with a sufficient number of bolts connecting the serrated restraint to the joint. The combination shall have a minimum working pressure rating equivalent to the pipe. The restraint devices shall be coated with MEGA-BOND (For complete specifications on MEGA-BOND visit www.ebaa.com.). The restraint shall be the Series 15MJ00, as manufactured by EBAA Iron, Inc., or approved equal.

Restraint for PVC pipe bell (AWWA C900) shall consist of the following: The restraint shall be manufactured of ductile iron conforming to ASTM A536. The restraint devices shall be coated using MEGA-BOND. A split ring shall be used behind the pipe bell. A serrated ring shall be used to grip the pipe, and a sufficient number of bolts shall be used to connect the bell ring and the gripping ring. The combination shall have a minimum working pressure rating equivalent to the pipe. The restraint shall be the Series 1500TD, as manufactured by EBAA Iron, Inc., or approved equal.

Restrained flange adapters for transitions between flanged fittings and plain end pipe shall be made of ductile iron conforming to ASTM A536 and have flange bolt circles that are compatible with ANSI/AWWA C110/A21.10. The restraint shall consist of gripping wedges and be capable of deflection during assembly. The restraint shall be coated with MEGA-BOND. The flange adapter shall be the Series 2100 Megaflange adapter, as manufactured by EBAA Iron, Inc., or approved equal.

Restraint for PVC pipe at PVC fittings shall consist of the following: The restraint shall be manufactured of ductile iron conforming to ASTM A536. The restraint device shall be coated using MEGA-BOND. A split ring shall be utilized on the PVC fitting bell. A serrated ring shall be used to grip the spigot end of the pipe, and a sufficient number of bolts shall be used to connect the bell ring and the gripping ring. The combination shall have a minimum working pressure rating equivalent to the pipe. The restraint shall be the Series 2500, as manufactured by EBAA Iron, Inc., or approved equal.

9-30.3(1) Gate Valves (3 to 16 inches)
Section 9-30.3(1) is supplemented with the following:

(District April 2020)
Gate valves shall be cast iron body with resilient seats with non-rising stems and operators. The valve shall be supplied with a fusion-bonded epoxy coating in accordance with ANSI/AWWA C550.

9-30.3(7) Combination Air Release/Air Vacuum Valves
Section 9-30.3(7) is revised to read:

(District April 2020)

Air Release, Air/Vacuum, and Combination Air valves shall be designed as applicable to operate with sanitary sewage under pressure to permit discharging a surge of air from an empty line when filling, relieve the vacuum when draining the system, and/or release an accumulation of air when the system is under pressure. This shall be accomplished in a single valve body.

Air Release, Air/Vacuum, and Combination Air valves shall be ARI D-025 as shown on the plans, or approved equal.

Section 9-30.3 is supplemented with the following new sections:

(District April 2020)

9-30.3(9) Check Valves

Check valves shall be cast iron bodied, swing disc type with bronze resilient seat and with external SS spring and weight and lever with an access port for seat replacement. Check valves shall conform to AWWA C508. The valve shall be supplied with a fusion-bonded epoxy coating in accordance with ANSI/AWWA C550.

9-30.3(10) Duckbill Valves

Duckbill valves shall be made of Neoprene and shall be slip-on type. The Duckbill valve shall be supplied with stainless steel clamps to secure it to the pipe. Duckbill valves shall be a Series CPO as manufactured by Elasto-Valve Rubber Products Inc. or approved equal.

(District April 2020)

Division 9 is supplemented with the following new section:

9-50 SEWAGE PUMPS, CONTROLS, AND GENERATORS

9-50.1 Sewage Pumps

9-50.1(1) General

Sewage pumps shall be centrifugal, submersible, vertical shaft, close-coupled, nonclog Flygt N-pumps suitable for pumping raw unscreened sewage. One pump shall be fitted with a Mix-Flush valve. The Mix-Flush valve shall be hydraulically operated to automatically close after a specified time that is integral to the pump volute. One spare pump with cables and a meltric plug shall be supplied to the District for future use. Each installed pump shall be supplied with discharge elbows, 316 stainless steel guide rails and brackets, a minimum of two 316 stainless steel guide rail supports for each pump, power and control cables, 316 stainless steel lifting chain, rope leader for each lifting chain, lifting accessories, controls and accessories by the pump manufacturer. All material and equipment incorporated into the Work shall be new.

9-50.1(2) Warranty

In addition to the general guarantee required elsewhere in the construction documents, the pump manufacturer shall furnish the Owner with a written warranty to cover the pumps, motors, guide and lift systems, and power/control cables against defects in workmanship and material for a period of five (5) years from substantial completion or 10,000 hours of operation under normal use and service. The pump manufacturer shall pay a prorated portion of the cost of all replacement parts and repair labor from the date of shipment of the pumps. The prorated share shall be 100 percent for the first 18 months or 3,000 hours and progressively reduced over the remaining life of the warranty. Pumps repaired under warranty will be returned to the Owner freight prepaid.

9-50.1(3) Motor
Motors shall be 600-volt rated, 480-volt, unless otherwise approved by the Engineer. The motor shall have a 1.15 service factor, maximum shaft rotation speed of 1800 RPM, and 3 phase 60 Hertz power.

The motor nameplate horsepower rating shall not be exceeded by the pump brake horsepower requirements at any point on the full-speed pump performance curve or corresponding performance curves at reduced speed operation.

9-50.1(4) Status and Monitoring Unit
The pump manufacturer shall supply a control and status monitoring unit, MiniCAS with 11 pin panel mount receptacle (back connecting with rear facing terminals). Unit shall be mounted as shown in the electrical drawings. The Contractor shall coordinate the work between all suppliers to furnish a complete, working pump system.

9-50.1(5) Pump Controls
Drives and control systems shall be supplied under Section 9-50.4.

9-50.1(6) Manufacturer
Pumps shall be Flygt NP series pumps and be as specified on the drawings.

9-50.1(7) Pump Materials
Pump materials and fabrication shall meet Flygt current standards for wastewater pumps. The impeller shall be an N-impeller made of high chrome cast iron.

9-50.1(8) Pump Discharge Connection, Guides and Lifts
Provide rope guide and Spectra rope attached to a stainless-steel chain to extend one foot above the Pump On elevation in the wet well and rope of sufficient length to properly and safely lift pumps from the wet well. Chain shall be six (6) feet in length and have shackles. Shackles shall have a load bearing stamp. Pump lifting eye grip to be provided for each pump. Provide a safety factor of at least four times the weight of the pump unit and equipment being lifted from the sump or the current W.I.S.H.A. code whichever is greater in the design of the lifting rope and chain.

9-50.2 Pressure Gauges
Pressure gauges shall be constructed of type 316 stainless steel, rated to 60 psi; Ashcroft #1009 SW. All pressure gauges shall include a diaphragm seal constructed of type 316 stainless steel; Ashcroft type 315 or approved equal. Minimum gauge size shall be 4-inches.

9-50.3 Flow Meters
Flow meters shall be a flange connection type Toshiba Flow Tube Magmeter Model LF654 “Mount Anywhere” with a PFA lining and Haselloy C equivalent electrodes. Flowmeter structure to be IP67, Nema 4X watertight with an ambient temperature rating of -40 to 140 degrees F and of a size shown on the approved plans. Unit to be provided with flow meter converter, see Section 9-36.3(1), and grounding rings.

Connect factory supplied cables to flow meter using cord grips. Route cables along discharge pipe attached every 18” to pipe. Route cable to wall then up to J-box mounted on wall. Enter Jbox from the top. Use 3M Scotchcast Resin 2123 to pot the terminals on the flow meter per manufacturer specifications.

9-50.3(1) Flow Meter Converter
The flow meter converter shall be as manufactured by Toshiba (part number LF622FAC211E). Provide optional Digital Output #2 (semiconductor contact) for use in providing a flow total pulse output to the PLC. Unit shall be mounted as shown in the electrical drawings.

Configure the output as follows:
Count Rate = 100 gal/pulse
Pulse width = 500 milliseconds

9-50.4 Control Panel

9-50.4(1) Panel Enclosure
The panel enclosure shall be a minimum of thirty-six (36) inches wide by sixty (60) inches tall by sixteen (16) inches deep and be a free standing, lockable, UL-Listed, NEMA 4 enclosure, Hoffman A60H36FLP. The panel shall be provided with a swing kit, Hoffman ANADFK, and custom swing panel overlade with ¼" polycarbonate for finger-safe application. The panel enclosure shall be furnished with all necessary fittings and appurtenances as specified in the Plans, Standard Drawings and these specifications.

The floor stand shall be a Hoffman AFK1216, or approved equal. Anchor bolts shall be zinc coated, one-half (½) inch diameter conforming to ASTM A 307. Nuts shall meet the requirements of AASHTO M 291. Washers shall meet the requirements of ASTM F 844. All anchor hardware shall be zinc coated in conformance to ASTM F2329.

The control panel shall be fitted with metal inner door overlaid with a one-quarter (¼) inch thick, clear polycarbonate layer as a barrier between the operator and all electrical components. The metal door shall have 4 large cut outs per District Standard Drawings.

9-50.4(2) Level Control System

9-50.4(2)A Level Controller
For wet wells 8-feet in diameter or greater, the level controller shall be a panel mountable Hydroranger 200 as manufactured by Siemens Industry, Inc. using an Echomax XPS-15F transducer as manufactured by Milltronics, Inc. to deliver a four (4) to twenty (20) milliampere signal to the PLC.

Transducer cable shall be of sufficient length to reach the control enclosure without being spliced.

9-50.4(2)B Multi-Point Level Probe and Appurtenances
Provide a Multitrode 110V level control relay (MTRA-3), Multitrode 5 channel barrier (MTISB5), and a Multitrode 40" length 10 sensor probe with either 33 feet of cable (1.0/10/10) or 100 feet of cable (1.0/10/30) to provide sufficient length to reach the control enclosure without being spliced. Length of probe shall be the manufacturer's nearest standard size to match the pump down range of wet well but shall be a minimum length of at least 48".

9-50.4(3) Operator Panel
The operator panel shall be a six (6) inch, color, touch screen display, with Ethernet connectivity as manufactured by Automation Direct (part number EA9-T7CL).

9-50.4(4) Ethernet Switch
Provide a 24VDC powered, 5 port RJ45 (copper) Ethernet switch for interconnecting the Radio, Operator panel, PLC, and GFCI/Ethernet Combo unit. Provide all interconnect communication (patch) cables as required. The unit shall be a Phoenix Contact model FL SWITH SFN 5TX (order number 2891152) or approved equal.

9-50.4(5) Thermal/leakage Sensor Relays
The thermal/leakage sensor relays shall be panel mountable Mini CAS 120 relays as manufactured by Flygt.

9-50.4(6) Phase Monitors
The Phase Monitors shall be SYMCOM #201A, or approved equal.

9-50.4(7) Uninterruptible Power Supply (UPS)
The UPS shall be a SmartUPS 750 as manufactured by American Power Conversion Corp, or approved equal.

9-50.4(8) Programmable Logic Controller (PLC)
The PLC shall be Allen Bradley Micrologix V1400 Part #1766-L32AWAA. Expansion cards shall be Allen Bradley Expansion Module 1 1762-IA8 for digital inputs and Expansion Module 1 1762-IF4 for analog inputs.

9-50.4(9) SCADA Radio
The SCADA radio will vary as shown on the drawings and by the pump station location as listed below. The radio shall be installed in the control panel and the antenna shall be mounted as shown on District Standard Drawings.

Clark Regional Wastewater District Service Area - MDS TransNET 900 transceiver as manufactured by General Electric or Calamp Viper SC 400 Ethernet radio. The antenna shall be an MDS model number 97-3194-A13 as manufactured by General Electric for the transet transceiver. The antenna for the viper radio is site specific. District to provide model number.

City of Ridgefield Service Area - Calamp Viper SC 400 Ethernet radio. Verify frequency of unit to be provided with the District, as this is a licensed spectrum unit. The antenna shall be an MDS model number 97-3194-A06 as manufactured by General Electric.

Provide LMR400 coax cabling, surge protector, adapter cables and connectors required for a complete system.

9-50.4(10) Intrinsically Safe Devices
All intrinsically safe devices shall be installed in accordance with applicable section of the NEC. Intrinsically safe wiring shall be separated from non-intrinsically safe wiring by at least 2-inches or by other means acceptable per the NEC. Intrinsically safe wiring must be identified, either by color coding, with light blue jacketed cable, or by tagging, at regular intervals, up to 25 feet. Non-intrinsically safe wiring shall not be connected to intrinsically safe terminations of intrinsically safe devices.

9-50.4(10)A Intrinsically Safe Barriers
Intrinsically safe barriers shall conform to UL-913 or FM-3610 standards as approved by ETL, FM, MSHA, or UL.

1. Provide and install intrinsically safe barriers/relays acceptable for use in Class I, Division 1, Group D, as required or indicated.
2. Provide and install intrinsically safe barriers/relays acceptable for use in Class I, Division 2, Group D, as required or indicated.
3. Intrinsically safe barriers shall meet the following minimum specifications, unless otherwise noted.
    a) Barrier designed to be used with 4-20 ma DC signals.
    b) Solid State construction
    c) DIN rail mounted.
    d) FM approved

9-50.4(10)B Intrinsically Safe Relays

Intrinsically safe relays shall be fixed sensitivity type U/L approved for use with a remote pilot device (dry contact) located in Hazardous (Classified) areas. Supply power shall be 120-volt AC 60 Hz. Final contact rating shall be 10 amperes or better at 120 volts AC

1. Provide and install intrinsically safe barriers/relays acceptable for use in Class I, Division 1, Group C or D, as required or indicated.
2. Provide and install intrinsically safe barriers/relays acceptable for use in Class I, Division 2, Group C or D, as required or indicated.
3. Intrinsically safe barriers shall meet the following minimum specifications, unless otherwise noted.
    a) 2-channels w/selectable or form C output
    b) DIN rail mounted.
    c) FM approved

9-50.4(11) Control Transformer

Provide a 3KVA open style industrial control transformer with a 480-240V primary and 120-240V secondary for providing 120V control and distribution power for the control panel. The unit shall be UL approved and have molded terminal block connections with finger guard option.

9-50.4(12) GFCI/Ethernet Combo Port

Provide a front panel mounted combination GFCI unit with an Ethernet RJ45 (copper) port for programming interface of Ethernet devices. The unit shall be a Hubbell PR205E or approved equal.

9-50.4(13) Relays

General purpose relays shall be IDEC RH series or approved equal, with coil voltages and contact configuration as required. Relays are to be provided with the corresponding bases.

Example – single pole double throw 24 VDC coil: RH1B-UDC24V

9-50.4(14) Voltage Transducers

Voltage transducers required to provide an analog input to the PLC that corresponds to DC process variable such as a generator starter battery voltage shall be Phoenix Contact model MCR-VDC-UI-B-DC (order number 2811116) or approved equal.

9-50.4(15) Surge Protectors

Surge protectors shall be Square D model # SDSA3650D or approved equal.

9-50.4(16) Motor Starters (Contactors)

Motor Starter Contactors shall be NEMA rated for the specific motor size being served or larger. The motor starter shall be equipped with a Siemens ESP 200 solid state overload relays.

9-50.4(17) DC power supplies
DC power supplies shall operate on 85 to 264 VAC input and shall provide 3.5 amps of output at 24 VDC. Units shall be Phoenix Contact model QUINT-PS/1AC/24VDC/3.5 (order number 2866747) or approved equal.

9-50.4(18) Current Sensor
Current sensors shall be a split core unit with selectable amperage range and 4-20mA output required to provide an analog input to the PLC that corresponds to pump motor current. Unit shall be a Veris Industries H921 or approved equal.

9-50.5 Pressure Transmitters
Pressure Transmitters shall be NOSHOK model 621-100-1-1-2-6-ORF or approved equal.

9-50.6 Check Valve Limit Switches
Limit switches shall be Automation Direct item # ABP1H71Z11 with stainless steel rod actuator or approved equal.

9-50.7 Light Fixtures
Shelter area light fixture shall be Teddico VPXG11CG or approved equal. Fixture shall be a box mounted jelly jar style with a polycarbonate or acrylic lens and wire basket style outer protection.

9-50.8 Pump Disconnect Plugs and Receptacles
Pump disconnect plugs and receptacles shall be Meltric DS series with current and HP ratings as required.

Plugs and receptacles shall have adequate accessory connections to accommodate the pump seal fail and over temp signals. Breakers shall have the ability to be locked out.

9-50.9 Cable Seals
All manufacturer power and control cables entering the pump disconnect panel shall be sealed using an acceptable cable sealing system. Cable seals shall be Appleton Protex 2000 or approved equivalent. Verify with local Authority Having Jurisdiction (AHJ) if cable seals are required.

9-50.10 Transfer Switches
Transfer Switches shall be ASCO Series 300 or approved equivalent with a programmable exercise timer, strip heater and position indicator contacts. The transfer switch shall include a portable generator receptacle, installed on the bottom of the enclosure. The receptacle shall be as manufactured by Appleton Electric and shall be Powertite series receptacle sized for the proper amperage. The receptacle shall have a lockable spring cover.

9-50.11 Kiosk Roof
The metal roofing shall be constructed of steel conforming to ASTM A-792 Grade C, minimum yield 43,500 psi, and minimum thickness of 26 gauge. The exterior finish shall include a 0.2 mil minimum thickness, corrosion resistant primer and a 0.8 mil minimum thick finish coat of Polyvinylidene Fluoride (PVF2), full 70% Kynar 500/Hylar 5000 for a total minimum thickness

of 1.0 mil dry film thickness. Color shall be Dark Sage equal to Garland Company Standard Color #188. The manufacturer shall furnish a 20-year written guarantee against failure of the finish.

9-50.12 Generator Set

The generator set and controls shall conform to NEMA (National Electrical Manufacturers' Association), National Electric Code (NEC), and American National Standards Institute (ANSI) and other local standards and codes that may apply.

The engine generator shall:

1. Be diesel powered.
2. Have adequate fuel storage to operate for at least twenty-four (24) hours continuous operation.
3. Be sized to operate all pumps simultaneously, controls, and all ancillary equipment required to operate the sewage pump station.
4. Be hard wired with auto function on demand.
5. Be located in a NEMA rated, water-tight enclosure.
6. Include a battery charger with remote alarm outputs and block heater.
7. Have all necessary controls and diagnostics to operate the system.
8. At a minimum, provide for the digital readout of AC volts, AC amperes, frequency and a continuous display of engine vitals, and running time.
9. Have safety shutdowns for over-cranking, over-speed, low oil pressure and high-water temperature.
10. Be within an enclosure and muffled such that it shall not produce over sixty-eight (68) decibels at twenty (20) feet from the engine generator.
11. Be anchored to the pad to conform to a plan designed by a licensed structural engineer.
12. The Contractor shall provide the District with sizing calculations and specifications for written approval.

9-50.12(1) Generator Receptacle

The Generator receptacle shall be as manufactured by Appleton or approved equal.

100 Amp Service:

- Cord Cap - # ACP1044CDRS
- Receptacle with angled back box - #ADJA1044RS

200 Amp Service

- Cord Cap - # AP20044CDRS
- Receptacle with angled back box - #ADJAR20044RS

9-50.13 Antenna Tower

Antenna towers shall be a commercial-grade fiberglass pole constructed of thermoset polyester resin containing type "E" fiberglass. The surface of the shaft shall be smooth and consist of a saturated polyester surfacing veil of 18-20 mils minimum thickness and a 10 mil resin layer. The resin shall contain UV inhibitor and pigment throughout. The pole shall extend 40 feet above grade and be black in color with a smooth glossy finish. The pole shall be designed to be embedded directly into the ground and come with a 10-year warranty. The pole shall be manufactured by Lightmart, part number 40FRTEDB, or approved equal.

9-50.14 Chemical Feed System
The chemical feed system shall be supplied with the following components.

9-50.14(3)A Tank
The chemical storage tank shall be constructed of Rotationally Molded Black High-Density Cross-Linked Polyethylene (HDXLPE). The tank shall meet the capacity and size requirements specified on the plans. The tank shall be provided with a seismic restraint system stamped by a state of Washington licensed professional engineer.

9-50.14(3)B Chemical Feed System Control Panel
The operation of the Chemical Feed System shall be controlled from a Control Panel. All equipment control switches, pilot lights, controller, etc. and the chemical feed pump shall be housed in this panel.

The control panel enclosure shall be constructed of FRP, be rated NEMA 4X, and be provided with a locking handle.

At a minimum, the control box shall contain the following:

- 24-hour time clocks.
- 12 Amp circuit breaker, 115 volt.
- Ground fault receptacle.
- On/Off switches with LED indicator lights.
- HAND/OFF/AUTO switch.
- PUMP/TIMER mode selection switch.
- Chemical feed pump.
- Cooling fan.
- Dry contact to receive signal from remote source.

All manually operated controls shall be located on a panel behind the enclosure door. The panel shall be outfitted with a main power disconnect located beneath the enclosure.

All control system design, fabrication, and wiring shall conform to the standards of Underwriters Laboratories, National Electrical Code, and any other applicable federal, state, or local codes.

The control box shall be mounted on a custom fabricated Uni-strut stand or an aluminum stand provided by the manufacturer.

9-50.14(3)C Pump
Provide a peristaltic pump meeting the flow rate and pressure requirements shown in the following table. The pump shall include motor, base, sealed bearings, flexible coupling, leak detection, and check valve filters.

Quantity	Adjustable Flow Rate Range (mL/min)	Max Discharge Pressure (psi)
1	5-50	40

The pump shall be self-priming and capable of suction lifts up to seven (7) feet when dry and up to twenty (20) feet when primed. The flow rate of the pump shall be adjustable. A calibration cylinder and valves shall be installed to calibrate the pump feed rates. Pump suction and discharge shall be 3/8" ID polypropylene barbed connection for "T" tubing. A 1-1/2" wye strainer shall be installed.

The metering pump shall be controlled by a three-position HAND/OFF/AUTO switch. When in the AUTO position the pump control method shall be determined by the two position PUMP/TIMER mode selection switch. When in PUMP mode, the chemical metering pump shall run when the pump station sewage pumps are in operation. When in TIMER mode the chemical metering pumps shall be controlled by a timer. The timer shall turn the pump on and off based upon preset time intervals. When in the HAND position the pump shall run, regardless of the preset time interval.

Pump components shall be made of materials compatible with calcium nitrate.

Motor shall be total enclosed 115-volt, 60 Hz, 0.034 HP, single-phase and shall be rated for continuous duty.

9-50.14(3)D Piping & Appurtenances

All suction and discharge piping shall be standard ½", Schedule 80 PVC. All valves, fittings, and connectors shall be Schedule 80 PVC.

All fill line piping shall be 2" Schedule 80 PVC. All fill line valves, fittings, and connectors shall be Schedule 80 PVC.

Fill line shall have a 2" stainless steel male camlock with a 2" plastic female camlock cap.

All chemical feed seals shall be compatible with the chemicals to be used in the regular operation, maintenance, and cleaning of the feed system.

All fittings shall be solvent-welded or threaded.

9-50.14(3)E Level Indication

The level controller shall be a panel mountable Hydroranger 200 as manufactured by Siemens Industry, Inc. using an Echomax XPS-15F transducer as manufactured by Milltronics, Inc. to deliver a four (4) to twenty (20) milliampere signal to the PLC. Transducer cable shall be of sufficient length to reach the control enclosure without being spliced.

9-50.14(4) Quality Assurance and Warranty

The chemical feed control panel shall be listed and labeled as approved by Underwriters Laboratories (UL).

All components of the feed system will be provided by a single manufacturer who shall have sole-source responsibility for the system.

All equipment shall be furnished by a single manufacturer who shall be responsible for the coordination of the system design.

The Manufacturer shall guarantee that the system will perform as described in these Specifications. The Manufacturer shall warrant the system, complete, to be free from defects

in materials or workmanship for a period twelve (12) months from acceptance or eighteen (18) months from shipment, whichever occurs first. The Manufacturer shall repair or provide replacement for any defective components under this warranty. In addition, the chemical storage tank shall be warranted for a period of five (5) years from warranty start date.

(District April 2020)
Division 10 is added as follows:

DIVISION 10
TRENCHLESS TECHNOLOGIES

10-01 JACKING AND BORING

10-01.1 Description
This Work consists of installing pipeline crossings by jacking and boring, and the installation of the sewer main pipe and casing where shown on the Plans.

10-01.1(1) Submittals
Contractor shall provide submittals to the District for review and written approval. Submittals shall include, but are not limited to, the following:

Prior to Start of Jack & Bore Operations

1. Product data on spacers and end cap material
2. Pipe data sheets
3. Jack and Bore Work Plan
4. Traffic Control and Phasing Plan
5. Site Security Plan
6. Casing Pipe Sand Filling Plan (as required)

During Jack & Bore Operations

1. Soil Excavation logs, Daily

Acceptance will not relieve the Contractor of the responsibility for making a satisfactory installation meeting the criteria set forth herein.

It is the Contractor's responsibility to decide whether subsurface exploration is needed. The Contractor will not be reimbursed for supplementary work including additional borings, lab testing, or other supplemental exploration.

10-01.2 Materials
Casing pipe material shall be ASTM A252 Grade 2 steel, fabricated in sections for welded steel joints. Diameter and wall thickness shall be as shown on the Plans and the District Standard Drawings, but not less than three-eighths (3/8) of an inch. Casing pipe diameters noted on the Plans are inside diameters unless noted otherwise. Steel pipe design to conform to ASTM A120 or AWWA C200.

Casing spacers shall be PSI Ranger II as manufactured by GPT (an EnPro Industries company) or approved equal. If the casing is not within alignment tolerances specified on the Plans, Contractor may use Calpico spacers as manufactured by Calpico, Inc., or approved equal, that are individually designed and manufactured to place the sanitary sewer pipe in the proper alignment.

Casing sand fill shall be clean sand with 100 percent passing the one-quarter (1/4) inch sieve and no more than four (4) percent passing the U.S. No. 200 sieve.

Casing end seals for casing pipe are to be plastic caps as manufactured by Cascade Waterworks Manufacturing or approved equal.

10-01.3 Construction

All installation shall be in accordance with the requirements of the Plans, District Standard Drawings, County utility permit when in County right of way, City of Battle Ground utility permit when in City of Battle Ground right of way, City of Ridgefield encroachment permit when in City of Ridgefield right of way, Railroad or WSDOT franchise requirements when in WSDOT right of way, whichever is more restrictive.

10-01.3(1) Casing Installation

Casing pipe shall be installed by the jacking method and bored to remove all soil and material from the pipe interior. Alternate methods may be considered by the District, and the Contractor must submit the request in writing with a specific description of the method and reasons for the alternate method. Alternate methods must be approved by the District in writing, and the District's decision is final.

The Contractor shall hold disturbances of surrounding material to a minimum. Execute all Work to prevent settlement of finished grade above the casing. The completed casing shall have full bearing against earth with no voids or pockets left in any portion of the Work. Surface settlement or excessive excavation volume will be conclusive evidence that voids exist. Promptly fill the backfill space between the casing and the excavated surface as needed to prevent settlement. Provide full breasting of excavation face when operations stop for more than 2 hours or sooner as site conditions dictate.

Sluicing and jetting will not be allowed.

The Contractor shall install the casing pipe with continuous circumferential field welded joints or other approved method to the line and grade necessary to install the carrier pipe to the line and grade shown on the Plans.

10-01.3(1)A Casing Soil Excavation

When required on the plans, the Contractor shall maintain a log of soil excavated versus face advance during the jacking operation. The log shall be sufficiently accurate and updated to quickly alert the operator of over excavation. Make the log available to the Inspector at all times and submit a copy to the Inspector at the end of each shift.

If at any time more soil is removed than calculated based on the forward progress, stop excavation, evaluate the situation and notify the Engineer. Make adjustments as necessary before proceeding.

Determine the cause of overbreaks and correct it before continuing. Immediately report all such cases of overbreaks to the Inspector.

10-01.3(2) Carrier Pipe Installation

The Contractor shall install the sewer pipe in the casing in accordance with the Plans and the District Standard Drawings using casing spacers and joint restraints. The carrier pipe shall be pulled into place. Casing spacers and joint restraints shall be installed per manufacturer guidelines. Provide casing spacers at carrier pipe joints, within 18-inches of casing ends, and along the carrier pipe at no more than six-foot intervals or a minimum of three per pipe section.

Casing spacers shall be adjusted if casing pipe appears to deflect during installation. Spacers shall be adjusted so that no deflection is detected along entire length of carrier pipe.

Following the completion of the pipe installation and successful testing of the pipe, the Contractor shall fill the casing with sand and plug the ends of the casing with end caps as specified above. Sand shall be air blown in the annular space in a manner which assures no voids around the carrier pipe following installation.

10-01.3(3) Casing End Seals Installation
After installation of the carrier pipe, the ends of the casing pipe shall be sealed to prevent moisture from entering the casing. Casing end seal shall account for required casing sand fill operation.

10-01.3(4) Casing Sand Fill Installation
When required on the plans and following review by the Inspector of the pipe grade and alignment, fill the annular space between the carrier pipe and the casing pipe with clean dry sand. Sand shall be installed in a manner as approved by the Inspector in Contractor submitted Work Plan. Sand shall be air blown in the annular space in a manner which assures no voids around the carrier pipe following installation.

10-01.3(5) Jacking and Receiving Pits
Excavation, shoring and backfill for the jacking and receiving pits shall be in accordance with the requirements of the Plans, District Standard Drawings, County utility permit when in County right of way, City of Battle Ground utility permit when in City of Battle Ground right of way, City of Ridgefield encroachment permit when in City of Ridgefield right of way, Railroad or WSDOT franchise requirements when in WSDOT right of way, whichever is more restrictive.

The Contractor shall backfill the jacking and receiving pits in accordance with the requirements of the governing Agencies. All pipe zone and backfill will conform to the standards for other sewer pipe installed in the Work and in accordance with the requirements of the Plans, District Standard Drawings, County utility permit when in County right of way, City of Battle Ground utility permit when in City of Battle Ground right of way, City of Ridgefield encroachment permit when in City of Ridgefield right of way, Railroad, or WSDOT franchise requirements when in WSDOT right of way, whichever is more restrictive.

Restoration of the area shall be in accordance with Plans, District Standard Drawings, County utility permit when in County right of way, City of Battle Ground utility permit when in City of Battle Ground right of way, City of Ridgefield encroachment permit when in City of Ridgefield right of way, Railroad or WSDOT franchise requirements when in WSDOT right of way, whichever is more restrictive.

10-01.4 Measurement
Measurement will be made for the item Jacking and Boring ____ In. Diam. on a per linear foot basis for each foot of casing, carrier pipe and appurtenances installed to the limits specified on the Plans.

Measurement for sanitary sewer pipe outside the limits of the casing and carrier pipe will be paid for under the individual type and size of sewer pipe.

10-01.5 Payment
"Jacking and Boring, ____ In. Diam.", per linear foot.

The unit Contract price per each for “Jacking and Boring ____ In. Diam.” shall be full pay for furnishing and installing casing and carrier pipe, casing spacers, joint restraints, casing end seals, casing sand fill, and for jacking and receiving pits including excavation, shoring, dewatering, disposal of water material, and backfill and compaction. This price shall also include all costs in connection with monitoring and reporting finish grade above the casing, moving all equipment to the site of the Work and for removing all such equipment from the site after installation.

Payment for restoration will be made under the applicable items shown in the Proposal. If no pay items for restoration are included in the Proposal, restoration shall be considered incidental to the Work of installing the casing and carrier pipe, and all costs thereof shall be included in the unit Contract price “Jacking and Boring ____ In. Diam.”

(District April 2020)
Division 11 is added as follows:

DIVISION 11
SEWAGE PUMP STATIONS

11-01 SEWAGE PUMP STATIONS

11-01.1 Description
This Work consists of constructing sewage pump stations and appurtenant items including a wet well, valve vault, controls, electrical service and other items in accordance with the Plans, these special provisions, the District Standard Drawings, and the Standard Plans.

11-01.2 Materials
Materials shall meet the requirements of the following sections:

Sewage Pumps, Controls, and Generators	9-50
Concrete	6-02
Ballast	9-03.9(2)
Crushed Surfacing	9-03.9(3)
Manhole External Seal	9-04.13
Manhole Boots	9-04.14
Penetration Seals	9-04.15
Precast Wet Well	9-05.50(6)
Precast Vaults	9-05.50(7)
Access Hatches	9-05.50(8)
Paints	9-08.1
Timber and Lumber	9-09
Mortar	9-20.4
Manhole Coating	9-26.4
Valves	9-30.3
Ductile Iron Pipe	9-30.1(1)
Ductile Iron Fittings	9-30.2(1)
Antenna Tower	9-50.12
Electrical Conduit	9-29.1

11-01.3 Construction Requirements
The pump station shall be located and configured as shown on the Plans. The Contractor shall request in writing, permission to vary from the Plans. The District will respond in writing. Alternate configurations may require different materials to address vehicle loading, drainage, or other considerations at the sole discretion of the District.

The excavation for wet wells and vaults shall be in conformance to Section 2-09.3. Excavation for trenches shall be in conformance to Section 7-08.3.

Wet wells and vaults shall be constructed in conformance to the applicable requirements of Section 7-05.3.

11-01.3(1) Submittals
The following shall be submitted for review and approval prior to beginning the work:

1. Schedule of Values – a schedule of values broken down into the listed items below shall be submitted for the following:
    a) Electrical and Controls
        i. Controls (telemetry, PLC, instrumentation)
        ii. Electrical (motor control center, pump disconnect, generator, transfer switch)
    b) Pump Station and Site Improvements
        i. Mechanical (wet well mechanical, piping and valves, bypass system, pigging system, cathodic protection)
        ii. Structures (kiosk structure, valve/meter vaults, wet well)
        iii. Site (landscaping, access road/driveway, site surfacing, fencing)
        iv. Odor Control
2. Dewatering Plan – at a minimum the plan shall contain the number, placement and type of wells proposed, point of discharge, intake and discharge piping, power source and backup and any relative soils information that may be pertinent to the successful operation of the dewatering system.
3. Shop Drawings for the wet well and vaults including a coring plan.
4. Pumps and accessories.
5. Controls and electrical – Vendor's components shall include data sheets that shall include specifications, pictures, dimensions, wiring diagrams, ratings, part numbers, model numbers, and general descriptions of each component's function. Data sheets shall include manufacturer's name, local vendor's name, address, telephone and FAX numbers. Contractor shall also provide a complete set of wiring diagrams and schematics.
6. Generator – manufacturer data sheet
7. Chemical Feed System
    a) control system layout drawing and electrical diagram
    b) manufacturer information on major system components including, but not limited to chemical feed pumps, controls, and tank
    c) statement of design conditions, performance guarantee, and warranty
8. Startup and acceptance documents:
    a) Start-Up Plan and Schedule – The startup plan shall be a detailed guideline of the startup procedures and necessary steps to complete each phase of the startup process. Each step shall have dates provided that include allowance for trouble shooting prior to verification of each component. The plan shall be submitted a minimum of twenty (15) working days prior to any start-up activities. The Start-Up Plan, at a minimum, shall include dates and details for the following:
        i. Phase 1: Installation verification
            1. Field installation/testing
            2. Field acceptance testing
            3. Elevation verification
            4. Walkthrough
        ii. Phase 2: Functional demonstration
            1. Remote telemetry
            2. System demo for pumps
            3. System demo for generator start-up
            4. System demo for instrumentation
            5. System demo for odor control
            6. Walkthrough
        iii. Phase 3: Operational testing
            1. 5-day freshwater test
            2. Contractor provided training

3. Cleanup
4. Substantial completion

iv. Phase 4: Acceptance
1. Punchlists complete
2. Final acceptance
3. Manufacturers statement of installation (see Phase 1 checklist for complete listing)
4. Agenda for the Contractor provided training
5. Operations and Maintenance Manual – draft and final
6. Freshwater test plan
7. Redline drawings

11-01.3(2) Dewatering

The Contractor shall be prepared to suspend further trenching and excavation operations and immediately implement indirect dewatering methods if groundwater seepage causes sloughing or erodes the stability of the trench walls of the excavation. Indirect dewatering may include, but is not limited to, well-point construction, as required to lower groundwater elevations below the trench foundation. The Contractor shall submit a dewatering plan that shall contain, at a minimum, the number, placement and type of wells proposed, point of discharge, intake and discharge piping, power source and backup and any relative soils information that may be pertinent to the successful operation of the dewatering system.

The Contractor shall file a "Notice of Intent to Construct a Dewatering Well" with the Washington State Department of Ecology and furnish the District a copy before dewatering of the Work begins.

The Contractor shall meet all State and County requirements for disposal of trench water and groundwater from dewatering operations.

The groundwater control system shall be adequate to keep excavations free from water and in a hydrostatically controlled condition during construction. The Contractor shall dewater and dispose of the water so as not to cause injury to public or private property, or to cause a nuisance or a menace to the public. The Contractor shall provide backup systems for all ordinary emergencies including power outage, and shall have available at all times competent workers for the continuous and successful operation of the groundwater control system. The Contractor shall not disable or shut down the system between shifts, on holidays, or weekends, or during work stoppages without written permission from the District.

The Contractor shall maintain water levels at all times and under all conditions to a minimum depth of 1' below the bottom of all open excavations.

11-01.3(3) Wet Well

The wet well shall be supported by a minimum of twelve (12) inches of CSBC, or as shown on the Plans.

Cable conduits that connect the wet well to the disconnect panel shall be installed as shown on the Plans. The conduit shall be divided to maintain intrinsically safe wiring from the wet well to the disconnect panel.

Cables in the wet well and the level control systems shall be hung from 316 stainless steel hooks. The hooks shall be installed in the concrete wet well cover just below the opening of the access hatch and be positioned to direct cables away from the area directly below the access hatch.

All hardware in the wet well shall be 316 stainless steel.

The wet well shall be supplied without an interior coating. Manhole interior coating shall be applied after the wet well is installed and in accordance with Section 7-05.3(6).

Metallic piping within the wet well shall be coated in accordance with Section 9-08.9.

Manhole external seal shall be installed over all joints.

All openings for conduit or pipes shall be core drilled or factory cast at the elevations shown on the Plans. Manhole boots shall be installed at all penetrations 2-inches and greater. Penetration seals shall be installed at all penetrations less than 2-inches.

An inside drop bowl shall be installed in the wet well for the influent sewer. Vertical drop bowl piping is not required. A hood may be required as shown on the plans or as directed by the Engineer.

11-01.3(4) Valve Vault

The vault shall be a solid wall, H20 load rated concrete structure installed on six (6) inches of crushed surfacing base course. The vault shall have an external dampproof coating applied.

A butyl rubber joint sealant shall be installed at each joint. A minimum of one row of joint sealant shall be installed around the perimeter of the vault joint in accordance with the manufacturer's recommendations.

A ductile iron drain shall be installed within the valve vault. The floor of the vault shall be sloped toward the drain. The drain shall be piped, with a pea trap, to the wet well and a duckbill valve installed on the outlet of the drainpipe in the wet well.

All valves and fittings shall be installed as shown on the plans and in accordance with the Construction Specifications Section 9-30.3 Valves. Valves, fittings, and pipe within the valve vault shall be coated in accordance with Section 9-08.9. Hand wheels and levers shall be red. Stencil "SEWAGE" in black enamel on the pipe at a visible location.

The Contractor shall determine prior to installation if the valve vault will accommodate the valves, fittings, flow meter and appurtenances. In addition, the valve vault shall include a working space of eighteen (18) inches around the inside perimeter of the valve vault from any fittings. The Contractor shall submit a working drawing of the Contractor's proposed valve vault layout and coring plan to the District for written approval prior to installation. District Standard Construction Drawings have a typical plan view for a valve vault, illustrating the detail required on the Contractor's plans.

A pressure gauge shall be installed on the discharge lines in accordance with the District Standard Drawings.

11-01.3(5) Duplex Pump Assembly

The discharge piping shall be as shown on the Plans, Class 52 Ductile Iron Pipe.

Pumps, motors, electrical wiring, junction boxes and all other items shall be constructed as shown on the plans and in accordance with the Standard Specifications Section 8-20 Illumination, Traffic Signal Systems, Intelligent Transportation Systems, and Electrical and the Standard Drawings.

The Contractor shall provide each pump, motor, cable, hangers, two (2) guide rails per pump, a minimum of two (2) guide rail supports, piping, and any other appurtenances as shown on the plans that are necessary for a complete installation.

The Contractor shall provide a spare assembled pump with cables and disconnect plug to the District.

Each motor shall be provided with a circuit breaker, motor starter, and overload with reset, hand-off-auto switch, run time meter and green run light as per the plans.

The pump discharge elbows, a prefabricated, non-porous, self-cleaning basin, and associated anchors shall be installed in the base in accordance with the manufacturer's written instructions.

The pump discharge bases shall be anchored into the bottom of the wet well in accordance with the manufacturer's recommendations.

Any pump which fails to meet any of the contract specifications will not be accepted until modified, repaired, or replaced to the satisfaction of and at no additional cost to the Owner.

11-01.3(6) Controls and Electrical

11-01.3(6)A General

The contractor shall coordinate and make arrangements with Clark Public Utilities (CPU) for all electrical needs. This shall include, but not be limited to, obtaining electrical service to the pump station from the nearest CPU facility and making the connection between CPU power and the pump station wiring. The location of the meter, transformer(s) and junction box shall be in the area designated on the Standard Construction Drawing and be approved by and in conformance with Clark Public Utility (CPU) requirements.

Electrical equipment and appurtenances for installation within the wet well shall be rated for use in a Class 1, Division 1, Group D hazardous location.

Terminal blocks shall be screw connection only and used for all electrical connections. Each connection shall be clearly identified.

Electrical panels shall be designed to operate on a 240-volt, three-phase, 60 hertz, four (4) wire service.

11-01.3(6)B Light Fixtures

Install control panel area light fixture as shown on shelter elevation drawings.

11-01.3(6)C Control Panel

Pump panel and controls shall be reviewed by the Contractor for compatibility with pumps supplied. This shall include, but not be limited to, the seal failure and high temperature method of control by the pumps supplied.

The control panel shall be a NEMA 4, corrosion resistant, painted (gray) steel enclosure. All controls and indicators shall be contained within the control panel.

The Control Panel is to be in conformance to District Standard Drawings.

Components mounted on the inner door shall include the level controller, operator panel, flow meter converter, and the two (2) thermal/leakage sensor relays, as well as the momentary push buttons, indicator lights, HOA switches and door mount operators as shown on the standard drawings.

The cabinet shall be supplied with a 120V, 100 watt, thermostatically controlled panel heater and a 120V inner panel light shall be mounted to the top of the cabinet. A 120V red, beacon type alarm light shall be mounted to the top of the cabinet on the exterior.

Wiring shall be neatly bundled and secured with plastic wire ties when located outside the conduit and protected from contact with sharp edges of the control panel sheet metal and from contacting the internal moisture prevention equipment.

Cables and wires will be clearly identified with heat shrink sleeves. Alarm and control panel wiring shall not be spliced.

Wiring from the transducer in the wet well shall include intrinsically safe barriers and relays within the control panel.

Phase Monitors shall be provided in the control panel for ground fault, phase reversal, phase loss, phase imbalance, over current and under voltage. Both pumps shall be shut down and alarms activated if any of these conditions occur.

Provide two (2) standard 120-volt receptacles, with 15-ampere breaker with a GFI inside the control panel.

The control panel shall include an uninterruptible power supply (UPS) for control power components.

Engraved name tags shall be provided for all electrical components in the control panel on or above each component as shown on the District Standard Construction Drawings.

11-01.3(6)D Level Control System

The level control system shall consist of two instruments: a level controller and a multi-point level probe. The level controller shall be the primary instrument to control pump operation during normal operating conditions and the multi-point level probe shall be provided to control the backup high level alarm and pump operation during an emergency. Intrinsically safe barrier and control relays shall be provided as shown on the Standard Drawings.

The multi-point level probe shall be dedicated to the following functions:

1. High level alarm
2. Emergency Operation (PLC bypass)

11-01.3(6)E Programmable Logic Controller

The Contractor shall provide a programmable logic controller (PLC) for operation of the pump station. The District will provide a program for the PLC. The Contractor shall install the program provided by the District, wire and program the PLC, test and troubleshoot as necessary to confirm the PLC is providing a fully operational pump station to the satisfaction of the District. District staff will be available for questions on the program. The PLC shall control the following pump operations:

1. Pumps off
2. Lead pump on
3. Lag pump on
4. Long run time
5. High level alarm
6. Seal fail motor shutdown
7. High temp motor shutdown

The inputs and outputs for the PLC shall be as shown in the Plans, including digital and analog expansion cards.

11-01.3(6)F Operator Interface Terminal

The Contractor shall provide an Operator Interface Terminal (OIT) for operation of the sewage pump station and a program for the OIT. The OIT shall be programmed for operation, tested, and a complete set of documentation, and programming and programming software provided to the District. The OIT shall have the following features and graphical displays:

1. Graphical display for the level in the wet well.
2. Graphical display for the level in chemical tank (if applicable)
3. Display amps and start counts for each motor
4. Display elapsed time meter for each motor (in tenths of hours) ex 1.1 hrs
5. Display system discharge pressure
6. Graphical trend chart for displaying wet well level, and motor starts
7. Display current flow in GPM and accumulated MGD
8. Graphical trend chart for displaying flow data and discharge pressure
9. A setpoint screen for adjustment of all alarm and pump operational setpoints, i.e. Pump start/stop levels, wet well high/low levels, system discharge pressure high/low levels etc.
10. All alarm points to be displayed (motor high temp, seal fail, low level, high level wet well and pressure)
11. Alarm history screen

The Contractor shall install the control enclosure including installation, programming and testing.

11-01.3(6)G Telemetry

A spare two (2) inch diameter conduit shall be installed for future telephone and telemetry wiring. The conduit shall be installed from the control panel to one (1) foot past the edge of pavement with a nylon cord installed and capped as shown on the Plans and the District Standard Drawings. A permanent marker will be installed at the edge of the concrete slab marking the location of the spare conduit.

Unless otherwise specified, the radio transceiver shall be connected to an antenna mounted in the location as shown on the standard drawings and the height shall be coordinated with the

District. When shown on the plans, an antenna tower meeting Section 9-50.12 shall be installed in accordance with the manufacturer's recommendations.

Cable connections at the antenna shall be wrapped with waterproof tape that is self-fusing.

11-01.3(6)H Pump Disconnect Panel
The Pump Disconnect Panel shall be installed in the location shown on the Plans. The Pump disconnect Panel shall be constructed in accordance with the Plans, Specifications, and the Standard Plans.

11-01.3(6)I Transfer Switch
The Transfer Switch shall be installed in the location shown on the Plans. The Transfer Switch shall be constructed in accordance with the Plans, Specifications, and the Standard Plans.

11-01.3(7) Generator Set
When indicated on the plans, a permanent engine generator shall be provided, installed, and tested in accordance with the Plans, Specifications and Standard Drawings.

The Contractor shall obtain all necessary building permits.

When an emergency power generator is required, the Contractor shall supply, install, connect and test the emergency power generator (engine generator) with a transfer switch. The test shall be based on a simulated power failure at the pump station. The generator shall be tested as part of Phases 1 and 2 of the startup and acceptance process. Electrical load banks may be used for preliminary testing but testing for final approval is only acceptable with the 'working' pump station.

The Contractor shall provide fuel for the generator, refuel the generator to 80% full following completion of the freshwater test, and test the fuel after refueling the generator. At a minimum the fuel test shall include the following test:

- Determination of water per ASTM D6304
- Presence of bacteria (counts)
- Presence of Fungi (counts)
- Presence of Mold (counts)
- Particle Count (particles/mL)

11-01.3(7)A Generator Pad
The concrete pad for the generator shall be constructed of Class 4000 Structural Concrete in accordance Section 6-02 of the Standard Specifications.

11-01.3(8) Control Panel Kiosk
The Contractor shall furnish and install a control panel kiosk meeting the District Standard Drawings.

The roof structure shall include metal gutters and two down spouts that outlet on the back or sides of the structure. The gutters and down spouts shall be fabricated of minimum 26-gauge thick sheet metal with an exterior finish coating as specified for the metal roof. The gutter shall be 4-inch seamless Type K.

Untreated wood shall be painted per 9-08.9. Touch-up paint shall be provided to the District.

The Contractor shall provide engineering drawings of the structure and the foundation prepared by an engineer licensed in the State of Washington and obtain all necessary building permits. Permit fees will be the responsibility of the Contractor.

11-01.3(9) Chemical Feed System

When indicated on the plans, the Contractor shall furnish and install a chemical feed system meeting requirements of Section 9-50.13. Contractor shall test system using fresh water. Contractor is not responsible for providing chemical.

11-01.3(10) Pump Station Startup and Acceptance

The District has a four (4) phase startup and acceptance process. The Contractor shall work with District staff to fulfill and complete four (4) checklists that make up the Pump Station Startup Checklist Requirements. A copy of the checklist is available at https://www.crwwd.com/forms/.

The Contractor's responsibility shall include but not be limited to developing a fresh water test plan, providing fresh water for testing of the pump station and chemical feed system, providing fuel for the generator, coordinating with manufacturer representatives, and furnishing all equipment, labor, and materials necessary to complete the startup and acceptance process. The process shall proceed as follows:

Phase 1: Installation Verification – the Contractor shall ensure that equipment has been installed correctly and that each manufacturer has field-verified that their specific devices meet the contract provisions.
Phase 2: Functional Demonstration – the Contractor shall demonstrate that all the equipment operates correctly as an integrated system.
Phase 3: Operational Testing and Startup – the Contractor shall conduct a 5-day freshwater test to mimic the stations realistic operation and provide a Training Day. The 5-day test shall be defined as 120 hours of continual operation without any failure of the system and its components. The Contractor shall operate the pump station for additional days as necessary to perform testing without failure. District training shall be provided on-site by factory trained representatives who instruct District personnel in the required maintenance and service procedures. Operation of each component of the pump station shall be demonstrated. The training shall be scheduled on a single day between Tuesdays and Thursdays.
Phase 4: Acceptance – The Contractor shall work with District staff to ensure that appropriate signatures, approvals, and documentation is submitted to the District.

The freshwater test plan shall include the following:

1. Written summary of how the Contractor will supply fresh water, how it will be circulated and plumbed, and how the flow into the wet well will be controlled or attenuated.
2. Sketch of the freshwater circulation and plumbing.
3. List of equipment

If the Contractor chooses to circulate the fresh water for the 5-day test, this may be accomplished by circulating the water through the cam lock fitting in the valve vault, discharging the water into a water truck that then discharges the water back into the wet well at a reduced flow rate.

11-01.3(11) Conditional Acceptance

Conditional acceptance of any mechanical, electrical or instrumentation installation shall be predicated upon the completion of tests and checks required by the District Specifications, Amendments to the Standard Specifications and Standard Drawings.

11-01.3(12) Operation and Maintenance Manual

The Contractor shall provide to the District a PDF copy and a minimum of one (1) bound copy of an operation and maintenance manual for the sewage pump station on letter size paper. The PDF file shall be searchable and have a table of contents with bookmarks and hyperlinks to all sections. All drawings that are part of the operation and maintenance manual shall be reduced to eleven (11) inch by seventeen (17) inch and be included in the manual.

The operation and maintenance manual, as a minimum, shall include the following:

1. Table of contents.
2. Record drawings that include design data for pumps, motors, force main, standby power, overflow point and elevation, telemetry, and odor control system as applicable.
3. Pump curve with computed system curve showing design operating point.
4. Product information, including brochures.
5. Maintenance requirements.
6. Test results and verification.
7. Warranty-time periods and stipulations.
8. Inventory of critical components, including nameplate data for pumps and motors.
9. Wiring schematics, including telemetric and alarm floats.
10. The PLC program with documentation including one (1) paper copy with documentation, one (1) paper copy without documentation and one (1) electronic copy of PLC program.
11. The HydroRanger operating program and instructions with one (1) paper copy.
12. Engine generator operation and maintenance instructions including one (1) paper copy.
13. A bill of materials for each item including quantity; voltage rating; manufacturer; model and part numbers; local supplier's company name, name of representative, address, telephone number and e-mail address. The bill of materials shall be referenced to the panel or site layout plans for easy identification.
14. All manuals for the PLC, CPU and associated modules.
15. The OIT program with documentation including (1) paper copy with documentation, and one (1) electronic copy of the OIT program.
16. Provide a fully functional and licensed copy of the OIT programming software for use by the owner. Software shall be PC compatible and shall include all required communications cables and converters.

11-01.4 Measurement

No unit of measure will apply to the item “Pump Station Dewatering”.

No unit of measure will apply to the lump sum Bid Item “Submersible Sewage Pumps and Accessories Incl. Spare Pump”.

No unit of measure will apply to the lump sum Bid Item “Electrical and Controls, Complete”.

No unit of measure will apply to the lump sum Bid Item “Operation and Maintenance Manual”.

No unit of measure will apply to the lump sum Bid Item “Pump Station and Site Improvements”.

11-01.5 Payment

Payment will be made in accordance with Section 1-04.1, for each of the following Bid items that are included in the Proposal:

“Pump Station Dewatering”, by force account.

All costs for labor, materials, and equipment necessary to furnish, install, operate, maintain, and remove dewatering wells, pumping equipment, piping, and all other items necessary to dewater the site in accordance with the Plans and specifications. This shall include the control of water and treatment of water in accordance with Clark County requirements prior to disposal. For the purpose of providing a common Proposal for all Bidders, the District has entered an amount in the Proposal to become a part of the total Bid by the Contractor.

If no pay items for pump station dewatering is included in the Proposal, pump station dewatering shall be considered incidental to the Work, and all costs thereof shall be included in the unit Contract price "Pump Station and Site Improvements, lump sum."

"Submersible Sewage Pumps and Accessories", lump sum.
The lump sum Contract price for "Submersible Sewage Pumps and Accessories" shall be full pay for furnishing and installing two submersible sewage pumps with base elbows, stainless steel guide rails with intermediate supports, stainless steel lifting chain with hook eye, and male end quick disconnect plug. Payment shall also include furnishing and delivering a third, spare pump with quick disconnect plug installed to the District operations center.

"Electrical and Controls, Complete", lump sum.
The lump sum Contract price for "Electrical and Controls, Complete" shall be full pay for furnishing and installing the Control Panel, Level Control System, Automatic Transfer Switch, Pump Disconnect Panel, conduit, wire, all necessary electrical components and provision of power supply from Clark Public Utilities to provide a complete and functioning control system per the Plans, Specifications and Standard Plans.

"Operations and Maintenance Manual", lump sum.
The lump sum Contract price for "Operations and Maintenance Manual" shall be full payment to prepare and furnish draft and final versions of the operation and maintenance manual to the District in accordance with the Specifications.

"Pump Station and Site Improvements", lump sum.
The lump sum Contract price for "Pump Station and Site Improvements" shall be full payment for all equipment, labor, and materials to construct the pump station wetwell, interior wet well coating and exterior seals, inside drop, cable conduits from the wet well to the disconnect panel, valve vault, pump station piping with joint restraints, fittings, and valves, geotextile fabric, and backfill, connection to existing force main, pigging the entire force main from the valve vault to the discharge location, control panel roof structure and foundation, odor control chemical feed piping, inside drop bowl, site grading and excavation, crushed surfacing base course, cement concrete surfacing, start up and testing of the pump station, equipment and warning signs, warranties, and any other associated work to provide operational pump station not included in other bid items.

The contract price for the appropriate bid items shall include all labor, materials, and equipment necessary for installation, testing, and start-up of the pump station in accordance with the Plans and specifications, including items not specifically itemized in the bid documents to provide a complete "turnkey" operational sewage pump station.

(District April 2020)
Division 12 is added as follows:

DIVISION 12
ALTERNATIVE SYSTEMS

12-01 STEP SYSTEMS

12-01.1 Description
This Work consists of constructing single family residential septic tank effluent pump (STEP) systems in accordance with the Plans, these Specifications, and the Standard Plans, at the locations shown on the Plans.

12-01.2 Materials

12-01.2(1) General
Materials shall meet the requirements of the following sections:

Toning Wire and Splices	9-05.30(1)
Gravel Backfill for Pipe Zone Bedding	9-03.12(3)
Gravel Borrow	9-03.14(1)
Manhole Boots	9-04.13
Saddles	9-30.6(1)
Detectable Marking Tape	9-15.18
ABS Composite Sewer Pipe	9-05.14

Polyvinyl Chloride Pipe and Fittings
The pressure service lines for single-family residences shall be PVC Pipe Schedule 40 conforming to ASTM D1785 specifications.

Solvent welded socket type fittings shall be PVC Schedule 40 conforming to ASTM D2466 specifications.

Threaded fittings shall be PVC Schedule 80 conforming to ASTM D2464 specifications.

Solvent cement joints shall be made in a two-step process with primer manufactured for thermoplastic piping systems and solvent cement conforming to ASTM D 2564.

Check Valves
Service line check valves shall be wye pattern swing check valves rated at 150 psi meeting ASTM B61 or B62 with a bronze seat, Stockham B-321B, William Powell 596, or approved equal.

Gate Valves
Service line gate valves shall be bronze body and bronze mounted solid wedge disc with a non-rising stem rated at 200 psi. Connections shall be with threaded (NPT) or IPS hub. Gate valves shall be Stockham B-103, Shalliam Powel 507, or approved equal.

Corporation Stops

Corporation stops shall be full port, bronze, for use with saddles. Corporation stops shall have male iron pipe thread inlets and outlet connections compatible with PVC Schedule 40 pipe. Ford Full Port Corp Stop FB1102 or approved equal.

Valve Boxes
Valve boxes shall be approximately twelve (12) inches deep, twenty-one (21) inches long and fifteen and one-half (15½) inches wide at the base. Two knockouts shall be provided at the base of the base box, a minimum of two (2) inch by two (2) inch size. Valve box extensions shall match the valve box base and the total height shall not exceed two (2) feet. Valve boxes shall be Carson Industries, Inc. Model 1419 and Model 1419 extension or approved equals.

Valve box covers shall be non-hinged with a bolt down cover clearly marked with "SEWER". Valve box covers shall be Carson Industries, Inc. Flush Cover Model 1419-3 or approved equal.

12-01.2(2) Pumps
Pumps shall be simplex installation and shall be as follows or as otherwise approved by the District in writing:

Pump Designation (Residential Only)	Minimum Head @ Shutoff	Minimum Head @ 20 GPM	Required Pump
Meadow Glade Low Head	72 feet	55 feet	Gould WE10H
Meadow Glade High Head	105 feet	90 feet	Gould WE1512 HH
Hockinson	105 feet	90 feet	Gould WE1512 HH

Pumps shall be cast iron submersible septic tank effluent pumps suitable for submersion in septic tank effluent and capable of passing a one-half (½) inch solid. All nuts, bolts, and miscellaneous hardware in contact with pumped material and inside the tank shall be stainless steel (Type 316), unless otherwise indicated on Plans.

Motors shall be single phase 240 volt with permanently split capacitor located in the motor housing. Motors shall not exceed a two (2) horsepower rating and shall be capable of starting and running on a 20-ampere circuit. Motors shall be non-overloading throughout the range of the manufacturer's pump curve. The cable splice to the motor lead shall be watertight. Motor casing shall be oil filled. Lower bearings shall be ball thrust bearings. Upper bearings shall be radial bearings.

Pumps shall be compatible with the specified electrical control panel.

Pump power cords shall use copper wire with type STOW insulation color coded consistently throughout the power supply system in accordance to Section 7-10.2(7). Cord grips shall be non-metallic resistant to septic tank corrosive atmospheres or type 18-9 stainless steel. The cords shall be suitable for use with two (2) horsepower, 240-volt motors including locked rotor conditions.

All pumps shall be installed with one-half (½) inch polypropylene lifting ropes connected to 304 stainless steel hooks at the top of the riser as shown on the Standard Plan.

12-01.2(3) Tanks

The manufacturing plant for precast concrete units shall be certified by the Precast/Prestressed Concrete Institute's Plant Certification Program for the type of precast member to be produced, or the National Precast Concrete Association's Plant Certification Program or be an International Congress Building Officials or International Code Council Evaluation Services recognized fabricator of structural precast concrete products, and shall be approved by WSDOT as a Certified Precast Concrete Fabricator prior to the start of production.

Tanks shall be certified by the manufacturer prior to shipment and the Contractor shall provide the District with the manufacturer's certification.

Tanks shall be a minimum 1,500 gallons nominal capacity as follows:

1. Fiberglass as manufactured by Fiber Septic Systems of Yakima, WA (509-965-8437); or
2. Fiberglass as manufactured by FSI of Red Bluff, California ; or
3. Concrete as manufactured by and available through D and K, Inc. Concrete Products of Vancouver, WA (360-573-4020); or
4. Approved equal.

12-01.2(4) Discharge Hose and Valve Assembly

The discharge hose and valve assembly consists of PVC pipe, a check valve, a bleeder valve, a discharge hose, fittings and other parts as shown on the Standard Plans.

The discharge hose and valve assembly shall be Orenco Systems, Inc. HV125CASX-H, or approved equal. Stem length shall be as required for the tank depth. The discharge hose shall be Orenco Systems Inc. HVX125 or approved equal.

The drop pipe from the STEP pumps shall be threaded and coupled and conform to American Standard tapered pipe thread specifications.

The discharge hose shall be flexible PVC suction discharge hose. Discharge hose clamps shall be two-ear stainless steel clamp as manufactured by Oetiker Inc. or approved equal.

The check valve shall be threaded PVC spring check valve. Spring shall be made of stainless steel.

The bleeder valve shall be a rubber Morrison bleeder valve as manufactured by Campbell Manufacturing, model BOR-4, or approved equal.

Fittings shall be solvent weld unless otherwise indicated on the Plans.

12-01.2(5) Float Assembly

The float assembly shall consist of four (4) mechanical float switches with non-metallic cord grips, waterproof and explosion-proof splices, PVC mounting frame and other miscellaneous parts as required.

Level sensors shall be mechanical switches (UL or CSA listed) S.J.E. Rhombus, mini-sensor control switch model 10MAPNPC N.O. or approved equal. Level sensors shall have copper wire and shall operate compulsively with a three (3) inch tether. Cord length shall be determined by field conditions.

12-01.2(6) Conductors

Conductors shall be stranded, uncoated copper conforming to ASTM B3 and B8 with color-coded type THHN insulation.

Color-coding for the float control conductors from the control panel to the tank junction box shall be:

Color	Use
Red	OFF
Yellow	HIGH LEVEL ALARM
Gray	REDUNDANT OFF
Blue	ON
Green	GROUND
Black	MOTOR CONDUCTOR (If routed with float wires)
Green	MOTOR GROUND (If routed with float wires)

12-01.2(7) Electrical Conduit, Fittings, Junction Box and Splices

Electrical conduit shall be rigid nonmetallic conduit and fittings conforming to National Electrical Code, NEMA Specification TC-2 and UL651. Electrical conduit fittings shall be Schedule 40 PVC.

Electrical junction boxes shall be nonmetallic conforming to NEMA 4X. Hardware parts shall be 316 stainless steel. Gaskets shall be neoprene. Junction boxes shall have a minimum interior volume of 78 cubic inches. Junction boxes shall be Scepter, Inc. JB446 with JBA14 adapters, or approved equal.

12-01.2(8) Control Panels

The simplex control panel shall be in accordance with the pump manufacturer's requirements and shall comply with the following:

1. The control panels shall be as manufactured by Orenco Systems, Inc., or approved equal.
2. The control panel shall be lockable. The District will provide a lock for District owned or District maintained systems.
3. The control panel assemblies shall be UL listed for industrial control equipment.
4. All panels shall be rated for a two (2) horsepower motor at 240-volts.
5. The control panel enclosure shall be eight (8) inch by ten (10) inch, fiberglass (UL508) with type 316 stainless steel hinges on the left side conforming to NEMA Specification 4X. The body shall be beveled to keep water away from the door gasket. It shall have a tamper resistant door fastened with type 316 stainless steel screws. The door shall have a maximum of four (4) set screws. The control panel enclosure shall be Vynckier VJ series or approved equal.
6. The motor contactor shall be an integral 35 millimeter symmetrical DIN track mounted with a 3-pole and one (1) N.O. auxiliary contact, General Electric CLO1A310T mod 1, or approved equal.
7. The audible alarm buzzer shall penetrate the bottom of the control panel and produce a 68-80 dB pulsating alarm at a distance of two (2) feet from the panel. The unit shall be salt spray resistant, with fully insulated terminal connectors. An audible alarm and a push to silence button with an integral visual red light shall be mounted on the face of the control panel door. The button shall be NEMA 4X rated with a red seven-eighths (7/8) inch diameter oil tight lens, IDEC model ALW29910-R, or approved equal. A mechanically fastened, engraved "PUSH TO SILENCE" tag shall be mounted by the push to silence button. The push to silence button will activate an audio alarm reset relay with a DIN rail mount socket base, rated at 120 volts, IDEC model RH1BU, or approved equal. The visual

alarm shall remain activated following the silencing of the audible alarm by the push to silence button.

8. The wiring terminations shall be screw tightening (not punch down). A terminal strip shall be provided with a 35 millimeter symmetrical DIN track mounting. The track shall be steel, fastened with 304 stainless steel rivets or 304 stainless steel machine screws and locking nuts.
9. The motor breaker shall be a double pole, 20-ampere DIN track mounted, Westinghouse Quicklag model QCR2020, or approved equal, and be fed by the #12 conductors supplying the control panel.
10. The control circuit breaker shall be a single pole, 20-ampere DIN track mount type, Westinghouse Quicklag QCR1010, or approved equal, and fed by the #12 conductors supplying the control panel.
11. The control panel conductors shall be copper and a minimum #12 AWG. The Contractor shall provide loops to line 1 and line 2 to facilitate amperage readings.
12. The running time hour meter shall be a non-resettable 7-digit (99,999.99) meter.
13. The Hand/Off/Auto switch shall be a double throw toggle switch rated at 240-volts and 20-amperes.
14. The level control shall be provided with “PUMP OFF”, “PUMP ON” and “HIGH LEVEL ALARM” switches. The “PUMP OFF” function shall be by two float switches with normally open contacts connected in series for the “PUMP OFF” redundant switching.
15. The inside of the panel shall contain one safety label (Height = 1¼ " x Width = 3"), red background with white lettering, with the words "WARNING: ELECTRICAL POWER IS STILL PRESENT WITH INTERNAL CIRCUIT BREAKER TURNED OFF". Material shall be Scotchcal 3690 with a 1 mil overlam cold seal, with a semi-gloss, white finish (0.0016 thickness) with a clear coat (0.0010 thickness). Screen print shall be a lam cold seal. Location in panel shall be as determined by the District.
16. The outside of the panel shall contain one label (Height = 1½ " x Width = 3½") aluminum anodized adhesive 3M #468 with a satin finish (0.0200 thickness) and a clear finish (0.0050 thickness). Label shall have the words: "IF ALARM SOUNDS CALL 750-5876". Label shall be located directly above the red alarm button.

12-01.3 Construction Requirements

12-01.3(1) General

Where shown on the Plans, STEP systems shall be installed in accordance with the Standard Plans and by a Contractor approved by the District to install STEP systems.

The STEP system shall be located and configured as shown on the Plans. The Contractor shall request in writing, permission to vary from the Plans. The District will respond in writing. Alternate configurations may require different materials to address vehicle loading, drainage, or other considerations at the sole discretion of the District.

Preconstruction Conference

Prior to the Contractor beginning the work, a preconstruction conference will be held between the Contractor, the Engineer and such other interested parties as may be invited. The purpose of the preconstruction conference will be:

1. To review the construction schedule;
2. To establish a working understanding among the various parties associated or affected by the work;
3. To establish and review procedures for notifications, approvals, submittals, etc.;
4. To establish normal working hours for the work;

5. To review safety standards; and
6. To discuss such other related items as may be pertinent to the work.

The Contractor shall submit material sources prior to the preconstruction conference.

The Contractor shall request the preconstruction conference a minimum of 10 calendar days prior to the start of construction. The actual date of the preconstruction conference will depend on availability of District staff and the various parties associated with the work.

The preconstruction conference may be held at the construction site for single-family residences. It will be held in conjunction with the Clark County preconstruction conference or scheduled at the District offices for all other projects.

12-01.3(2) Testing

After the tank is placed, and prior to backfilling, the tank shall be filled to a point above the base of the riser. There shall be no more than a one (1) inch loss of water depth over a 24-hour period. Concrete tanks may be filled for a period of 24 hours to allow for absorption prior to testing.

Hydrostatic pressure testing for pressure sewer services shall be done following installation and prior to acceptance in the presence of the District Inspector. The lines shall be tested in accordance with Section 7-09.3(23) Hydrostatic Test at 150 psi for 15 minutes with no loss of pressure.

12-01.3(3) Pressure Service Lines

Pressure service line construction shall be in conformance to Section 7-09.3 except as modified below.

The pressure service lines shall not be backfilled prior to inspection.

The District will install taps on existing mains. A “Request for Tap” form must be completed by the Contractor, fees paid, and a two (2) working day notice be given to the District to allow the tap to be scheduled.

The pressure service line from the main to the valve box shall be installed at a minimum depth of 36-inches below finished grade or the flow line of a ditch. The pressure service line from the valve box to the STEP tank shall be 24-inches below finished grade or the flow line of a ditch.

A continuous toning wire shall be attached to the top of the pressure service line. A minimum of a three (3) foot coil of wire shall be left in each access point (junction boxes, vaults, locate stations, air/vacuum valves, etc.).

Detectable marking tape shall be installed one (1) foot above the top of the pressure service line.

12-01.3(4) Tanks

STEP tanks shall be installed in accordance with the Plans, Standard Plans, and the manufacturer’s instructions. The tank shall be installed where it will not collect surface water. All lids and access risers shall be set such that surface waters will flow away from them.

The outlet access openings shall accommodate a twenty-four (24) inch diameter riser.

The entrance of the inlet or outlet tee shall pass through a Ty-seal type of neoprene grommet for fiberglass tanks or a manhole boot for concrete tanks that shall provide a watertight seal, but allow flexibility to the building sewer.

The inlet tee shall be Schedule 40 ABS. The Contractor shall install the four (4) inch Schedule 40 ABS service line from the tank to the house. The house shall be connected (if it is for an existing house) or the new service line shall be stubbed and plugged in the location staked.

Twenty-four (24) inch risers shall be installed at each tank end. The risers shall be of the same material as the tank and submitted for District review and approval. For concrete tanks, risers shall be ribbed PVC as manufactured by Orenco Systems, Inc., Model RR24 with riser-to-lid adapters, Model RLA24, or approved equal.

The risers shall have a minimum inside diameter of twenty-three and one-half (23½) inches and shall be a maximum of thirty-six (36) inches tall. Any change in length of the riser shall be approved.

An eight (8) inch diameter Schedule 40 PVC riser pipe shall be installed over the inlet tee and be fastened to the tank with a water-tight connection as specified for the twenty-four (24) inch riser.

The lid shall extend at least one-half (½) inch over the riser and be capable of supporting a 2,500-pound wheel load. The lids shall have a non-skid finish, a neoprene sponge gasket, and shall be fastened to the riser with four (4) allen head stainless steel bolts. Neoprene grommets shall be supplied for all penetrations.

Anti-flotation measures shall be installed according to manufacturer recommendation.

Fiberglass tank(s) shall be bedded in and backfilled with pea gravel consisting of clean washed gravel, rounded with no crushed material. The maximum size shall be one quarter (¼) inch in diameter, well graded with no more than 2% passing the No. 200 sieve.

Concrete tanks shall be bedded in and backfilled with Crushed Surfacing Base Course per Section 9-03.9(3). Compaction shall be at 90% of the maximum density for the material as established by Section 2-03.3(14)D.

The tank supplier shall supply a written five (5) year warranty to the Owner.

The tanks shall be installed in non-traffic areas whenever possible. For installation in traffic areas, a traffic-bearing lid will be required. The traffic-bearing lid shall be cast iron marked “Sanitary Sewer”, have two (2) pick holes and be rated at H-20 loading. No part of the ring shall cover or bear on the riser or cover.

12-01.3(5) Electrical

12-01.3(5)A General

1. All electrical work shall be completed by an electrician licensed by the State of Washington.
2. All work shall be inspected and approved by the State of Washington Labor and Industries.
3. The Contractor shall install a complete electrical installation, including connection to the electrical house panel.

4. The Contractor shall provide a 20-ampere, 240-volt, single phase, four (4) wire circuit with one (1) ground conductor; one (1) neutral conductor and two (2) power conductors.
5. All connections and installation shall be in accordance with the National Electrical Code, State of Washington Department of Labor and Industries requirements and these specifications.
6. All underground power installations shall be placed in a one (1) inch minimum Schedule 40 PVC conduit at a minimum depth of twenty-four (24) inches.
7. Components shall be listed or recognized by an accepted testing laboratory (UL, CSA or FM).
8. All electrical equipment shall be rated for local temperature ranges.
9. All exposed electrical terminals shall be fully insulated.

12-01.3(5)B Safety Disconnect Panel

1. The safety disconnect panel shall be lockable, rated at thirty (30) amperes, 240-volts, non-fused, waterproof with an external disconnect handle. The safety disconnect panel shall be Cutler Hammer model DG221URB, or approved equal.
2. The disconnect panel power shall be supplied by a #12/3 NMB conductor with ground if the total length of conductor from house power panel to the pump motor is one hundred (100) feet or less.
3. If the total length of conductor from the Customer's house electrical panel is more than one hundred (100) feet from the house power panel to the pump motor, the conductor gage shall be increased in accordance with the National Electrical Code as adopted by the State of Washington.
4. The safety disconnect panel shall be locked. The District will provide a lock for District owned or District maintained systems.

12-01.3(5)C Electric Service Mounting

1. The safety disconnect panel and the control panel shall be located and configured as shown on the Plans. The Contractor shall request in writing, permission to vary from the Plans.
2. The District will respond in writing. Alternate configurations may require different materials to address vehicle loading, drainage, or other considerations at the sole discretion of the District. The Contractor shall bear any added costs that result from the change.
3. The safety disconnect panel shall be mounted to the right of the control panel with a minimum six (6) inch and a maximum twelve (12) inch clearance between the panels; and
4. The safety disconnect panel and the control panel shall be mounted at the same height. There shall be a distance between four (4) and five (5) feet between the top of the panels and the mounting base; and
5. The Contractor may locate the control panel on a separate pressure treated 4x4 post, buried 24-inches in the ground, adjacent to the building at the height discussed in (b) above.
6. No structure, fence or landscaping or other material shall be installed, placed or stored that block access to the STEP tank, valve box, disconnect panel, control panel or block the view of the control panel or disconnect panel from the street.

12-01.4 Measurement

STEP Systems will be measured per each.

No measurement will be made for clearing and grubbing, removal of existing street improvements, protection of existing utilities and services, excavation, pipe zone backfill, pipe zone bedding, trench backfill, and compaction of backfill.

Removal and replacement of unsuitable material will be measured per cubic yard.

12-01.5 Payment

Payment will be made in accordance with Section 1-04.1 for each of the following Bid items that are included in the Proposal:

"STEP System", per each.
The unit Contract price per each for STEP systems shall be full pay for furnishing, hauling, and assembling in place the completed installation including all fittings, special fittings, joint materials, bedding and backfill material, motor, pump, tank, electrical, testing, turn-on, and other Work to for the completion of the installation in accordance to Plans and Contract Provisions.

"Removal and Replacement of Unsuitable Material", per cubic yard.
The unit Contract price per cubic yard for "Removal and Replacement of Unsuitable Material" shall be full pay for all Work to remove unsuitable material and replace and compact suitable material as specified in Section 7-08.3(1)A.

12-02 COMMERCIAL (DUPLEX) STEP SYSTEMS

12-02.1 Description

This Work consists of constructing Duplex Commercial septic tank effluent pump (STEP) systems in accordance with the Plans, these Specifications, and the Standard Plans, at the locations shown on the Plans.

12-02.2 Materials

12-02.2(1) General

Materials shall meet the requirements of the following sections:

Gravel Backfill for Pipe Zone Bedding	9-03.12(3)
Crushed Surfacing	9-03.9(3)
Gravel Borrow	9-03.14(1)
Manhole Boots	9-04.13
Penetration Seal	9-04.14
ABS Composite Sewer Pipe	9-05.14
Toning Wire and Splices	9-05.30(1)
Detectable Marking Tape	9-15.18
Saddles	9-30.6(1)

Polyvinyl Chloride Pipe and Fittings
The pressure service lines for commercial duplex systems shall be PVC Pipe Schedule 40 conforming to ASTM D1785 specifications.

Solvent welded socket type fittings shall be PVC Schedule 40 conforming to ASTM D2466 specifications.

Threaded fittings shall be PVC Schedule 80 conforming to ASTM D2464 specifications.

Solvent cement joints shall be made in a twostep process with primer manufactured for thermoplastic piping systems and solvent cement conforming to ASTM D 2564.

Check Valves
Check valves shall be non-shock swing or spring loaded and be operational in the horizontal or vertical positions. They shall be wye pattern swing check valves rated at 200 psi CWP (cold working pressure), meeting ASTM B61, B62 and B584 with a bronze seat.

Gate Valves
Service line gate valves shall be bronze body and bronze mounted solid wedge disc with a non-rising stem rated at 200 psi CWP. Connections shall be with threaded (NPT) or IPS hub. Gate valves shall be full port valves meeting ASTM B584 standards.

Corporation Stops
Corporation stops shall be full port, bronze, for use with saddles. Corporation stops shall have male iron pipe thread inlets and outlet connections compatible with PVC Schedule 40 pipe. Ford Full Port Corp Stop FB1102 or approved equal.

Commercial STEP Duplex Valve Box
Valve boxes shall be concrete vaults equivalent to a Utility Vault UV 644-LA, a minimum of approximately thirty-six (36) inches deep, forty-eight (48) inches wide and seventy-two (72) inches long. They shall be capable of withstanding an H-20 loading. Pipe penetrations shall be sealed with the appropriately sized core and boot or penetration seal. Valve box extensions shall match the valve box base and the total height shall not exceed three (3) feet. Valve boxes shall be by Utility Vault of the appropriate size or approved equal.

Valve boxes shall contain check valves, gate valves, flow meter, and all necessary piping and fittings for a complete installation.

Valve box covers shall be locking, hinged and clearly marked with “SEWER”. Valve box covers shall be appropriately sized and shall be a Utility Vault Inc. H-20 Grate and Frame or approved equal.

When service connections are needed for a commercial connection to a STEP system they shall be installed in accordance with the approved plans as specified in Section 7-10.2(1).

Power Supply
Permanent and unrestricted 240 volt (208-volt power not acceptable) single- or two-phase power shall be supplied to the pump station safety disconnect by the property owner. Emergency Generator power may be required, as shown on the approved plans, where public sanitary sewer service is being provided with the installation. The owner must sign an acknowledgement/agreement that they are responsible to supply power to the pumping system and that the District cannot be held responsible if the sewer system does not work due to a power supply failure

Flow meters
Flow meters will be installed in the STEP Duplex Valve Box. They shall be a Toshiba electromagnetic flow meter Model LF400 series of a size shown on the approved plans or approved equal.

Inspection

The District electrician must provide final approval, in writing, to the District Inspector assigned to the project before the District inspector can issue final acceptance for the STEP installation.

12-02.2(2) Pumps

Pumps shall be duplex installation and shall be as follows or as otherwise approved by the District in writing:

Pump Designation (Residential Only)	Minimum Head @ Shutoff	Minimum Head @ 20 GPM	Required Pump
Meadow Glade Low Head	72 feet	55 feet	Gould WE10H
Meadow Glade High Head	105 feet	90 feet	Gould WE1512 HH
Hockinson	105 feet	90 feet	Gould WE1512 HH

Pumps shall be cast iron submersible pumps suitable for submersion in septic tank effluent and capable of passing a one-half (½) inch solid. All nuts, bolts, and miscellaneous hardware in contact with pumped material and inside the tank shall be stainless steel (Type 316), unless otherwise indicated on Plans.

Motors shall be single phase 240 volt with permanently split capacitor located in the motor housing. Motors shall not exceed a two (2) horsepower rating without the written consent of the District and shall be capable of starting and running on a supplied electric service. Motors shall be non-overloading throughout the range of the manufacturer's pump curve. The motor lead shall be plug connected with the mating receptacle at the pump disconnect panel. Motor casing shall be oil filled. Lower bearings shall be ball thrust bearings. Upper bearings shall be radial bearings.

Pumps shall be compatible with the specified electrical control panel.

Pump power cords shall use copper wire with type STOW insulation color coded consistently throughout the power supply system in accordance with Section 7-10.2(7). Cord grips shall be non-metallic resistant to septic tank corrosive atmospheres or type 18-9 stainless steel. The cords shall be suitable for use with two (2) horsepower, 240-volt motors including locked rotor conditions.

All pumps shall be installed with one-half (½) inch polypropylene lifting ropes connected to 304 stainless steel hooks at the top of the riser as shown on the Standard Plan.

12-02.2(3) Tanks

Tanks shall be a minimum 1,500 gallons nominal capacity as follows:

1. Fiberglass as manufactured by Fiber Septic Systems of Yakima, WA; or
2. Fiberglass as manufactured by FSI of Red Bluff, California; or
3. Concrete as manufactured by and available through Sound Placement Services LLC of Castle Rock, WA; or
4. Single-Wall FRP Tanks as manufactured by the Xerxes Corporation, or
5. Approved equal.

12-02.2(3)A Precast Concrete Tanks

The manufacturing plant for precast concrete units shall be certified by the Precast/Prestressed Concrete Institute's Plant Certification Program for the type of precast member to be produced, or the National Precast Concrete Association's Plant Certification Program or be an International

Congress Building Officials or International Code Council Evaluation Services recognized fabricator of structural precast concrete products, and shall be approved by WSDOT as a Certified Precast Concrete Fabricator prior to the start of production.

Tanks shall be certified by the manufacturer prior to shipment and the Contractor shall provide the District with the manufacturer's certification.

12-02.2(3)B Fiberglass Reinforced Tanks

Tank manufacturer shall be in the business of manufacturing tanks to Underwriters Laboratories (UL) Standard 1316 with materials conforming to the requirements of ANSI/AWWA D120-02 Thermosetting Fiberglass-Reinforced Plastic Tanks.

Single-Wall Fiberglass Reinforced Plastic (FRP) Underground Storage Tanks shall conform to the following:

1. Loading Conditions – Tank shall meet the following design criteria:
   a) Internal Load – Tank shall withstand a 5-psig air-pressure test (3 psig for a 12'-diameter tank) with 5:1 safety factor. When tank is designed for onsite testing, contractor shall individually test tank for leakage prior to installation. Maximum test pressure is 5 psig (3 psig for a 12'-diameter tank).
   b) Surface Loads – Tank shall withstand surface H-20 axle loads when properly installed according to tank manufacturer's current Installation Manual and Operating Guidelines.
   c) External Hydrostatic Pressure – Tank shall be capable of being buried in ground with 7' of overburden over the top of the tank, the hole fully flooded and a safety factor of 5:1 against general buckling.
   d) Tank shall support accessory equipment – such as inlet and outlet piping, effluent filter chamber, ladders and baffles – when installed according to tank manufacturer's current Installation Manual and Operating Guidelines.
2. Product Storage
   a) Tank shall be capable of storing wastewater products limited to the collection and storage of human solid or liquid organic sewage.
   b) Tank shall be vented to atmospheric pressure.
   c) Tank shall be capable of storing products identified in the manufacturer's current standard limited warranty.
3. Materials
   a) Tank shall be manufactured with 100% resin and glass-fiber reinforcement, no sand fillers.
   b) Resin used in tank and accessories shall be premium isophthalic polyester.

12-02.2(3)C Piping and Fittings

1. Piping
   a) Schedule 40 PVC or ABS pipe shall be used for inlet and outlet piping.
   b) When a PVC or ABS pipe is affixed to the tank, a fiberglass lay-up is used.
   c) All piping shall be factory-sealed to enable field tightness testing with at least one pipe opening provided with a threaded fitting for connecting a pressure-test manifold.
2. Access Openings
   a) All access openings 24"-diameter or larger shall be manufactured of FRP.
   b) Location(s) shall be as shown on tank drawings.
   c) Optional riser extensions shall be FRP or PVC.
   d) With tanks designed for onsite tightness testing, all access openings shall be factory-sealed to enable field tightness testing.

3. Optional Anchor Straps
   a) Straps shall be FRP anchor straps as supplied by tank manufacturer.
   b) Number and location of straps shall be specified in current literature by tank manufacturer.
4. Optional Ladders
   a) Ladders shall be the standard ladder as supplied by tank manufacturer.
5. Optional Fittings
   a) All threaded fittings shall be constructed of stainless steel or FRP.
   b) All standard threaded fittings shall be half-couplings and shall be 2"-, 4"- or 6"-diameter. Reducers are to be used for smaller sizes where shown and provided by contractor.
6. Optional Internal Pump Platforms
   a) Pump platforms shall be FRP or hanging PVC vaults.
   b) Contact tank manufacturer with pump details, such as dimensions and weight.

12-02.2(3)D Testing and Installation
The tank shall be tested according to the manufacturer's Installation Manual and Operating Guidelines in effect at time of installation.

Prior to installation, a tank-tightness test consisting of a 5-psig air-pressure/soap test shall be performed (3 psig for 12'-diameter tanks) per the tank testing procedures outlined in the manufacturer's Installation Manual and Operating Guidelines in effect at time of installation.

12-02.2(3)E Warranty
Warranty shall be manufacturer's limited warranty for underground septic tanks in effect at time of purchase (5 year minimum).

12-02.2(4) Discharge Hose and Valve Assembly
The discharge hose consists of PVC pipe, a flexible discharge hose, bleeder valve, union, fittings and other parts as shown on the Standard Plans.

The 'Commercial STEP Duplex Valve Box' and valve assembly shall be as shown in the standard drawings or approved equal.

The drop pipe from the STEP pumps shall be threaded and coupled and conform to American Standard tapered pipe thread specifications.

The discharge hose shall be flexible suction discharge hose. Discharge hose clamps when necessary shall be two-ear stainless steel clamps as manufactured by Oetiker Inc. or approved equal.

The check valve shall be a threaded bronze spring check valve. Springs shall be made of stainless steel.

The bleeder valve shall be a rubber Morrison bleeder valve as manufactured by Campbell Manufacturing, model BOR-4, or approved equal.

Fittings shall be solvent weld unless otherwise indicated on the Plans.

12-02.2(5) Level Control System
The District will allow one of three types of level controls in commercial STEP applications:

1. Ultrasonics (Hydro Ranger 200) by Siemens Corp.
2. A Multitrode probe made by Multitrode Inc., or
3. The A1000I pressure transducer available from Siemens Corp.

A Hydro Ranger 200 Ultrasonic level measurement instrument using a XPS-15 transducer as manufactured by Militronics, Inc. shall be provided to deliver a four (4) to twenty (20) milliampere signal to the PLC.

Alarm and control panel wiring shall not be spliced.

One mercury float switch shall be provided to control the backup high level alarm for the sewage pump system. The float switches shall be polyurethane foam resin bodies encapsulating mercury tube switches. The float switches shall be Anchor Scientific Inc., roto-float, Type S - Suspended, UL listed for pilot duty and industrial control equipment, or equal. The cable shall be 18-2 SJOW/A rated at 600 volts. Provide intrinsically safe relays. The mercury float switches shall be dedicated to the following functions:

1. High level alarm
2. Emergency On - PLC Bypass

The Contractor shall provide a programmable logic controller (PLC) for operation of the sewage pump station and a program for the PLC. The PLC shall be Automation Direct D0-06AA or approved equal. The PLC shall be programmed for operation, tested, and a complete set of documentation, and programming provided to the District in both paper copy and electronic format (CD). The PLC shall control the following pump operations:

1. Pumps off
2. Lead pump on
3. Lag pump on
4. Long run time alarm
5. High level alarm

The inputs and outputs for the PLC shall be as follows:

Fixed outputs on PLC:

AC(L)	H1 (JUMPER TO C0)
G	(JUMPER TO LG)
AC(N)	NEUTRAL
LG	GROUND
24v	+ 24
0V	-24
C0	(JUMPER TO C1)
Y0	PUMP #1
Y1	PUMP #2
Y2	HIGH ALARM LT. DOOR
C1	(JUMPER TO C2)
C2	(JUMPER TO C3)
Y7 L	OW ALARM LT
Y10	PHASE FAIL OUTPUT
Y11	SPARE OUTPUT
Y12	ALARM BEACON OUTPUT
Y13	MTR #1 EXCESSIVE RUN TIME OUTPUT
C3	

Y14 MTR #2 EXCESSIVE RUN TIME OUTPUT
Y15 SPARE OUTPUT
Y16 SPARE OUTPUT
Y17 OUTPUT READ BY MASTER PLC FOR HEARTBEAT (ON BY SPECIAL RELAY ALWAYS ON)
N.C.

Fixed Outputs on PLC:
CO (JUMPER TO C1)
X0 PUMP 1 HAND TO PLC (SWITCH ALSO WIRED DIRECT TO MOTOR)
X1 PUMP 1 AUTO
X2 PUMP 2 HAND TO PLC (SWITCH ALSO WIRED DIRECT TO MOTOR)
X3 PUMP 2 AUTO
C1 (JUMPER TO C2)
X4 HIGH LEVEL ALARM FLOAT INPUT
X5 BACKUP ON FLOAT INPUT
X7 SPARE INPUT
C2 (JUMPER TO C3)
X10 PHASE FAIL MONITOR INPUT
X11 RESET INPUT
C3 (JUMPER TO C4)
X16 SPARE INPUT
X17 SPARE INPUT
C4 NEUTRAL
X20 SPARE INPUT
X21 SPARE INPUT
X22 SPARE INPUT
X23 SPARE INPUT
N.C.
N.C.

Slot 1 F0-04AD-1 4 channel analog input:
1. (+-) 4-20MA INPUT FROM HYDRO-RANGER 200 (TIE COMMON NEG 24V WITH PLC, NEG 24V)
2. (CT1+ CT1-) 4-20MA INPUT FROM MTR #1 CT (SOURCE VOTAGE FROM PLC 24V DC
3. (CT2+ CT2-) 4-20MA INPUT FROM MTR #2 CT (SOURCE VOTAGE FROM PLC 24V DC)
4. (+-) TOSHIBA FLOW METER

The Contractor shall install the control enclosure including installation, programming and testing.

12-02.2(6) Telemetry

A spare two (2) inch diameter conduit shall be installed for future telephone and telemetry wiring. The conduit shall be installed from the control panel to one (1) foot past the edge of pavement with a nylon cord installed and capped as shown on the plans and the District Standard Drawings. A permanent marker will be installed at the edge of the concrete slab marking the location of the spare conduit.

An MDS TransNET 900 transceiver as manufactured by General Electric (GE) shall be installed within the control panel and shall include diagnostics software. The transceiver shall be

connected to an antenna mounted in the location shown on the plans. The antenna shall be an MDS model number 97-3194A13 as manufactured by GE.

12-02.2(7) Electrical Conduit, Fittings, Junction Box and Splices

Electrical conduit shall be rigid nonmetallic conduit and fittings conforming to National Electrical Code, NEMA Specification TC-2 and UL651. Electrical conduit fittings shall be Schedule 40 PVC.

12-02.2(8) Control Panels

Pump panel and controls shall be reviewed by the Contractor for compatibility with pumps supplied. This shall include, but not be limited to, the seal failure and high temperature method of control by the pumps supplied.

The control panel shall be a NEMA 4, corrosion resistant, painted (gray) steel enclosure. All controls and indicators shall be contained within the control panel.

The Control Panel is to be in conformance to District Standard Drawings.

Components mounted on the inner door shall include the level controller, operator panel, flow meter converter, and the two (2) thermal/leakage sensor relays, as well as the momentary push buttons, indicator lights, HOA switches and door mount operators as shown on the standard drawings.

The cabinet shall be supplied with a 120V, 100 watt, thermostatically controlled panel heater and a 120V inner panel light shall be mounted to the top of the cabinet. A 120V red, beacon type alarm light shall be mounted to the top of the cabinet on the exterior.

Wiring shall be neatly bundled and secured with plastic wire ties when located outside the conduit and protected from contact with sharp edges of the control panel sheet metal and from contacting the internal moisture prevention equipment.

Cables and wires will be clearly identified with heat shrink sleeves. Alarm and control panel wiring shall not be spliced.

Wiring from the transducer in the wet well shall include intrinsically safe barriers and relays within the control panel.

Phase Monitors shall be provided in the control panel for ground fault, phase reversal, phase loss, phase imbalance, over current and under voltage. Both pumps shall be shut down and alarms activated if any of these conditions occur.

Provide two (2) standard 120-volt receptacles, with 15-ampere breaker with a GFI inside the control panel.

The control panel shall include an uninterruptible power supply (UPS) for control power components.

Engraved name tags shall be provided for all electrical components in the control panel on or above each component as shown on the District Standard Construction Drawings.

12-02.3 Construction Requirements

12-02.3(1) General
Where shown on the Plans, STEP systems shall be installed: in accordance with the Standard Plans and by a Contractor approved by the District to install STEP systems.

The STEP system shall be located and configured as shown on the Plans. The Contractor shall request in writing, permission to vary from the Plans. The District will respond in writing. Alternate configurations may require different materials to address vehicle loading, drainage, or other considerations at the sole discretion of the District.

Preconstruction Conference
Prior to the Contractor beginning the work, a preconstruction conference will be held between the Contractor, the Engineer and such other interested parties as may be invited. The purpose of the preconstruction conference will be:

1. To review the construction schedule;
2. To establish a working understanding among the various parties associated or affected by the work;
3. To establish and review procedures for notifications, approvals, submittals, etc.;
4. To establish normal working hours for the work;
5. To review safety standards; and
6. To discuss such other related items as may be pertinent to the work.

The Contractor shall submit material sources prior to the preconstruction conference.

The Contractor shall request the preconstruction conference a minimum of 10 calendar days prior to the start of construction.

The actual date of the preconstruction conference will depend on availability of District staff and the various parties associated with the work.

The preconstruction conference may be held at the construction site for single-family residences. It will be held in conjunction with the Clark County preconstruction conference or scheduled at the District offices for all other projects.

12-02.3(2) Testing
After the tank is placed, and prior to backfilling, the tank shall be filled to a point above the base of the riser. There shall be no more than a one (1) inch loss of water depth over a 24-hour period. Concrete tanks may be filled for a period of 24 hours to allow for absorption prior to testing. Where multiple tanks are installed each tank shall be isolated in such a way as to make it possible to test each tank individually.

Hydrostatic pressure testing for pressure sewer services shall be done following installation and prior to acceptance in the presence of the District Inspector. The lines shall be tested in accordance with Section 7-09.3(23) Hydrostatic Test at 150 psi for 15 minutes with no loss of pressure.

12-02.3(3) Pressure Service Lines
Pressure service line construction shall be installed in conformance with Section 7-09.3 except as modified below.

The pressure service lines shall not be backfilled prior to inspection.

The District will install taps on existing mains. A "Request for Tap" form must be completed by the Contractor, fees paid, and a two (2) working day notice be given to the District to allow the tap to be scheduled.

The pressure service line from the main to the valve box shall be installed at a minimum depth of 36-inches below finished grade or the flow line of a ditch. The pressure service line from the valve box to the STEP tank shall be 24-inches below finished grade or the flow line of a ditch.

A continuous toning wire shall be attached to the top of the pressure service line. A minimum of a three (3) foot coil of wire shall be left in each access point (junction boxes, vaults, locate stations, air/vacuum valves, etc.).

Detectable marking tape shall be installed one (1) foot above the top of the pressure service line.

12-02.3(4) Tanks

STEP tanks shall be installed in accordance with the Plans, Standard Plans, and the manufacturer's instructions.

The tank shall be installed where it will not collect surface water. All lids and access risers shall be set such that surface waters will flow away from them.

The inlet and outlet access openings shall accommodate a twenty-four (24) inch diameter riser. The openings for the pump vaults shall accommodate a thirty (30) inch Perma-Loc PVC riser.

The entrance of the inlet or outlet tee shall pass through a Ty-seal type of neoprene grommet for fiberglass tanks or a manhole boot for concrete tanks that shall provide a watertight seal, but allow flexibility to the building sewer.

The inlet tee shall be Schedule 40 ABS or PVC (PVC can be ASTM 3034 for six (6) inch or larger pipe). The Contractor shall install the six (6) inch Schedule 40 ABS or PVC service line from the tank to the building. The building shall be connected (if it is for an existing building) or the new service line shall be stubbed and plugged in the location staked.

Thirty (30) inch risers shall be installed at each tank when they service a pump. The risers shall be of the same material as the tank and submitted for District review and approval. For concrete tanks, risers shall be ribbed PVC as manufactured by Orenco Systems, Inc., Model RR30 with riser-to-lid adapters, Model RLA30, or approved equal.

The risers shall have a minimum inside diameter of twenty-nine and one-half (29½) inches, and shall be a maximum of thirty-six (36) inches tall. Any change in length of the riser shall be approved.

A twenty-four (24) inch (if not servicing a pump) diameter Ultra-Rib PVC riser pipe shall be installed over the inlet tee and be fastened to the tank with a water-tight connection as specified for the twenty-four (24) inch riser.

The lid shall extend at least one-half (½) inch over the riser and be capable of supporting a 2,500-pound wheel load. The lids shall have a non-skid finish, a neoprene sponge gasket, and shall be fastened to the riser with four (4) allen head stainless steel bolts. Neoprene grommets shall be supplied for all penetrations.

Anti-flotation measures shall be installed according to manufacturer recommendation.

Fiberglass tank(s) shall be bedded in and backfilled with pea gravel consisting of clean washed gravel, rounded with no crushed material. The maximum size shall be one quarter (¼) inch in diameter, well graded with no more than 2% passing the No. 200 sieve.

Concrete tanks shall be bedded in and backfilled with Crushed Surfacing Base Course per Section 9-03.9(3). Compaction shall be at 90% of the maximum density for the material as established by Section 2-03.3(14)D.

The tank supplier shall provide a written five (5) year warranty to the Owner.

The tanks shall be installed in non-traffic areas whenever possible. For installation in traffic areas, a traffic-bearing lid will be required. The traffic-bearing lid shall be cast iron marked “Sanitary Sewer”, have two (2) pick holes, be rated at H-20 loading and shall have a watertight seal with the riser. No part of the ring shall cover or bear on the riser or cover.

12-02.3(5) Electrical

12-02.3(5)A General

1. All electrical work shall be completed by an electrician licensed by the State of Washington.
2. All work shall be inspected and approved by the State of Washington Labor and Industries.
3. The Contractor shall install a complete electrical installation, including connection to the electrical building panel.
4. All connections and installation shall be in accordance with the National Electrical Code, State of Washington Department of Labor and Industries requirements and these specifications.
5. All underground power installations shall be placed in a one (1) inch minimum Schedule 40 PVC conduit at a minimum depth of twenty-four (24) inches or the 8” x 8” raceway for the pump power lines, float wire level control lines from the tank risers to the pump disconnect panel located adjacent to the tank.
6. Components shall be listed or recognized by an accepted testing laboratory (UL, CSA or FM).
7. All electrical equipment shall be rated for local temperature ranges.
8. All exposed electrical terminals shall be fully insulated.
9. The float assembly shall consist of one (1) mercury float switch with non-metallic cord grips, waterproof and explosion-proof splices, stainless steel mounting frame and other miscellaneous parts as required.

12-02.3(5)B Safety Disconnect Panel

1. The safety disconnect panel shall be lockable, rated at the calculated need of the system (as determined by the design engineer [service amperes]), 240-volts, non-fused, waterproof with an external disconnect handle. The safety disconnect panel shall be rated as needed (such as a Cutler Hammer model DG221URB), or approved equal.
2. If the total length of conductor from the commercial building electrical panel is more than one hundred (100) feet from the building power panel to the pump motor, the conductor gage shall be increased in accordance with the National Electrical Code as adopted by the State of Washington.
3. The safety disconnect panel shall be locked. The District will provide a lock for District owned or District maintained systems.

12-02.3(5)C Pump Disconnect Panel

The Pump Disconnect Panel shall be installed in the location shown on the Plans and be used as a disconnect for electrical lines from the tank/wet pit to the control panel. It will service the power cords, float wires, transducer wires and any other wiring that is necessary for the operation and control of the tank, pumps and appurtenances. The Pump disconnect Panel shall be constructed in accordance with the Plans, Specifications, and the Standard drawings that apply to it. The panel must have Meltric decontactor receptacles to mate with the motor cord and plug. The panel must have at least forty-five (45) inches of open-air space enclosed with expanded metal that has at least one face hinged and latched from the surface level to the bottom of the panel enclosure. The panel must have an intrinsically safe barrier in it.

12-02.3(5)D Electric Service Mounting

1. The safety disconnect panel and the control panel shall be located and configured as shown on the Plans and described in these specifications. The Contractor shall request in writing, permission to vary from the Plans and specifications. The District will respond in writing. Alternate configurations may require different materials to address vehicle loading, drainage, or other considerations at the sole discretion of the District. The Contractor shall bear any added costs that result from the change; and
2. The safety disconnect panel shall be mounted to the right of the control panel with a minimum six (6) inch and a maximum twelve (12) inch clearance between the panels; and
3. The safety disconnect panel and the control panel shall be mounted at the same height. There shall be a distance between four (4) and five (5) feet between the top of the panels and the mounting base; and
4. The Contractor may locate the control panel on a separate pressure treated 4x4 post, buried 24-inches in the ground, adjacent to the building at the height discussed in (b) above; and
5. No structure, fence or landscaping or other material shall be installed, placed or stored that block access to the STEP tank, valve box, disconnect panel, control panel or block the view of the control panel or disconnect panel from the street.

12-02.4 Measurement

STEP Systems will be measured per each.

No measurement will be made for clearing and grubbing, removal of existing street improvements, protection of existing utilities and services, excavation, pipe zone backfill, pipe zone bedding, trench backfill, and compaction of backfill.

Removal and replacement of unsuitable material will be measured per cubic yard.

12-02.5 Payment

Payment will be made in accordance with Section 1-04.1 for each of the following Bid items that are included in the Proposal:

“STEP System”, per each.

The unit Contract price per each for STEP systems shall be full pay for furnishing, hauling, and assembling in place the completed installation including all fittings, special fittings, joint materials, bedding and backfill material, motor, pump, tank, valves (check, gate and bleeder valves), valve vault, flow meter, electrical, paving, fencing and gates, testing, start-up, and all other Work necessary for the completion of the installation in accordance with Plans and Contract Provisions.

“Removal and Replacement of Unsuitable Material”, per cubic yard.
The unit Contract price per cubic yard for “Removal and Replacement of Unsuitable Material” shall be full pay for all Work to remove unsuitable material and replace and compact suitable material as specified in Section 7-08.3(1)A.

12-02.3(1) General

Where shown on the Plans, STEP systems shall be installed: in accordance with the Standard Plans and by a Contractor approved by the District to install STEP systems.

The STEP system shall be located and configured as shown on the Plans. The Contractor shall request in writing, permission to vary from the Plans. The District will respond in writing. Alternate configurations may require different materials to address vehicle loading, drainage, or other considerations at the sole discretion of the District.

Preconstruction Conference

Prior to the Contractor beginning the work, a preconstruction conference will be held between the Contractor, the Engineer and such other interested parties as may be invited. The purpose of the preconstruction conference will be:

1. To review the construction schedule;
2. To establish a working understanding among the various parties associated or affected by the work;
3. To establish and review procedures for notifications, approvals, submittals, etc.;
4. To establish normal working hours for the work;
5. To review safety standards; and
6. To discuss such other related items as may be pertinent to the work.

The Contractor shall submit material sources prior to the preconstruction conference.

The Contractor shall request the preconstruction conference a minimum of 10 calendar days prior to the start of construction.

The actual date of the preconstruction conference will depend on availability of District staff and the various parties associated with the work.

The preconstruction conference may be held at the construction site for single-family residences. It will be held in conjunction with the Clark County preconstruction conference or scheduled at the District offices for all other projects.

12-02.3(2) Testing

After the tank is placed, and prior to backfilling, the tank shall be filled to a point above the base of the riser. There shall be no more than a one (1) inch loss of water depth over a 24-hour period. Concrete tanks may be filled for a period of 24 hours to allow for absorption prior to testing. Where multiple tanks are installed each tank shall be isolated in such a way as to make it possible to test each tank individually.

Hydrostatic pressure testing for pressure sewer services shall be done following installation and prior to acceptance in the presence of the District Inspector. The lines shall be tested in accordance with Section 7-09.3(23) Hydrostatic Test at 150 psi for 15 minutes with no loss of pressure.

12-02.3(3) Pressure Service Lines

Pressure service line construction shall be installed in conformance with Section 7-09.3 except as modified below.

The pressure service lines shall not be backfilled prior to inspection.

The District will install taps on existing mains. A "Request for Tap" form must be completed by the Contractor, fees paid, and a two (2) working day notice be given to the District to allow the tap to be scheduled.

The pressure service line from the main to the valve box shall be installed at a minimum depth of 36-inches below finished grade or the flow line of a ditch. The pressure service line from the valve box to the STEP tank shall be 24-inches below finished grade or the flow line of a ditch.

A continuous toning wire shall be attached to the top of the pressure service line. A minimum of a three (3) foot coil of wire shall be left in each access point (junction boxes, vaults, locate stations, air/vacuum valves, etc.).

Detectable marking tape shall be installed one (1) foot above the top of the pressure service line.

12-02.3(4) Tanks

STEP tanks shall be installed in accordance with the Plans, Standard Plans, and the manufacturer's instructions.

The tank shall be installed where it will not collect surface water. All lids and access risers shall be set such that surface waters will flow away from them.

The inlet and outlet access openings shall accommodate a twenty-four (24) inch diameter riser. The openings for the pump vaults shall accommodate a thirty (30) inch Perma-Loc PVC riser.

The entrance of the inlet or outlet tee shall pass through a Ty-seal type of neoprene grommet for fiberglass tanks or a manhole boot for concrete tanks that shall provide a watertight seal, but allow flexibility to the building sewer.

The inlet tee shall be Schedule 40 ABS or PVC (PVC can be ASTM 3034 for six (6) inch or larger pipe). The Contractor shall install the six (6) inch Schedule 40 ABS or PVC service line from the tank to the building. The building shall be connected (if it is for an existing building) or the new service line shall be stubbed and plugged in the location staked.

Thirty (30) inch risers shall be installed at each tank when they service a pump. The risers shall be of the same material as the tank and submitted for District review and approval. For concrete tanks, risers shall be ribbed PVC as manufactured by Orenco Systems, Inc., Model RR30 with riser-to-lid adapters, Model RLA30, or approved equal.

The risers shall have a minimum inside diameter of twenty-nine and one-half (29½) inches, and shall be a maximum of thirty-six (36) inches tall. Any change in length of the riser shall be approved.

A twenty-four (24) inch (if not servicing a pump) diameter Ultra-Rib PVC riser pipe shall be installed over the inlet tee and be fastened to the tank with a water-tight connection as specified for the twenty-four (24) inch riser.

The lid shall extend at least one-half (½) inch over the riser and be capable of supporting a 2,500-pound wheel load. The lids shall have a non-skid finish, a neoprene sponge gasket, and shall be fastened to the riser with four (4) allen head stainless steel bolts. Neoprene grommets shall be supplied for all penetrations.

Anti-flotation measures shall be installed according to manufacturer recommendation.

Fiberglass tank(s) shall be bedded in and backfilled with pea gravel consisting of clean washed gravel, rounded with no crushed material. The maximum size shall be one quarter (¼) inch in diameter, well graded with no more than 2% passing the No. 200 sieve.

Concrete tanks shall be bedded in and backfilled with Crushed Surfacing Base Course per Section 9-03.9(3). Compaction shall be at 90% of the maximum density for the material as established by Section 2-03.3(14)D.

The tank supplier shall provide a written five (5) year warranty to the Owner.

The tanks shall be installed in non-traffic areas whenever possible. For installation in traffic areas, a traffic-bearing lid will be required. The traffic-bearing lid shall be cast iron marked “Sanitary Sewer”, have two (2) pick holes, be rated at H-20 loading and shall have a watertight seal with the riser. No part of the ring shall cover or bear on the riser or cover.

12-02.3(5) Electrical

12-02.3(5)A General

1. All electrical work shall be completed by an electrician licensed by the State of Washington.
2. All work shall be inspected and approved by the State of Washington Labor and Industries.
3. The Contractor shall install a complete electrical installation, including connection to the electrical building panel.
4. All connections and installation shall be in accordance with the National Electrical Code, State of Washington Department of Labor and Industries requirements and these specifications.
5. All underground power installations shall be placed in a one (1) inch minimum Schedule 40 PVC conduit at a minimum depth of twenty-four (24) inches or the 8” x 8” raceway for the pump power lines, float wire level control lines from the tank risers to the pump disconnect panel located adjacent to the tank.
6. Components shall be listed or recognized by an accepted testing laboratory (UL, CSA or FM).
7. All electrical equipment shall be rated for local temperature ranges.
8. All exposed electrical terminals shall be fully insulated.
9. The float assembly shall consist of one (1) mercury float switch with non-metallic cord grips, waterproof and explosion-proof splices, stainless steel mounting frame and other miscellaneous parts as required.

12-02.3(5)B Safety Disconnect Panel

1. The safety disconnect panel shall be lockable, rated at the calculated need of the system (as determined by the design engineer [service amperes]), 240-volts, non-fused, waterproof with an external disconnect handle. The safety disconnect panel shall be rated as needed (such as a Cutler Hammer model DG221URB), or approved equal.
2. If the total length of conductor from the commercial building electrical panel is more than one hundred (100) feet from the building power panel to the pump motor, the conductor gage shall be increased in accordance with the National Electrical Code as adopted by the State of Washington.
3. The safety disconnect panel shall be locked. The District will provide a lock for District owned or District maintained systems.

12-02.3(5)C Pump Disconnect Panel

The Pump Disconnect Panel shall be installed in the location shown on the Plans and be used as a disconnect for electrical lines from the tank/wet pit to the control panel. It will service the power cords, float wires, transducer wires and any other wiring that is necessary for the operation and control of the tank, pumps and appurtenances. The Pump disconnect Panel shall be constructed in accordance with the Plans, Specifications, and the Standard drawings that apply to it. The panel must have Meltric decontactor receptacles to mate with the motor cord and plug. The panel must have at least forty-five (45) inches of open-air space enclosed with expanded metal that has at least one face hinged and latched from the surface level to the bottom of the panel enclosure. The panel must have an intrinsically safe barrier in it.

12-02.3(5)D Electric Service Mounting

1. The safety disconnect panel and the control panel shall be located and configured as shown on the Plans and described in these specifications. The Contractor shall request in writing, permission to vary from the Plans and specifications. The District will respond in writing. Alternate configurations may require different materials to address vehicle loading, drainage, or other considerations at the sole discretion of the District. The Contractor shall bear any added costs that result from the change; and
2. The safety disconnect panel shall be mounted to the right of the control panel with a minimum six (6) inch and a maximum twelve (12) inch clearance between the panels; and
3. The safety disconnect panel and the control panel shall be mounted at the same height. There shall be a distance between four (4) and five (5) feet between the top of the panels and the mounting base; and
4. The Contractor may locate the control panel on a separate pressure treated 4x4 post, buried 24-inches in the ground, adjacent to the building at the height discussed in (b) above; and
5. No structure, fence or landscaping or other material shall be installed, placed or stored that block access to the STEP tank, valve box, disconnect panel, control panel or block the view of the control panel or disconnect panel from the street.

12-02.4 Measurement

STEP Systems will be measured per each.

No measurement will be made for clearing and grubbing, removal of existing street improvements, protection of existing utilities and services, excavation, pipe zone backfill, pipe zone bedding, trench backfill, and compaction of backfill.

Removal and replacement of unsuitable material will be measured per cubic yard.

12-02.5 Payment

Payment will be made in accordance with Section 1-04.1 for each of the following Bid items that are included in the Proposal:

“STEP System”, per each.

The unit Contract price per each for STEP systems shall be full pay for furnishing, hauling, and assembling in place the completed installation including all fittings, special fittings, joint materials, bedding and backfill material, motor, pump, tank, valves (check, gate and bleeder valves), valve vault, flow meter, electrical, paving, fencing and gates, testing, start-up, and all other Work necessary for the completion of the installation in accordance with Plans and Contract Provisions.

“Removal and Replacement of Unsuitable Material”, per cubic yard.
The unit Contract price per cubic yard for “Removal and Replacement of Unsuitable Material” shall be full pay for all Work to remove unsuitable material and replace and compact suitable material as specified in Section 7-08.3(1)A.

APPENDIX B

STANDARD DRAWINGS

Plotted on Apr 04, 2020 - 11:42am, Modified 04-04-20
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STANDARD DRAWING SHEET INDEX

#	DRAWING NAME	DESIGN SECTION	APPROVED
1.	SIGNATURE BLOCK	DESIGN	APR 2020
2.	STANDARD GRAVITY CONSTRUCTION NOTES	DESIGN	APR 2020
3.	PRESSURE CONSTRUCTION NOTES	DESIGN	APR 2020
4.	PUMP STATION CONSTRUCTION NOTES	DESIGN	APR 2020
5.	PIPE INSTALLATION	GRAVITY/PRESSURE	APR 2020
6.	MANHOLE TYPE 1	GRAVITY	APR 2020
7.	MANHOLE TYPE 2	GRAVITY	APR 2020
8.	MANHOLE TYPE 3	GRAVITY	APR 2020
9.	MANHOLE INSIDE DROP	GRAVITY	APR 2020
10.	MANHOLE LATERAL CONNECTION	GRAVITY	APR 2020
11.	STANDARD MANHOLE FRAME & COVER	GRAVITY	APR 2020
12.	MANHOLE STEPS	GRAVITY	APR 2020
13.	MANHOLE GRADE ADJUSTMENT	GRAVITY	APR 2020
14.	TONING WIRE IN MANHOLE	GRAVITY	APR 2020
15.	CLEANOUTS	GRAVITY	APR 2020
16.	RESIDENTIAL SIDE SEWER	GRAVITY	APR 2020
17.	RESIDENTIAL SERVICE CONNECTION	GRAVITY	APR 2020
18.	RESIDENTIAL DRIVEWAY CLEANOUT	GRAVITY	APR 2020
19.	OFFSET RESIDENTIAL DRIVEWAY CLEANOUT	GRAVITY	APR 2020
20.	COMMERCIAL SERVICE CONNECTION	GRAVITY	APR 2020
21.	COMMERCIAL TWO WAY CLEANOUT ALTERNATE	GRAVITY	APR 2020
22.	GREASE INTERCEPTOR	GRAVITY	APR 2020
23.	RESIDENTIAL RV DISPOSAL STATION	RV	APR 2020
24.	COMMERCIAL RV DISPOSAL STATION	RV	APR 2020
25.	CONCRETE TO PVC OR DIP TRANSITION	GRAVITY	APR 2020
26.	CLAY DAMS	GRAVITY	APR 2020
27.	BOLLARD	RV	APR 2020
28.	GATE VALVE	FORCE MAIN	APR 2020
29.	AIR / VACUUM VALVE	FORCE MAIN	APR 2020
30.	LOCATE STATION	FORCE MAIN	APR 2020
31.	PRESSURE GAUGE	FORCE MAIN	APR 2020
32.	THRUST BLOCK	FORCE MAIN	APR 2020
33.	SITE PLAN	PUMP STATION	APR 2020
34.	LANDSCAPE PLAN	PUMP STATION	APR 2020
35.	TYPICAL PUMP STATION WET WELL	PUMP STATION	APR 2020
36.	TYPICAL PUMP STATION DESIGN CRITERIA	PUMP STATION	APR 2020
37.	VALVE VAULT	PUMP STATION	APR 2020
38.	CONTROL PANEL KIOSK	PUMP STATION	APR 2020
39.	CONTROL PANEL COVER CROSS SECTIONS	PUMP STATION	APR 2020
40.	CONTROL PANEL COVER FOOTING / POST CONNECTION	PUMP STATION	APR 2020
41.	CONTROL PANEL CONDUIT LAYOUT	PUMP STATION	APR 2020
42.	CONTROL PANEL ENCLOSURE	PUMP STATION	APR 2020
43.	SWING / SUB PANEL DETAIL	PUMP STATION	APR 2020
44.	CONTROL PANEL WIRING DIAGRAM	PUMP STATION	APR 2020
45.	CONTROL PANEL I/O WIRING DIAGRAM	PUMP STATION	APR 2020
46.	PUMP DISCONNECT PANEL	PUMP STATION	APR 2020
47.	RESIDENTIAL CONCRETE S.T.E.P. TANK	S.T.E.P.	APR 2020
48.	RESIDENTIAL FIBERGLASS S.T.E.P. TANK	S.T.E.P.	APR 2020
49.	COMMERCIAL FIBERGLASS S.T.E.P. TANK	S.T.E.P.	APR 2020
50.	COMMERCIAL S.T.E.P. SITE PLAN	S.T.E.P.	APR 2020
51.	COMMERCIAL S.T.E.P. DUPLEX VALVE BOX	S.T.E.P.	APR 2020
52.	RESIDENTIAL GRINDER / S.T.E.P. SITE PLAN	S.T.E.P. / GRINDER	APR 2020
53.	RESIDENTIAL GRINDER / S.T.E.P. VALVE BOX	S.T.E.P. / GRINDER	APR 2020
54.	RESIDENTIAL PRESSURE SERVICE CONNECTION	S.T.E.P. / GRINDER	APR 2020
55.	RESIDENTIAL GRINDER / S.T.E.P. FORCE MAIN EXTENSION	S.T.E.P. / GRINDER	APR 2020
56.	RESIDENTIAL GRINDER / S.T.E.P. FORCE MAIN CLEAN OUT	S.T.E.P. / GRINDER	APR 2020
57.	RESIDENTIAL GRINDER PUMP TANK	GRINDER	APR 2020
58.	GRINDER DISCHARGE HOSE & VALVE ASSEMBLY	GRINDER	APR 2020
59.	PRESSURE TO GRAVITY SERVICE CONNECTION	GRINDER	APR 2020
60.	JACK AND BORE	GRAVITY	APR 2020

CLARK REGIONAL WASTEWATER DISTRICT

STANDARD DRAWING INDEX

STANDARD DRAWING

I

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 11:44am, Modified 03-28-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_01_D

SANITARY SEWER SYSTEM

CLARK REGIONAL WASTEWATER DISTRICT

APPROVED FOR CONSTRUCTION:

DATE

CLARK REGIONAL WASTEWATER DISTRICT

SIGNATURE BLOCK

STANDARD DRAWING

1

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 11:45am, Modified 03-28-20
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STANDARD GRAVITY CONSTRUCTION NOTES

1. All sanitary sewer construction shall conform to the current adopted District General Special Provisions and Standard Drawings.

2. All work in public right-of-way shall conform to the requirements of the Clark County utility permit , City of Vancouver, City of Ridgefield, City of Battle Ground, applicable railroad permits, WSDOT, or District requirements, whichever are more restrictive.

3. Contractor shall contact the NW Utility Notification Center at 1-800-424-5555 at least two (2) working days before but not more than (10) ten working days before the start of construction of the work and shall comply with State requirements for utility locating.

4. All survey monumentation shall be protected from damage unless otherwise permitted by Department of Natural Resources.

5. A preconstruction conference shall be held prior to the start of construction of the project.

6. Gravity sanitary sewer pipe materials for lines six (6) inches inside diameter and larger shall be:

   a. AWWA C-900 or C-905 SDR 18 PVC, OR Class 50 ductile iron pipe at depths of cover from three (3) feet to less than five (5) feet in a vehicle-traveled area and depths of cover greater than twenty (20) feet; or

   b. ASTM D3034 SDR 35 PVC pipe at depths of cover of five (5) feet to depths of cover of twenty (20) feet;

7. Gravity sanitary sewer pipe materials for lines four (4) inches inside diameter and smaller shall be of the same material as the main. Schedule 40 ABS may be used with ASTM D3034 SDR 35 PVC mains.

8. Connections for side sewers (laterals) shall be:

   a. Wyes for new sanitary sewers.

   b. District installed taps for existing plastic lines: A “Request for Tap” form must be completed by the contractor and a two (2) working day notice be given to the District to allow the tap to be scheduled.

   c. Contractor shall cut in wyes for existing non-plastic pipe.

9. The ends of side sewers (laterals) shall be:

   a. Back-filled only after District inspection and approval and the Design Engineer or surveyor has obtained record drawing information.

   b. Marked with a 2”x4”x10’ wrapped with a14 gauge wire not connected to the toning wire and at a 90-degree angle from the end of the lateral. The marker will extend at least three (3) feet above the finished ground surface. Two (2) feet of each end of the 2”x4”x10’ shall be painted green. If the 2”x4” is not ten (10) feet long, the contractor shall mark the actual length on the 2”x4” within six inches of the top and on both sides.

   c. Indicated by an "S" that is stamped into the curb directly above the side sewer.

10. Manhole joints shall be externally sealed in accordance with 7-05.3 and where shown on the Plans.

11. Manholes shall not have edges of manhole casting and cover within three (3) feet of the curb gutter. Where determined by the District, inflow dishes shall be installed in manholes.

12. All testing shall be in accordance with the General Special Provisions.

13. The Design Engineer or surveyor shall submit pre-paving record drawings.

14. Final Record Drawings shall be submitted to the District prior to final acceptance.

15. All side sewer (laterals) shall be installed with toning wire. Toning wire shall be installed on main lines where shown on the plans.

16. Invert elevations of all cleanouts shall be verified prior to backfilling.

Plotted on Apr 04, 2020 - 11:46am, Modified 03-28-20
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STANDARD PRESSURE SEWER CONSTRUCTION NOTES

1. All sanitary sewer construction shall conform to the current adopted District General Special Provisions and Standard Drawings.

2. All work in public right-of-way shall conform to the requirements of the Clark County utility permit , City of Vancouver, City of Ridgefield, City of Battle Ground, applicable railroad permits, WSDOT, or District requirements, whichever are more restrictive.

3. Contractor shall contact the NW Utility Notification Center at 1-800-424-5555 at least two (2) working days before but not more than (10) ten working days before the start of construction of the work and shall comply with State requirements for utility locating.

4. All survey monumentation shall be protected from damage unless otherwise permitted by Department of Natural Resources.

5. A preconstruction conference shall be held prior to the start of construction of the project.

6. Pressure sanitary sewer pipe materials for depths of cover less than twenty (20) feet for lines two (2) inches inside diameter and larger shall be:

   a. Ductile iron pipe (DIP), standard thickness class 50, AWWA C151; or

   b. Polyvinyl chloride (PVC) pipe ASTM D2241, SDR 21, Class 200; or

   c. Polyvinyl chloride (PVC) pipe AWWA C900 or AWWA C905, SDR 18; or

   d. High density polyethylene (HDPE) pipe PE 3408, minimum SDR 17, 100 psi, ASTM D3350, PE 3454C and ASTM D-1248 type III, class C, category 5, grade P3; and

   e. All fittings shall match the pipe material installed.

   f. Pressure sanitary sewer pipe materials for special installations (e.g., depths of cover twenty (20) feet or greater, stream crossings, suspended pipes) shall be submitted to the District Engineer for approval.

7. Pressure service line pipe for residential installations shall be:

   a. One and one-quarter (1¼) inch diameter schedule 40 polyvinyl chloride (PVC) for STEP systems; and

   b. Two (2) inch diameter schedule 40 polyvinyl chloride (PVC) for grinder pump systems.

8. Connections for single-family residential pressure service lines shall be:

   a. One and one-quarter (1¼) inch by main diameter self-tapping PVC full circle stainless steel saddles for STEP systems on new force mains; and

   b. Two (2) inch by main diameter self-tapping PVC full circle stainless steel saddles for grinder pump systems on new force mains; and

   c. The District will install taps on all existing force mains. A "Request for Tap" form must be completed by the Contractor, fees paid, and a two (2) working day notice be given to the District Superintendent to allow the tap to be scheduled.

9. All force mains and pressure service lines installed (both public and private) shall include the installation of toning wire with appropriate locate access points. A continuous toning wire shall be atop of the pressure service line. The toning wire shall end in the valve box with a minimum of a two (2) foot coil of wire. The toning wire shall be tested for continuity prior to acceptance.

10. Detectable marking tape shall be installed eighteen (18) inches above the force main.

11. The ends of pressure service lines shall be:

   a. Generally marked with a 2"x4"x8' with the toning wire from the pressure service line wrapped around the marker. The marker shall extend three (3) feet above the finished ground surface. Two (2) feet of each end of the 2"x4"x8' shall be painted green. If the 2"x4" is not eight (8) feet long, Contractor will mark actual length on the 2"x4".

12. All testing shall be in accordance with the District's General Special Provisions.

13. Final Record Drawings will be submitted to the District prior to approval of Sewer Permits.

CLARK REGIONAL WASTEWATER DISTRICT	STANDARD PRESSURE SEWER CONSTRUCTION NOTES STANDARD DRAWING	3 APPROVED: APR 2020

Plotted on Apr 04, 2020 - 11:47am, Modified 03-28-20
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STANDARD PUMP STATION CONSTRUCTION NOTES

1. All sanitary sewer construction shall conform to the current adopted District General Special Provisions and Standard Drawings.
2. All work in public right-of-way shall conform to the requirements of the Clark County utility permit , City of Vancouver, City of Ridgefield, City of Battle Ground, applicable railroad permits, WSDOT, or District requirements, whichever are more restrictive.
3. Contractor shall contact the NW Utility Notification Center at 1-800-424-5555 at least two (2) working days before but not more than (10) ten working days before the start of construction of the work and shall comply with State requirements for utility locating.
4. All survey monumentation shall be protected from damage unless otherwise permitted by Department of Natural Resources.
5. A preconstruction conference shall be held prior to the start of construction of the project.
6. Contractor shall have an Air Discharge Permit from the Southwest Clean Air Agency on-site prior to fueling the generator.
7. Contractor shall have a building permit from Clark County. Special inspections may be required. Special inspections may include, but not be limited to equipment anchors and rebar reinforcement.
8. Antenna height shall be as shown on the plans.
9. Pump station start-up and acceptance process shall be in accordance with 11-01.3.

CLARK REGIONAL WASTEWATER DISTRICT

STANDARD PUMP STATION CONSTRUCTION NOTES

STANDARD DRAWING

4

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 11:48am, Modified 03-28-20
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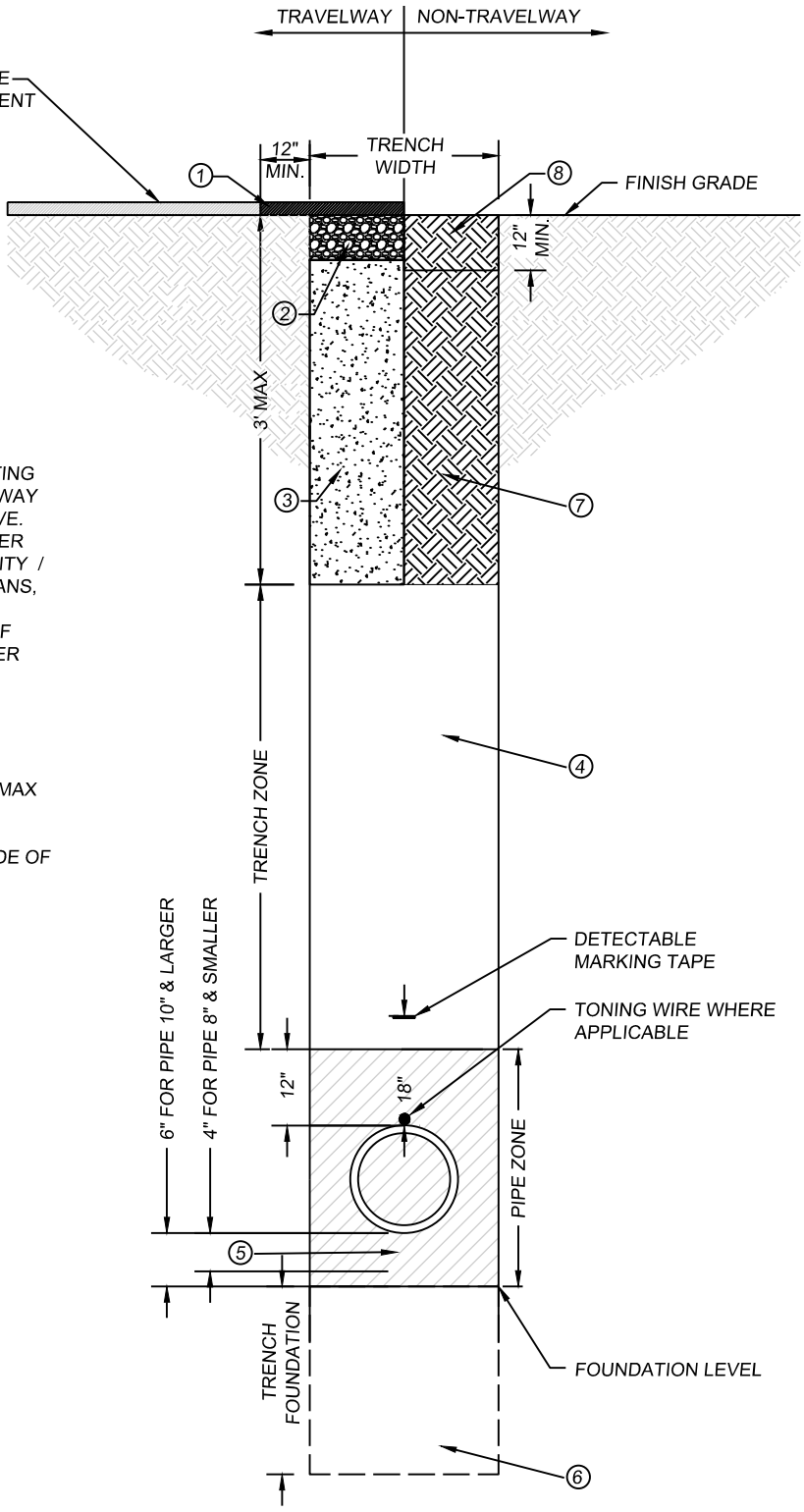

NOTES:

1. SURFACE TREATMENT TO MATCH EXISTING APPROVED PLANS, OR UTILITY/RIGHT OF WAY PERMIT, WHICHEVER IS MORE RESTRICTIVE.
2. CRUSHED SURFACING BASE COURSE PER 9-03.9(3) . THICKNESS SHALL BE PER UTILITY / RIGHT OF WAY PERMIT OR APPROVED PLANS, WHICHEVER IS MORE RESTRICTIVE.
3. CONTROL DENSITY FILL PER 2-09.3(1)E IF REQUIRED OR TRENCH ZONE BACKFILL PER 7-08.3(3).
4. TRENCH ZONE BACKFILL PER 7-08.3(3).
5. PIPE ZONE BACKFILL PER 7-08.3(3).
6. TRENCH FOUNDATION PER 7-08.3(1)A IF REQUIRED.
7. NATIVE BACKFILL COMPACTED TO 95% MAX DENSITY.
8. TOP SOIL WITH SURFACING TO MATCH EXISTING OR AS NOTED ON PLANS OUTSIDE OF PUBLIC ROADS.

GENERAL NOTES:

1. COMPACTION TESTING SHALL BE PER 2-03.3(14)D

CLARK REGIONAL WASTEWATER DISTRICT

PIPE INSTALLATION

STANDARD DRAWING

NTS

5

APPROVED: APR 2020

Plotted on Apr 06, 2020 - 12:21pm, Modified 04-04-20
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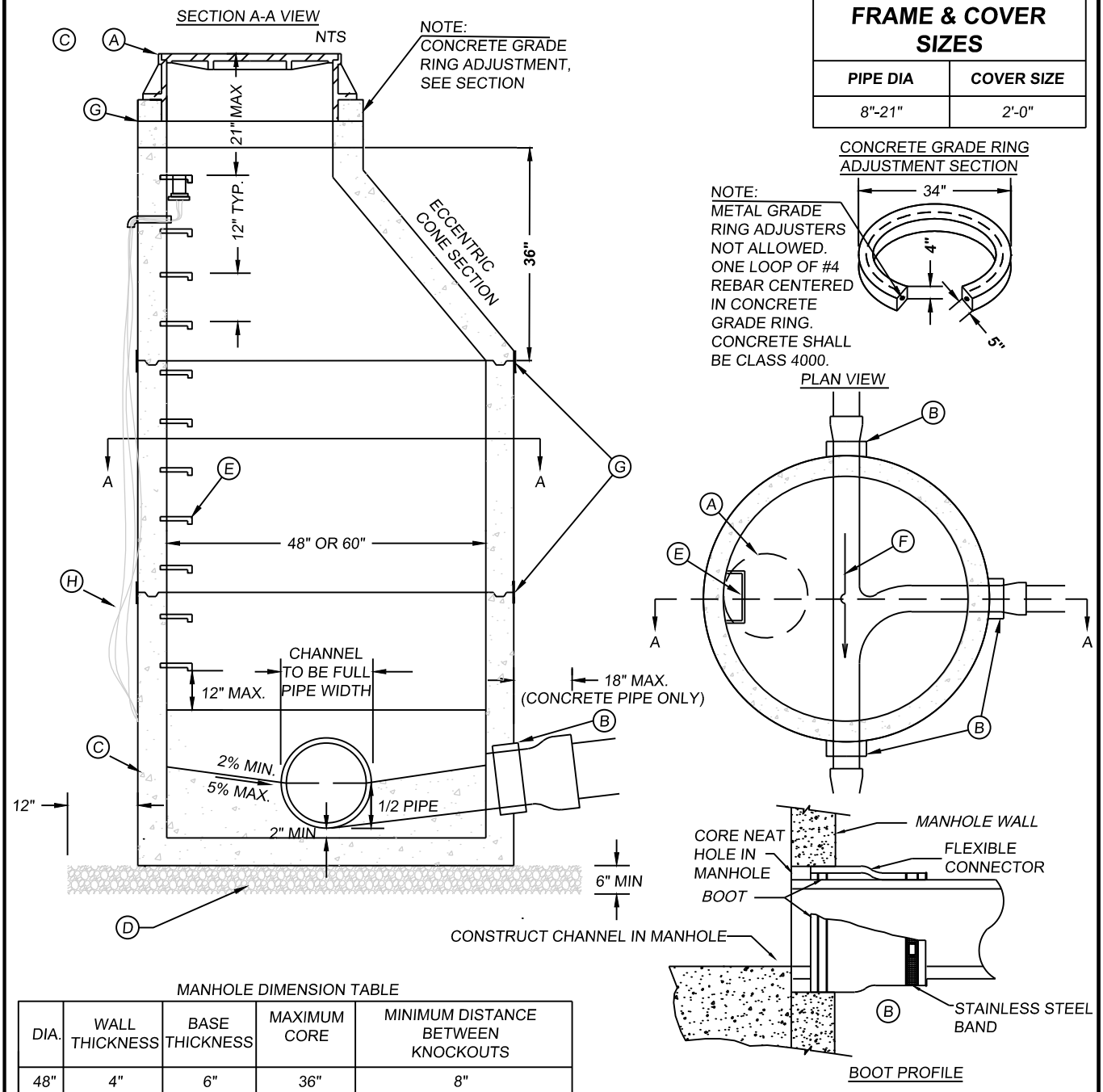

FRAME & COVER SIZES

PIPE DIA	COVER SIZE
8"-21"	2'-0"

MANHOLE DIMENSION TABLE

DIA.	WALL THICKNESS	BASE THICKNESS	MAXIMUM CORE	MINIMUM DISTANCE BETWEEN KNOCKOUTS
48"	4"	6"	36"	8"
60	5"	8"	48"	8"

A. STANDARD MANHOLE FRAME & COVER.
B. ALL MANHOLE PENETRATIONS SHALL BE CORED AND BOOTED PER SECTION 7-05.3. SEE BOOT PROFILE.
C. MANHOLES LOCATED IN NON-TRAVELWAYS SHALL EXTEND A MINIMUM OF 12" ABOVE FINISHED GRADE OR HAVE A 4'X4' CONCRETE PAD. SEE STANDARD DRAWING #13 FOR CONCRETE PAD DETAIL.
D. CRUSHED SURFACING BASE COURSE PER 9-03.9(3) COMPACTED TO 95% MAX DENSITY.
E. MANHOLE STEPS NOT ALLOWED IN RISER RINGS.
F. 0.2 FT DROP THROUGH MANHOLES UNLESS OTHERWISE APPROVED.
G. EXTERNAL MANHOLE SEAL PER 7-05.3.
H. SEE STANDARD DRAWING TONING WIRE IN MANHOLE.

CLARK REGIONAL WASTEWATER DISTRICT

MANHOLE TYPE 1

STANDARD DRAWING

NTS

6

APPROVED: MAR 2020

Plotted on Apr 06, 2020 - 12:22pm, Modified 04-06-20
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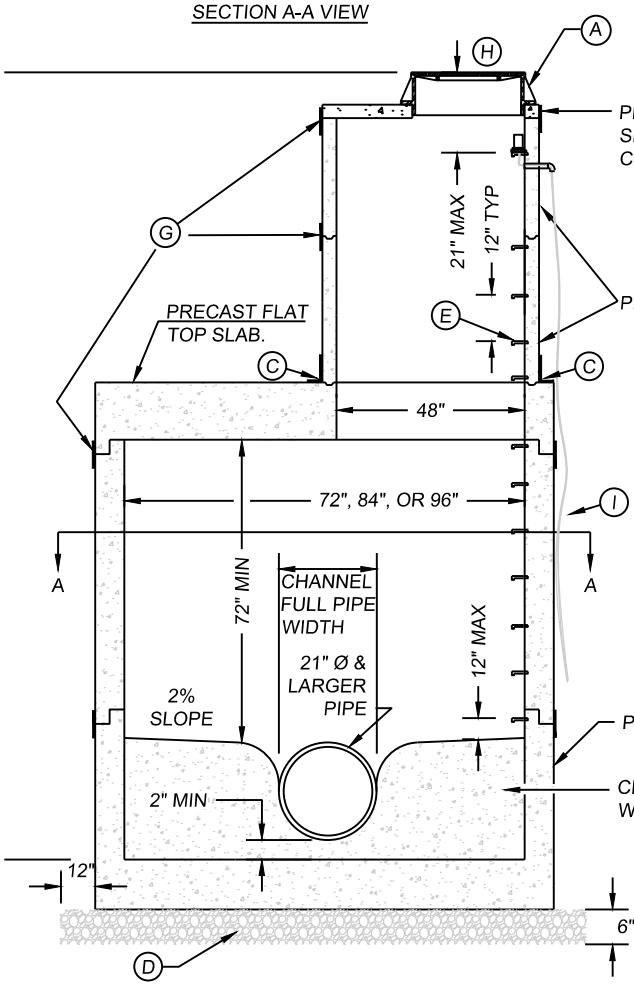
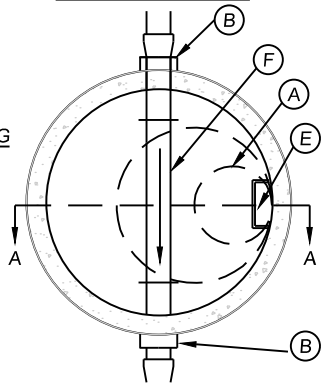
SECTION A-A VIEW

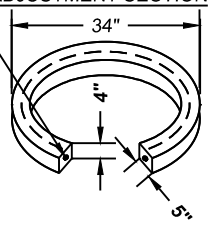


FRAME & COVER SIZES	
PIPE DIA	**COVER SIZE**
21" -30"	2'-6"
> 30"	3'-0"

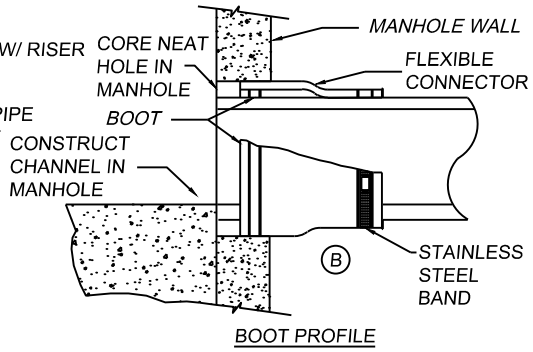
PLAN VIEW SECTION



CONCRETE GRADE RING ADJUSTMENT SECTION



NOTE:
METAL GRADE RING ADJUSTERS NOT ALLOWED. ONE LOOP OF #4 REBAR CENTERED IN CONCRETE. GRADE RING CONCRETE SHALL BE CLASS 4000



BOOT PROFILE

MANHOLE DIMENSION TABLE

DIA	WALL THICKNESS	BASE THICKNESS	MAX CORE SIZE	MIN DISTANCE BETWEEN CORE
72"	6"	8"	60"	12"
84"	8"	12"	72"	12"
96"	12"	12"	84"	12"

A. STANDARD MANHOLE FRAME & COVER.
B. ALL MANHOLE PENETRATIONS SHALL BE CORED AND BOOTED PER SECTION 7-05.3. SEE BOOT PROFILE.
C. INSTALL HYDROPHYLIC SEAL IN ADDITION TO GASKET.
D. CRUSHED SURFACING BASE COURSE PER 9-03.9(3) COMPACTED TO 95% MAX DENSITY.
E. MANHOLE STEPS NOT ALLOWED IN RISER RINGS.
F. 0.2 FT DROP THROUGH MANHOLES UNLESS OTHERWISE APPROVED.
G. EXTERNAL MANHOLE SEAL PER 7-05.3.
H. MANHOLES LOCATED IN NON-TRAVELWAYS SHALL EXTEND A MINIMUM OF 12" ABOVE FINISHED GRADE OR HAVE A 4'X4' CONCRETE PAD. SEE STANDARD DRAWING #13 FOR CONCRETE PAD DETAIL.
I. SEE STANDARD DRAWING FOR TONING WIRE IN MANHOLE.

CLARK REGIONAL WASTEWATER DISTRICT

MANHOLE TYPE 2

STANDARD DRAWING

NTS

7

APPROVED: APR 2020

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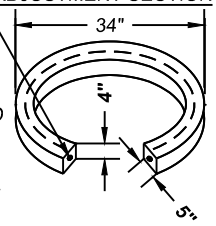
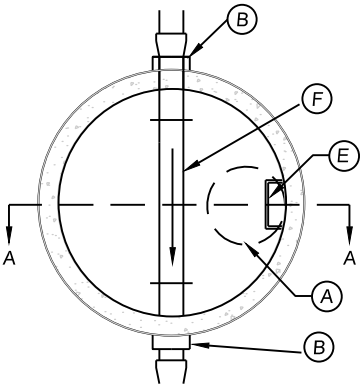
FRAME & COVER SIZES	
PIPE DIA	**COVER SIZE**
8-21"	2'-0"

CONCRETE GRADE RING ADJUSTMENT SECTION

NOTE:
METAL GRADE RING ADJUSTERS NOT ALLOWED. ONE LOOP OF #4 REBAR CENTERED IN CONCRETE GRADE RING. CONCRETE SHALL BE CLASS 4000



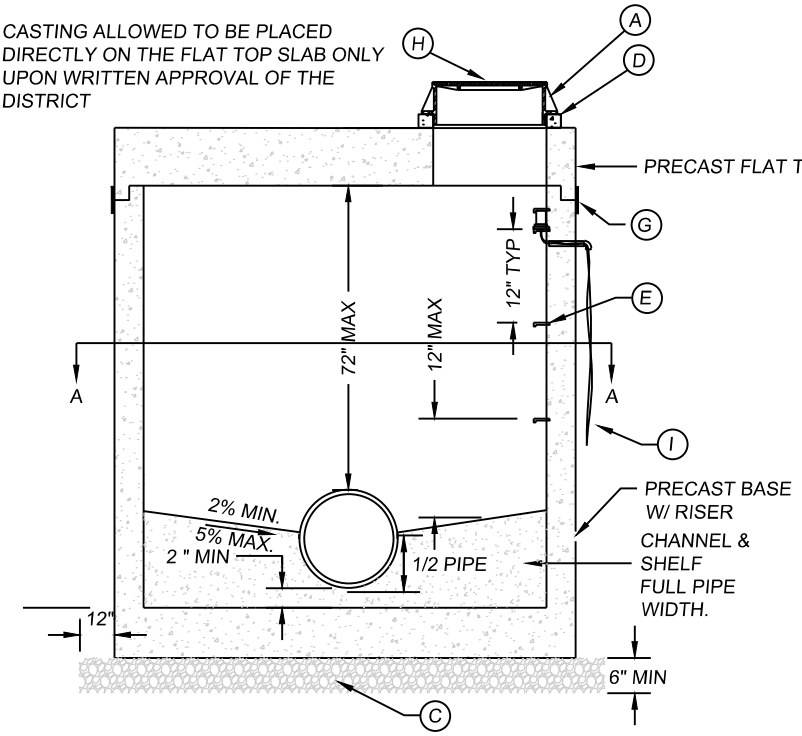
PLAN VIEW

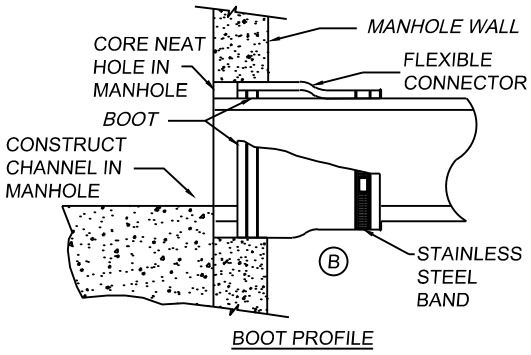


SECTION VIEW

NOTE:

CASTING ALLOWED TO BE PLACED DIRECTLY ON THE FLAT TOP SLAB ONLY UPON WRITTEN APPROVAL OF THE DISTRICT





BOOT PROFILE

MANHOLE DIMENSION TABLE

DIA.	WALL THICKNESS	BASE THICKNESS	MAXIMUM CORE SIZE	MINIMUM DISTANCE BETWEEN CORE
48"	4"	6"	36"	8"
60"	5"	8"	48	8"

A. STANDARD MANHOLE FRAME & COVER.
B. ALL MANHOLE PENETRATIONS SHALL BE CORED AND BOOTED PER 7-05.3. SEE BOOT PROFILE.
C. CRUSHED SURFACING BASE COURSE PER 9-03.9(3) COMPACTED TO 95% MAX DENSITY.
D. GRADE RING ADJUSTMENT PER 7-05.3(1).
E. MANHOLE STEPS NOT ALLOWED IN RISER RINGS.
F. 0.2 FT DROP THROUGH MANHOLES UNLESS OTHERWISE APPROVED.
G. EXTERNAL MANHOLE SEAL PER 7-05.3
H. MANHOLES LOCATED IN NON-TRAVELWAYS SHALL EXTEND A MINIMUM OF 12" ABOVE FINISHED GRADE OR HAVE A 4'X4' CONCRETE PAD. SEE STANDARD DRAWING #13 FOR CONCRETE PAD DETAIL.
I. SEE STANDARD DRAWING FOR TONING WIRE IN MANHOLE.

CLARK REGIONAL WASTEWATER DISTRICT

MANHOLE TYPE 3

STANDARD DRAWING

NTS

8

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 11:52am, Modified 04-04-20
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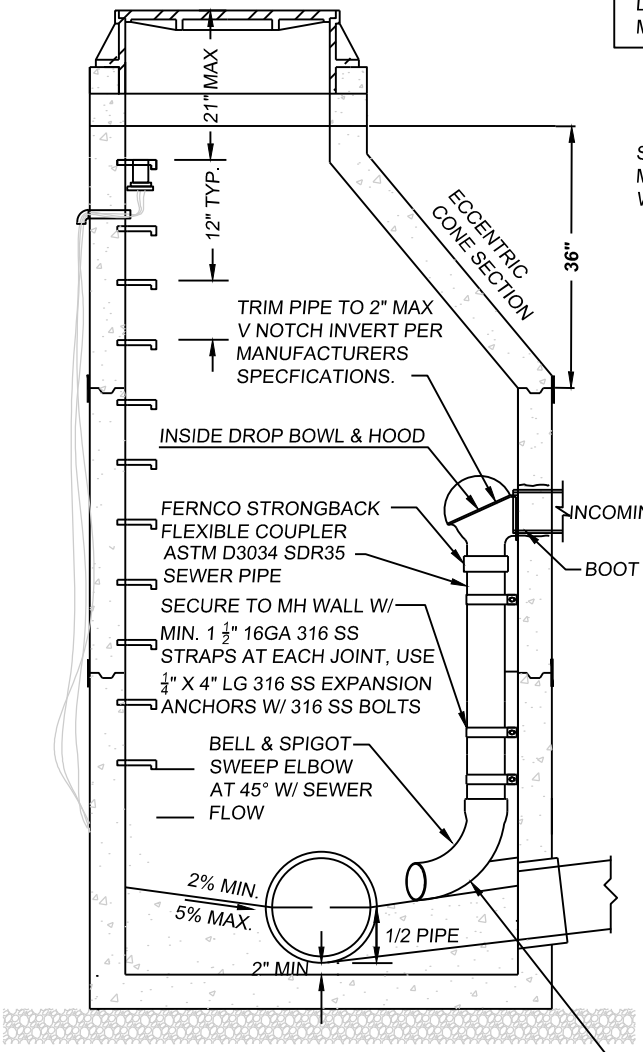
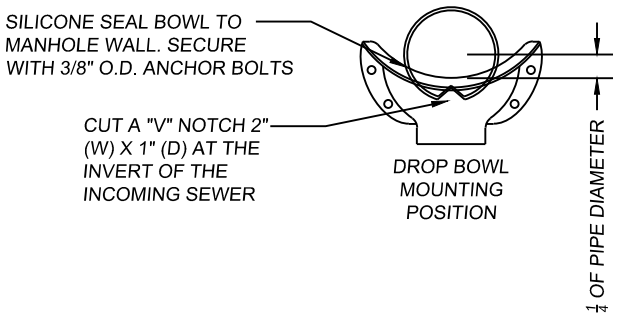
SECTION VIEW



NO MORE THAN ONE INSIDE DROP ALLOWED IN A 48-INCH MANHOLE. NO MORE THAN TWO INSIDE DROPS ALLOWED IN A 60-INCH MANHOLE. NO MORE THAN TWO INSIDE DROPS IN ANY MANHOLE.



SPECIFICATIONS:
1) CLAMP AND BRACKETS IS TYPE 316 STAINLESS STEEL, 11 GAUGE (.1196").
2) 3/8" Ø PINCH BOLT AND NUTS IS TYPE 316 STAINLESS STEEL.

CONSTRUCT CHANNEL IN MANHOLE. IN EX. MANHOLE PLACE PVC ELBOW ON BENCH, GROUT NEW BENCH TO SPRINGLINE AND TROWEL SMOOTH. FORM SMOOTH CHANNEL TO INVERT AND CHANNEL TO DIRECT FLOW DOWNSTREAM AND EXTEND TO NEW CHANNEL.

MANHOLE DIMENSION TABLE

INCOMING SEWER SIZE	DROP PIPE SIZE 'X'	DROP BOWL MODEL
8" DIAMETER	6"	A-6
10" DIAMETER	8"	B-8
12" DIAMETER	10"	B-10

NOTE:
1. WRITTEN APPROVAL REQUIRED TO USE DROP MANHOLES.
2. SEE STANDARD DRAWINGS # 4-5, 6-14 FOR ADDITIONAL MANHOLE REQUIREMENTS
3. DROP BOWL & CONNECTIONS TO BE RELINER OR APPROVED EQUAL
4. DROP BOWL & CONNECTIONS SHALL BE LOCATED A MIN. OF 90 DEGREES FROM STAIRS

CLARK REGIONAL WASTEWATER DISTRICT

MANHOLE INSIDE DROP

STANDARD DRAWING

NTS

9

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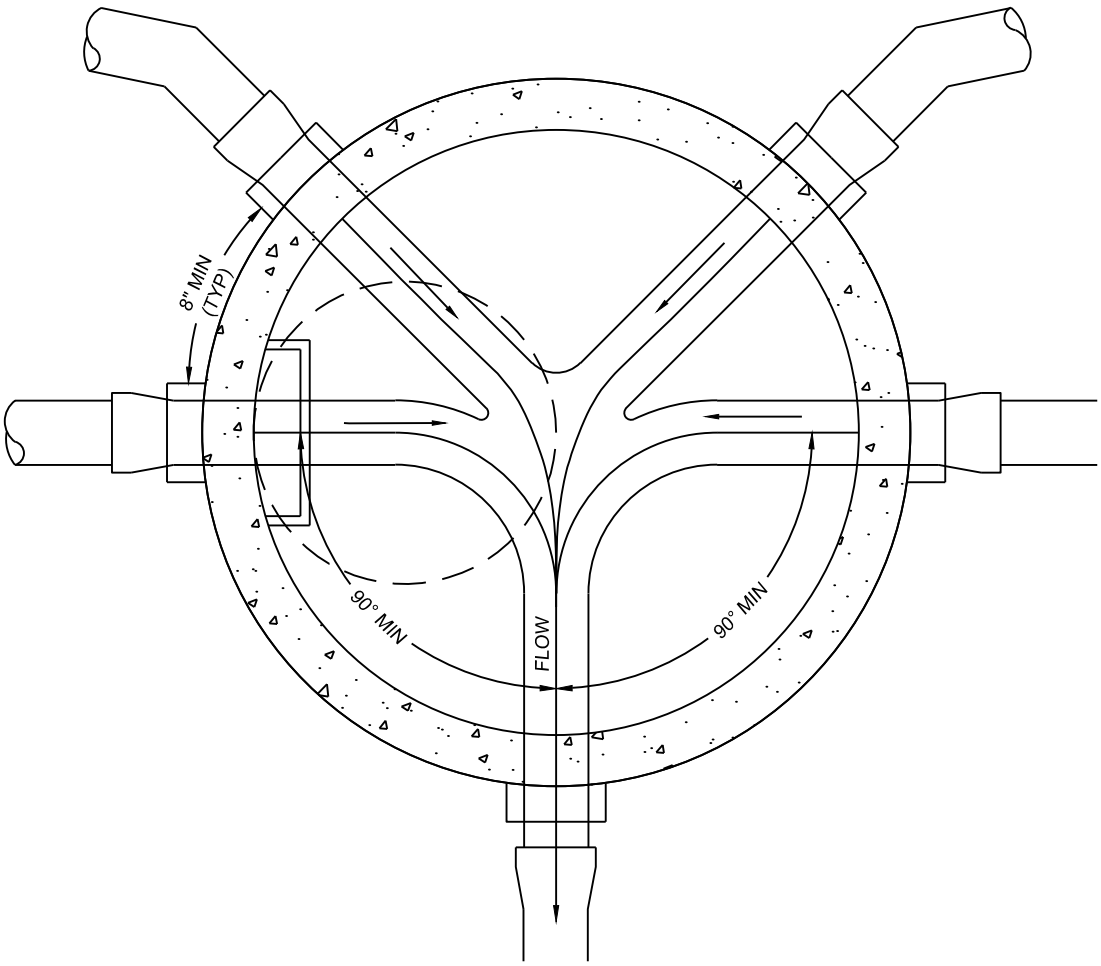
PLAN VIEW



1. SEE STANDARD DRAWING #2 FOR ADDITIONAL DETAILS.
2. MAXIMUM OF FOUR (4) 4" RESIDENTIAL LATERALS PER MANHOLE.
3. 0.5' MINIMUM DROP FROM LATERAL INVERT TO MANHOLE OUTLET.
4. ALL PENETRATIONS SHALL BE CORED AND BOOTED PER 7-05.3.
5. ENSURE CHANNELS ARE STRUCK SMOOTH.
6. ALL MANHOLES WITH THREE (3) OR MORE LATERALS SHALL BE VACUUM TESTED.
7. LATERAL PENETRATIONS IN MANHOLES ARE ONLY ALLOWED ON TERMINUS MANHOLES UNLESS PRE-APPROVED.
8. STRAIGHT THROUGH LATERAL PENETRATIONS ARE NOT ALLOWED.

CLARK REGIONAL WASTEWATER DISTRICT

MANHOLE LATERAL CONNECTION

STANDARD DRAWING

NTS

10

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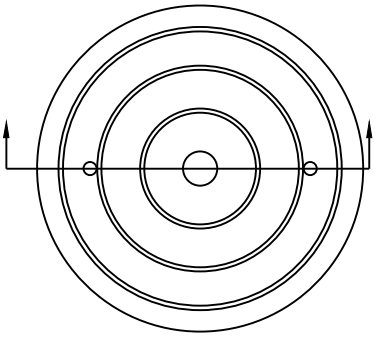
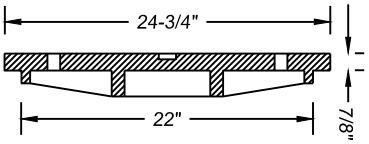
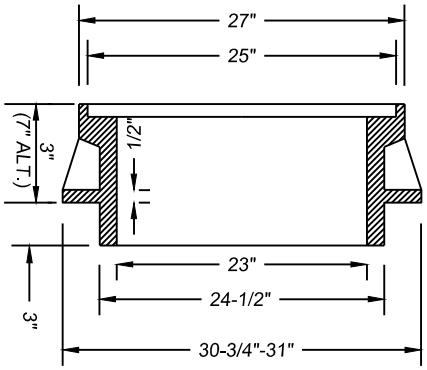
NOTE: ALL HOLES SHALL BE NO LARGER THAN 3/4" DIAMETER.

MANUFACTURED BY OLYMPIC FOUNDRY, VARICAST, OR APPROVED EQUAL.

STANDARD

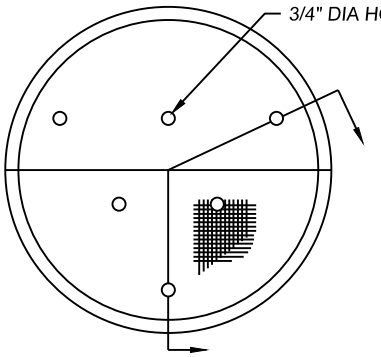


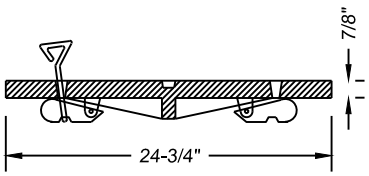




* 2 HOLE COVER, SANITARY SEWER

* LOCKING

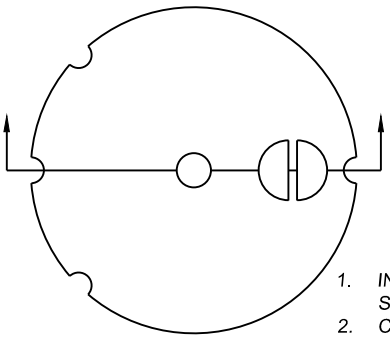


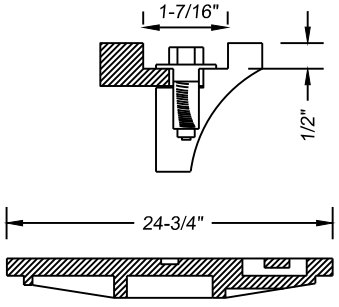


CAP SCREWS

3 REQUIRED 1/2" X 1-1/4" HEX HEAD (STAINLESS STEEL)

WATERTIGHT





1. INCLUDE 1/16" RUBBER GASKET PUNCHED FOR CAP SCREWS AND LOCATING STUD.
2. CONTRACTOR TO PROVIDE ONE ADDITIONAL GASKET FOR EVERY TWO INSTALLED, MIN 1 ADDITIONAL GASKET.
3. FRAME SHALL BE TAPPED AND THREADED TO MATCH COVER.
4. LARGER FRAME/COVERS REQUIRED FOR TYPE 2 MANHOLES SHALL BE REVIEWED BY SUBMITTAL.

CLARK REGIONAL WASTEWATER DISTRICT

STANDARD MANHOLE FRAME & COVER

STANDARD DRAWING

NTS

11

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 11:54am, Modified 03-28-20
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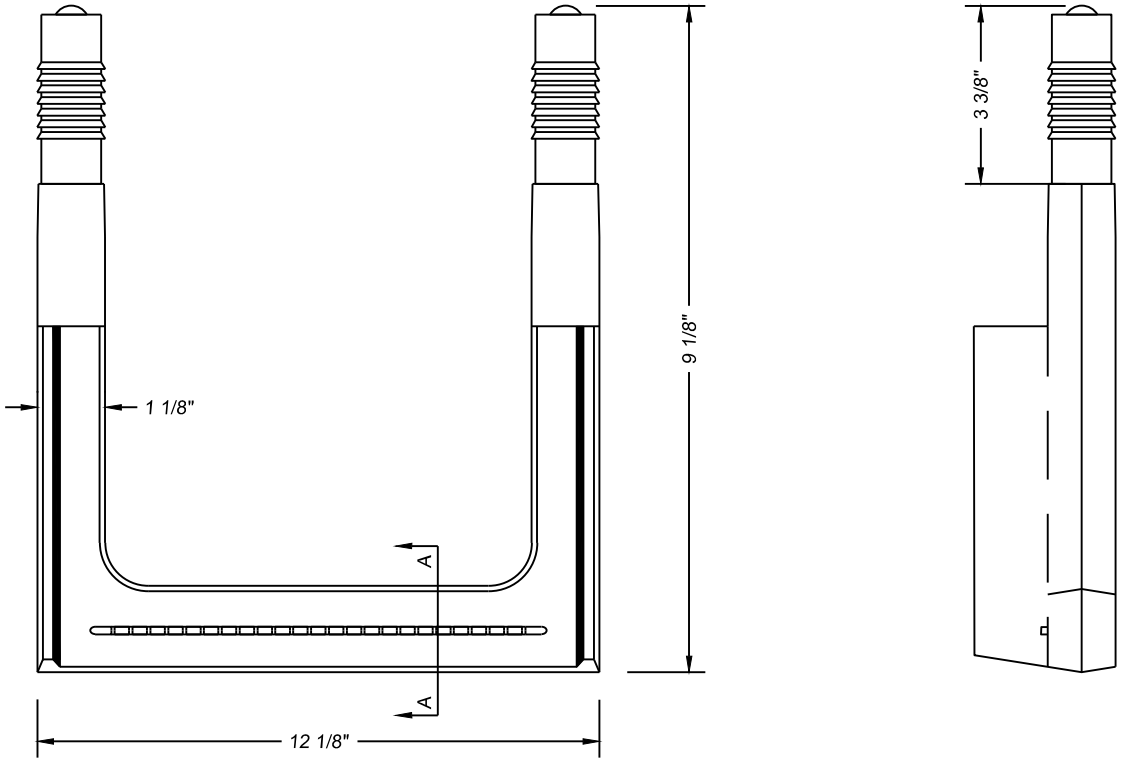
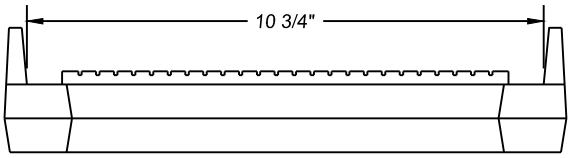
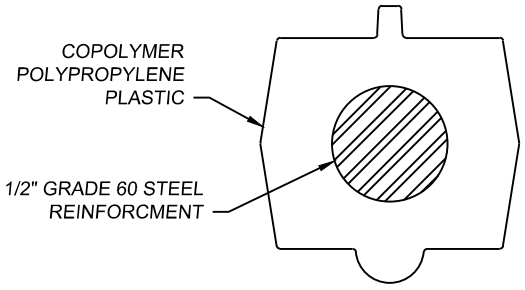
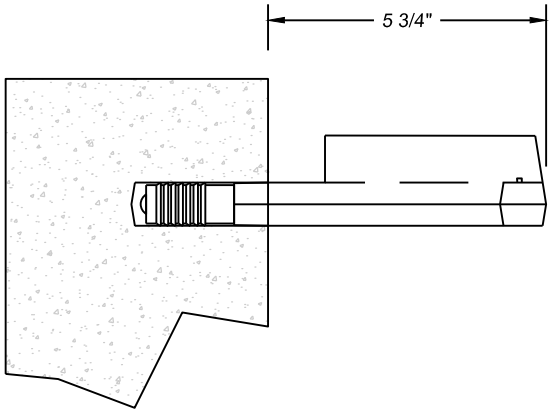






SECTION A



NOTE:
MANHOLE STEPS SHALL MEET: ASTM C478, AASHTO-M-199, & ALL WSDOT REQUIREMENTS. STEPS SHALL BE INSTALLED PER 7-05.3.

CLARK REGIONAL WASTEWATER DISTRICT

MANHOLE STEPS

STANDARD DRAWING

NTS

12

APPROVED: APR 2020

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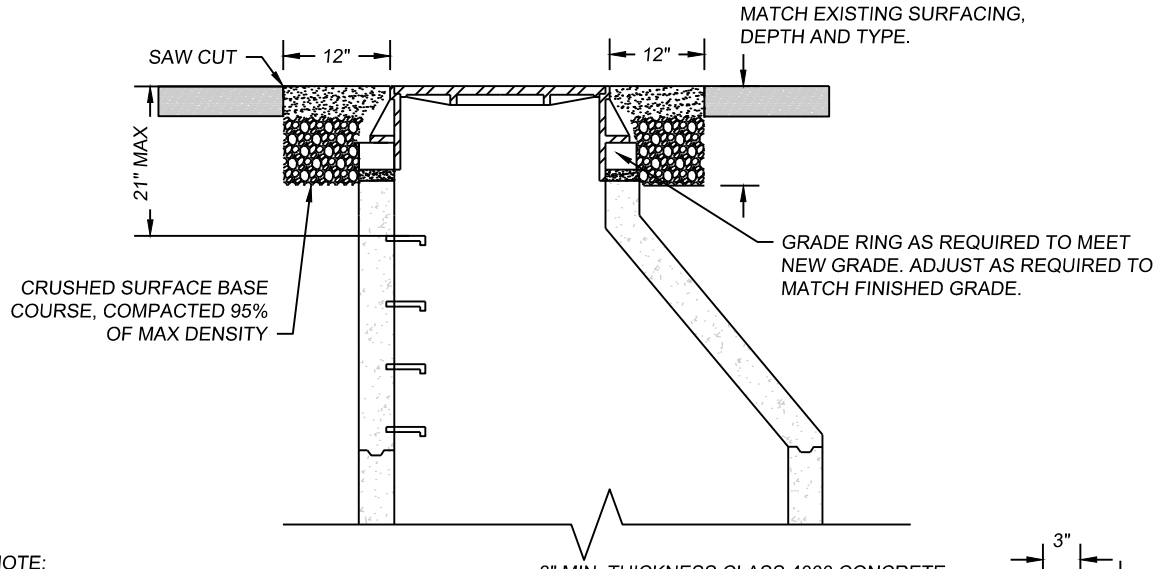
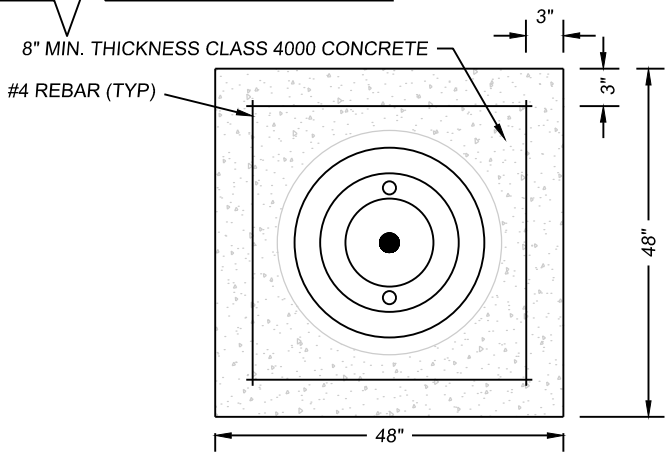
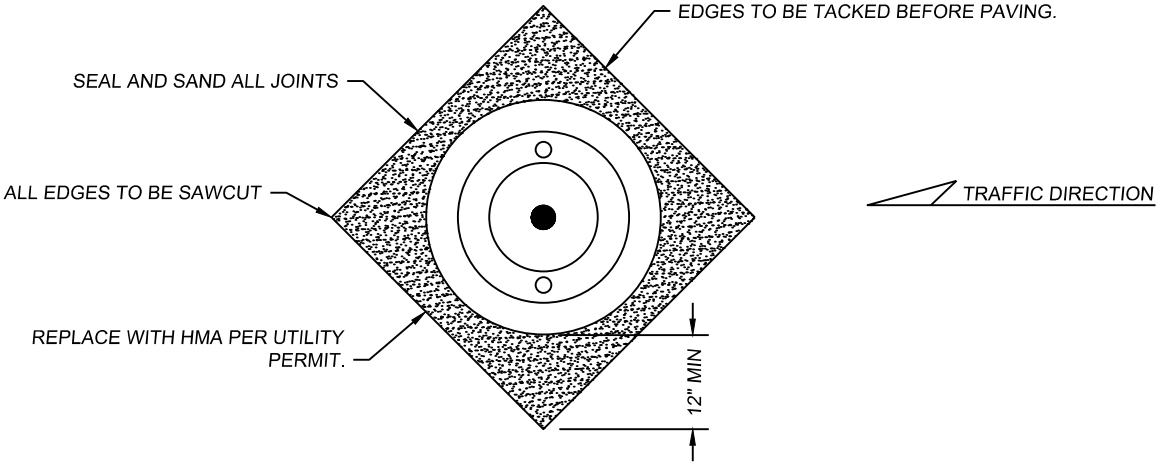


NOTE:
1. STEPS NOT ALLOWED IN GRADE RINGS. IF GRADE RINGS RAISE DISTANCE BETWEEN 1ST STEP & TOP OF LID TO MORE THAN 21", A NEW PRECAST MANHOLE SECTION MUST BE INSTALLED BELOW THE CONE.
2. PAVEMENT TO BE SAWCUT IN A DIAMOND SHAPE TO RAISE MANHOLE CASTING TO NEW FINISHED GRADE.
3. METAL GRADE RINGS ARE NOT ALLOWED.
4. GRADE RINGS TO BE EXTERNALLY SEALED.
5. SLOPES TO MATCH EXISTING PAVMENT
6. GRADE ADJUSTMENT SHALL BE PER 7-05.3(1) AND RIGHT-OF-WAY / UTILITY PERMIT.



MH OUTSIDE OF PAVED SURFACE (PLAN VIEW)



MH INSIDE OF TRAVELWAY (PLAN VIEW)

CLARK REGIONAL WASTEWATER DISTRICT

MANHOLE GRADE ADJUSTMENT

STANDARD DRAWING

NTS

13

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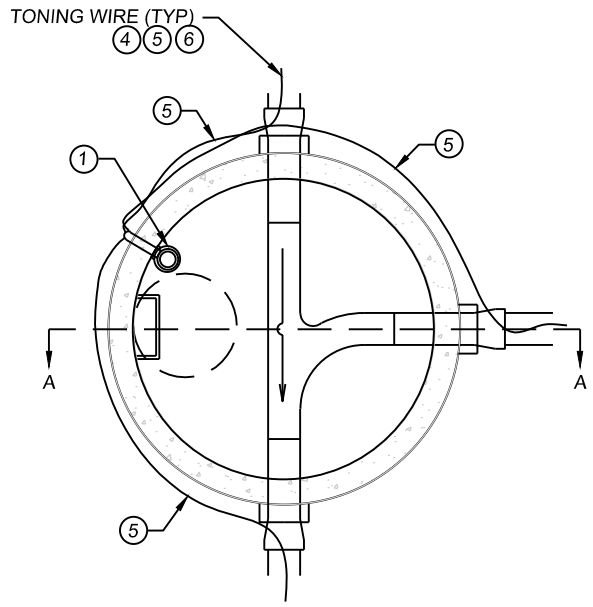
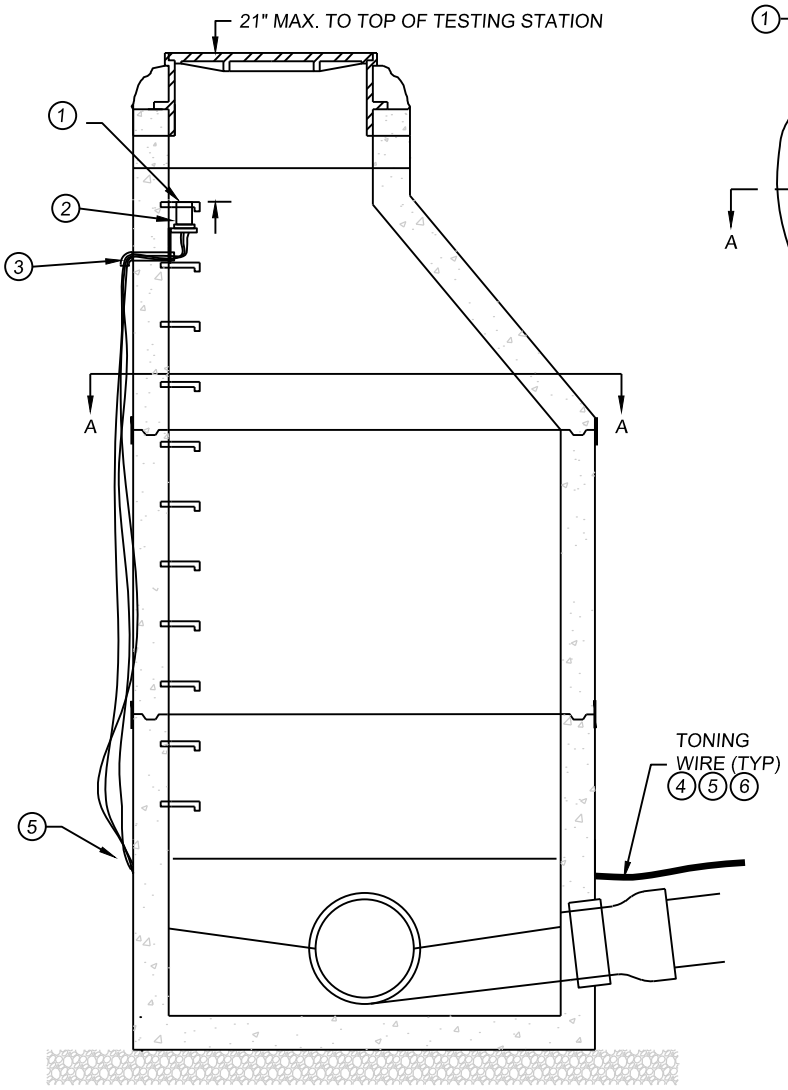
PLAN VIEW SECTION A-A

NTS



SECTION VIEW

NTS



NOTES:

1. FLANGEFINK PER 9-05.30(3).
2. TESTING STATION TO BE INSTALLED FLUSH WITH THE FIRST STEP OF MANHOLE WITH STAINLESS STEEL BRACKET, BOLTS AND ANCHORS ADJACENT TO THE SIDE OF STEP AT TOP OF MANHOLE PER MANUFACTURERS RECOMMENDATIONS.
3. CONDUIT TO BE LINK SEALED AND WIRES TO BE SEALED IN CONDUIT.
4. SEE STANDARD SPECIFICATIONS SECTION 9-05.30(1) FOR TONING WIRE & SPLICES.
5. TONING WIRE FROM EACH PIPE SHALL BE ROUTED AROUND MANHOLE THEN VERTICALLY TO CONDUIT.
6. WIRE TO BE INSTALLED ONLY WHEN REQUIRED BY THE DISTRICT.

CLARK REGIONAL WASTEWATER DISTRICT

TONING WIRE IN MANHOLE

STANDARD DRAWING

NTS

14

APPROVED: APR 2020

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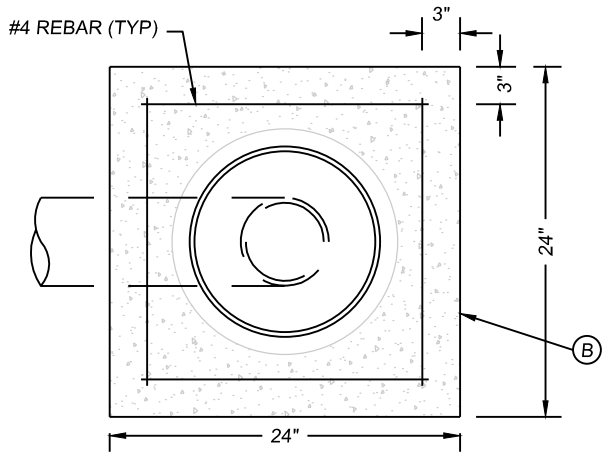
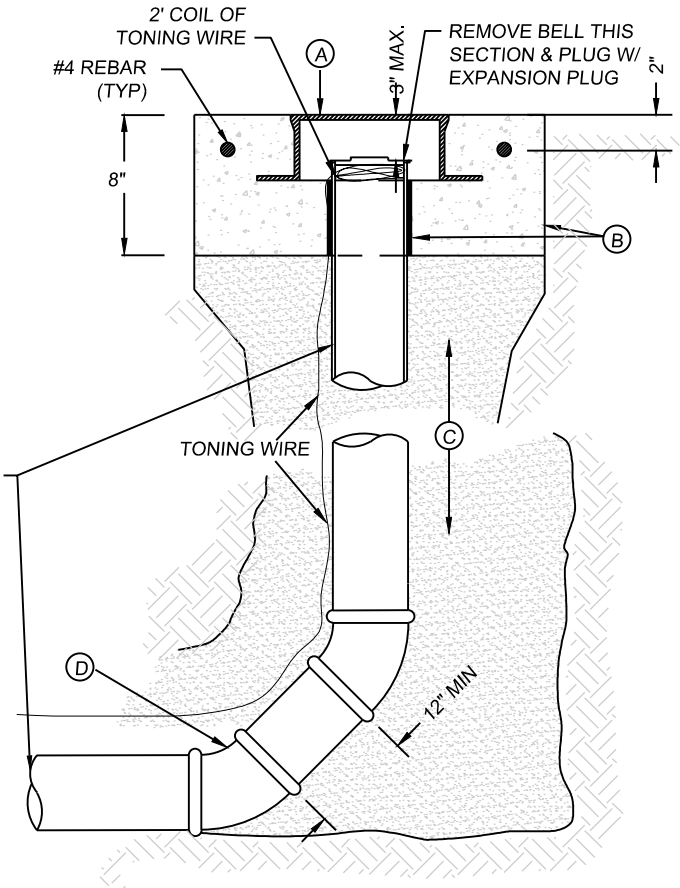


PLAN



STAND PIPE DIAMETER SHALL BE THE SAME AS MAINLINE DIAMETER

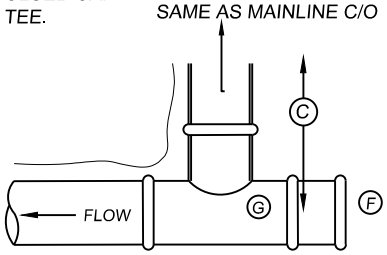
NOTE:

A. STANDARD ADJUSTABLE CLEANOUT CAST IRON TRAFFIC BEARING FRAME AND COVER MANUFACTURED BY EAST JORDON IRON WORKS OR APPROVED EQUAL. MUST CONFORM TO THE REQUIREMENTS OF AASHTO M105 GRADE 30B.
   1. PIPES GREATER THAN 10" DIA REQUIRE STANDARD MANHOLE FRAME AND COVER.
   2. COMMERCIAL CLEANOUTS TO HAVE "SEWER" EMBOSSED IN LID.
   3. CONFORM TO THE REQUIREMENTS OF AASHTO M 105, GRADE 30B.
B. CONCRETE CLASS 3000 COLLAR (TO BE INSTALLED WHEN LOCATED OUTSIDE OF PAVED AREAS) W/ 50# FELT BETWEEN PIPE & CONCRETE.
C. BEDDING AND BACKFILL TO CONFORM WITH THAT SPECIFIED FOR SEWER LINE EXTENSION.
D. 45° BENDS
E. WYE
F. GLUED CAP
G. TEE.

MAINLINE CLEANOUT

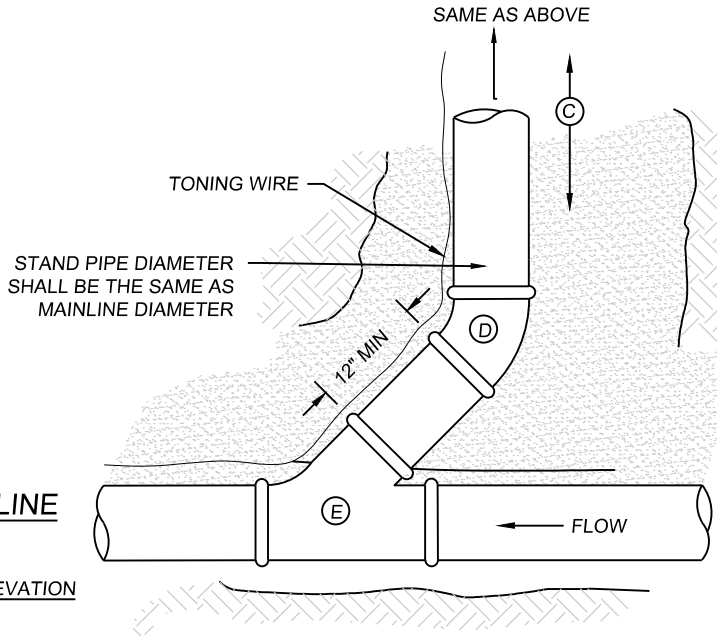
ELEVATION

NTS



STUB MARKER CLEANOUT

NTS



COMMERCIAL INLINE CLEANOUT

ELEVATION

CLARK REGIONAL WASTEWATER DISTRICT

CLEANOUTS

STANDARD DRAWING

NTS

15

APPROVED: APR 2020

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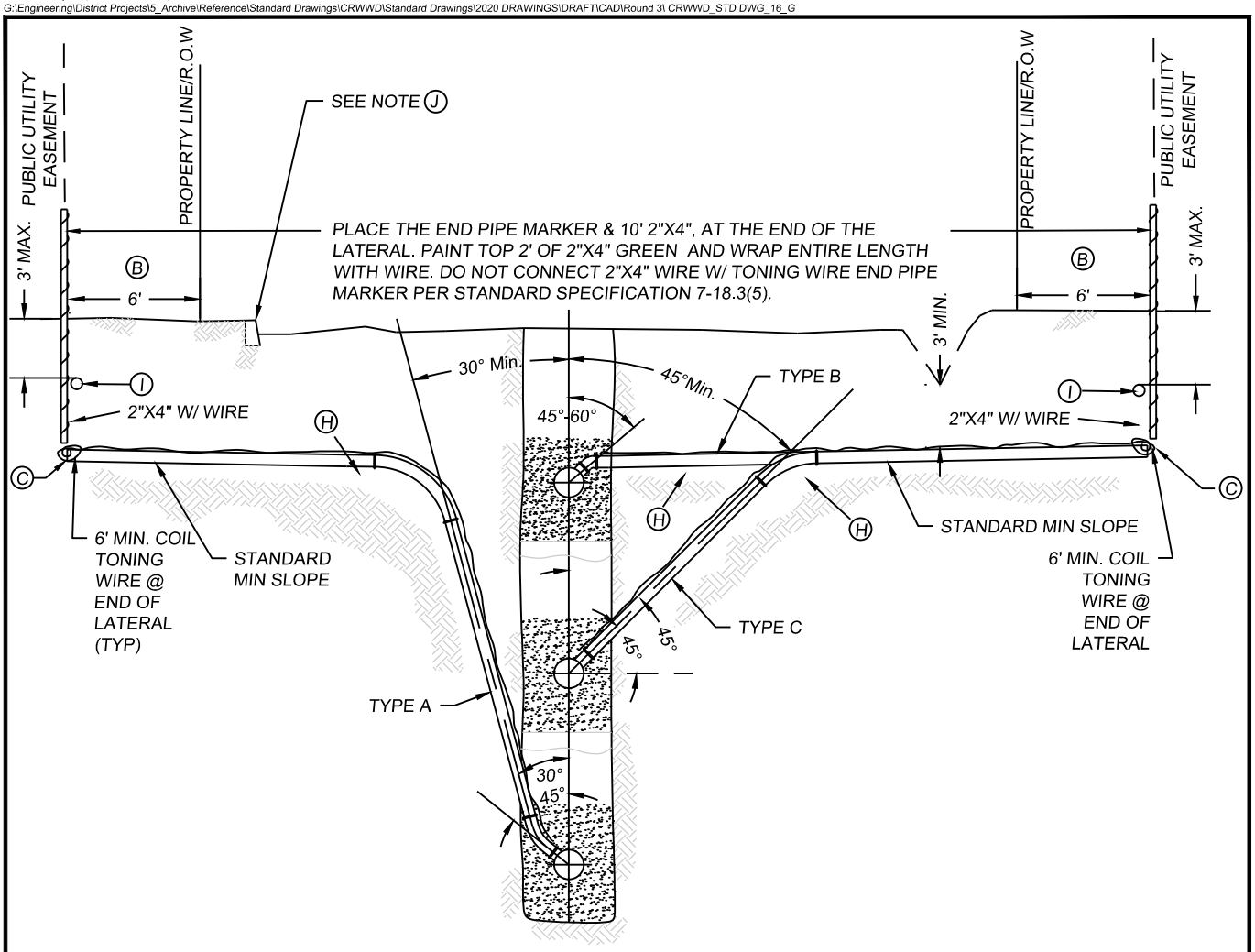

NOTE:

A. ALL RESIDENTIAL SERVICE LINES SHALL BE 4" MIN DIA.
B. ALL SERVICE LINES SHALL TERMINATE AT THE PROPERTY LINE, WITH THE EXCEPTION OF NEW SUBDIVISIONS, WHICH SHALL TERMINATE 6' BEYOND THE PROPERTY LINE OR AS SHOWN ON PLANS.
C. DEPTHS OF SERVICE LINES AT THE PROPERTY LINE SHALL BE DETERMINED AS FOLLOWS:
    1. SET TO THE ELEVATION AS NOTED ON PLANS.
    2. WHEN THE GROUND SURFACE AT THE PROPERTY LINE IS HIGHER THAN THE EDGE OF PAVEMENT, THE SERVICE ELEVATION SHALL BE A MIN. OF 6' LOWER THAN THE EDGE OF PAVEMENT ELEVATION.
    3. WHEN THE GROUND SURFACE ELEVATION AT THE PROPERTY LINE IS LOWER THAN THE EDGE OF PAVEMENT THE SERVICE LINE SHALL HAVE MINIMUM 6' OF COVER AT THE PROPERTY LINE. LATERALS WITH COVER OF LESS THAN 5' MUST BE PRE-APPROVED.
D. CONTRACTOR SHALL USE THE MOST APPROPRIATE TYPE OF CONNECTION (A, B OR C) AS DIRECTED BY THE ENGINEER.
E. ALL SERVICE CONNECTIONS SHALL BE STANDARD WYE BRANCH FITTINGS OR DISTRICT INSTALLED TAP.
F. INSPECTION REQUIRED PRIOR TO BACKFILLING OF ALL SIDE SEWERS.
G. USE MULTI-PURPOSE GLUE WHEN TRANSITIONING FROM PVC TO ABS.
H. BEDDING AND BACKFILL SHALL MATCH THAT OF THE MAIN LINE.
I. WHERE SHOWN ON THE PLANS, INSTALL MARKER BALL AT END OF SIDE SEWER.
J. ALL SIDE SEWER LOCATIONS SHALL BE INDICATED ON THE CURB BY AN IMBEDDED "S" STAMP PER 7.18.3(1).

CLARK REGIONAL WASTEWATER DISTRICT

RESIDENTIAL SIDE SEWER

STANDARD DRAWING

NTS

16

APPROVED: APR 2020

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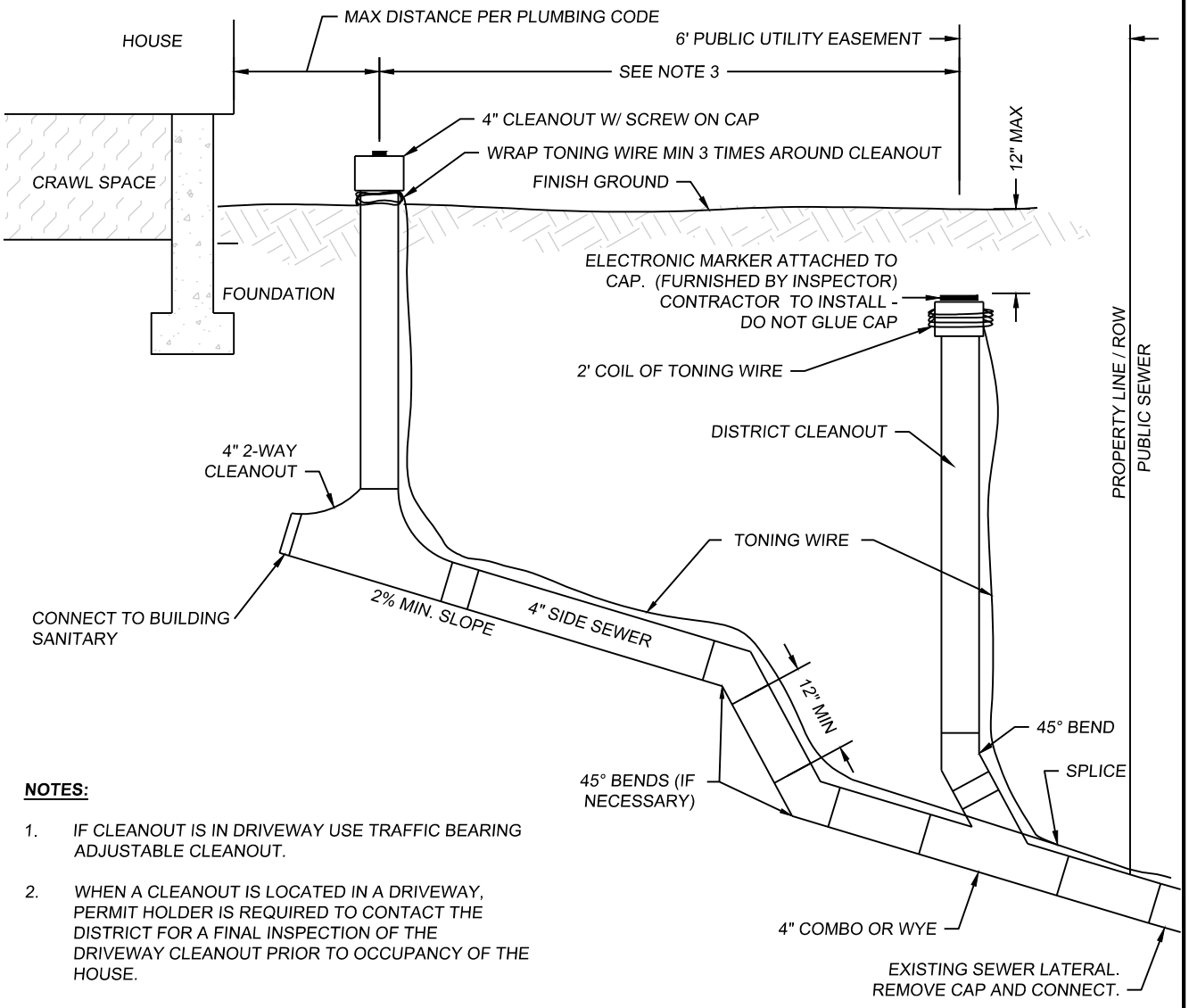


NOTES:

1. *IF CLEANOUT IS IN DRIVEWAY USE TRAFFIC BEARING ADJUSTABLE CLEANOUT.*
2. *WHEN A CLEANOUT IS LOCATED IN A DRIVEWAY, PERMIT HOLDER IS REQUIRED TO CONTACT THE DISTRICT FOR A FINAL INSPECTION OF THE DRIVEWAY CLEANOUT PRIOR TO OCCUPANCY OF THE HOUSE.*
3. *CLEANOUT REQUIRED FOR EVERY 135° CHANGE IN DIRECTION AND / OR EVERY 70 FEET. NO 90° BENDS ALLOWED.*
4. *PIPE MATERIAL SHALL MATCH SIDE SEWER.*
5. *PROVIDE 24" HORIZONTAL AND 18" VERTICAL SEPARATION FROM WATER, GAS, POWER, PHONE, OR CABLE SERVICE LINES WHERE POSSIBLE.*

CLARK REGIONAL WASTEWATER DISTRICT

RESIDENTIAL SERVICE CONNECTION

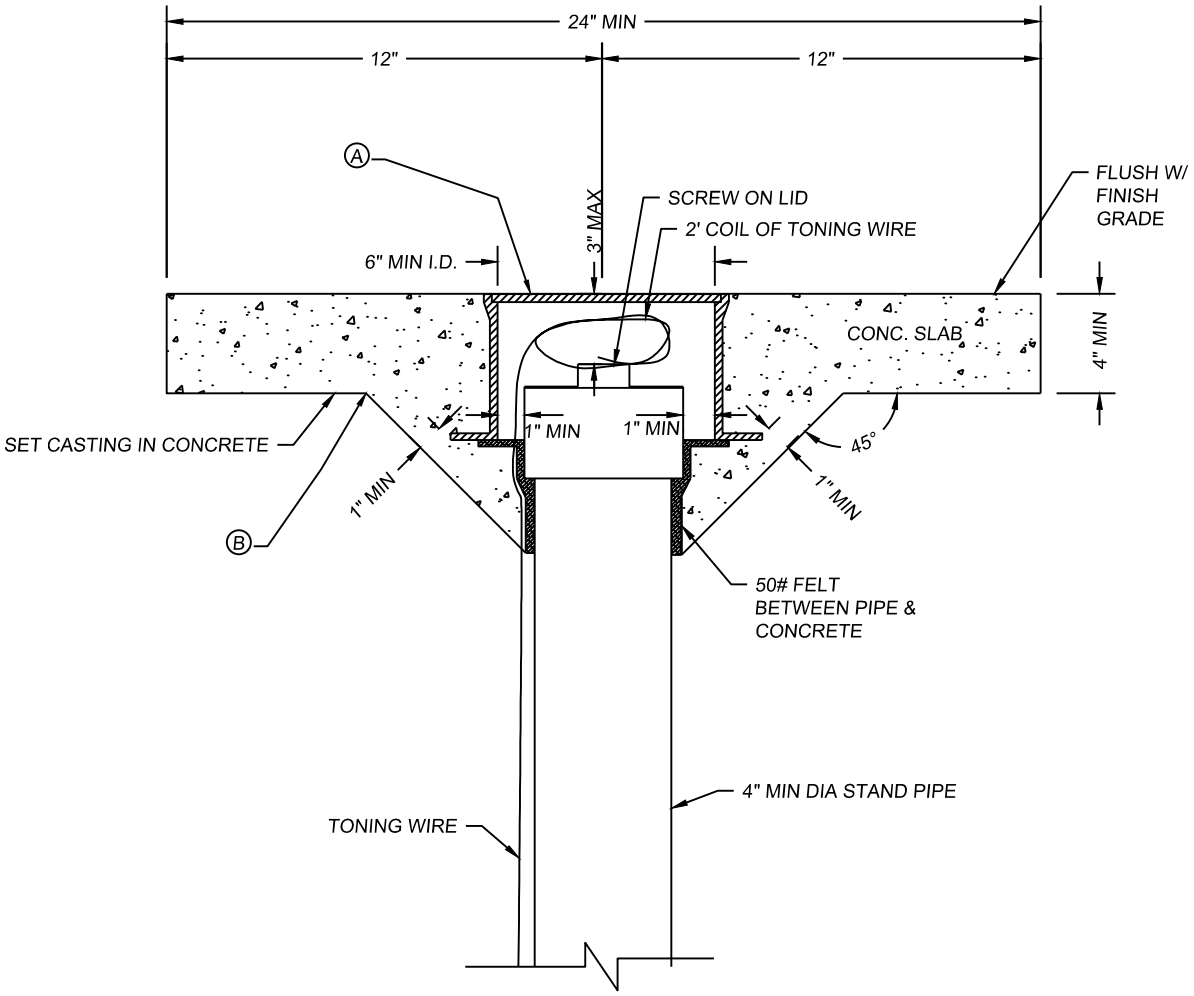
STANDARD DRAWING

NTS

17

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 11:58am, Modified 03-30-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_18_G



Ⓐ STANDARD CAST IRON TRAFFIC BEARING FRAME MANUFACTURED BY EAST JORDON IRON WORKS OR APPROVED EQUAL CONFORMING TO THE REQUIREMENTS OF AASHTO M 105, GRADE 30B. CLEANOUT SHALL HAVE "SEWER" EMBOSSED IN LID.

Ⓑ CONCRETE SHALL BE CLASS 3000.

CLARK REGIONAL WASTEWATER DISTRICT

RESIDENTIAL DRIVEWAY CLEANOUT

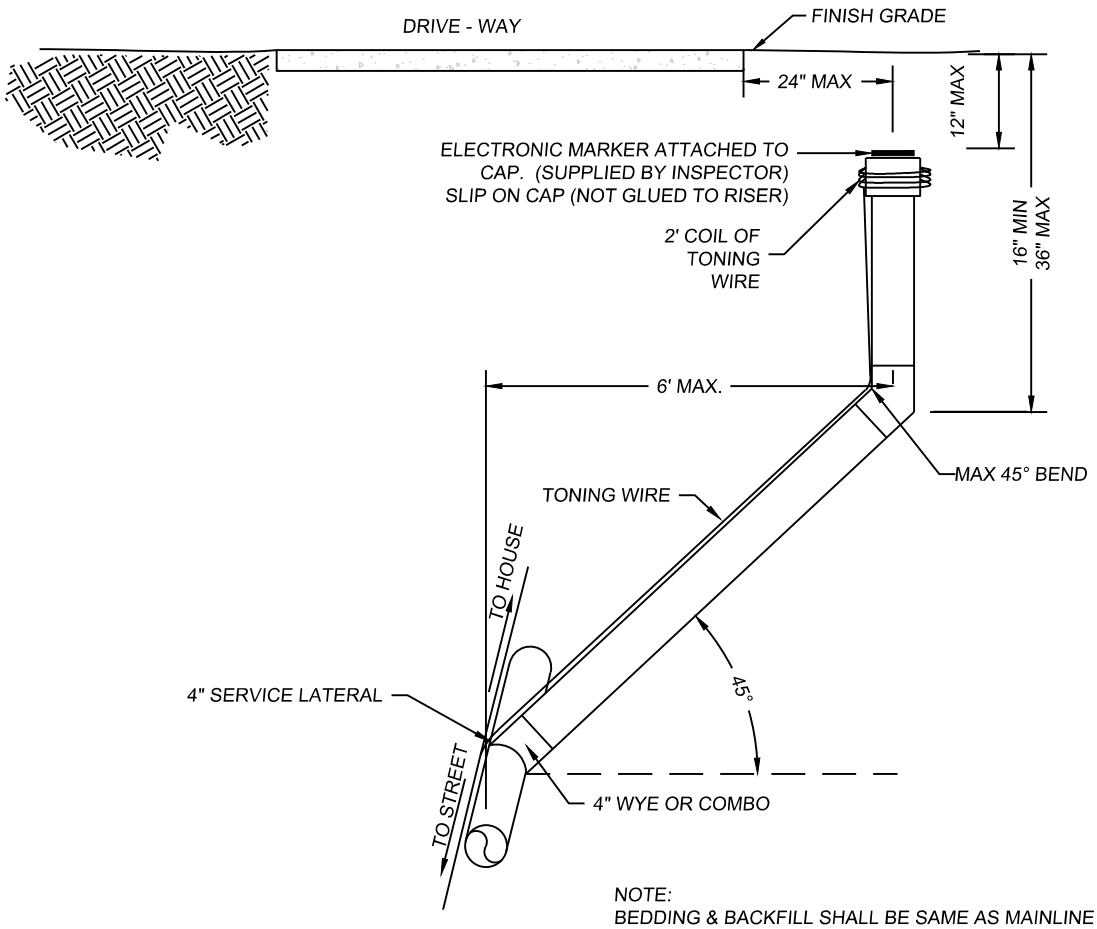
STANDARD DRAWING

NTS

18

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 11:59am, Modified 03-28-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_19_G



NOTE:
BEDDING & BACKFILL SHALL BE SAME AS MAINLINE

CLARK REGIONAL WASTEWATER DISTRICT

OFFSET RESIDENTIAL DRIVEWAY CLEANOUT

STANDARD DRAWING

NTS

19

APPROVED: APR 2020

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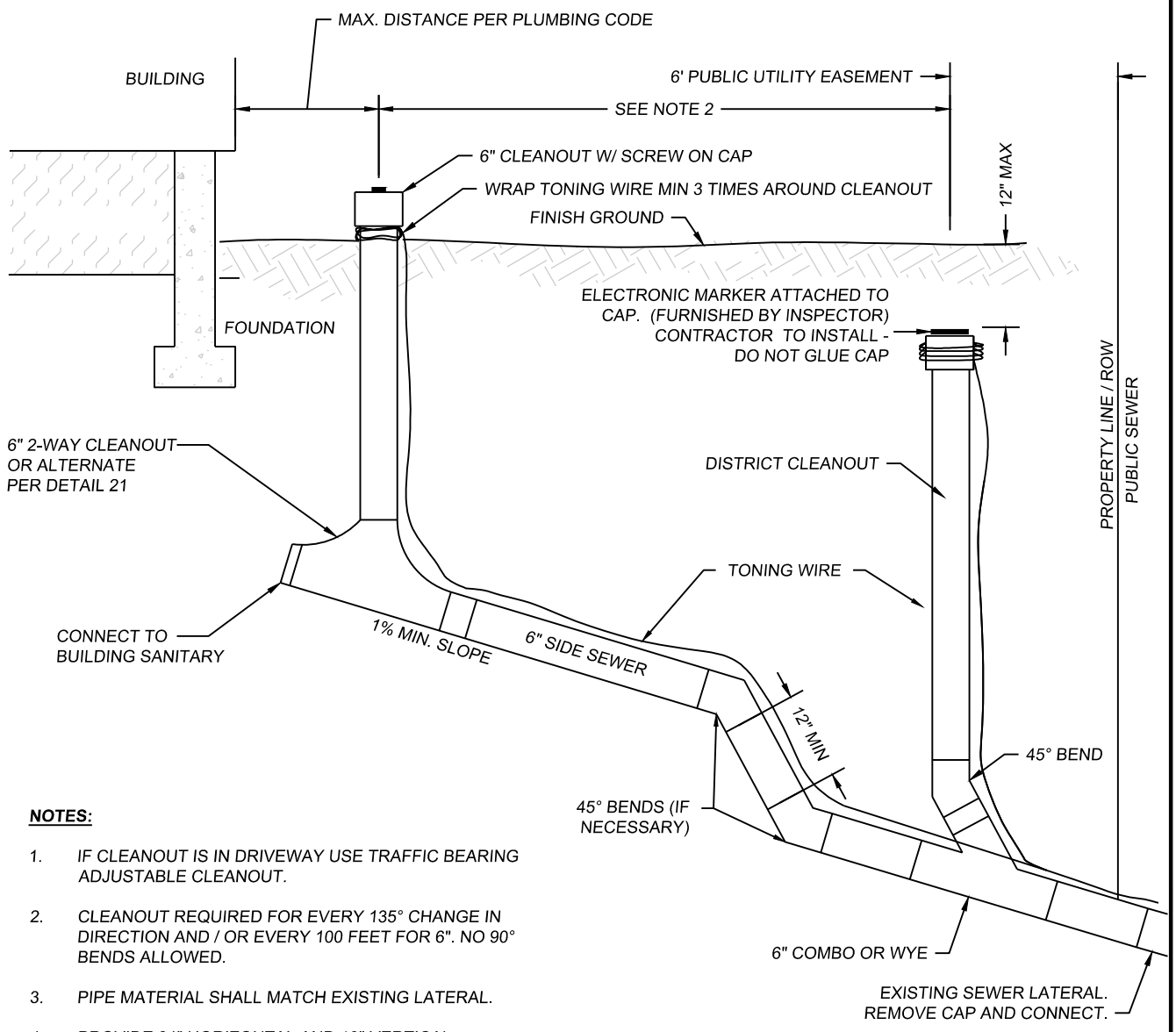
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_20_G



NOTES:

1. IF CLEANOUT IS IN DRIVEWAY USE TRAFFIC BEARING ADJUSTABLE CLEANOUT.
2. CLEANOUT REQUIRED FOR EVERY 135° CHANGE IN DIRECTION AND / OR EVERY 100 FEET FOR 6". NO 90° BENDS ALLOWED.
3. PIPE MATERIAL SHALL MATCH EXISTING LATERAL.
4. PROVIDE 24" HORIZONTAL AND 18" VERTICAL SEPARATION FROM WATER, GAS, POWER, PHONE, OR CABLE SERVICE LINES WHERE POSSIBLE.

CLARK REGIONAL WASTEWATER DISTRICT

COMMERCIAL SERVICE CONNECTION

STANDARD DRAWING

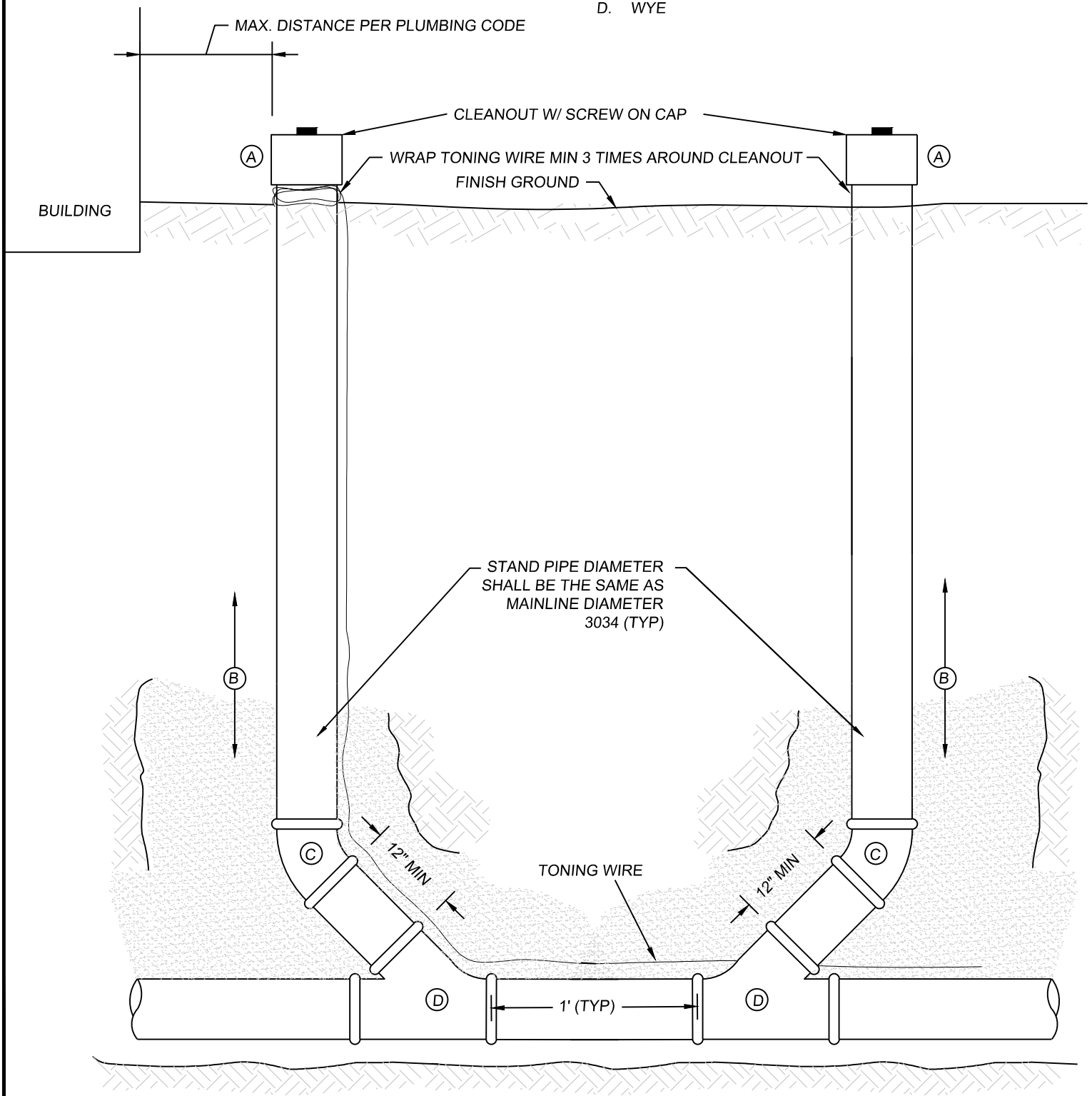
NTS

20

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:00pm, Modified 03-28-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_21_G

NOTE:
A. IF CLEANOUT IS IN DRIVEWAY USE TRAFFIC BEARING ADJUSTABLE CLEANOUT
B. BEDDING AND BACKFILL TO CONFORM WITH THAT SPECIFIED FOR SEWER LINE EXTENSION.
C. 45° BEND
D. WYE



CLARK REGIONAL WASTEWATER DISTRICT

COMMERCIAL TWO WAY CLEANOUT ALTERNATE

STANDARD DRAWING

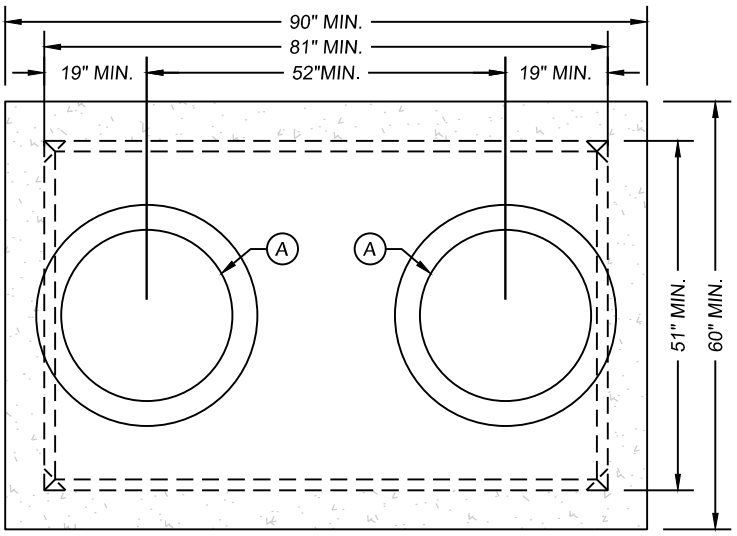
NTS

21

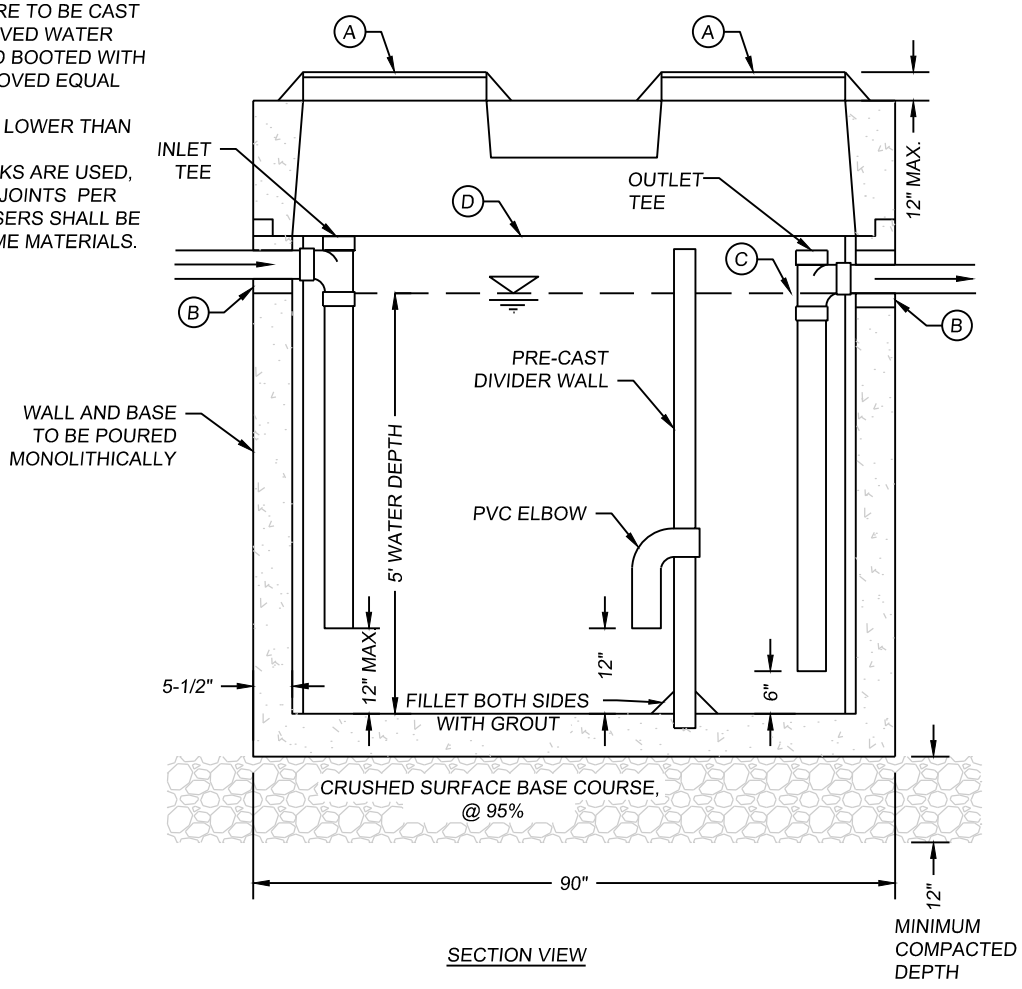
APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:01pm, Modified 03-28-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_22_G

GENERAL NOTES:
1) GREASE INTERCEPTOR DEVICES SHALL ACCEPT GRAY WATER ONLY AND DISCHARGE INTO A MONITORING MANHOLE.
2) ALL DEVICES SHALL BE SIZED AND INSTALLED PER CURRENT UNIFORM PLUMBING CODE REQUIREMENTS.
3) SUBMIT PRODUCT DATA FOR ALL INSTALLATIONS.
4) DEVICES LOCATED IN TRAVELWAY SHALL BE H20 RATED.
5) DEVICES SHALL BE HYDROSTATICALLY TESTED PER 12-01.3(2).



NOTES:
A. 24" STANDARD MANHOLE FRAME AND COVER.
B. ALL PENETRATIONS ARE TO BE CAST IN PLACE WITH APPROVED WATER STOPS OR CORED AND BOOTED WITH KOR 'N SEAL OR APPROVED EQUAL PER 7-05.3.
C. OUTLET TO BE 1" MIN. LOWER THAN INLET.
D. IF MULTI SECTION TANKS ARE USED, EXTERNALY SEAL ALL JOINTS PER 7-05.3 AND 9-04.13. RISERS SHALL BE SEALED WITH THE SAME MATERIALS.



SECTION VIEW

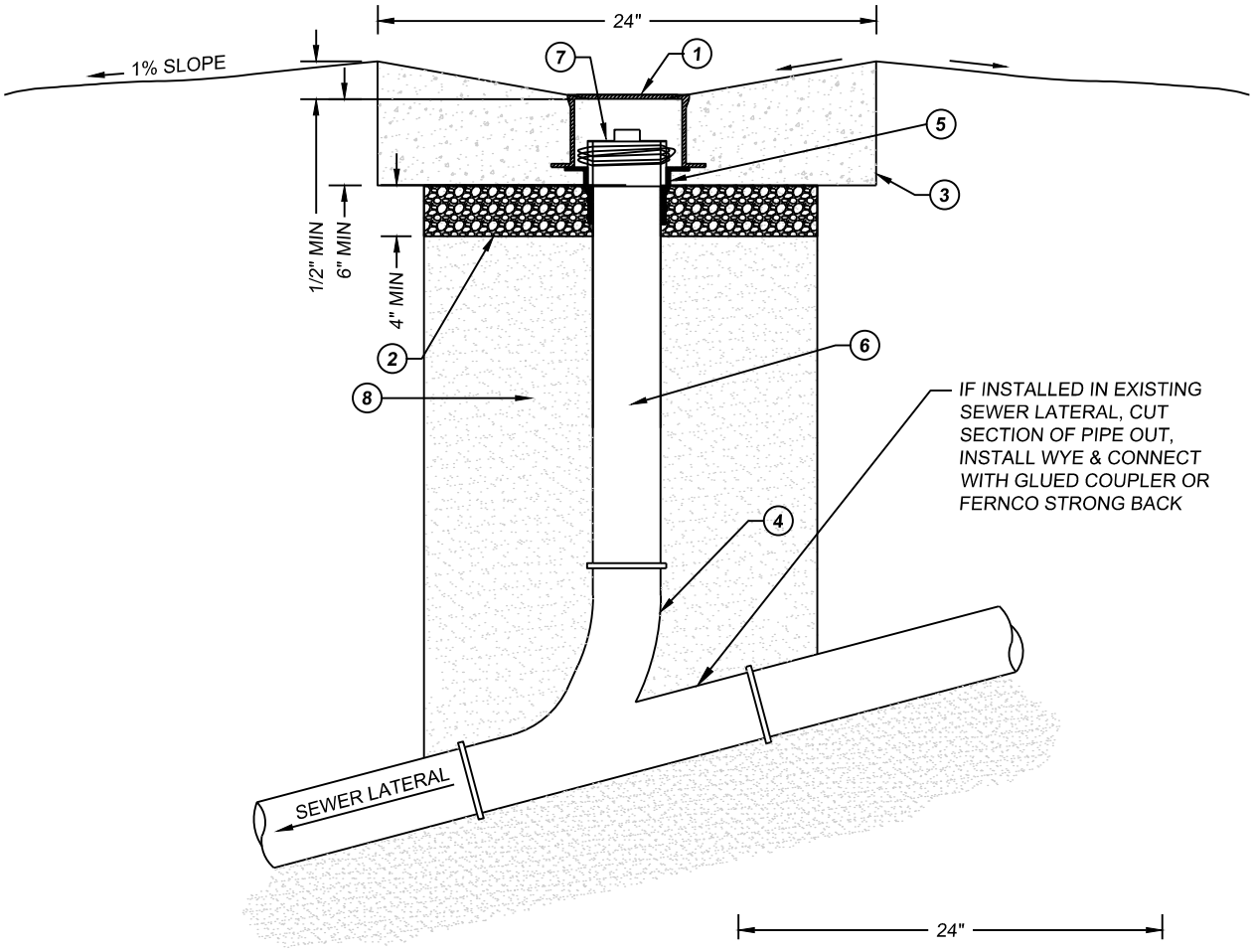
CLARK REGIONAL WASTEWATER DISTRICT

CONCRETE GREASE INTERCEPTOR

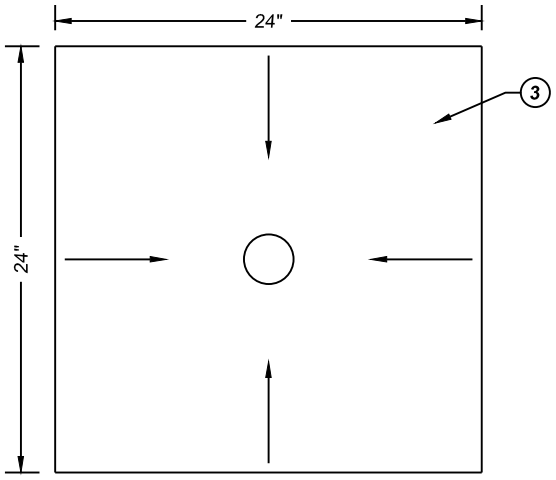
STANDARD DRAWING

NTS
22
APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:02pm, Modified 03-28-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_23_R



SECTION VIEW



PLAN VIEW

1. TRAFFIC BEARING ADJUSTABLE CLEANOUT.
2. CRUSHED SURFACING BASE COURSE COMPACTED TO 95% MAXIMUM DENSITY.
3. CLASS 3000 CONCRETE PAD SLOPED TO CENTER.
4. 2-WAY TEE OR WYE.
5. INSTALL 50# FELT BETWEEN PIPE AND CONCRETE.
6. ALL PIPE MATERIAL SHALL MATCH LATERAL PIPE MATERIAL.
7. COMPRESSION / EXPANSION PLUG
8. NATIVE BACKFILL COMPACTED TO 95% MAXIMUM DENSITY

CLARK REGIONAL WASTEWATER DISTRICT

RESIDENTIAL RV DISPOSAL STATION

STANDARD DRAWING

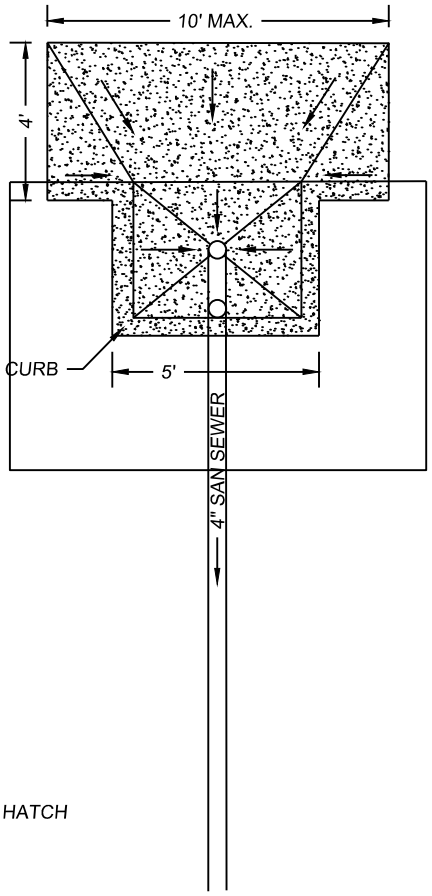
NTS

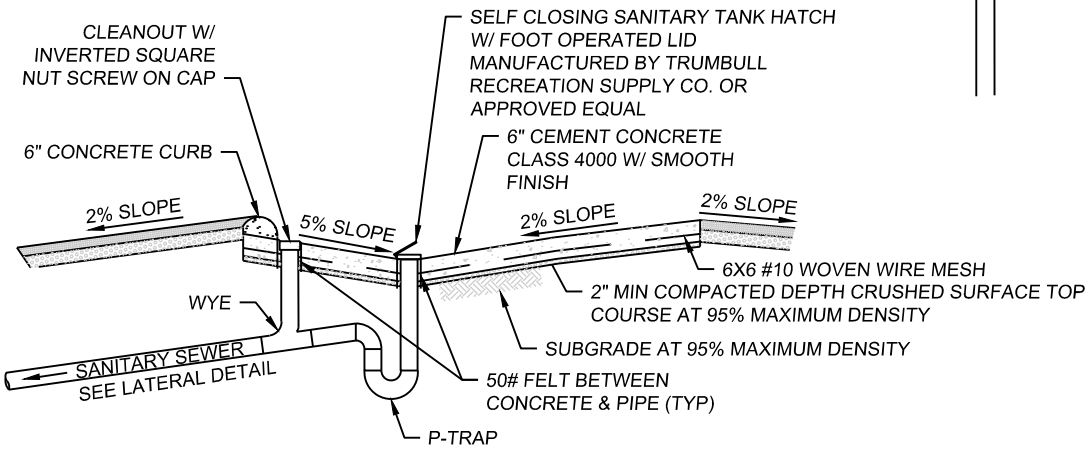
23

APPROVED: APR 2020

Plotted on Apr 06, 2020 - 12:12pm, Modified 04-06-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_24_R

PLAN VIEW
NTS





CLARK REGIONAL WASTEWATER DISTRICT

COMMERCIAL RV DISPOSAL STATION

STANDARD DRAWING

NTS
24
APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:03pm, Modified 03-28-20
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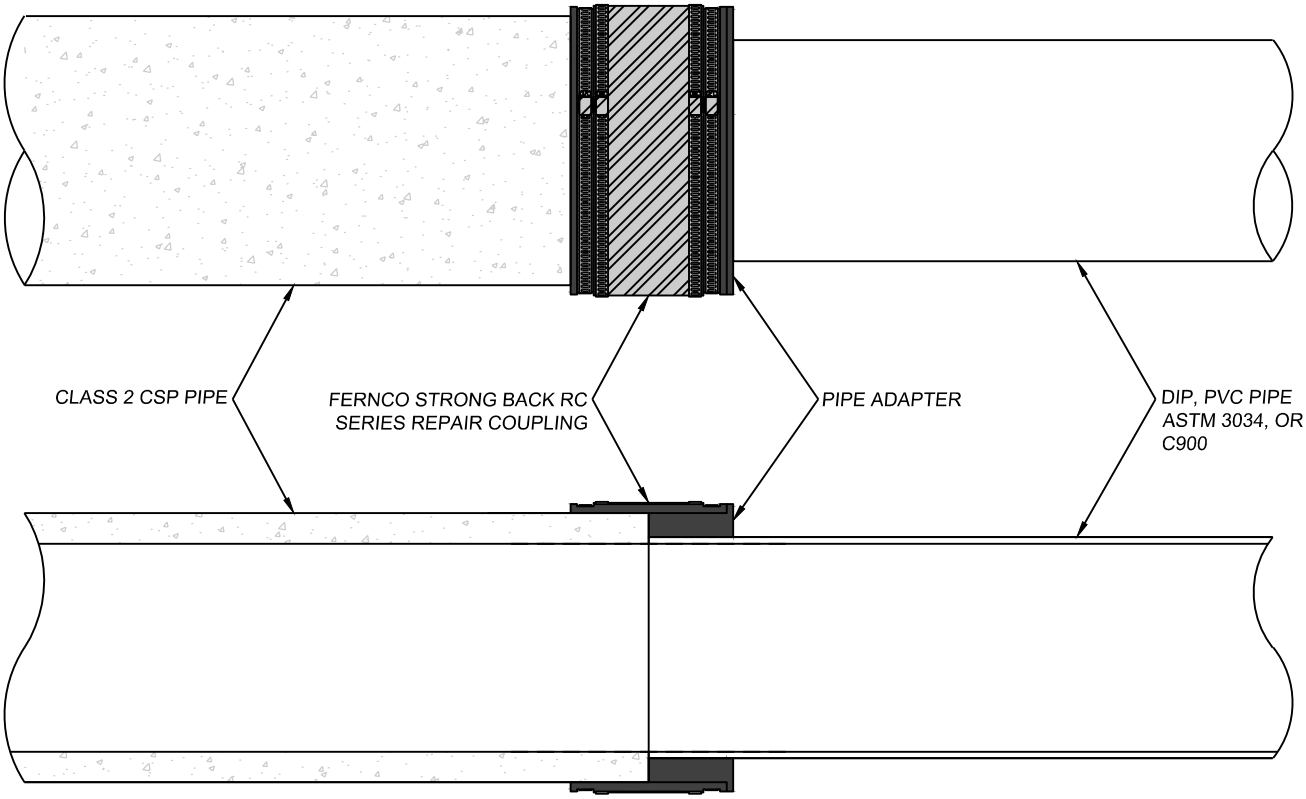


USE FERNCO STRONG BACK - RC SERIES REPAIR COUPLINGS		
	FROM	TO
	4" CLASS 2 CONCRETE	4" DUCTILE IRON, OR C900
	6" CLASS 2 CONCRETE	6" DUCTILE IRON, ASTM 3034 OR C900
	8" CLASS 2 CONCRETE	8" DUCTILE IRON, ASTM 3034 OR C900
	12" CLASS 2 CONCRETE	12" DUCTILE IRON, ASTM 3034 OR C900

NOTE: FERNCO REPAIR / CONNECTION APPROVED FOR CLASS 2 CONCRETE PIPE ONLY

CLARK REGIONAL WASTEWATER DISTRICT

CONCRETE TO PVC OR DIP PIPE TRANSITION

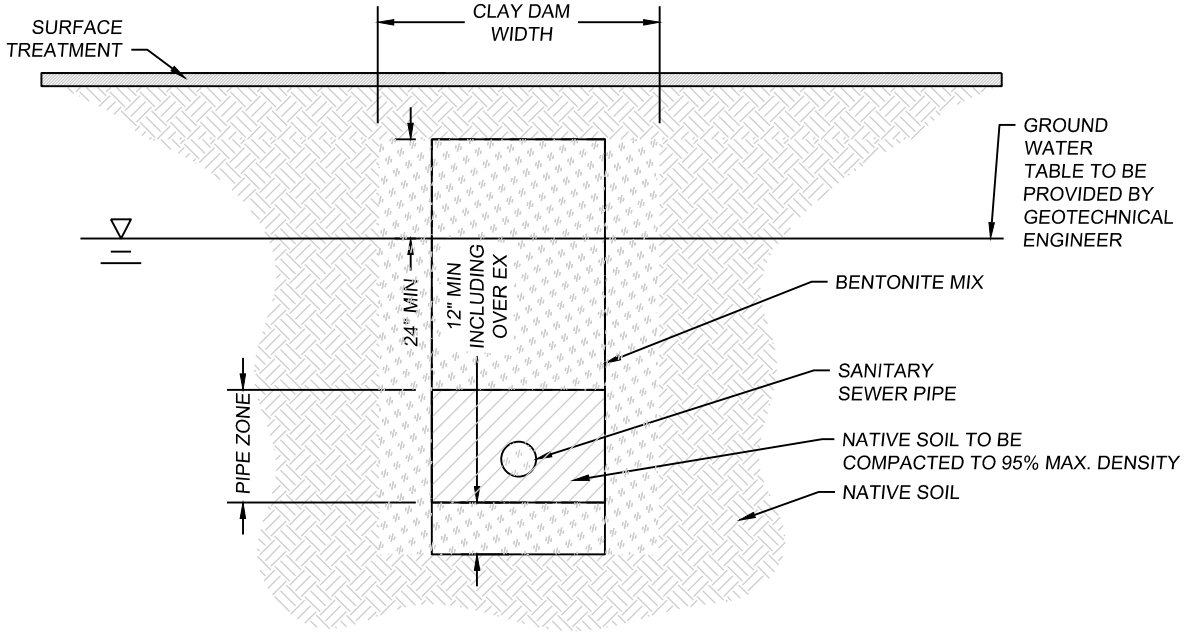
STANDARD DRAWING

NTS

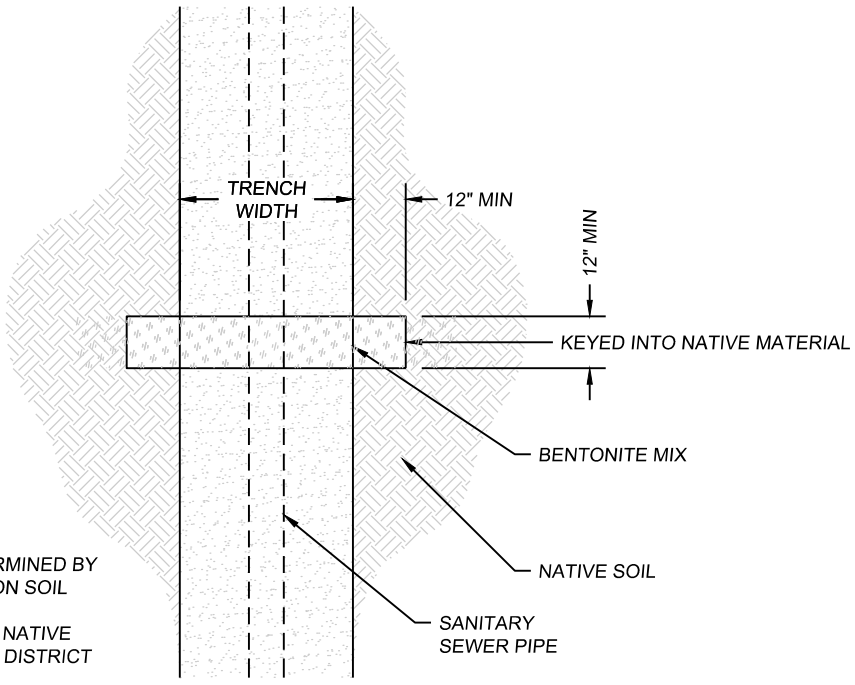
25

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:03pm, Modified 04-04-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_26_G



SECTION VIEW



PLAN VIEW

1. BENTONITE MIX RATIO TO BE DETERMINED BY A GEOTECHNICAL ENGINEER BASED ON SOIL CONDITIONS. SEE 7-08.3(3).
2. IF TRENCH IS NOT IN PUBLIC ROAD, NATIVE MATERIAL MAY BE APPROVED BY THE DISTRICT FOR USE IN LIEU OF BENTONITE.

CLARK REGIONAL WASTEWATER DISTRICT

CLAY DAM

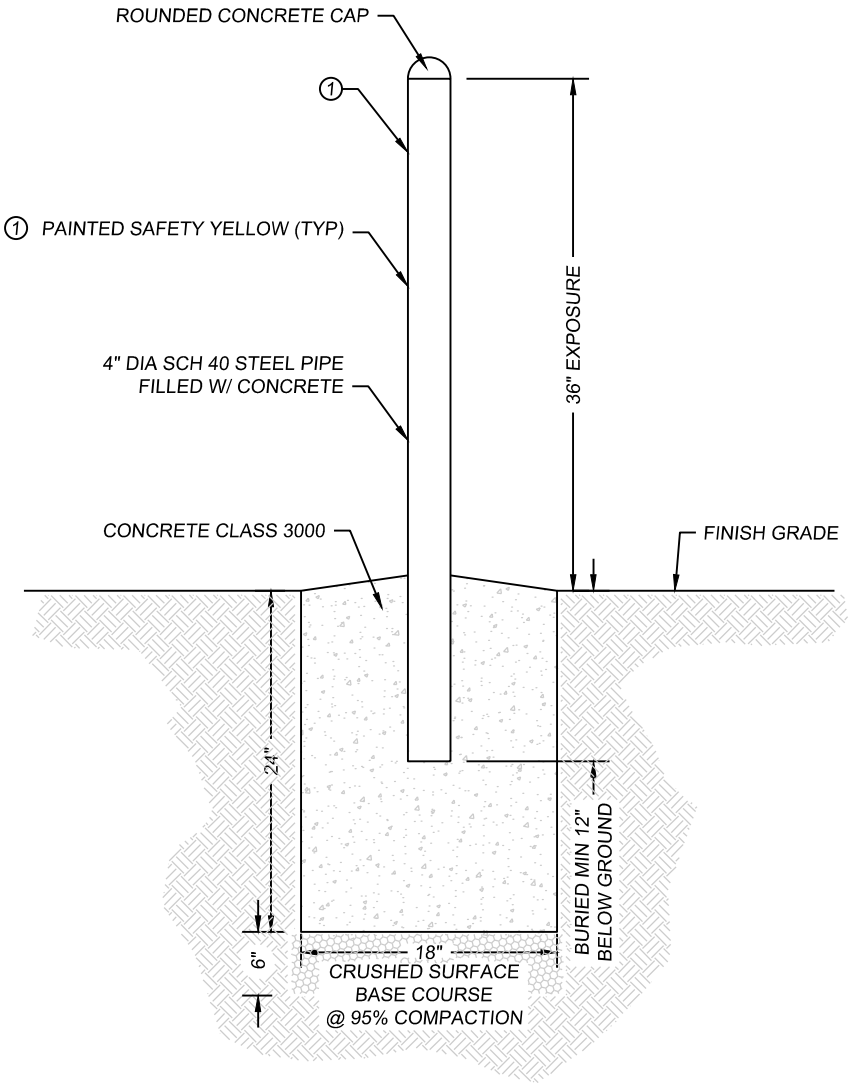
STANDARD DRAWING

NTS

26

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:04pm, Modified 03-28-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_27_R



NOTE:

1. BOLLARD SHALL BE CLEANED AND PRIMERED WITH RUST BLOCKING ALKYD METAL PRIMER OR APPROVED EQUAL AND THEN PAINTED WITH A HEAVY DUTY ALKYD YELLOW ENAMEL OR APPROVED EQUAL.

CLARK REGIONAL WASTEWATER DISTRICT

BOLLARD

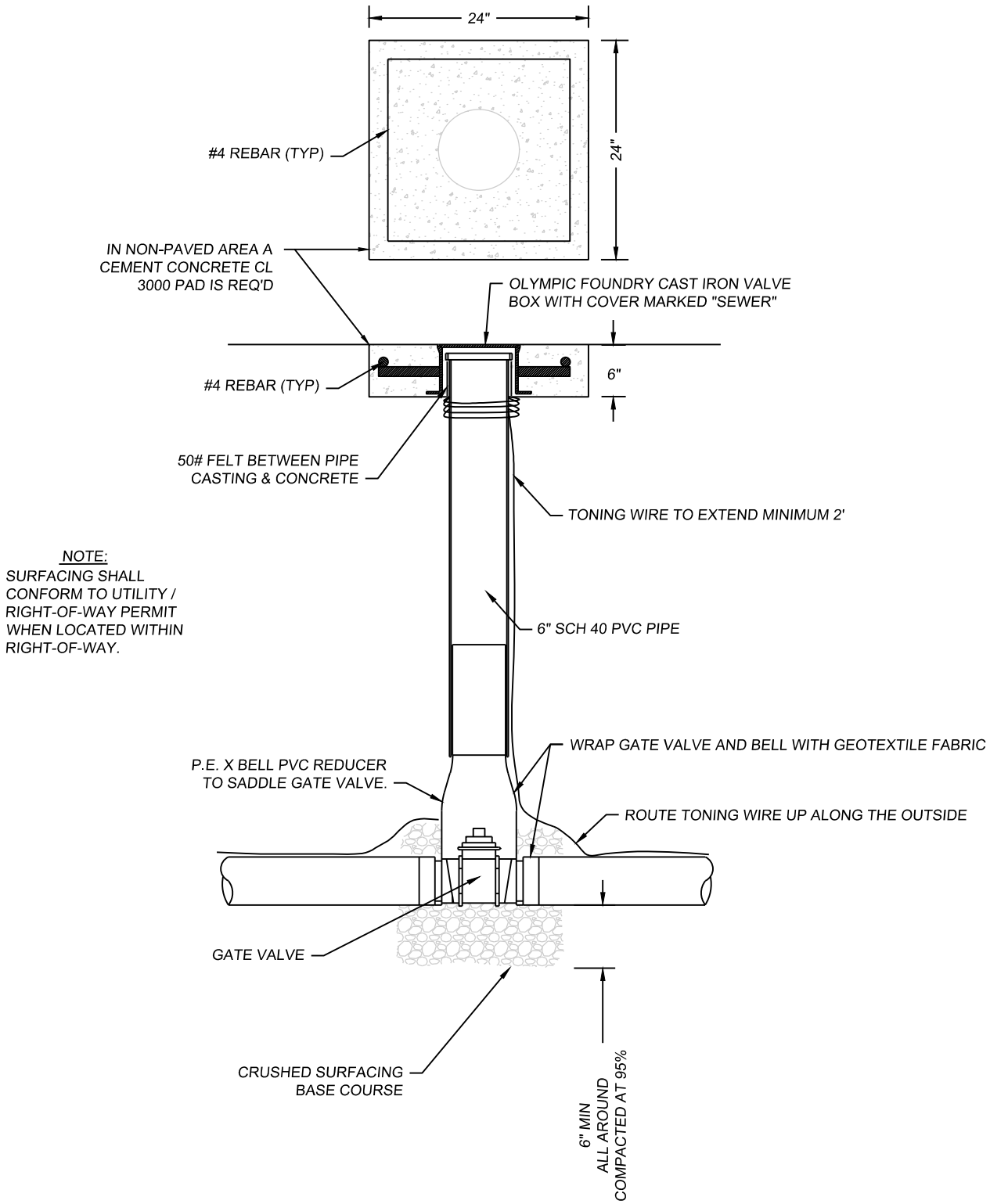
STANDARD DRAWING

NTS

27

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:04pm, Modified 03-28-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_28_FM



CLARK REGIONAL WASTEWATER DISTRICT

GATE VALVE

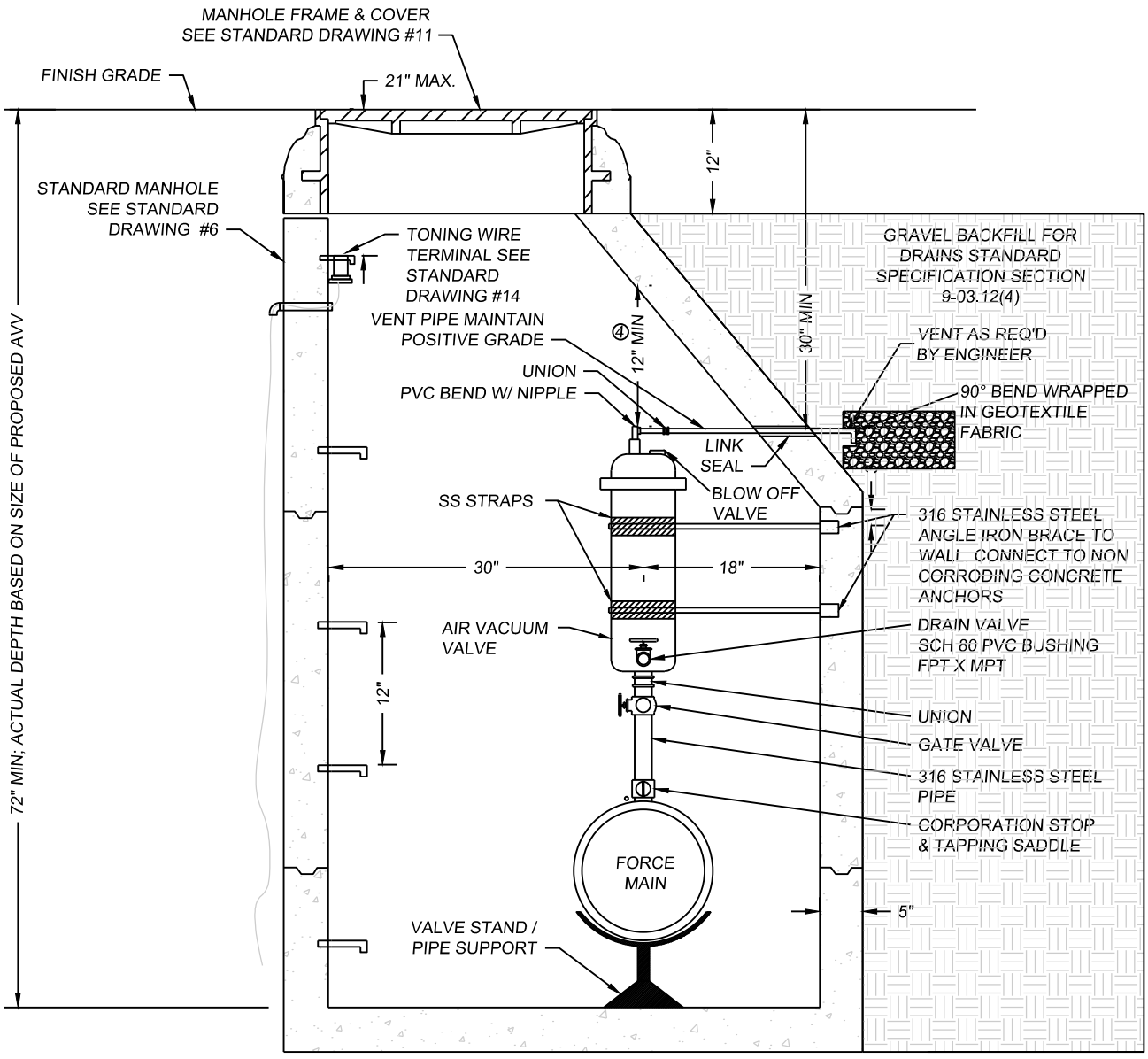
STANDARD DRAWING

NTS

28

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:05pm, Modified 03-30-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_29_FM



NOTES:

1. KOR-N-SEAL BOOT REQ'D ON ALL MANHOLE PENETRATIONS GREATER THAN 2" PER STANDARD SPECIFICATION SECTION 7-05.3.
2. BACKFILL SHALL BE THE SAME AS SHOWN ON THE PLANS FOR THE MAINLINE.
3. AIR VACUUM VALVE & PIPING TO BE SIZED BY THE DESIGN ENGINEER.
4. IF 12" CLEARANCE BETWEEN TOP OF AIR VACUUM VALVE AND MANHOLE CANNOT BE MET, DESIGN ENGINEER TO SUBMIT DETAIL FOR AIR VACUUM VALVE VAULT FOR APPROVAL.

CLARK REGIONAL WASTEWATER DISTRICT

AIR / VACUUM VALVE

STANDARD DRAWING

NTS

29

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:06pm, Modified 03-30-20
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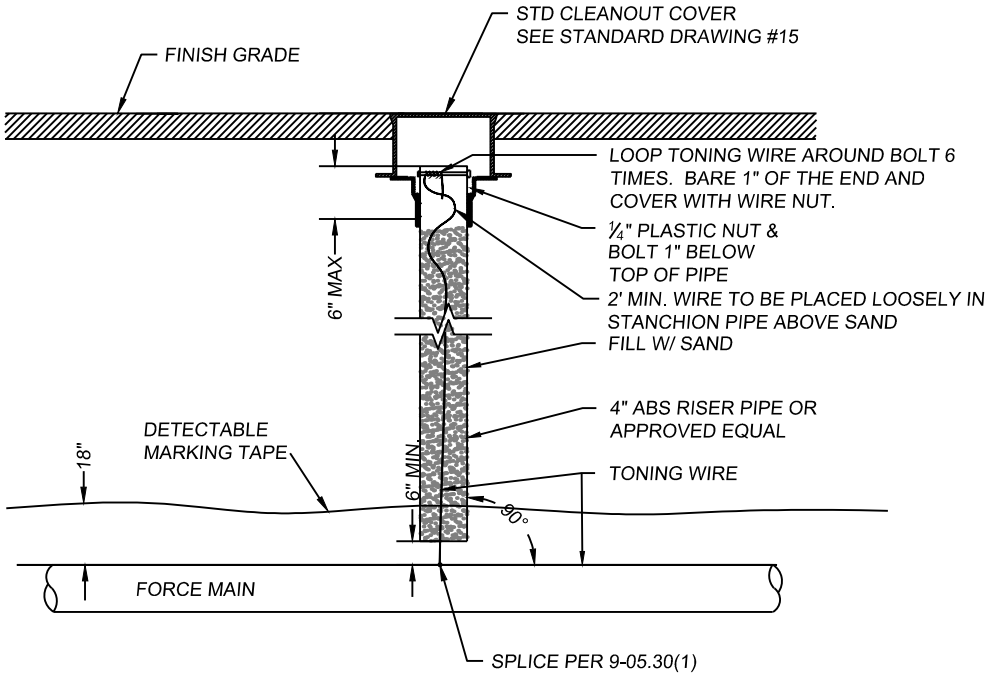
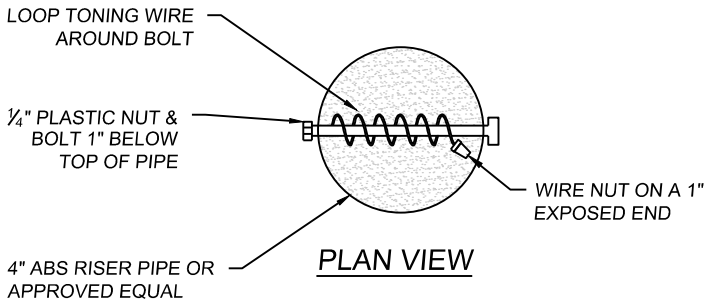


SECTION VIEW



PLAN VIEW

CLARK REGIONAL WASTEWATER DISTRICT

LOCATE STATION

STANDARD DRAWING

NTS

30

APPROVED: APR 2020

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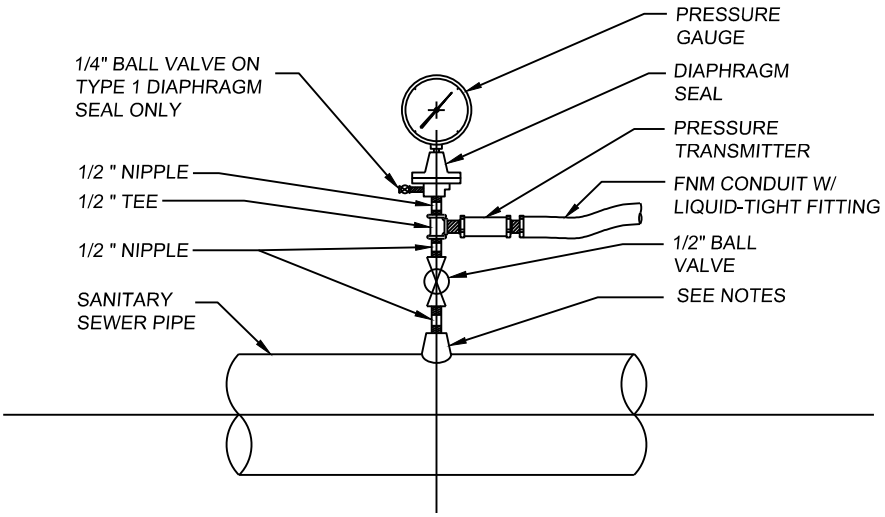
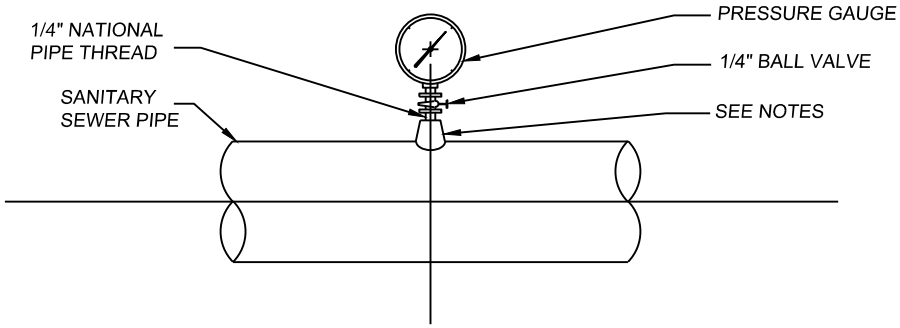


DETAIL A
DIAPHRAGM PRESSURE GAUGE & TRANSMITTER
NTS



DETAIL B
PRESSURE GAUGE
NTS

NOTES

1. FOR STEEL AND PVC 2 1/2" AND SMALLER USE A BUSHING IN A TEE.
2. FOR DUCTILE IRON AND FIBERGLAS REINFORCED PLASTIC PIPE, ALL SIZES, USE PIPE SADDLE WITH BUSHING.

CLARK REGIONAL WASTEWATER DISTRICT

PRESSURE GAUGE

STANDARD DRAWING

NTS
31
APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:06pm, Modified 03-28-20
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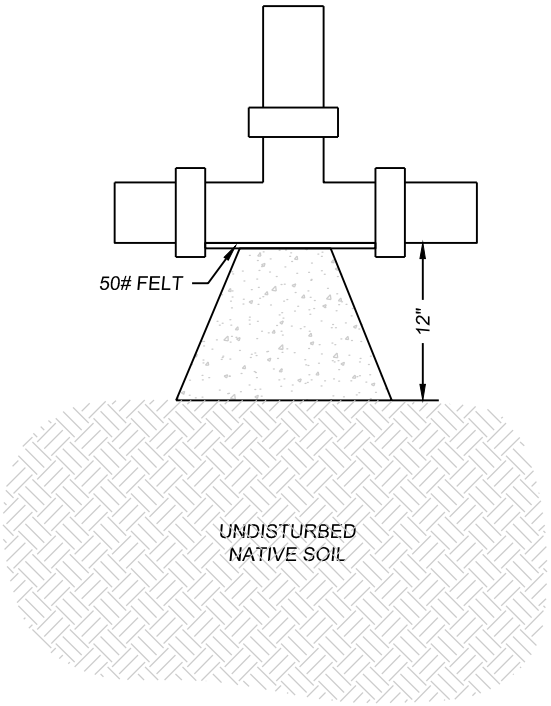


NOTES:
1. FOR USE ON EXISTING PIPES ONLY
2. MECHANICALLY RESTRAINED JOINTS REQUIRED ON NEW INSTALLATIONS
3. NO BOLTS , JOINTS, FOLLOWERS, GLANDS, ETC. ARE TO BE COVERED W/ CONCRETE

MIN SOIL BEARING AREA TABLE (SQ FT)

PIPE DIA	TEE	90°	45°	22-1/2°	11-1/2°
2"	0.30	0.50	0.30	0.20	–
2 1/2"	0.50	0.70	0.04	0.20	–
3"	0.70	1.00	0.60	0.30	0.20
4"	1.30	1.80	1.00	0.50	0.30
6"	2.90	4.00	2.20	1.20	0.60
8"	5.00	7.30	3.80	2.00	1.00
10"	7.90	11.00	6.00	3.10	1.60

SOIL = 1,000 PSF - PRESSURE <= 100 PSI

CLARK REGIONAL WASTEWATER DISTRICT

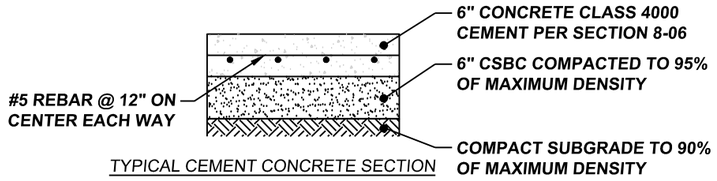
THRUST BLOCK

STANDARD DRAWING

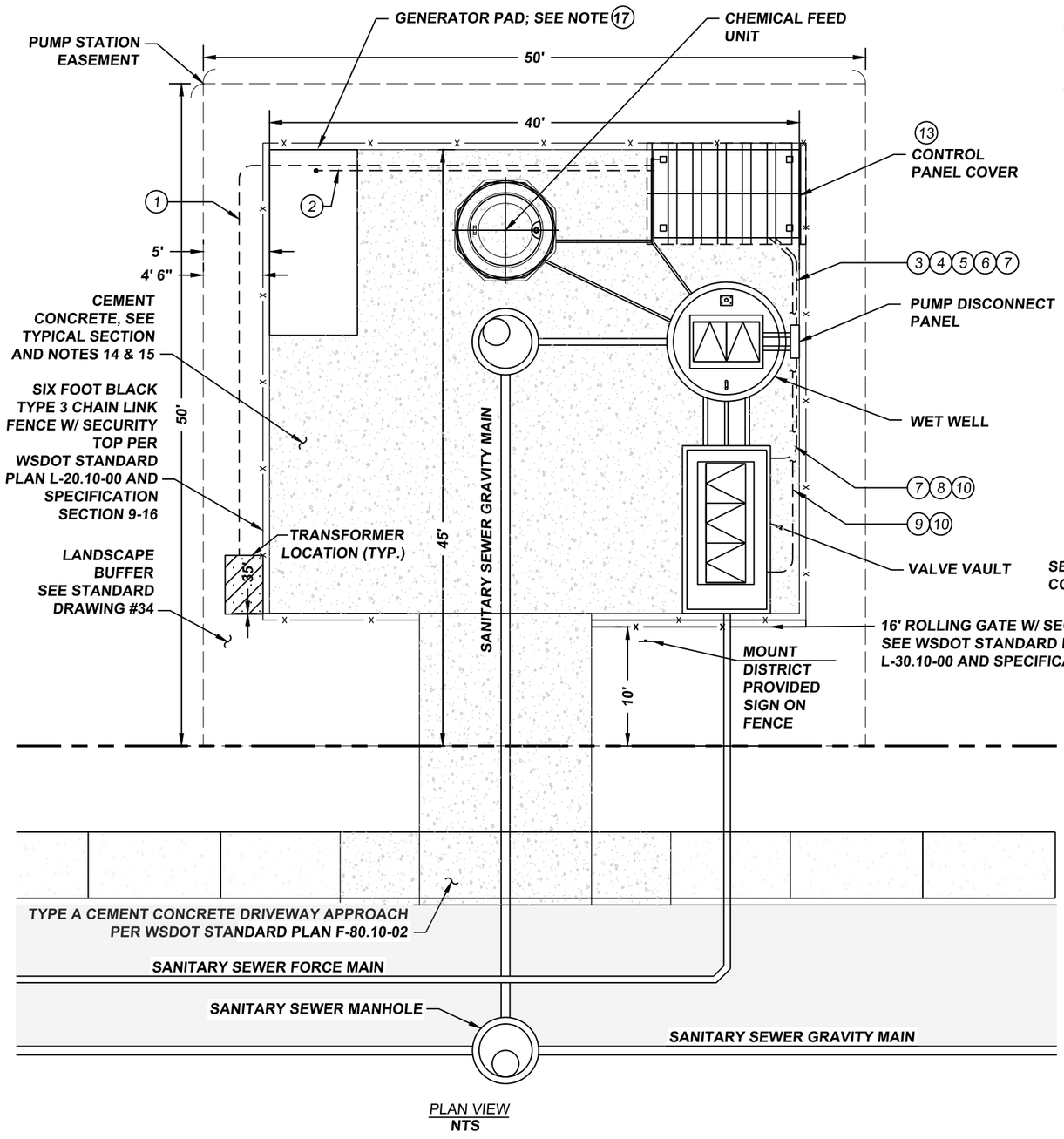
NTS

32

APPROVED: APR 2020



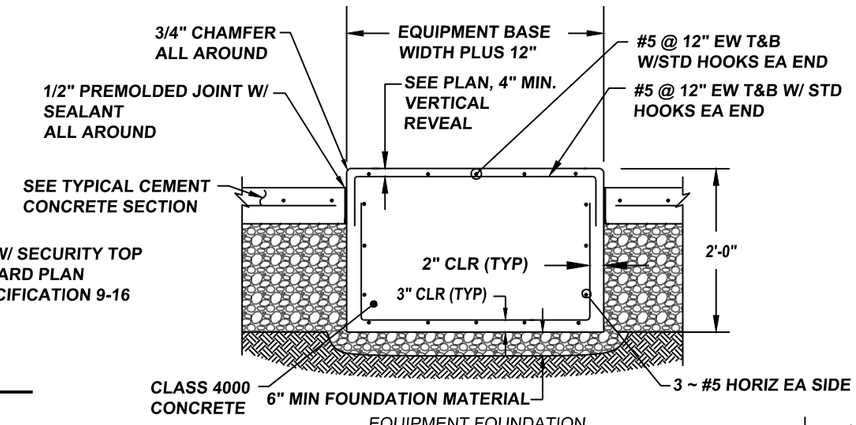
TYPICAL CEMENT CONCRETE SECTION



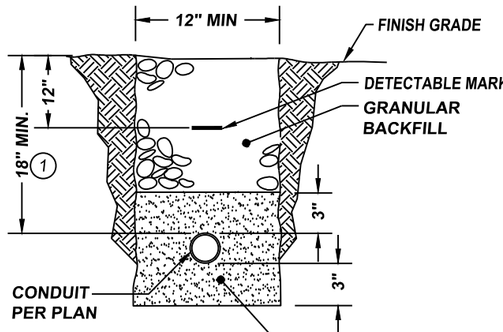
PLAN VIEW
NTS

NOTES:

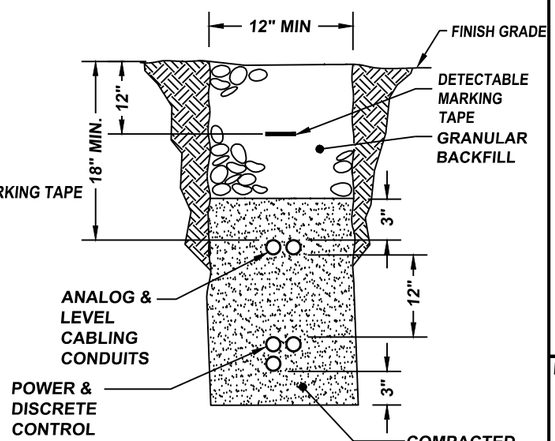
1. 2" SERVICE CONDUIT FROM TRANSFORMER TO METERBASE. VERIFY TRENCH DEPTH AND COVERING FOR INCOMING SERVICE CONDUIT WITH LOCAL UTILITY.
2. (1) 2" POWER CONDUIT, (1) 1" CONTROL CONDUIT FROM AUTOMATIC TRANSFER SWITCH TO GENERATOR. VERIFY STUB-UP LOCATIONS WITH MANUFACTURER OF GENERATOR SET BEING SUPPLIED. SEE TYPICAL CONDUIT TRENCH DETAIL; THIS SHEET. IF PROJECT DOES NOT INCLUDE GENERATOR, STUB AND CAP AT EDGE OF PAD FOR FUTURE CONNECTION.
3. (2) 1" PUMP POWER CONDUITS FROM CONTROL PANEL TO PUMP DISCONNECT PANEL. SEE STANDARD DRAWINGS #41, #42, #45, #46 AND COMBINED CONDUIT TRENCH DETAIL; THIS SHEET.
4. (1) 1" [120V] CONTROL CONDUIT FROM CONTROL PANEL TO PUMP DISCONNECT PANEL. SEE STANDARD DRAWINGS #41, #42, #45, #46 AND COMBINED CONDUIT TRENCH DETAIL; THIS SHEET.
5. (1) 1" [DC] CONTROL CONDUIT FROM CONTROL PANEL TO PUMP DISCONNECT PANEL. SEE STANDARD DRAWINGS #41, #42, #45, #46 AND COMBINED CONDUIT TRENCH DETAIL, THIS SHEET.
6. (1) 1" LEVEL TRANSDUCER CONDUIT FROM CONTROL PANEL TO PUMP DISCONNECT PANEL. SEE STANDARD DRAWINGS #41, #42, #45, #46 AND COMBINED CONDUIT TRENCH DETAIL; THIS SHEET.
7. CONDUITS TO PUMP DISCONNECT PANEL SHALL BE CONTINUOUS SECTION OF RGS CONDUIT FROM TRANSITION UNDERGROUND TO PUMP DISCONNECT PANEL. REFERENCE NEC ARTICLE 501.15 (B2) EXCEPTION NO 1.
8. (1) 1" CONTROL CONDUIT FROM VALVE VAULT TO PUMP DISCONNECT PANEL. SEE STANDARD DRAWINGS #37, #45, AND TYPICAL CONDUIT TRENCH DETAIL; THIS SHEET.
9. (2) 1" FLOWMETER CONDUITS FROM VALVE VAULT TO CONTROL PANEL. SEE STANDARD DRAWINGS #37, #40, #41, AND TYPICAL TRENCH DETAIL; THIS SHEET.
10. CONDUITS ENTERING VALVE VAULT SHALL BE CONTINUOUS RGS FROM OUTSIDE VAULT TO A SEAL-OFF LOCATED INSIDE VAULT. WRAP RGS CONDUIT WITH CORROSION RESISTANT TAPE FROM PVC TRANSITION TO SEAL-OFF CONNECTION INSIDE VAULT. REFERENCE NEC ARTICLE 501.15 (B). ROUTE RGS ALONG PIPING AND USE NM FLEXIBLE CONDUIT FOR FINAL CONNECTIONS TO EQUIPMENT.
11. (2) 1" CONDUITS FOR CONNECTION TO CHEMICAL FEED UNIT.
12. ALL CONDUITS TRANSITIONING FROM PVC UNDERGROUND TO RGS ABOVE GRADE ARE TO BE WRAPPED WITH CORROSION RESISTANT TAPE FROM TRANSITION TO A MINIMUM 6" ABOVE GRADE.
13. SEE STANDARD DRAWING #43, ONE-LINE DIAGRAMS FOR ADDITIONAL INFORMATION.
14. PROVIDE POSITIVE DRAINAGE AWAY FROM STRUCTURES. PLACE ELASTOMERIC EXPANSION JOINT SEALS PER 9-04.1(4) OF THE STANDARD SPECIFICATIONS AROUND THE VALVE VAULT, KIOSK FOUNDATION, WETWELL, AND GENERATOR FOUNDATION. PLACE CONTRACTION JOINTS ALONG GRADE BREAKS AND FLOW LINES. FILL IN FLOW LINES WITH GRAY POURED RUBBER JOINT SEALER PER 9-04.2(2) OF THE STANDARD SPECIFICATIONS. SUBMIT SITE SPECIFIC GRADING PLAN NOTING JOINT LOCATIONS FOR APPROVAL BY THE DISTRICT ENGINEER.
15. CONTROL JOINTS TO BE CUT INTO CONCRETE SURFACE. JOINTS SHALL BE CUT NO MORE THAN 10' APART AND AT ALL CORNERS.
16. ALL BOLLARDS SHALL BE TYPE 1 PER WSDOT STANDARD PLAN H-60.10-01.
17. GENERATOR SIZE SHALL BE AS SHOWN ON APPROVED PLANS.
18. CONTRACTOR TO CONSTRUCT AN EQUIPMENT PAD FOR THE CHEMICAL FEED TANK AND GENERATOR. EPOXY ANCHORS MAY BE USED AND SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER RECOMMENDATIONS AND INSPECTED BY SPECIAL INSPECTION PER BUILDING CODE.



EQUIPMENT FOUNDATION



TYPICAL CONDUIT TRENCH



COMBINED CONDUIT TRENCH

CLARK REGIONAL WASTEWATER DISTRICT

TYPICAL PUMP STATION SITE PLAN

STANDARD DRAWING

NTS

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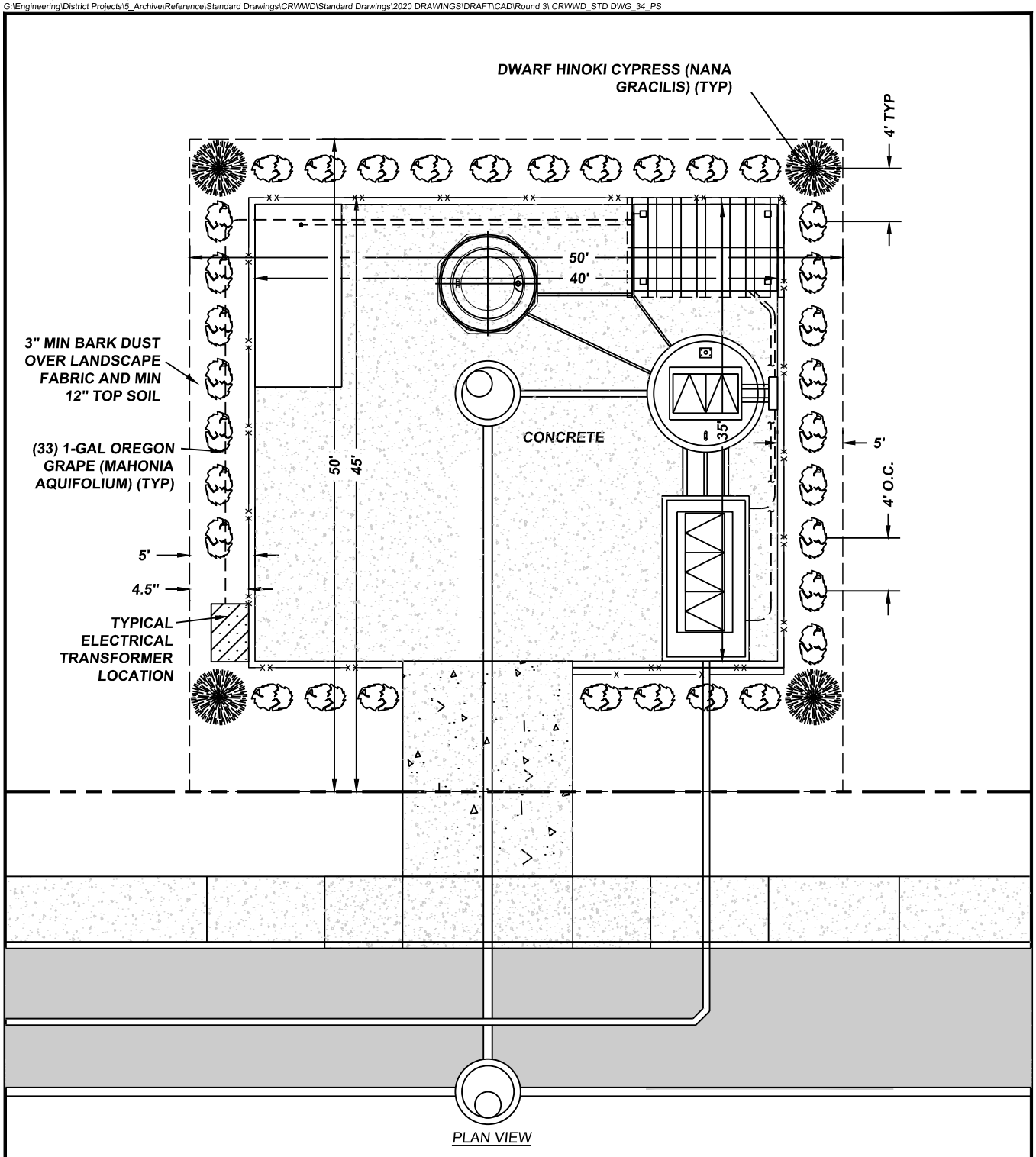
APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:08pm, Modified 03-29-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_34_PS



CLARK REGIONAL WASTEWATER DISTRICT

TYPICAL PUMP STATION LANDSCAPE PLAN

STANDARD DRAWING

NTS

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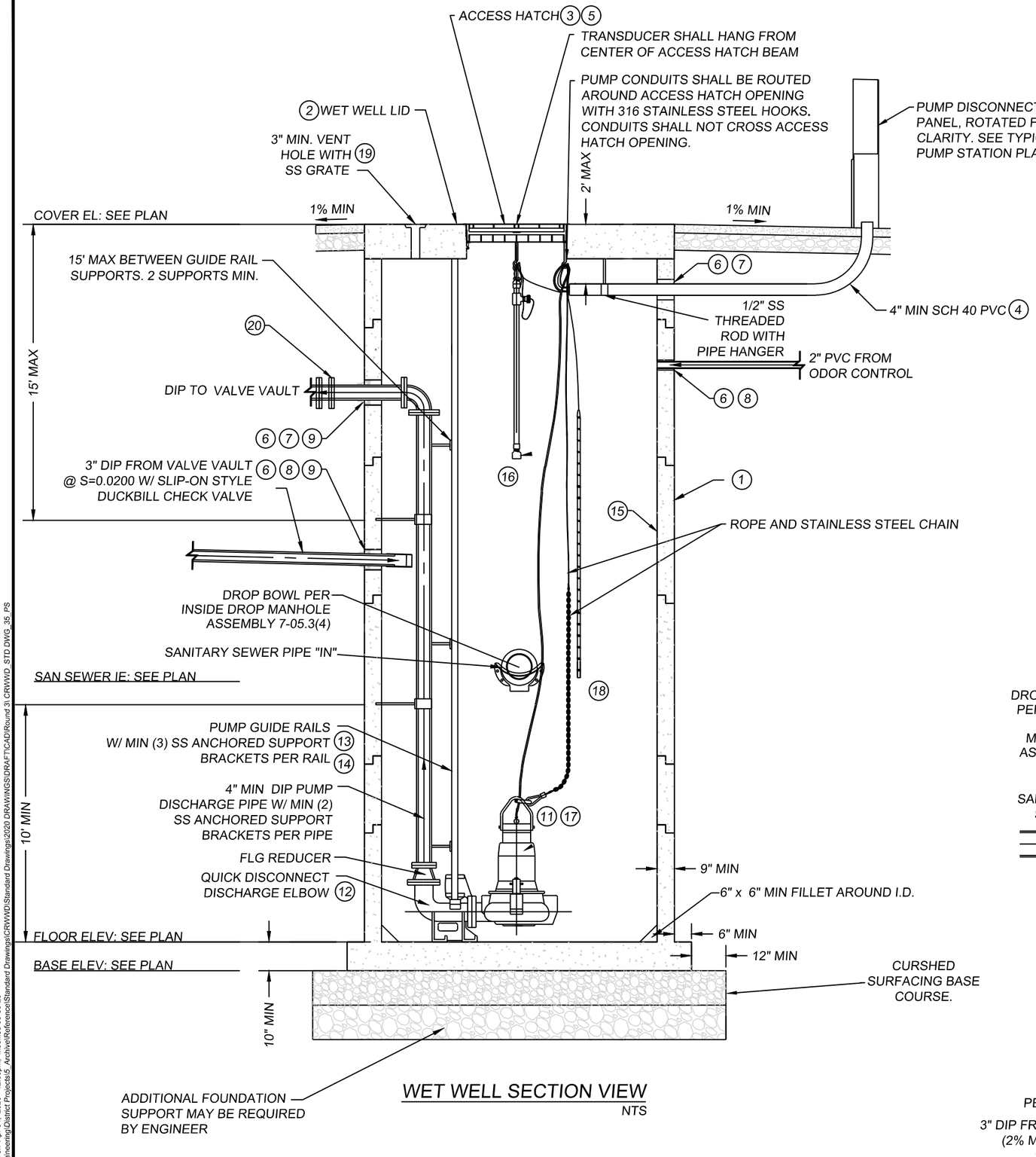
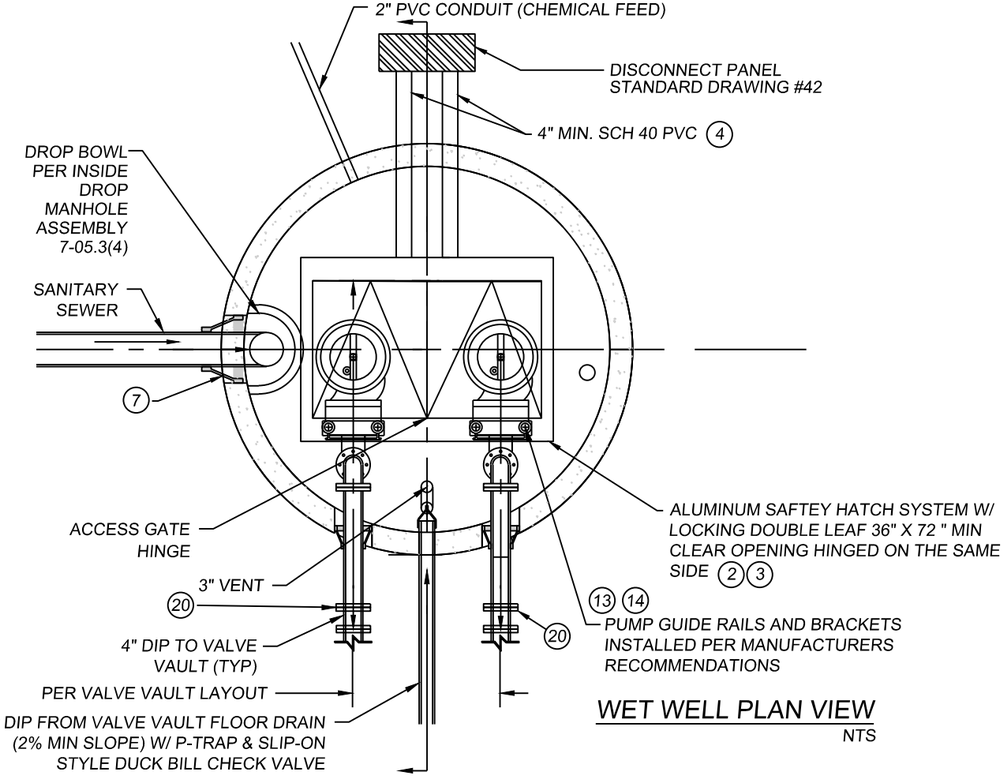


WET WELL SECTION VIEW

NTS

NOTE:

1. WET WELL SHALL BE 96" DIA MIN REINFORCED CONCRETE.
2. WET WELL LID & ACCESS HATCHES SHALL BE H-20 RATED.
3. ACCESS HATCH PER 9-05.50(8) OR APPROVED EQUAL
4. COORDINATE CONDUIT SIZE WITH PUMP PLUGS AND PROVIDE LONG RADIUS ELBOWS INTO DISCONNECT PANEL. CONDUIT SIZE TO BE COORDINATED WITH PUMP MANUFACTURE.
5. HATCH COVERS SHALL HAVE NON-SLIP COATING MEETING ADA / OSHA REQUIREMENTS FOR COEFFICIENT OF FRICTION (COF)
6. ALL PENETRATIONS SHALL BE CORE DRILLED.
7. ALL PENETRATIONS 2" & LARGER SHALL BE BOOTED USING KOR-N-SEAL CONNECTORS W/ SS WEDGE & PIPE CLAMPS PER STANDARD SPECIFICATION SECTION 7-05.3 AND 9-04.14.
8. ALL PENETRATIONS SMALLER THAN 2" SHALL BE SEALED USING LINK SEAL MODEL S-316 MODULAR SEAL.
9. ALL PIPES AND FITTINGS SHALL BE FLANGED CEMENT LINED CLASS 52 DUCTILE IRON EXCEPT WHERE SPECIFIED
10. ALL WET WELL HARDWARE SHALL BE 316 SS.
11. PUMPS SHALL BE FLYGT PUMPS W/ "N" IMPELLERS OR APPROVED EQUAL PER STANDARD SPECIFICATION SECTION 9-50. SEE PLANS FOR FLOW AND HEAD REQUIREMENTS
12. PUMP DISCHARGE ELBOW SHALL BE PER PUMP MANUFACTURER
13. PUMP GUIDE RAIL BRACKETS SHALL BE 316 SS PER PUMP MANUFACTURER
14. PUMP GUIDE RAILS SHALL BE 316 SS W/ WELDED JOINTS
15. WET WELL SHALL BE COATED WHEN SPECIFIED BY THE DISTRICT PER STANDARD SPECIFICATION SECTION 7-05.3(7).
16. ULTRASONIC LEVEL TRANSDUCER PER STANDARD SPECIFICATION SECTION 9-50.4(2)A. SEE PLANS FOR ELEVATION REQUIREMENTS
17. ONE COMPLETE ADDITIONAL (SPARE) PUMP & MOTOR ASSEMBLY SHALL BE SUPPLIED TO THE DISTRICT BEFORE FINAL ACCEPTANCE OF THE SYSTEM.
18. MULTI-POINT LEVEL PROBE PER STANDARD SPECIFICATION SECTION 9-50.4(2)B. SEE PLANS FOR ELEVATION REQUIREMENTS
19. 3" MINIMUM VENT WITH STAINLESS STEEL GRATE SHALL BE CAST INTO FLAT TOP.
20. LONG SLEEVE MECHANICAL JOINT WITH RESTRAINTS.



WET WELL PLAN VIEW

NTS

CLARK REGIONAL WASTEWATER DISTRICT

PUMP STATION

TYPICAL PUMP STATION WET WELL

STANDARD DRAWING

NTS

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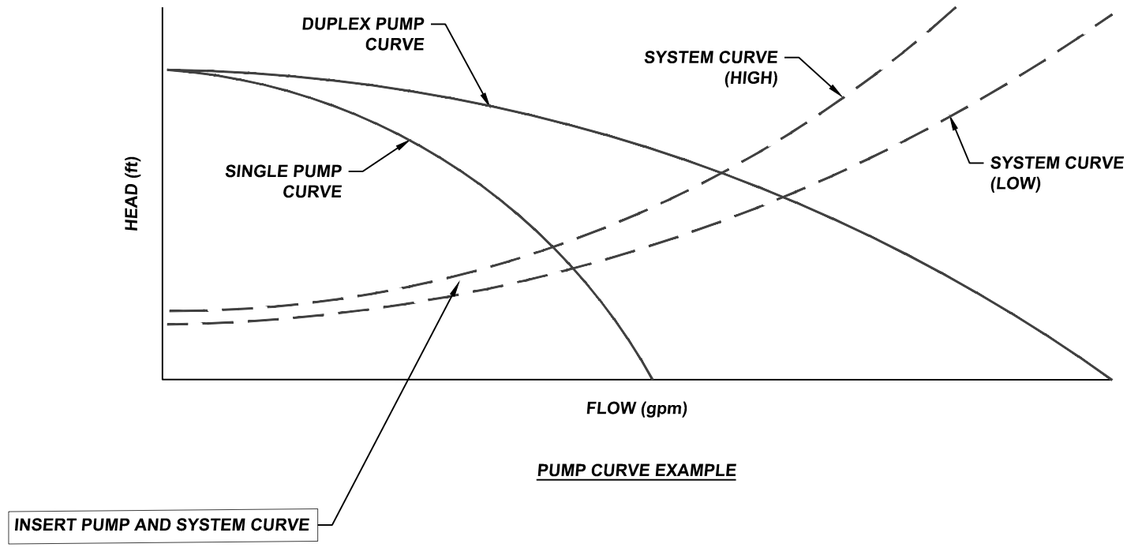
DESIGN DATA SUMMARY TABLE

ITEM DESCRIPTION	DESIGN INFORMATION
PUMP STATION TYPE	
PUMP TYPE	
CAPACITY	"X" GPM @ "X" TPH
PUMP HP	"X" HP
ELECTRICAL SERVICE TYPE	"X" V, "X" AMP
LEVEL CONTROL TYPE	ULTRASONIC TRANSDUCER
OVERFLOW POINT ELEVATION	"X" FT
OVERFLOW LOCATION	WETWELL RIM
AVE. TIME TO OVERFLOW	"X" MIN
AUXILIARY POWER TYPE	POTABLE GENERATOR
TRANSFER SWITCH	AUTOMATIC
ALARM TELEMETRY TYPE	RADIO SCADA
EPA RELIABILITY	CLASS I
FORCE MAIN LENGTH / DIAMETER	"X" LF / "X" PVC
FORCE MAIN PROFILE	CONTINUOUSLY ASCENDING
DISCHARGE MANHOLE / LOCATION	MH #"X" / "X" NE STREET NAME
AIR RELEASE VALVES	NONE
AVE. DETENTION TIME, EXISTING FLOWS	"X" MINUTES
SULFIDE CONTROL SYSTEM	CHEMICAL INJECTION IN WETWELL

NOTE: EXAMPLE INFORMATION PROVIDED. PROJECT SPECIFIC INFORMATION TO BE INCLUDED BY DESIGN ENGINEER

PUMP STATION OPERATION ELEVATION TABLE

ITEM DESCRIPTION	DESIGN INFORMATION
INFLUENT IE	"X"
INFLUENT PIPE SIZE	"X"
INFLUENT PIPE SLOPE	"X"
PUMP ON	"X"
PUMP OFF	"X"
LAG PUMP ON	"X"
HIGH ALARM	"X"



PUMP CURVE EXAMPLE

CLARK REGIONAL WASTEWATER DISTRICT

TYPICAL PUMP STATION DESIGN CRITERIA

STANDARD DRAWING

NTS

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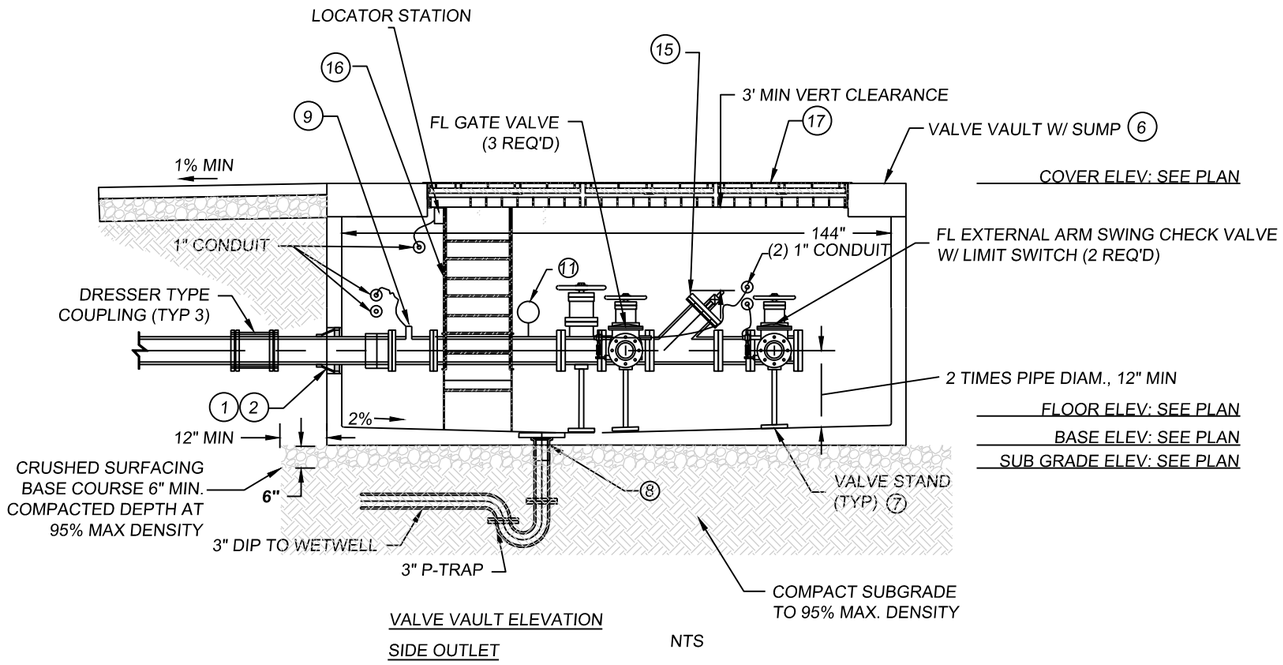


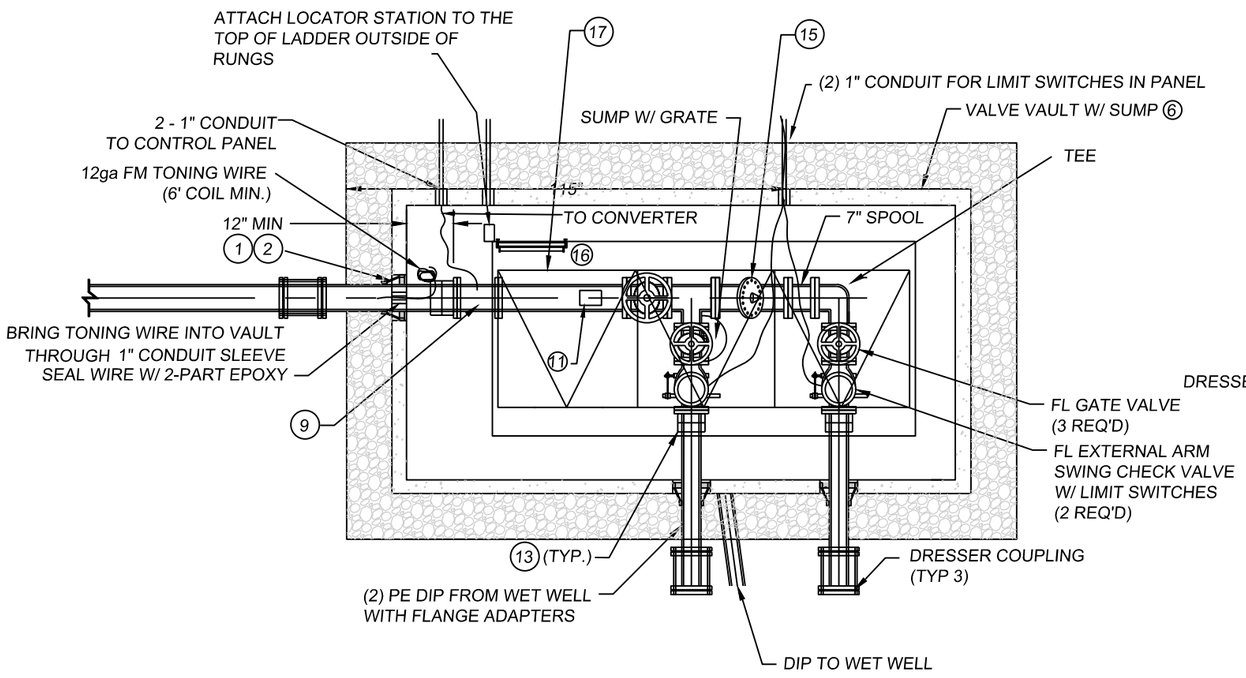
VALVE VAULT ELEVATION

SIDE OUTLET

NTS

NOTES:
UNLESS OTHERWISE NOTED:

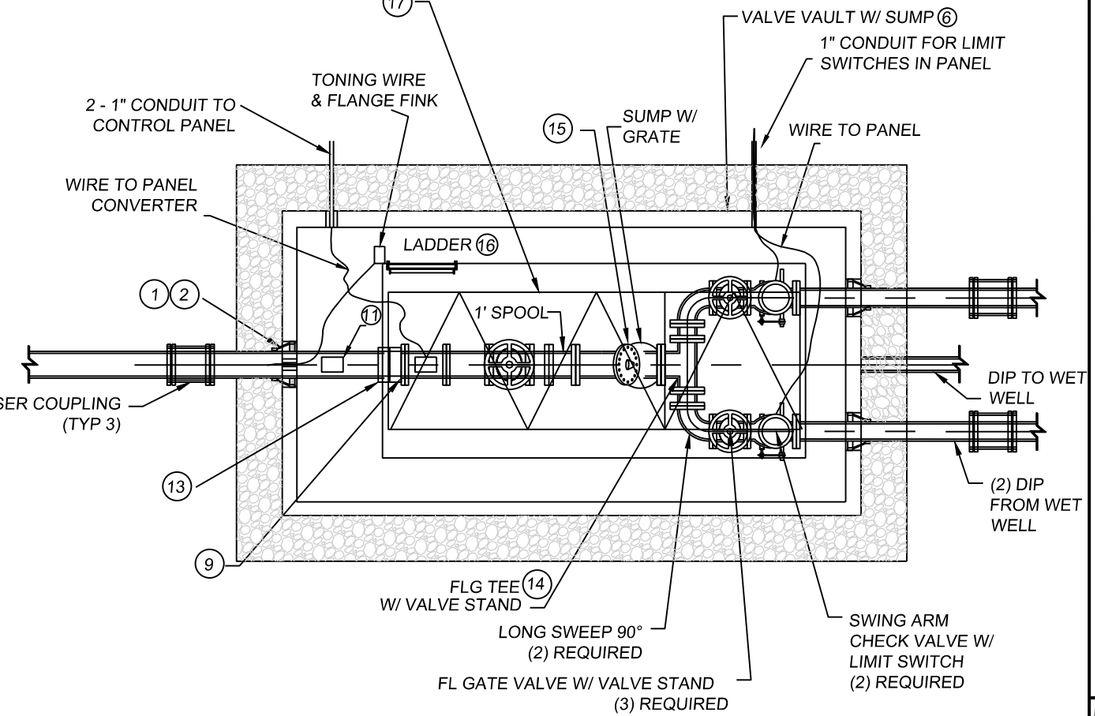
1. ALL PENETRATIONS SHALL BE CORE DRILLED.
2. ALL PENETRATIONS 2" & LARGER SHALL BE SEALED USING KOR-N-SEAL BOOTS W/ SS WEDGE & PIPE CLAMPS OR APPROVED EQUAL. CONTRACTOR TO SUBMIT CORING PLAN FOR VALVE VAULT.
3. ALL PENETRATIONS SMALLER THAN 2" SHALL BE SEALED USING LINK SEAL MODEL S-316 MODULAR SEAL OR APPROVED EQUAL.
4. ALL PIPES AND FITTING SHALL BE FLANGED CEMENT LINED CLASS 52 DUCTILE IRON EXCEPT WHERE SPECIFIED.
5. ALL HARDWARE SHALL BE 316 SS.
6. VALVE VAULT SHALL BE 6' X 12' X 6'-8" (UV NO. 612-LA OR APPROVED EQUAL). VAULT SHALL BE MONOLITHICALLY CAST WITH TOP SLAB SECTION ONLY.
7. VALVE STANDS SHALL BE ADJUSTABLE.
8. VALVE VAULT FLOOR SHALL BE SLOPED @ MIN. 2% TO SUMP DRAIN w/ 3" BRASS FLOOR DRAIN.
9. FLOW METER SHALL BE PER SECTION 9-50.3.
10. GENERIC PIPE SIZING SHOWN - ACTUAL PIPE SIZE TO BE SPECIFIED ON PLAN.
11. PRESSURE GAUGE .
12. LOCATOR STATION .
13. FLANGE ADAPTER.
14. FLG TEE REDUCING ON BOTH OUTLETS (THROUGH SIZED TO FORCE MAIN; INLETS SIZED TO PUMP DISCHARGE).
15. WYE WITH TAP TO REDUCE TO 4"/6" FOLLOWED BY GATE VALVE AND CAM LOCK.
16. LADDER TO BE 6" AWAY FROM OPENING EDGE. FINAL LOCATION TO BE FIELD DETERMINED.
17. ACCESS HATCH PER 9-05.50(8).



VALVE VAULT PLAN VIEW

SIDE INLET

NTS



VALVE VAULT LAYOUT PLAN VIEW

END INLET - ALTERNATE

NTS

CLARK REGIONAL WASTEWATER DISTRICT

VALVE VAULT

STANDARD DRAWING

NTS

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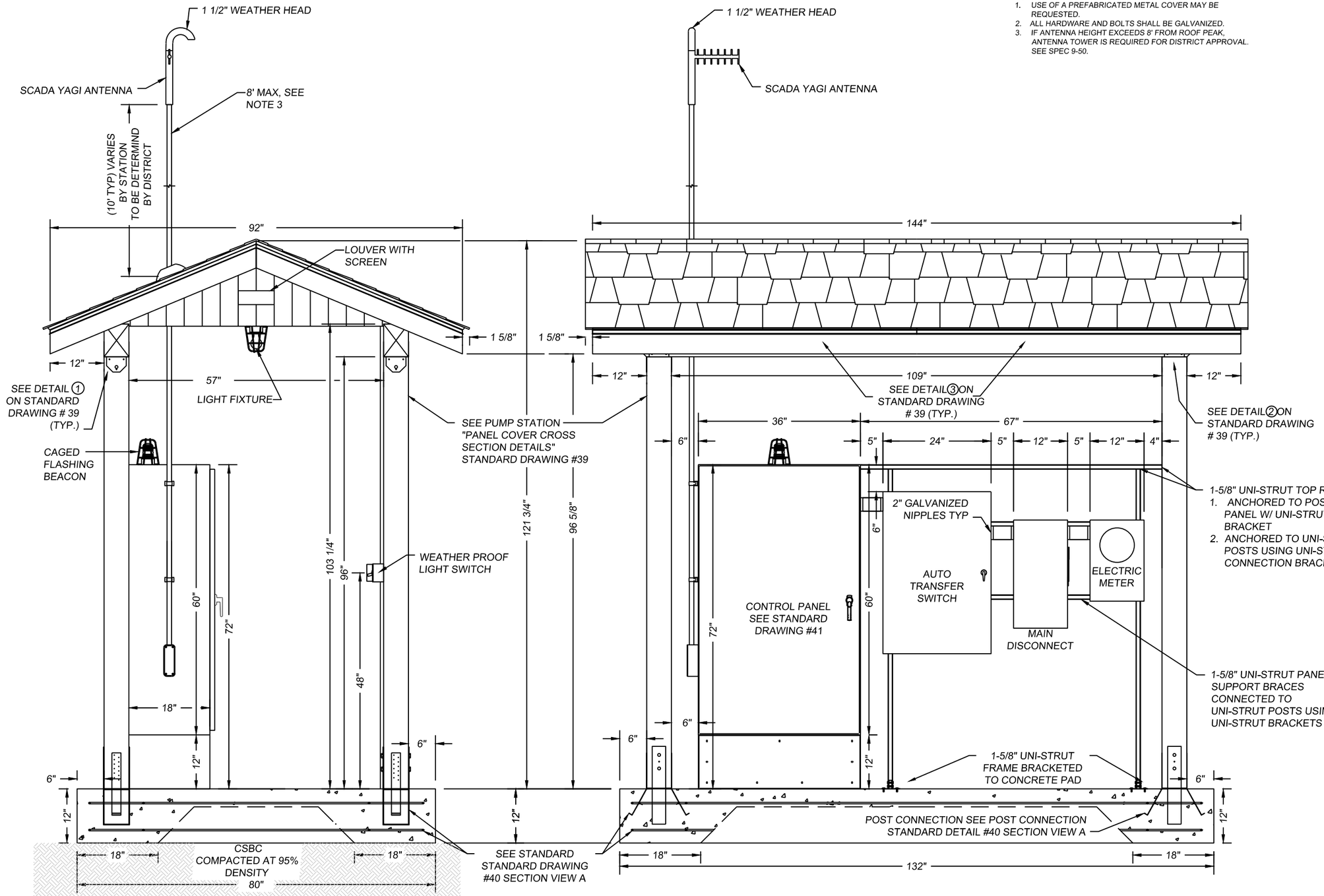
APPROVED: APR 2020

NOTE :
1. USE OF A PREFABRICATED METAL COVER MAY BE REQUESTED.
2. ALL HARDWARE AND BOLTS SHALL BE GALVANIZED.
3. IF ANTENNA HEIGHT EXCEEDS 8' FROM ROOF PEAK, ANTENNA TOWER IS REQUIRED FOR DISTRICT APPROVAL. SEE SPEC 9-50.



CLARK REGIONAL WASTEWATER DISTRICT

CONTROL PANEL KIOSK

STANDARD DRAWING

38

APPROVED: APR 2020

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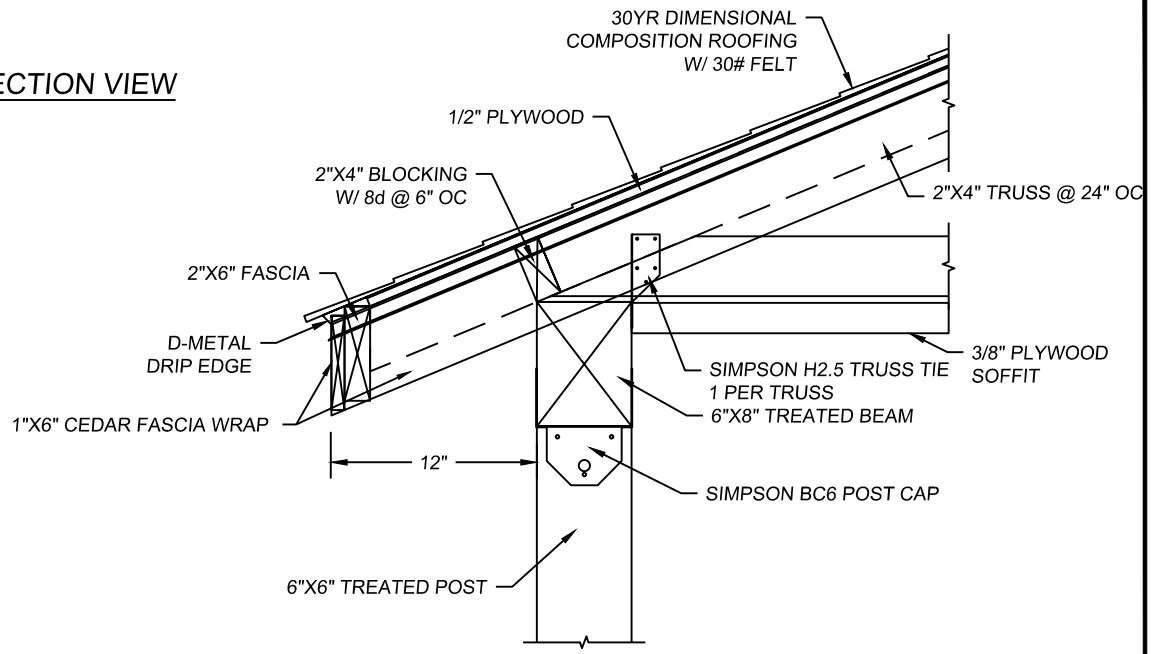
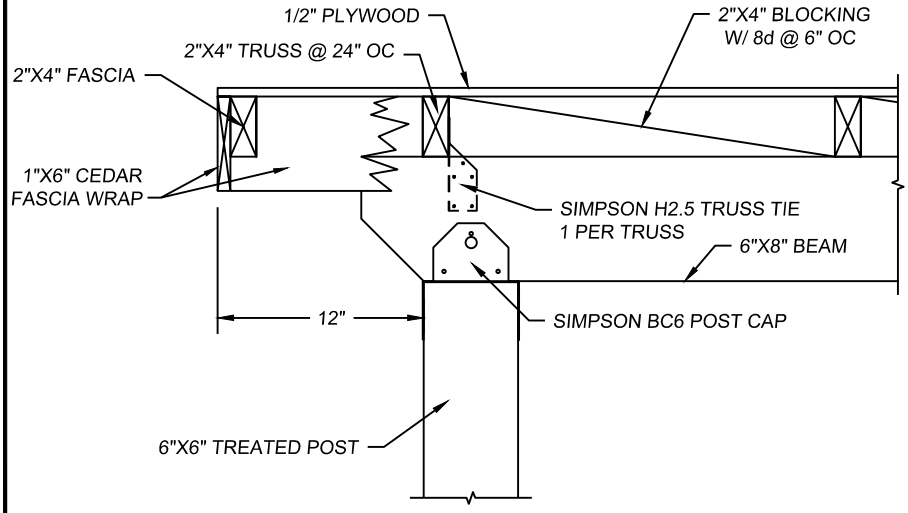
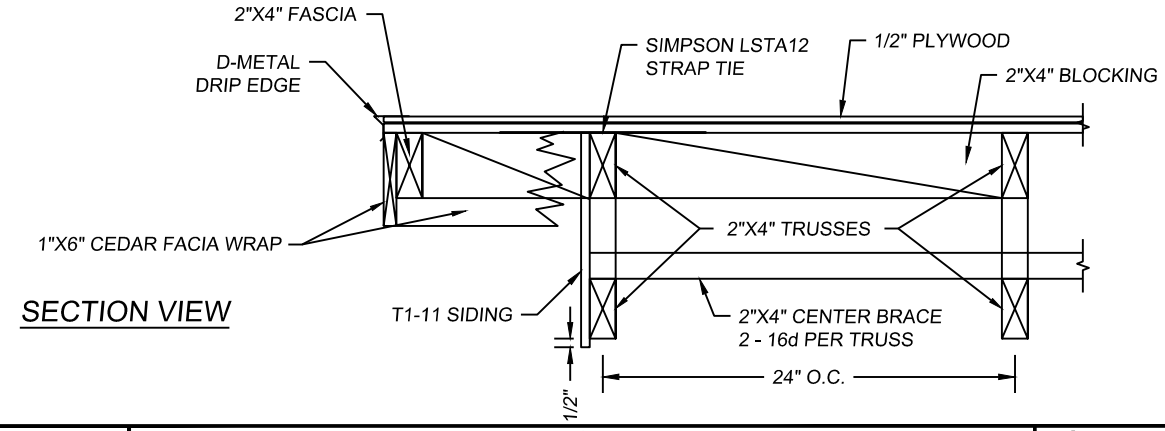
1 SECTION VIEW



2 SECTION VIEW



3 SECTION VIEW



CLARK REGIONAL WASTEWATER DISTRICT

CONTROL PANEL COVER CROSS SECTIONS

STANDARD DRAWING

NTS

39

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:12pm, Modified 03-31-20
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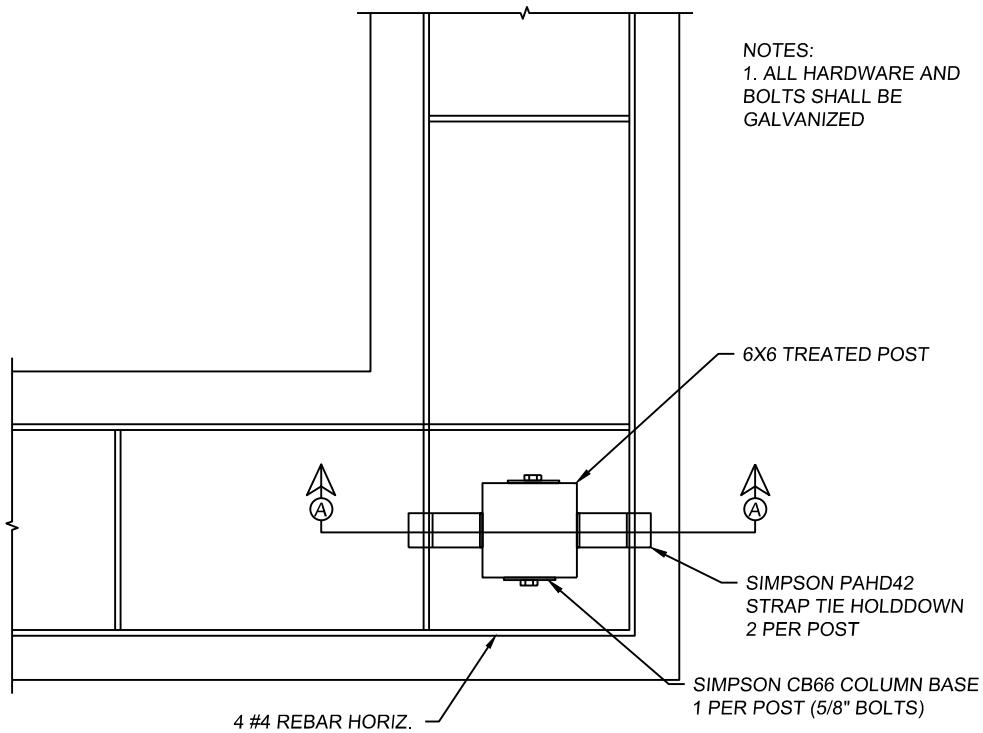
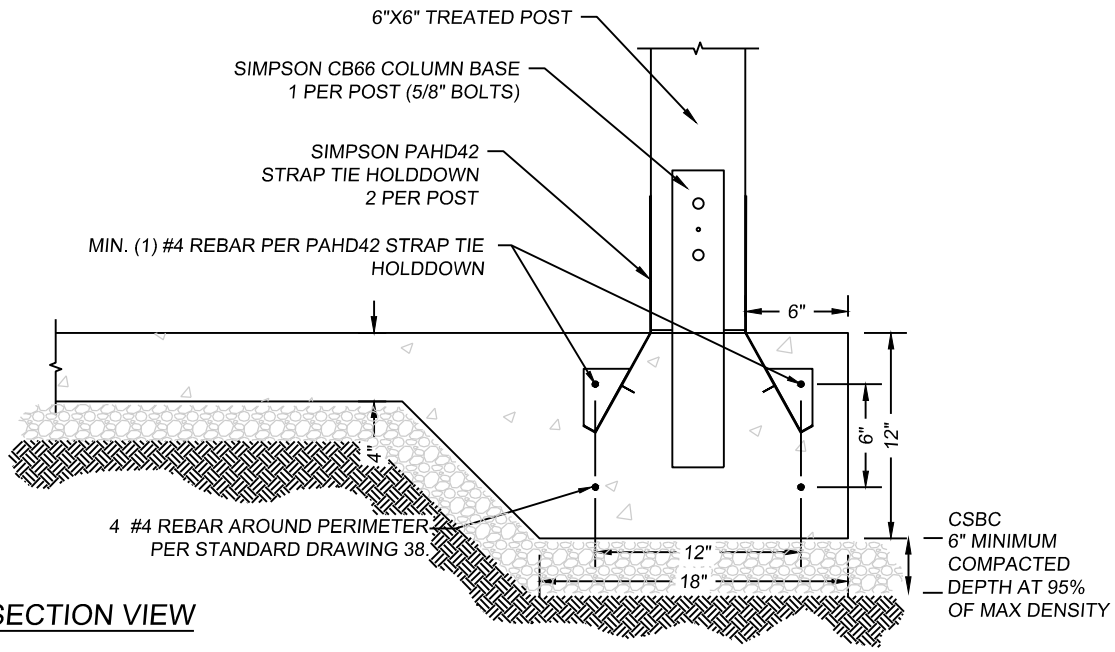


PLAN VIEW



(A) SECTION VIEW

CLARK REGIONAL WASTEWATER DISTRICT

CONTROL PANEL COVER FOOTING / POST CONNECTION

STANDARD DRAWING

NTS

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APPROVED: MAR 2020

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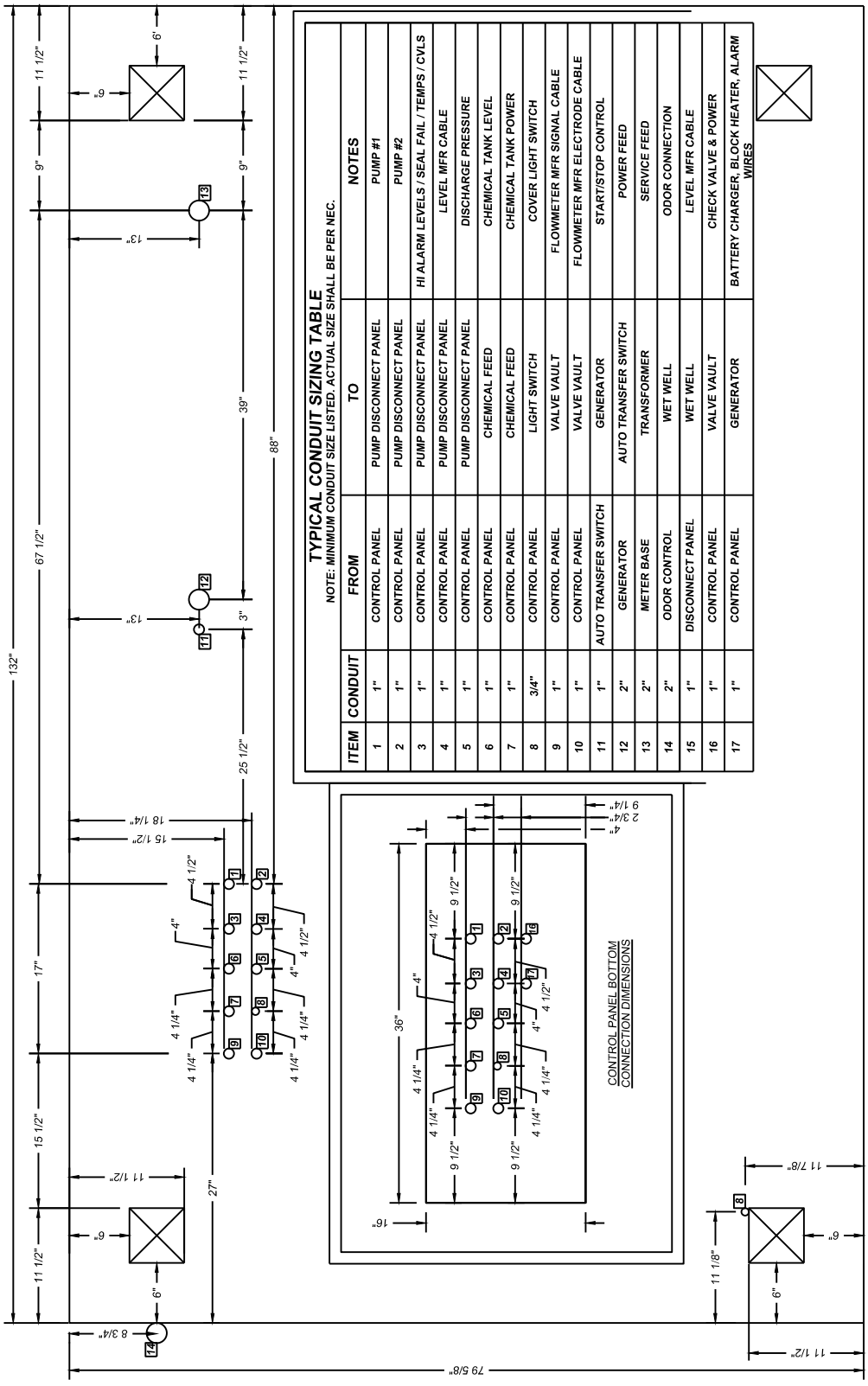


TYPICAL CONDUIT SIZING TABLE

NOTE: MINIMUM CONDUIT SIZE LISTED. ACTUAL SIZE SHALL BE PER NEC.

ITEM	CONDUIT	FROM	TO	NOTES
1	1"	CONTROL PANEL	PUMP DISCONNECT PANEL	PUMP #1
2	1"	CONTROL PANEL	PUMP DISCONNECT PANEL	PUMP #2
3	1"	CONTROL PANEL	PUMP DISCONNECT PANEL	HI ALARM LEVELS / SEAL FAIL / TEMPS / CVLS
4	1"	CONTROL PANEL	PUMP DISCONNECT PANEL	LEVEL MFR CABLE
5	1"	CONTROL PANEL	PUMP DISCONNECT PANEL	DISCHARGE PRESSURE
6	1"	CONTROL PANEL	CHEMICAL FEED	CHEMICAL TANK LEVEL
7	1"	CONTROL PANEL	CHEMICAL FEED	CHEMICAL TANK POWER
8	3/4"	CONTROL PANEL	LIGHT SWITCH	COVER LIGHT SWITCH
9	1"	CONTROL PANEL	VALVE VAULT	FLOWMETER MFR SIGNAL CABLE
10	1"	CONTROL PANEL	VALVE VAULT	FLOWMETER MFR ELECTRODE CABLE
11	1"	AUTO TRANSFER SWITCH	GENERATOR	START/STOP CONTROL
12	2"	GENERATOR	AUTO TRANSFER SWITCH	POWER FEED
13	2"	METER BASE	TRANSFORMER	SERVICE FEED
14	2"	ODOR CONTROL	WET WELL	ODOR CONNECTION
15	1"	DISCONNECT PANEL	WET WELL	LEVEL MFR CABLE
16	1"	CONTROL PANEL	VALVE VAULT	CHECK VALVE & POWER
17	1"	CONTROL PANEL	GENERATOR	BATTERY CHARGER, BLOCK HEATER, ALARM WIRES

CLARK REGIONAL WASTEWATER DISTRICT

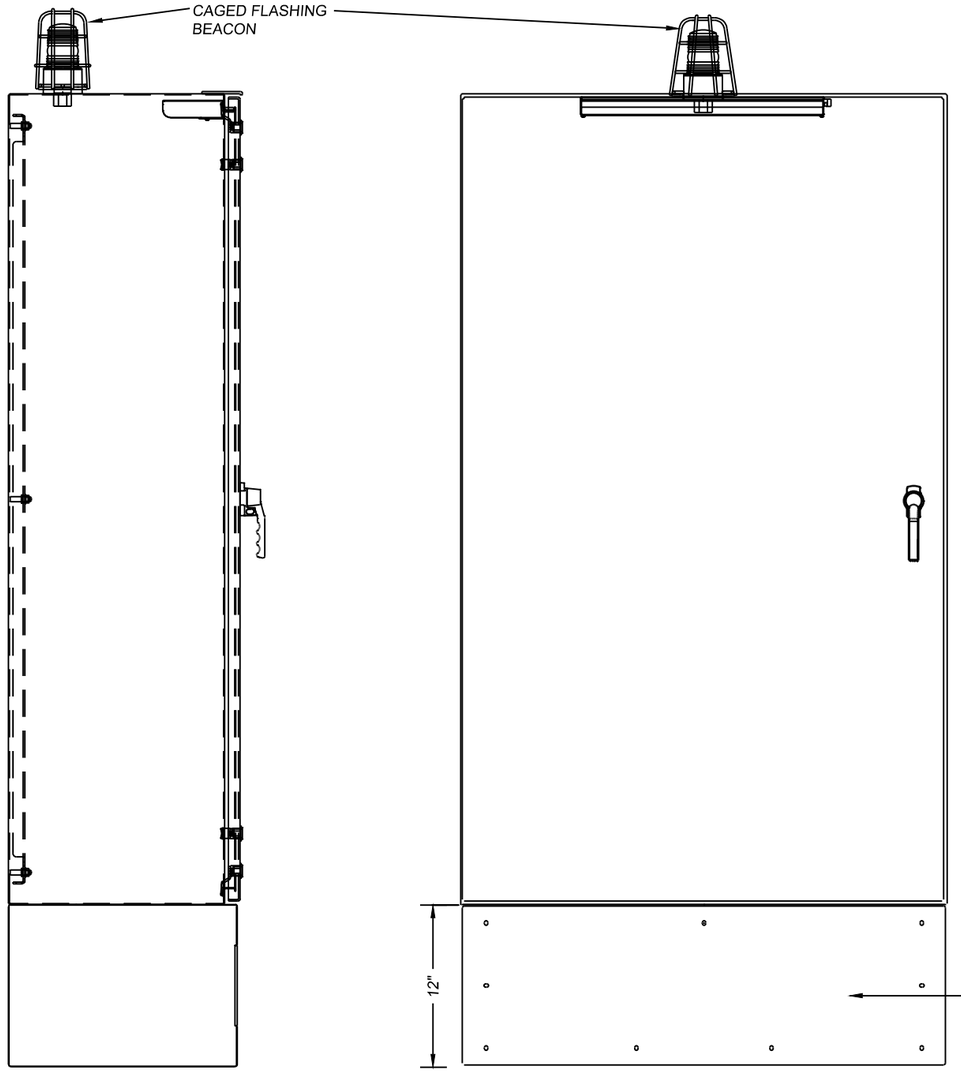
CONTROL PANEL CONDUIT LAYOUT

STANDARD DRAWING

41

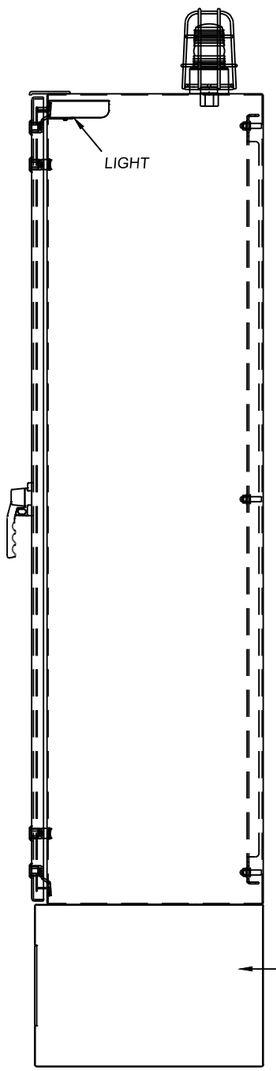
APPROVED: APR 2020

NOTE:
PANEL ENCLOSURE SHALL MEET REQUIREMENTS OF SECTION 9-50.4(1).

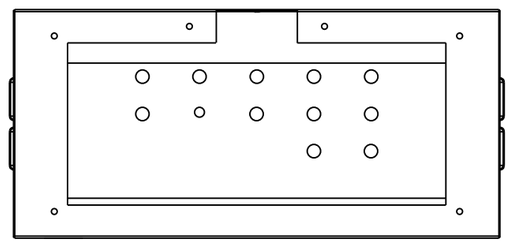


LEFT SIDE
NTS

ELEVATION
NTS



RIGHT SIDE
NTS



BOTTOM
NTS

CLARK REGIONAL WASTEWATER DISTRICT

CONTROL PANEL ENCLOSURE

STANDARD DRAWING

NTS

42

APPROVED: APR 2020

Plotted on: Apr 04, 2020 - 12:13pm Modified 03-31-20
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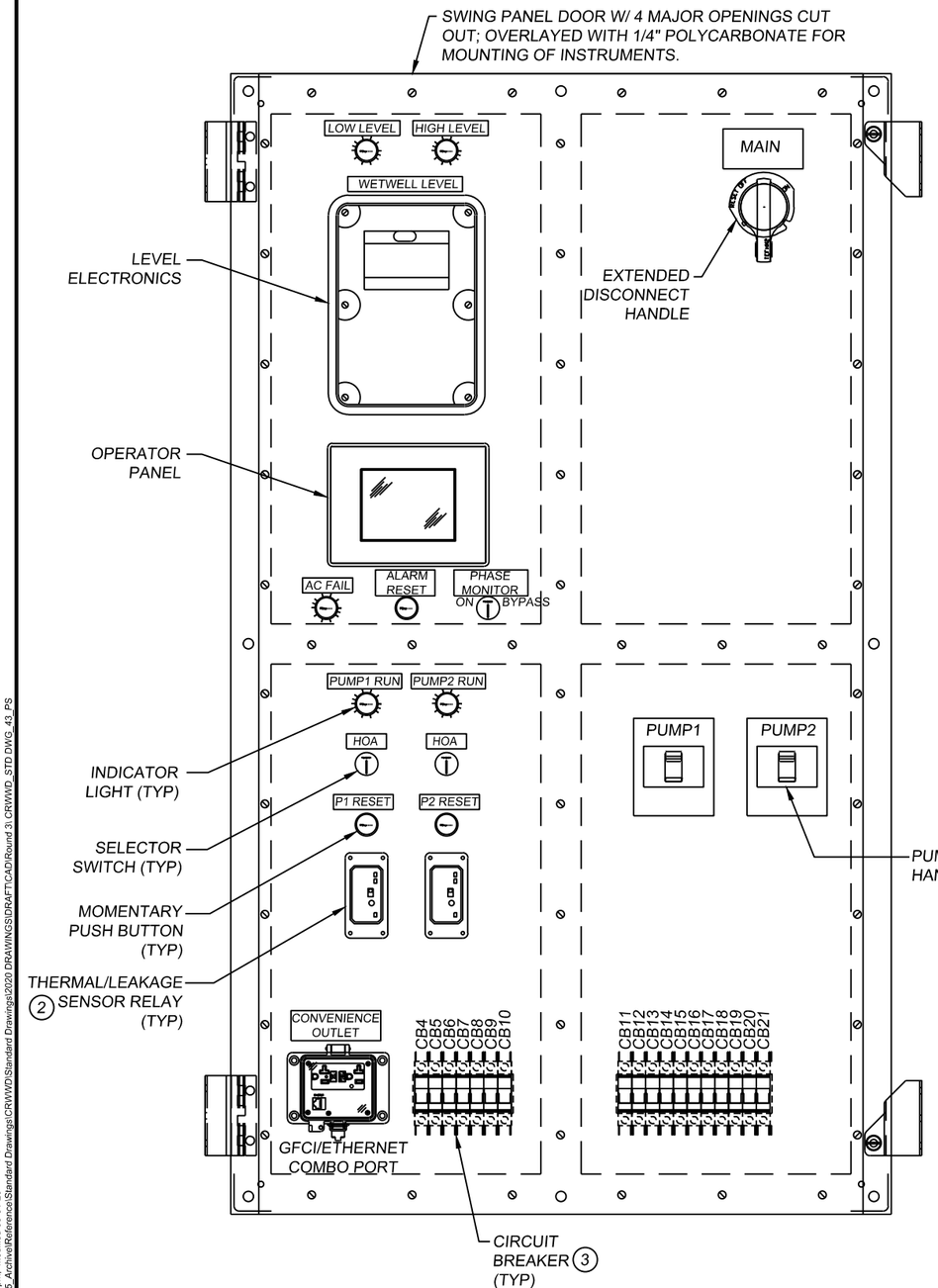
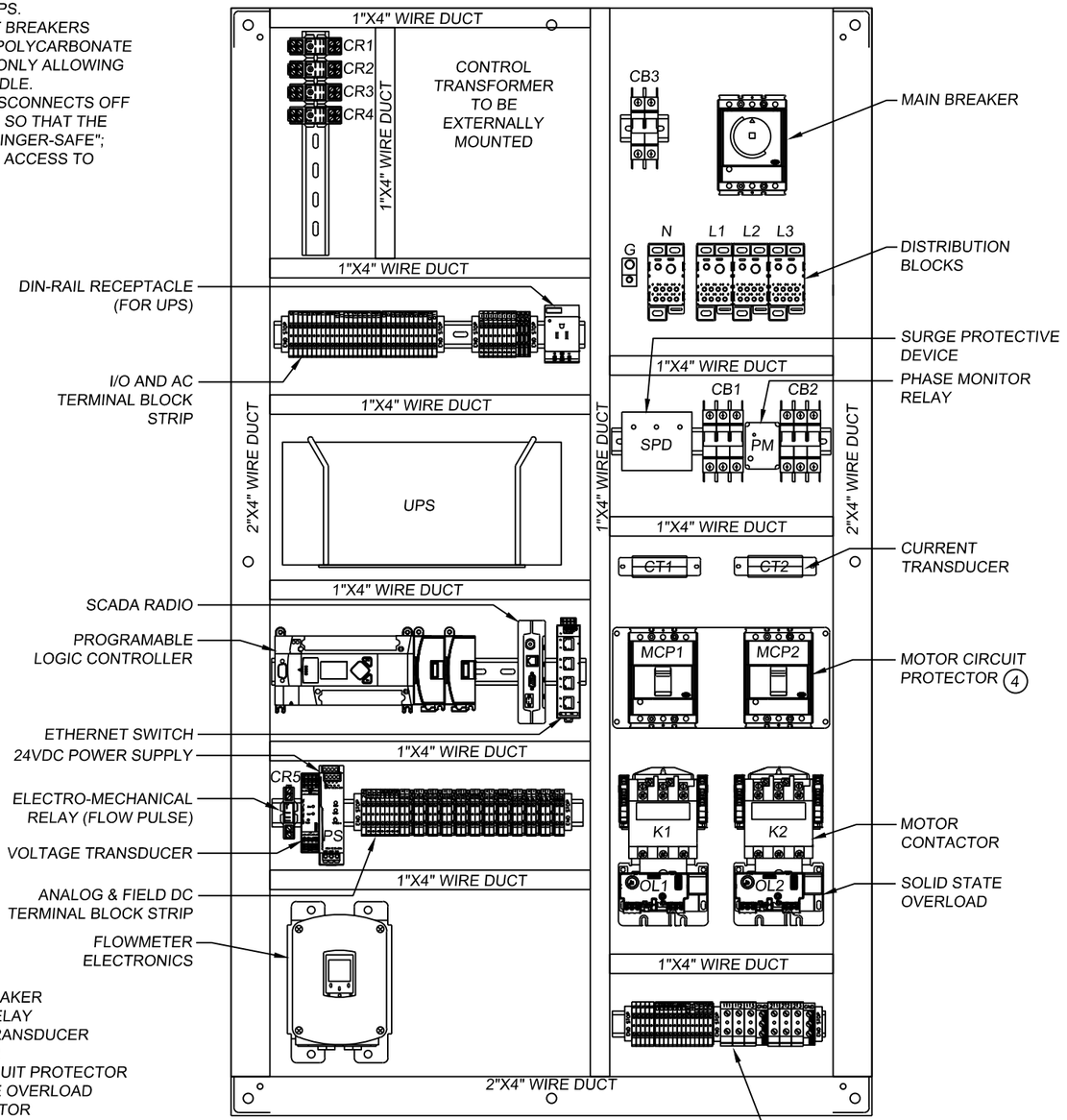
NOTES:
1. SEE STANDARD DRAWINGS #43 AND #44 FOR CONTROL PANEL WIRING.
2. THERMAL/LEAKAGE SENSOR FOR FLYGT PUMPS.
3. INSTALL CIRCUIT BREAKERS FROM REAR OF POLYCARBONATE "FINGER-SAFE"; ONLY ALLOWING ACCESS TO HANDLE.
4. MOUNT PUMP DISCONNECTS OFF THE BACKPANEL SO THAT THE HANDLES ARE "FINGER-SAFE"; ONLY ALLOWING ACCESS TO HANDLE.



SWING PANEL FRONT VIEW 1
NTS



SUB-PANEL FRONT VIEW 1
NTS

LEGEND
CB- CIRCUIT BREAKER
CR- CONTROL RELAY
CT- CURRENT TRANSDUCER
K- CONTACTOR
MCP- MOTOR CIRCUIT PROTECTOR
OL- SOLID STATE OVERLOAD
PM- PHASE MONITOR
PS- POWER SUPPLY
SPD- SURGE PROTECTOR

NOTE:
TYPICAL LAYOUT SHOWN
ACTUAL LAYOUT TO BE SUBMITTED FOR DISTRICT REVIEW PRIOR TO INSTALLATION.

CLARK REGIONAL WASTEWATER DISTRICT

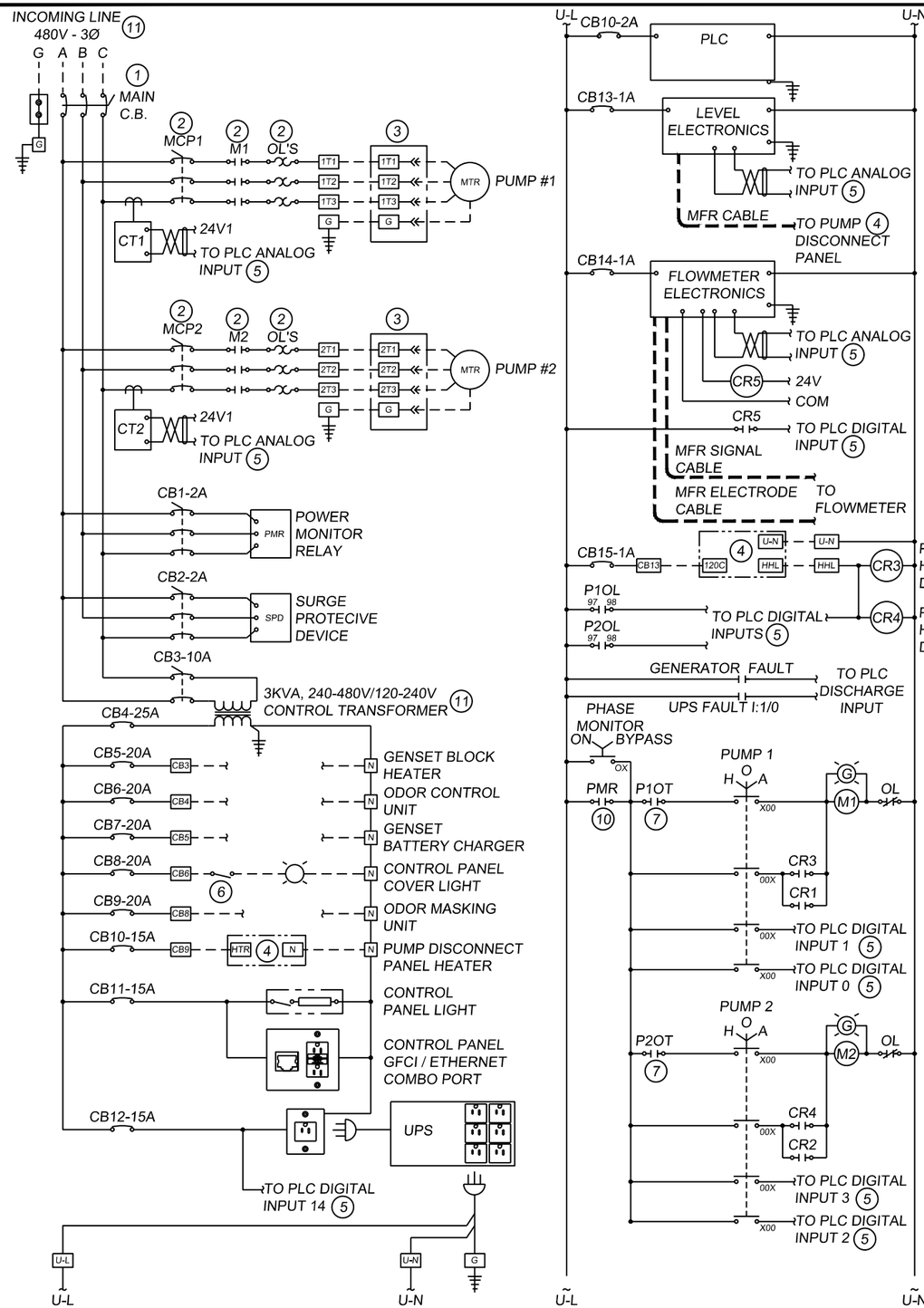
SWING / SUB PANEL

STANDARD DRAWING

NTS

43

APPROVED: APR 2020



NOTE:

1. MAIN BREAKER TO BE SIZED PER NEC BASED ON PROJECT PUMP SIZES AND MISCELLANEOUS POWER LOADS.
2. SIZE MOTOR CIRCUIT PROTECTOR, MOTOR STARTER AND SOLID STATE OVERLOADS ON 'FLA' OF PROJECT PUMPS.
3. PUMP MOTOR PLUGS, RECEPTACLES AND TERMINAL BLOCKS LOCATED AT PUMP DISCONNECT PANEL. SEE STANDARD DRAWING #46.
4. SEE STANDARD DRAWING #46 FOR CONNECTION AT PUMP DISCONNECT PANEL.
5. SEE STANDARD DRAWING #45 FOR PLC I/O CONNECTIONS.
6. LIGHT SWITCH UNDER CONTROL PANEL COVER. SEE STANDARD DRAWING #41 FOR LOCATION.
7. THERMAL/LEAKAGE SENSOR CONNECTION FOR FLYGT PUMPS. THERMAL CONTACT CLOSED IN "NORMAL CONDITION, OPENING ON FAULT. LEAK CONTACT OPEN IN "NORMAL" CONDITION.
8. SEE STANDARD DRAWING #44 FOR CONTROL PANEL LAYOUT.
9. SEE STANDARD DRAWING #38 FOR ANTENNA MOUNTING.
10. PMR CONTACT IS CLOSED IN "NORMAL" CONDITION, OPENING ON FAULT.
11. STANDARD SYSTEM VOLTAGE IS 480V, 3Ø.
12. IF THE WET WELL IS LESS THAN 8' IN DIAMETER, USE EVOQUA A1000i FOR LEVEL CONTROL

CLARK REGIONAL WASTEWATER DISTRICT

CONTROL PANEL WIRING DIAGRAM

STANDARD DRAWING

NTS

44

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:17pm. Modified 04-04-20
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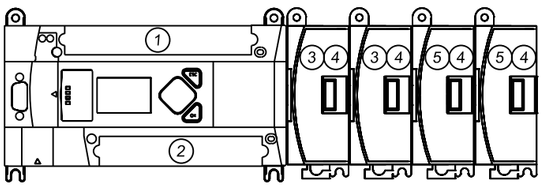
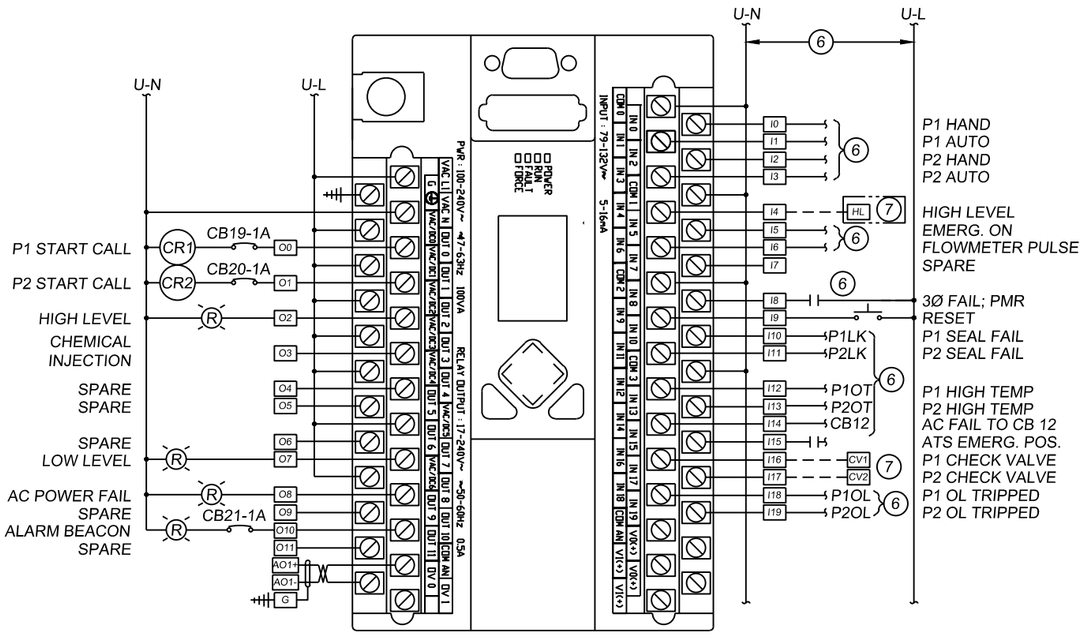
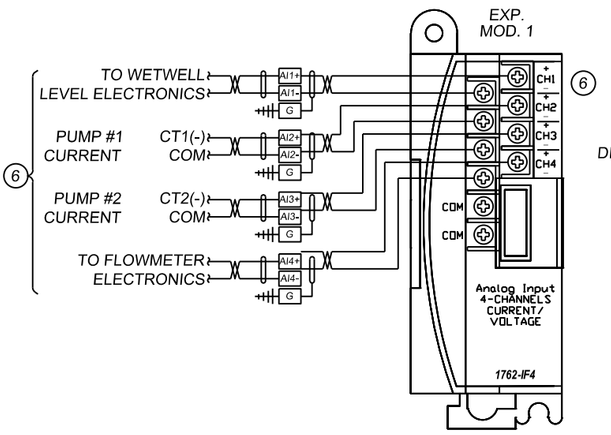
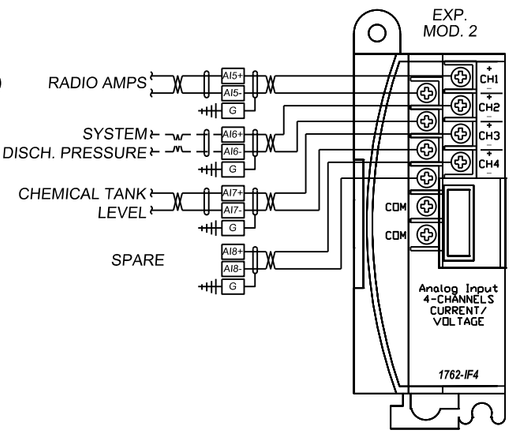
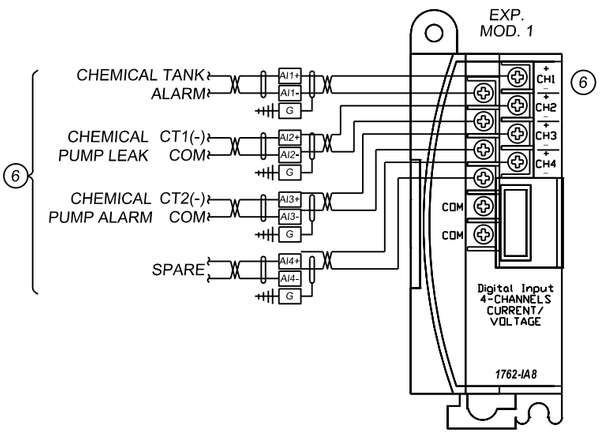


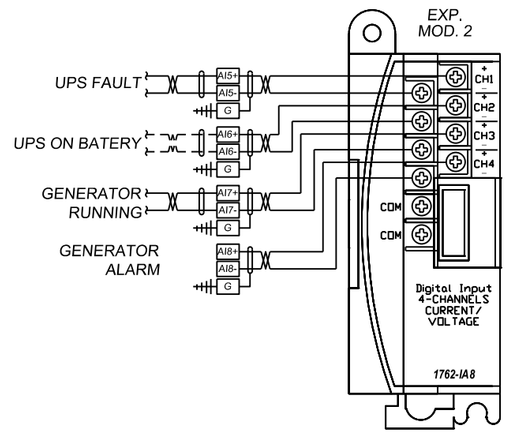
NOTE:
1. DISCRETE INPUTS; SEE WIRING BELOW.
2. DISCRETE OUTPUTS; SEE WIRING BELOW.
3. EXPANSION ANALOG INPUT MODULES; SEE WIRING BELOW.
4. SET DIP SWITCHES TO CURRENT SETTING.
5. EXPANSION DIGITAL INPUT MODULES; SEE WIRING BELOW.
6. SEE STANDARD DRAWING #44.
7. SEE STANDARD DRAWING #46.











NTS

CONTROL PANEL I/O WIRING DIAGRAM

STANDARD DRAWING

45

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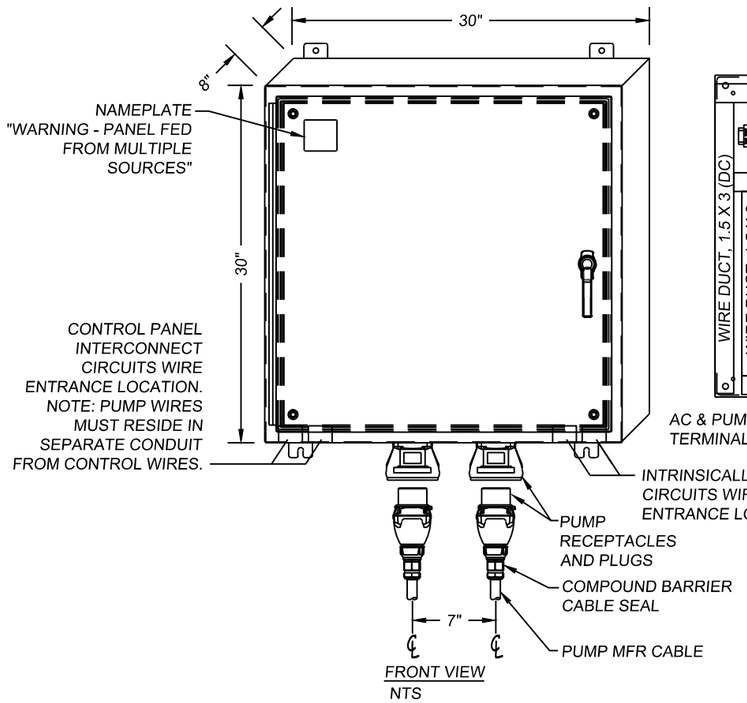
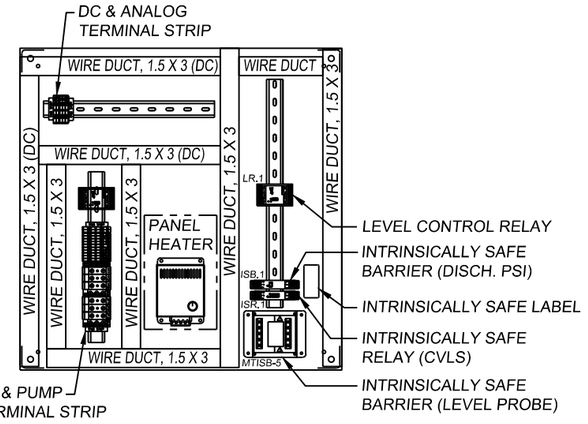
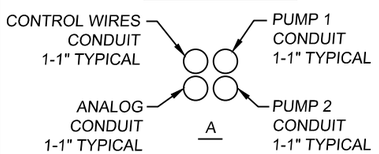
CLARK REGIONAL WASTEWATER DISTRICT



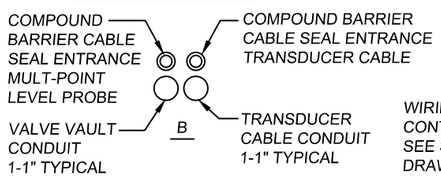


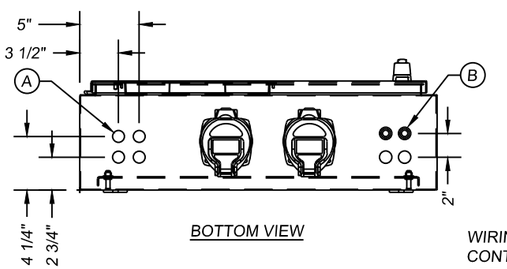
NOTE: ALL CONDUITS MUST BE CONTINUOUS RGS FROM BELOW GRADE TO CONTROL PANEL. REFERENCE NEC ARTICLE 501.15 (B2) EXCEPTION NO 1. REFERENCE NEC FOR CONDUIT SIZES. ALL CONDUIT SIZES SHOWN ARE MINIMUM.

CONDUIT ENTRANCE LOCATION FROM MAIN CONTROL PANEL



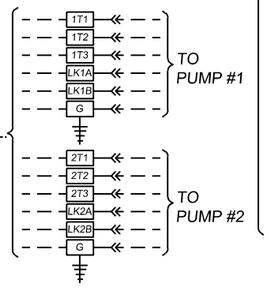
INTRINSIC WIRING ENTRANCE LOCATION



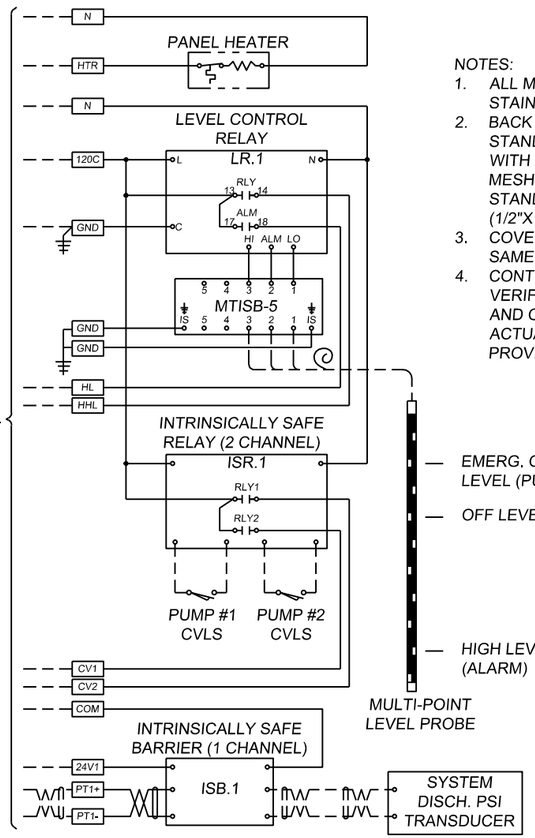


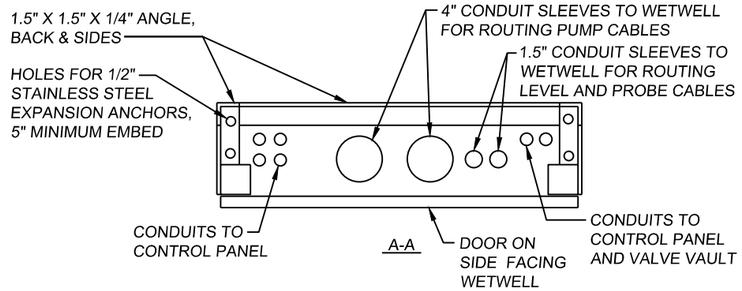
BOTTOM VIEW

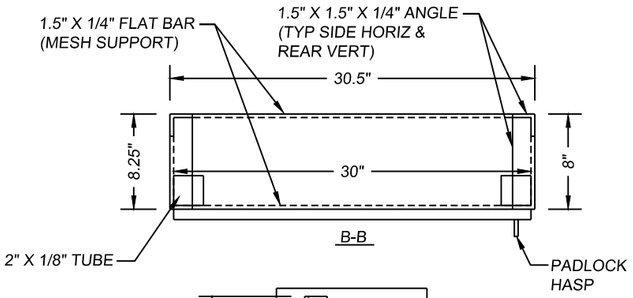
WIRING TO CONTROL PANEL. SEE STANDARD DRAWINGS #44 AND 45.



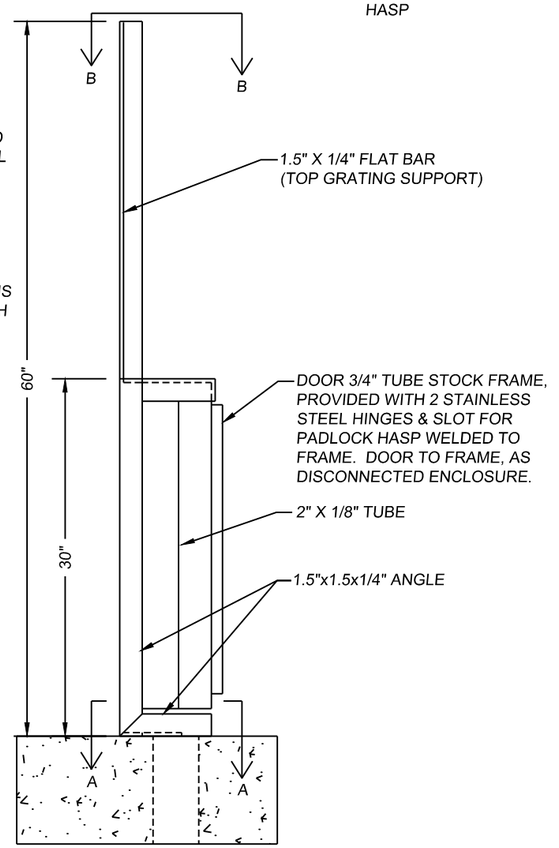
WIRING TO CONTROL PANEL. SEE STANDARD DRAWINGS #44 AND 45.







NOTES:
1. ALL MATERIAL TO BE STAINLESS STEEL 316.
2. BACK AND SIDES OF STAND TO BE ENCASED WITH EXPANDED METAL MESH, WELDED TO STAND AND FRAME (1/2"X13MM).
3. COVER DOOR WITH SAME MESH AS STAND.
4. CONTRACTOR TO VERIFY ALL DIMENSIONS AND CLEARANCES WITH ACTUAL PANEL BEING PROVIDED.



DISCONNECT PANEL STAND
NTS

CLARK REGIONAL WASTEWATER DISTRICT

PUMP DISCONNECT PANEL

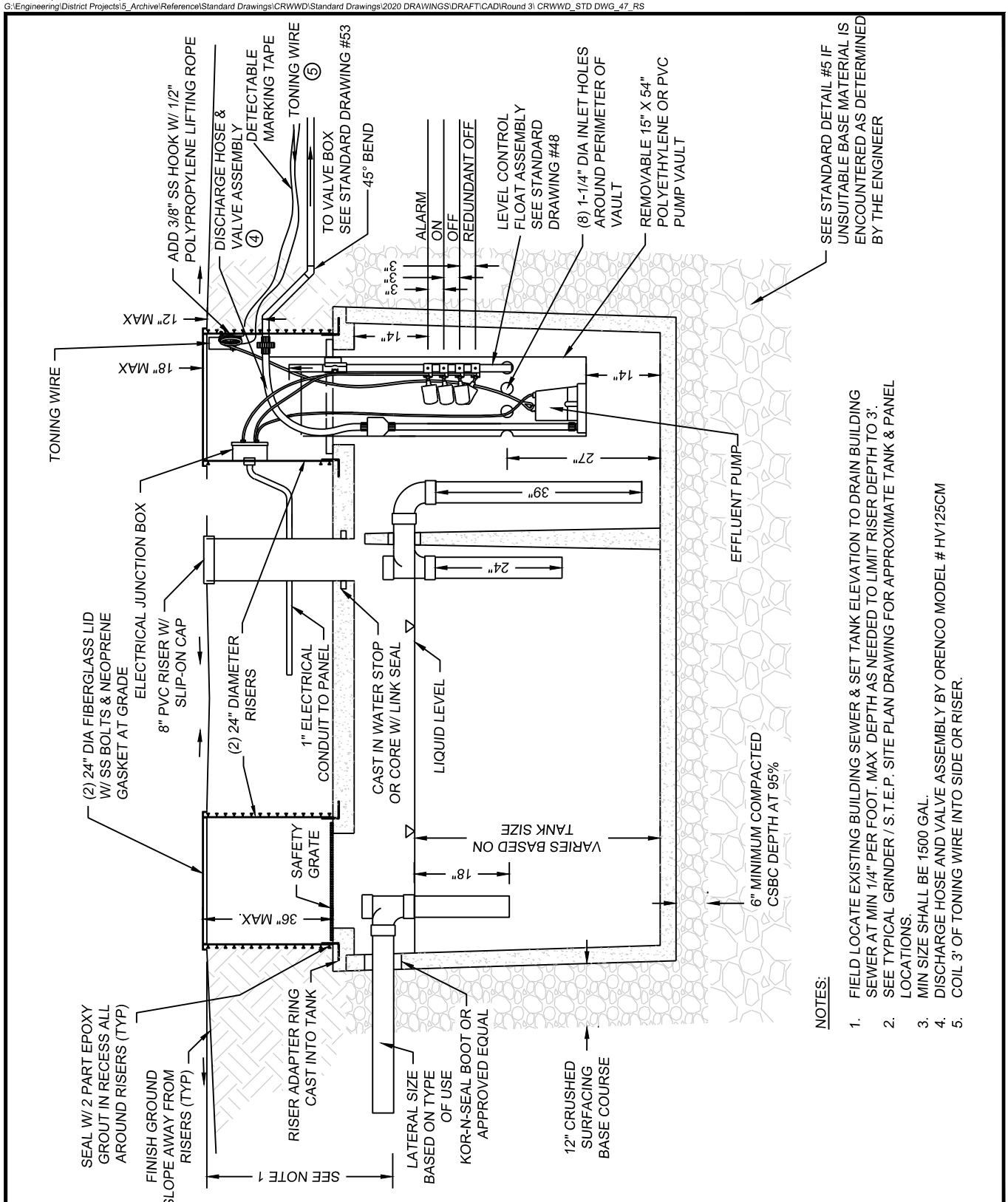
STANDARD DRAWING

NTS

46

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 1:13pm, Modified 04-04-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_47_RS



NOTES:

1. FIELD LOCATE EXISTING BUILDING SEWER & SET TANK ELEVATION TO DRAIN BUILDING SEWER AT MIN 1/4" PER FOOT. MAX DEPTH AS NEEDED TO LIMIT RISER DEPTH TO 3'.
2. SEE TYPICAL GRINDER / S.T.E.P. SITE PLAN DRAWING FOR APPROXIMATE TANK & PANEL LOCATIONS.
3. MIN SIZE SHALL BE 1500 GAL.
4. DISCHARGE HOSE AND VALVE ASSEMBLY BY ORENCO MODEL # HV125CM
5. COIL 3' OF TONING WIRE INTO SIDE OR RISER.

CLARK REGIONAL WASTEWATER DISTRICT

RESIDENTIAL CONCRETE S.T.E.P. TANK

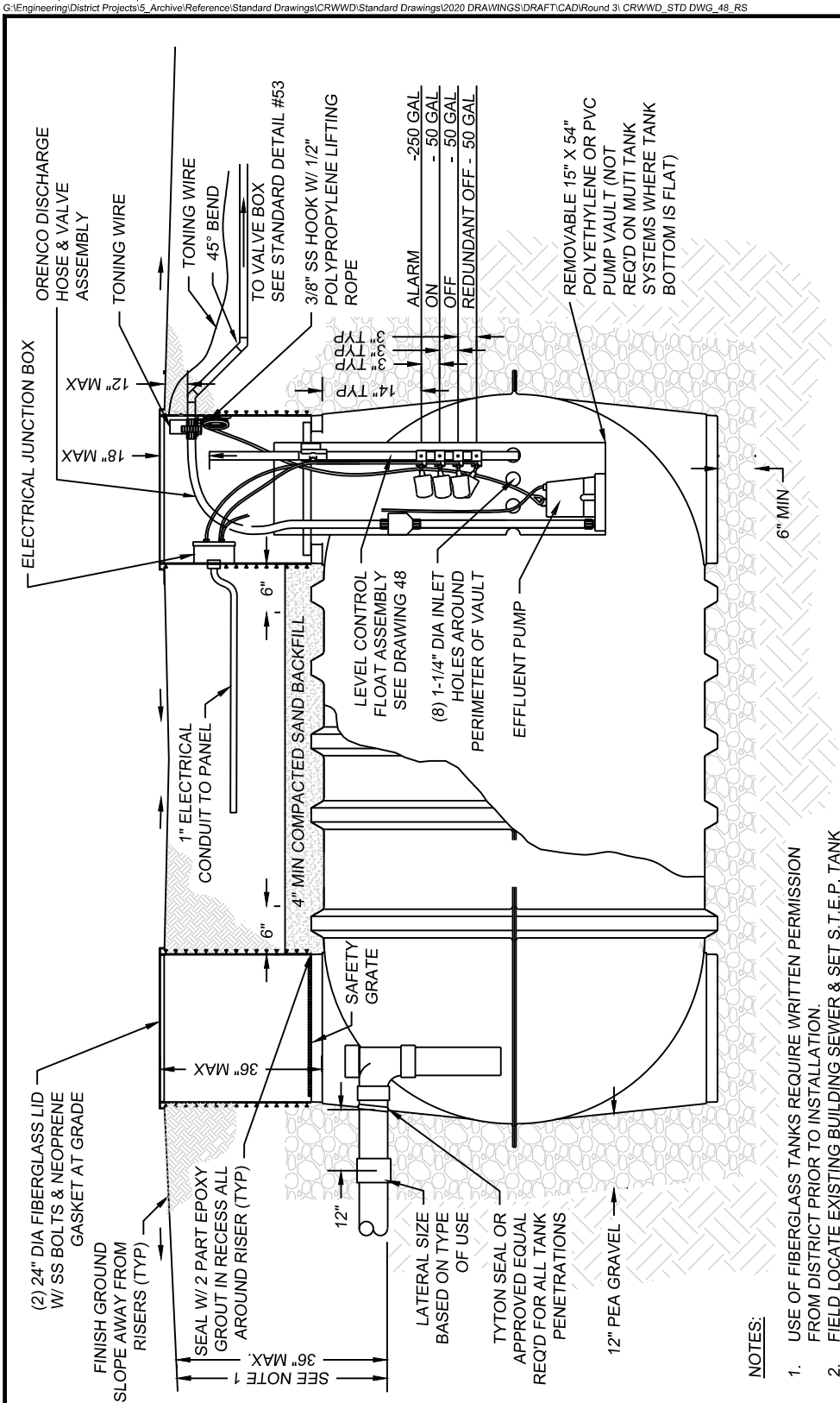
STANDARD DRAWING

NTS

47

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 1:11pm, Modified 04-04-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_48_RS



NOTES:

1. USE OF FIBERGLASS TANKS REQUIRE WRITTEN PERMISSION FROM DISTRICT PRIOR TO INSTALLATION.
2. FIELD LOCATE EXISTING BUILDING SEWER & SET S.T.E.P. TANK ELEVATION TO ALLOW FOR GRAVITY FLOW FROM HOUSE AND STILL MEET MAX RISER DEPTH.
3. SEE TYPICAL GRINDER / S.T.E.P. SITE PLAN DRAWING FOR TANK & PANEL LOCATION REQUIREMENTS. MAX 3' DEPTH
4. RESIDENTIAL TANKS SHALL BE A MIN OF 1500 GAL.
5. TANK BEDDING & BACKFILL MATERIAL SHALL BE PEA GRAVEL, CONSISTING OF CLEAN WASHED SAND AND GRAVEL, ROUNDED AND SUB-ROUNDED, NOT CRUSHED. MAXIMUM SIZE SHALL BE 1/4" WELL GRADED FROM COURSE TO FINE , WITH NOT MORE THAN 2% BY WEIGHT PASSING THE NO. 200 SIEVE.
6. THE DISTRICT WILL REQUIRE ANTI-FLOTATION CALCULATIONS BASED ON DEPTH OF COVER.
7. COIL 3' OF TONING WIRE INTO SIDE OR RISER.
8. DISCHARGE ASSEMBLY ORENCO MODEL #HV125CM SHALL BE USED FOR STEP SYSTEMS.

CLARK REGIONAL WASTEWATER DISTRICT

RESIDENTIAL FIBERGLASS S.T.E.P. TANK

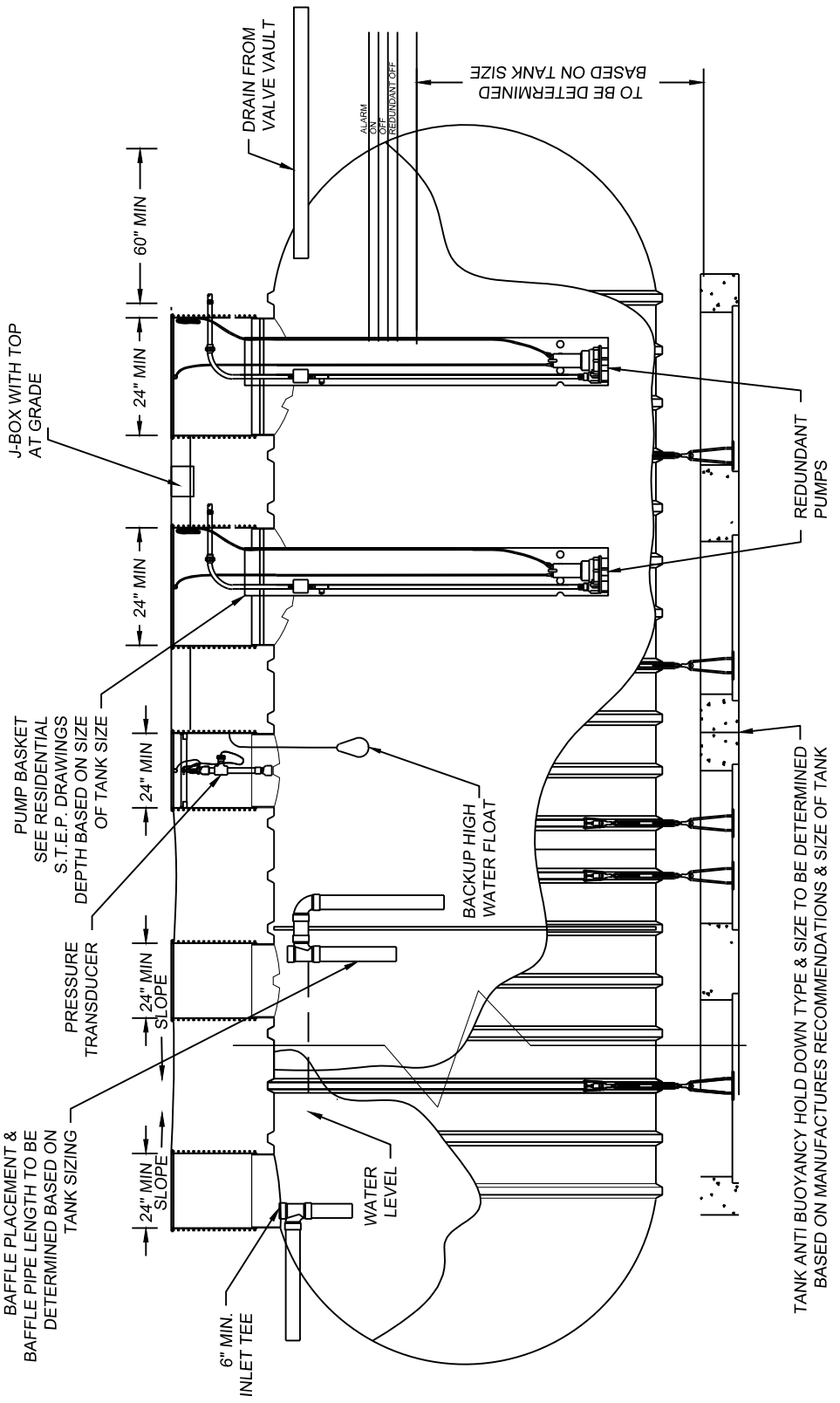
STANDARD DRAWING

NTS

48

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:19pm, Modified 03-31-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_49_CS



CLARK REGIONAL WASTEWATER DISTRICT

COMMERCIAL FIBERGLASS S.T.E.P TANK

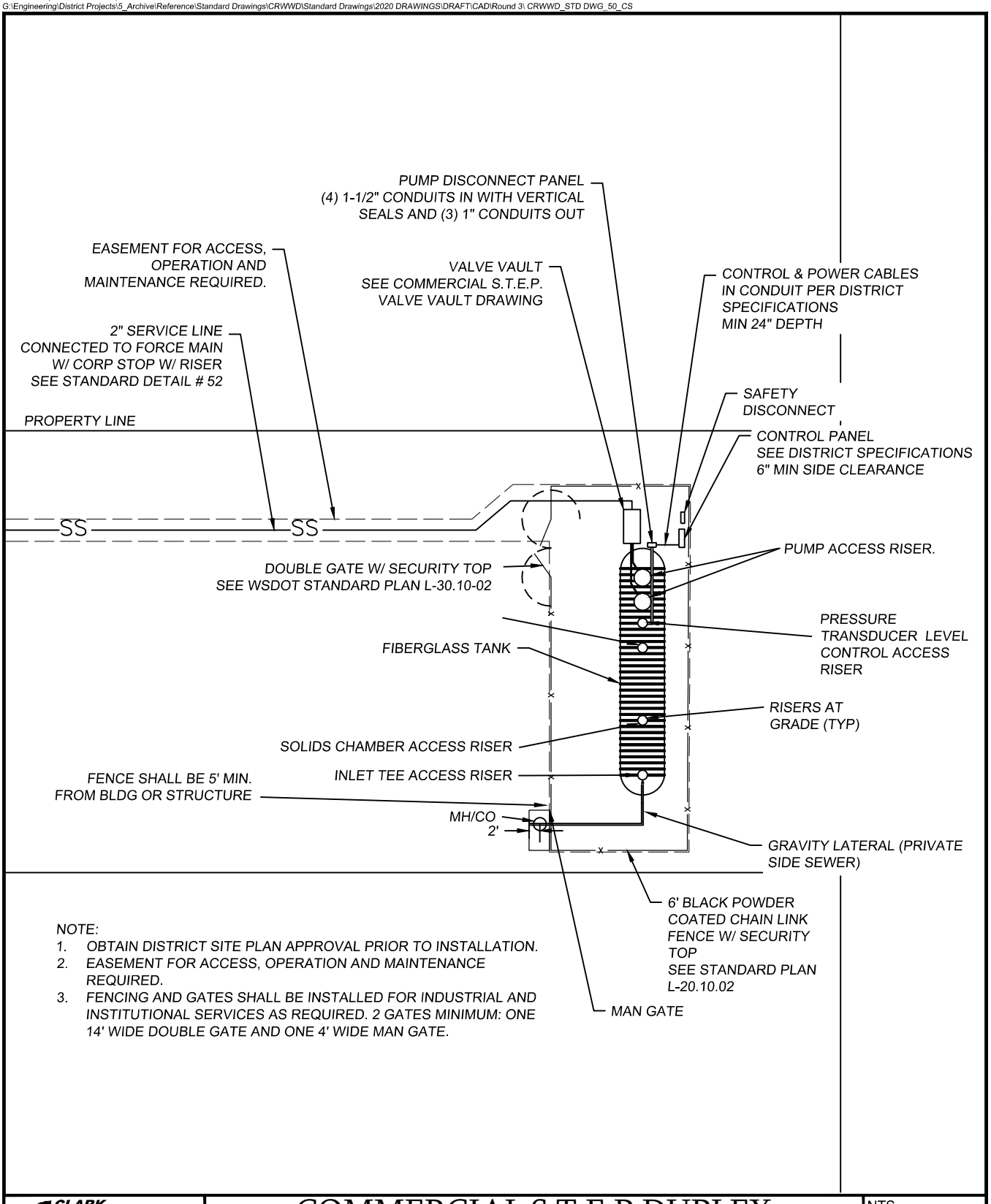
STANDARD DRAWING

NTS

49

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 1:07pm, Modified 04-04-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_50_CS



NOTE:
1. OBTAIN DISTRICT SITE PLAN APPROVAL PRIOR TO INSTALLATION.
2. EASEMENT FOR ACCESS, OPERATION AND MAINTENANCE REQUIRED.
3. FENCING AND GATES SHALL BE INSTALLED FOR INDUSTRIAL AND INSTITUTIONAL SERVICES AS REQUIRED. 2 GATES MINIMUM: ONE 14' WIDE DOUBLE GATE AND ONE 4' WIDE MAN GATE.

CLARK REGIONAL WASTEWATER DISTRICT

COMMERCIAL S.T.E.P DUPLEX SITE PLAN

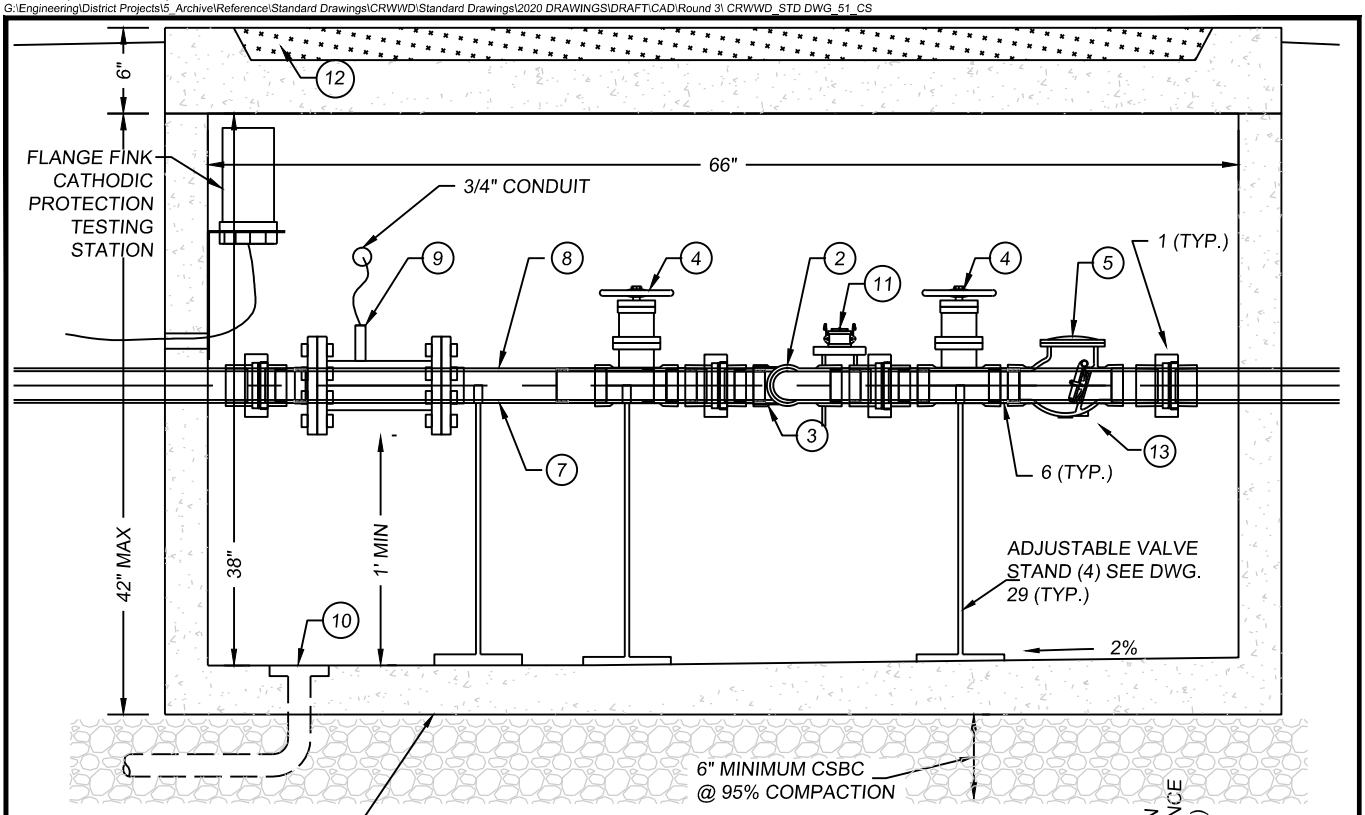
STANDARD DRAWING

NTS

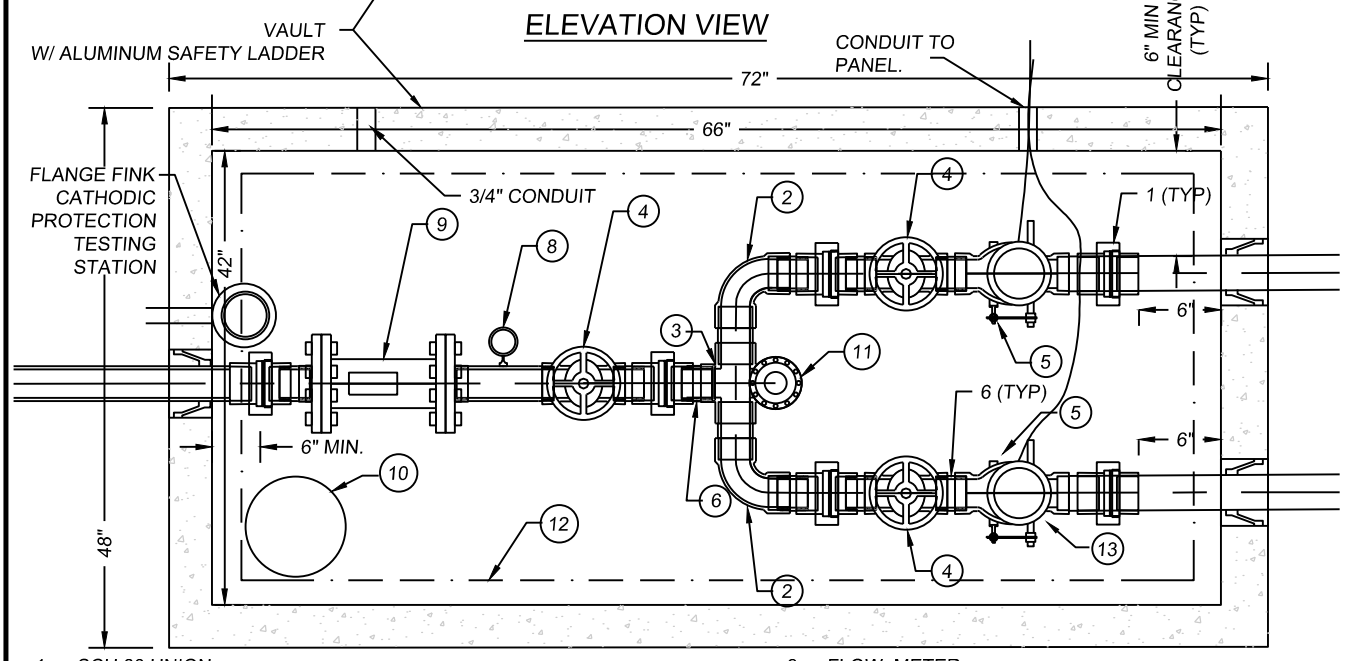
50

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:36pm, Modified 03-31-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_51_CS



ELEVATION VIEW



PLAN VIEW

1. SCH 80 UNION
2. SCH 80 90° BEND
3. SCH 80 CROSS
4. BRONZE GATE VALVE
5. BRONZE CHECK VALVE
6. SCH 80 NIPPLE - SHOULDER (TYP.)
7. SCH 80 NIPPLE - 6" LONG
8. PRESSURE GAUGE SEE DRAWING #31
9. FLOW METER
10. SUMP DRAIN.
11. 90° BEND, BLIND FLANGE, THREADED NIPPLE AND CAM LOCK HOSE ASSEMBLY
12. 36"x60" HEAVY DUTY H-20 ALUMINUM HATCH

CLARK REGIONAL WASTEWATER DISTRICT

COMMERCIAL S.T.E.P DUPLEX VALVE BOX

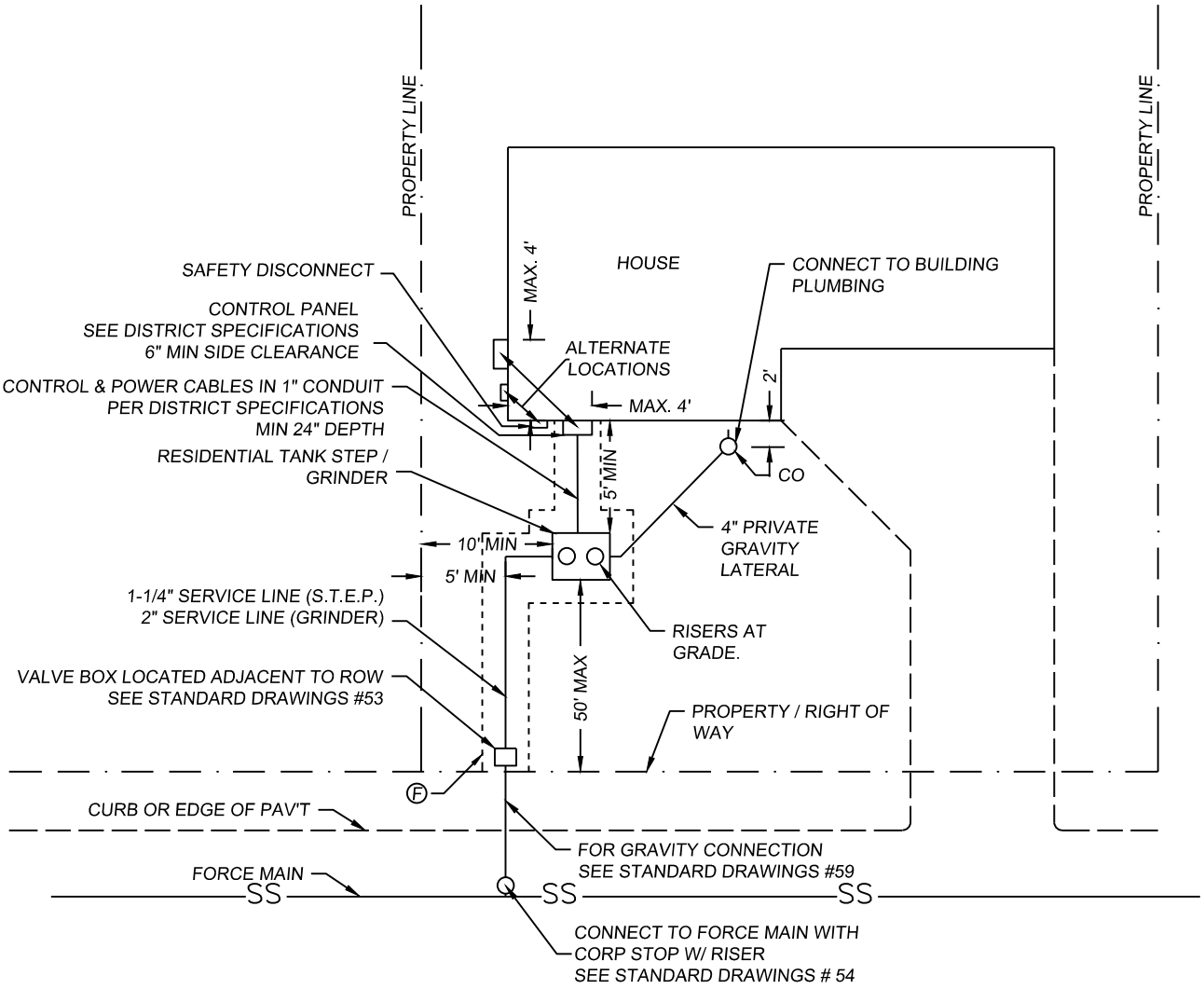
STANDARD DRAWING

NTS

51

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 1:05pm, Modified 04-04-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_52_GS



NOTES:

A. LOCATE S.T.E.P. / GRINDER TANK MIN OF 5' FROM BUILDING & AS CLOSE TO PUBLIC RIGHT-OF-WAY AS POSSIBLE.
B. MAINTAIN DISTRICT ACCESS TO TANK, VALVE BOX, CONTROL PANEL, & SAFETY DISCONNECT.
C. CONTROL PANEL SHALL BE LOCATED WITH AN UNOBSTRUCTED LINE OF SIGHT TO THE STEP TANK PER DISTRICT SPECIFICATIONS
D. VALVE BOX OR TANK SHALL NOT BE LOCATED IN DRIVEWAY WITHOUT DISTRICT APPROVAL.
E. OBTAIN DISTRICT SITE PLAN APPROVAL PRIOR TO INSTALLATION.
F. EASEMENT FOR ACCESS, OPERATION AND MAINTENANCE REQUIRED.

CLARK REGIONAL WASTEWATER DISTRICT

RESIDENTIAL GRINDER / S.T.E.P. SITE PLAN

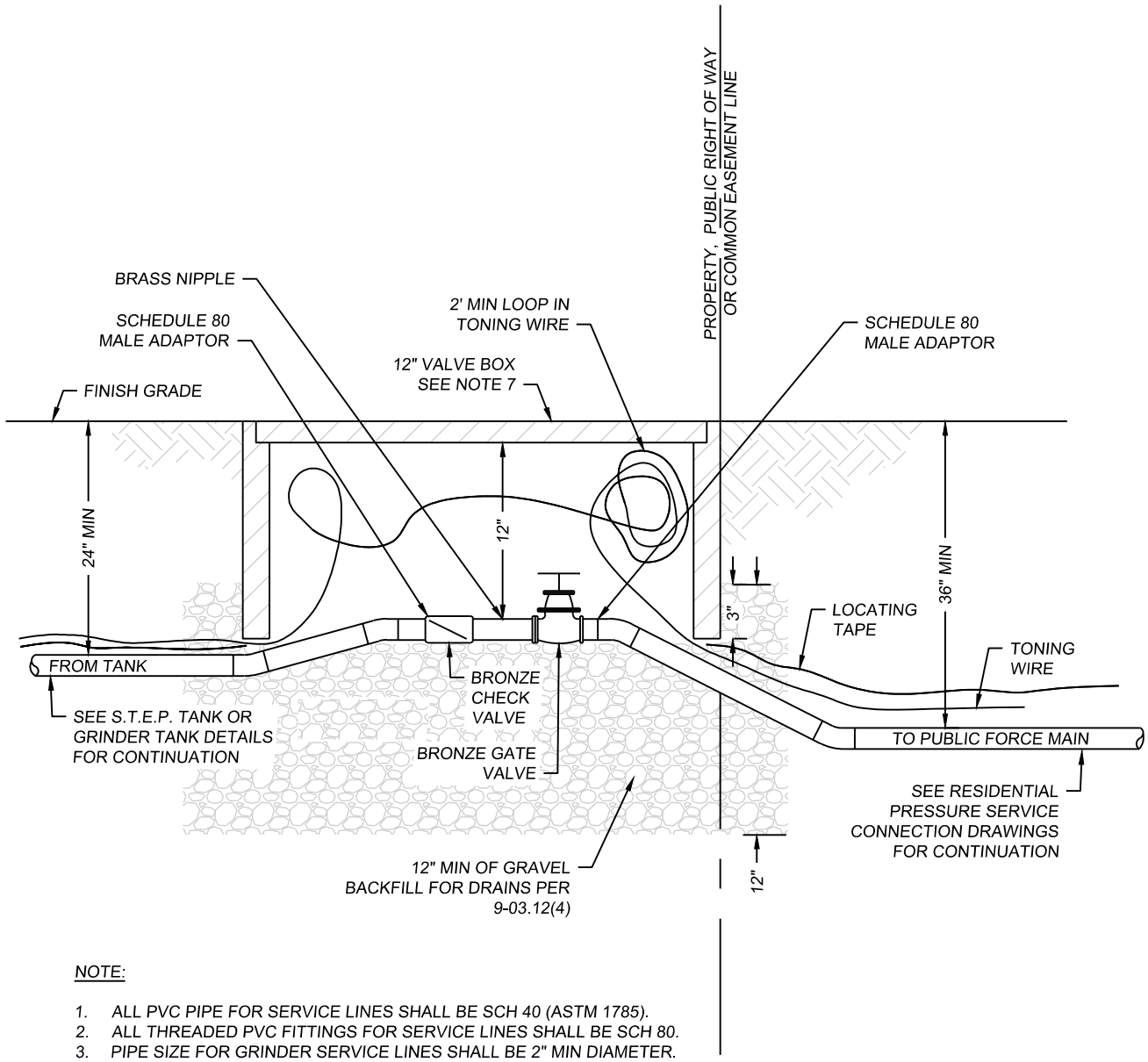
STANDARD DRAWING

NTS

52

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:37pm, Modified 03-31-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_53_GS



NOTE:

1. ALL PVC PIPE FOR SERVICE LINES SHALL BE SCH 40 (ASTM 1785).
2. ALL THREADED PVC FITTINGS FOR SERVICE LINES SHALL BE SCH 80.
3. PIPE SIZE FOR GRINDER SERVICE LINES SHALL BE 2" MIN DIAMETER.
4. PIPE SIZE FOR S.T.E.P. SERVICE LINES SHALL BE 1 1/4".
5. FITTINGS & VALVES SHALL MATCH PIPE SIZE.
6. NO CLOSE NIPPLES.
7. VALVE BOX SHALL BE CARSON IND. MOD# 1419 W/ BOLTED. NON-HINGED COVER & A # 1419E EXTENSION OR APPROVED EQUAL.

CLARK REGIONAL WASTEWATER DISTRICT

RESIDENTIAL GRINDER / S.T.E.P. VALVE BOX

STANDARD DRAWING

NTS

53

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:37pm, Modified 03-31-20
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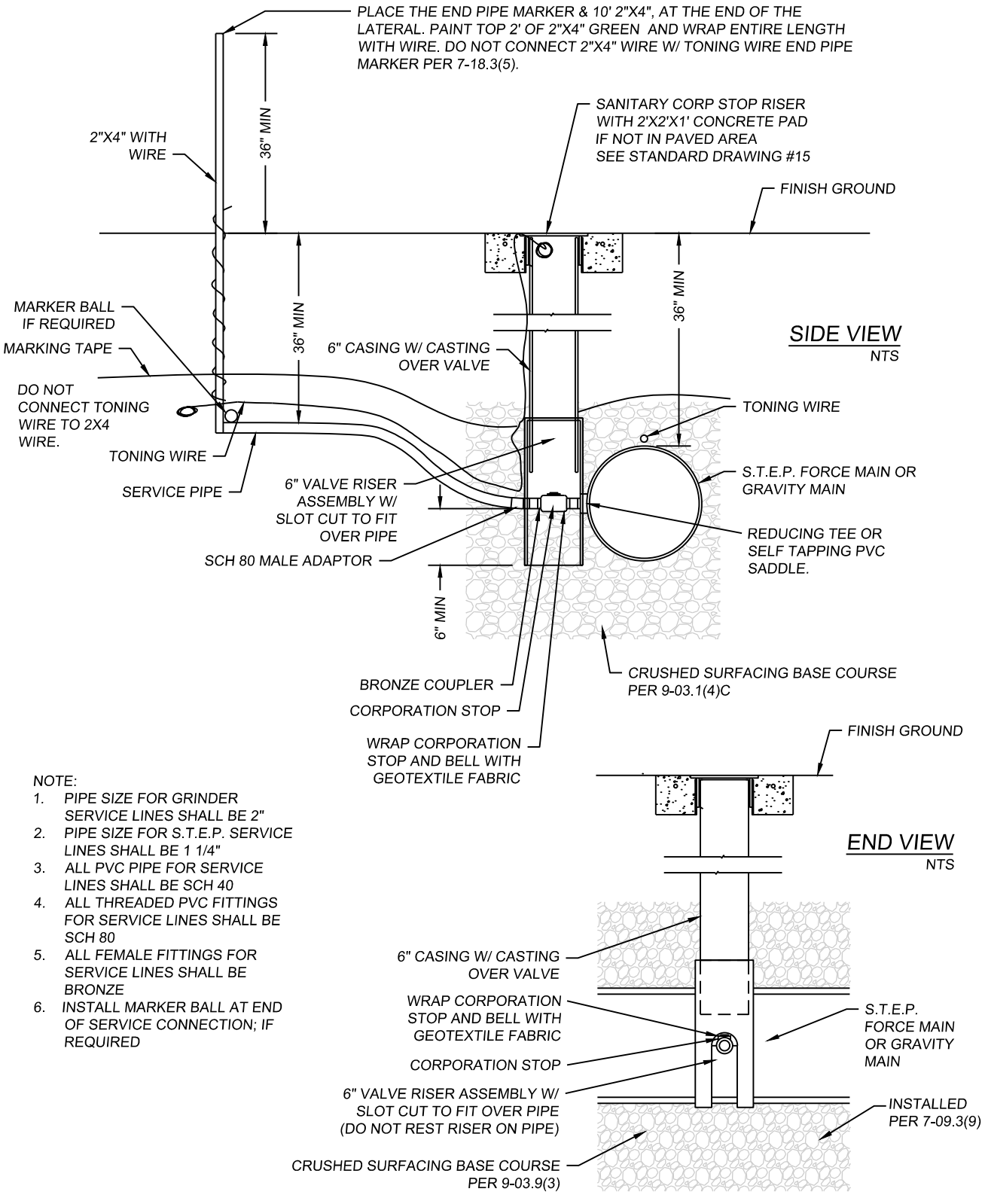


NOTE:

1. PIPE SIZE FOR GRINDER SERVICE LINES SHALL BE 2"
2. PIPE SIZE FOR S.T.E.P. SERVICE LINES SHALL BE 1 1/4"
3. ALL PVC PIPE FOR SERVICE LINES SHALL BE SCH 40
4. ALL THREADED PVC FITTINGS FOR SERVICE LINES SHALL BE SCH 80
5. ALL FEMALE FITTINGS FOR SERVICE LINES SHALL BE BRONZE
6. INSTALL MARKER BALL AT END OF SERVICE CONNECTION; IF REQUIRED

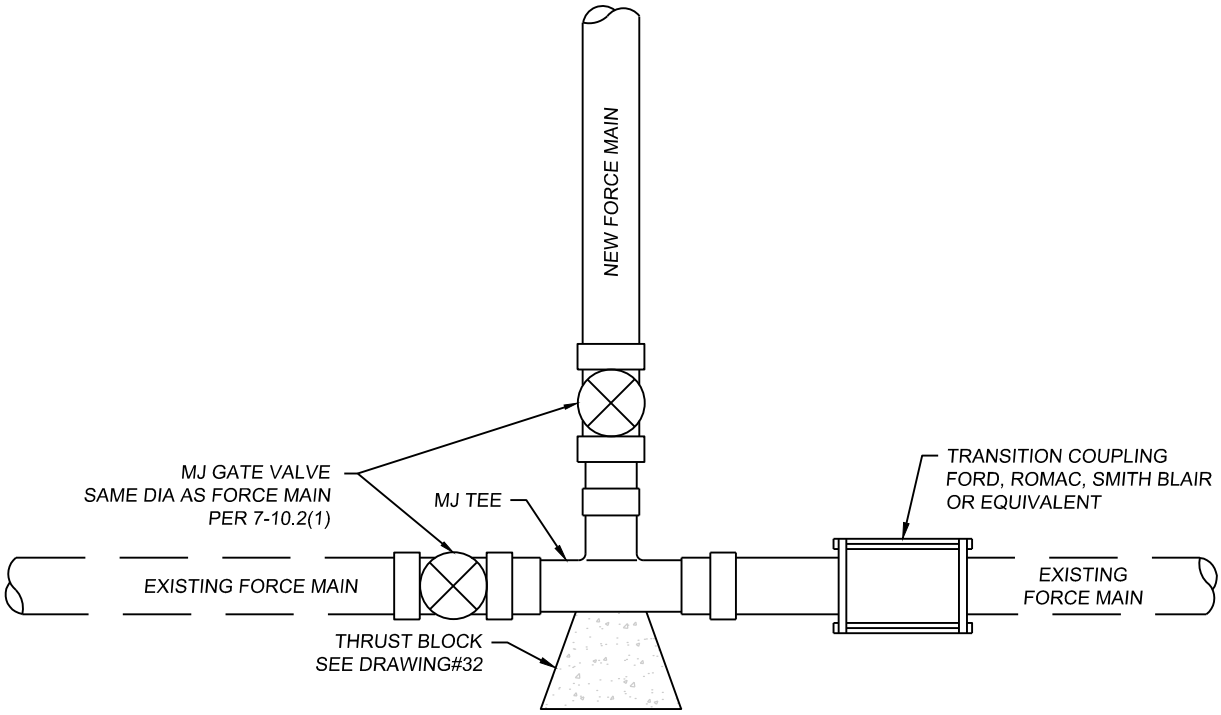
CLARK REGIONAL WASTEWATER DISTRICT

RESIDENTIAL PRESSURE SERVICE CONNECTION

STANDARD DRAWING

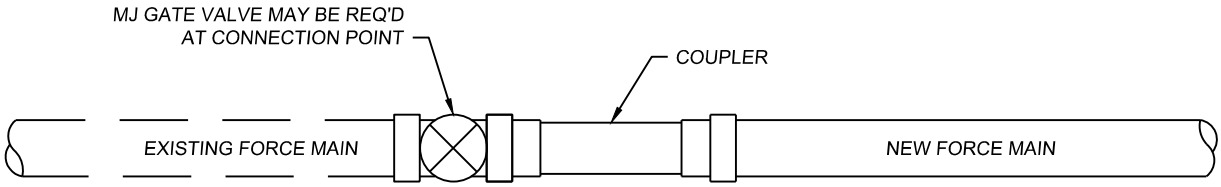
54

APPROVED: APR 2020



TEE CONNECTION DETAIL

NTS



IN LINE CONNECTION DETAIL

NTS

CLARK REGIONAL WASTEWATER DISTRICT

GRINDER / S.T.E.P. FORCE MAIN EXTENSION

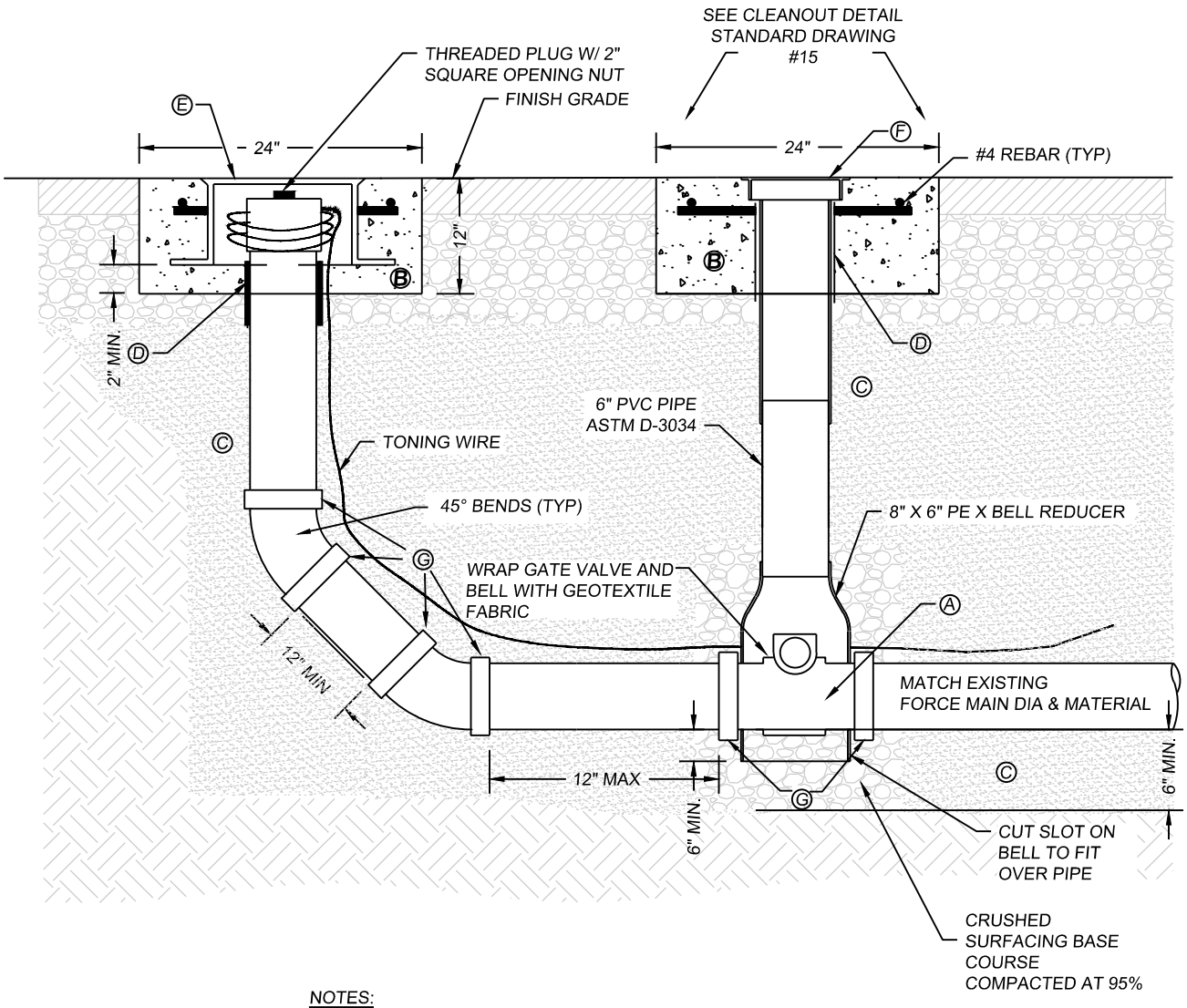
STANDARD DRAWING

NTS

55

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 1:01pm, Modified 04-04-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_56_GS



NOTES:

A. MJ GATE VALVE (AWWA C515) W/ NON RISING STEM W/ 2" SQUARE BRONZE OPERATOR W/ RESTRAINED JOINTS(EACH SIDE) (9-30.0).
B. CONCRETE (CLASS 3000). COLLAR TO BE INSTALLED WHEN LOCATED OUTSIDE OF PAVED AREAS W/ 50# FELT BETWEEN PIPE AND CONCRETE. SEE STANDARD DETAIL #15.
C. BEDDING & BACKFILL TO CONFORM WITH MATERIALS. SPECIFIED IN THE SEWER LINE EXTENSION PLANS.
D. NOT USED.
E. STANDARD ADJUSTABLE CLEANOUT CAST IRON FRAME AND COVER MANUFACTURED BY EAST JORDON IRON WORKS OR APPROVED EQUAL.
F. VALVE BOX SHALL BE OLYMPIC FOUNDRY CAST IRON COVER TO READ "SEWER".

CLARK REGIONAL WASTEWATER DISTRICT

RESIDENTIAL GRINDER / S.T.E.P. FORCE MAIN CLEANOUT

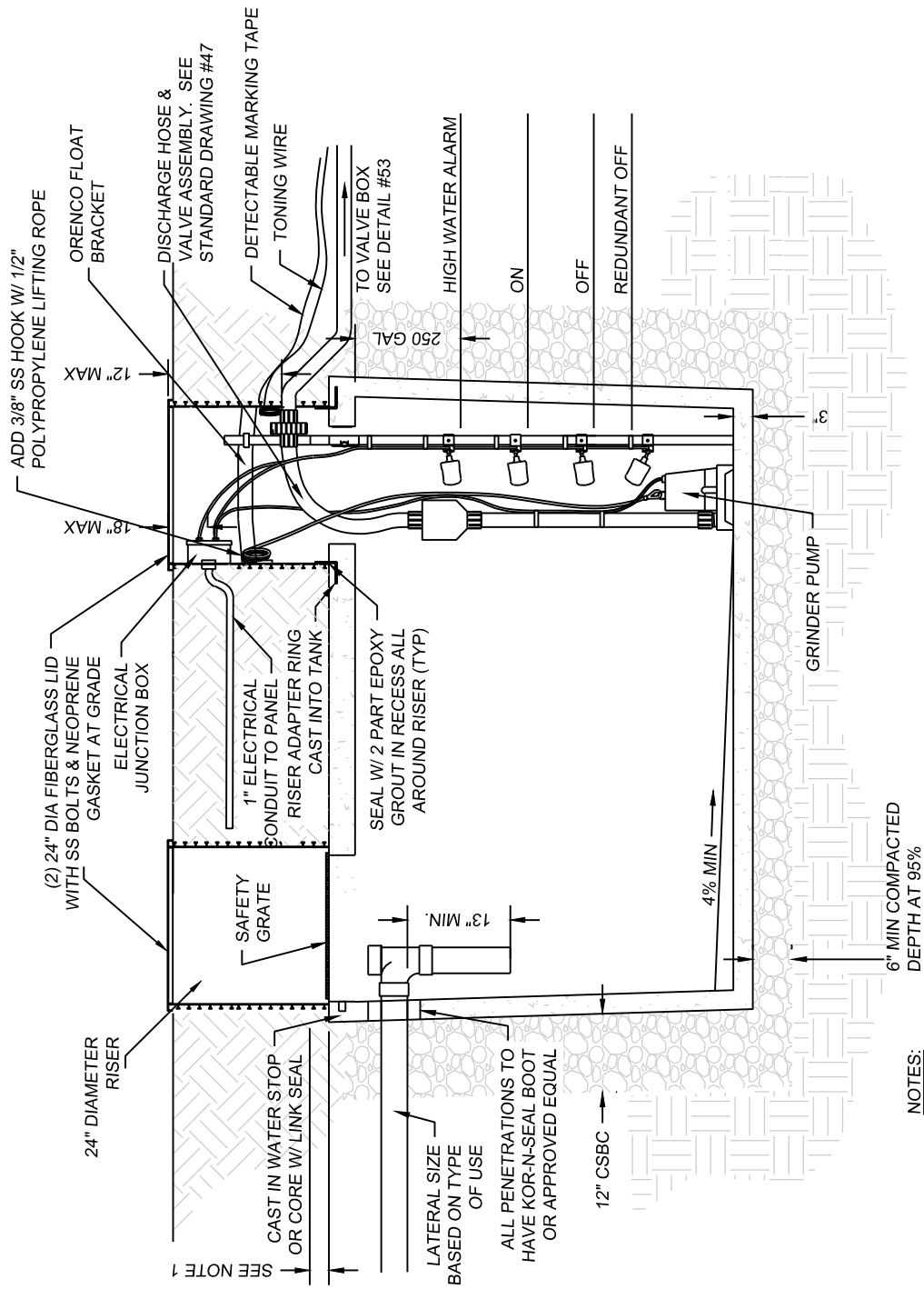
STANDARD DRAWING

NTS

56

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:57pm, Modified 04-04-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_57_GS



NOTES:

1. FIELD LOCATE EXISTING BUILDING SEWER & SET INTERCEPTOR TANK ELEVATION TO DRAIN BUILDING SEWER AT MIN 1/4" PER FOOT.
2. SEE TYPICAL GRINDER / S.T.E.P. SITE PLAN DRAWING FOR APPROXIMATE TANK & PANEL LOCATIONS.
3. DIMENSIONS SHALL BE SUBJECT TO THE REQUIREMENTS OF THE DISTRICT SPECIFICATIONS.
4. MIN SIZE SHALL BE 500 GAL.
5. SEE DISTRICT FOR FLOAT SET POINTS.

CLARK REGIONAL WASTEWATER DISTRICT

RESIDENTIAL GRINDER PUMP TANK

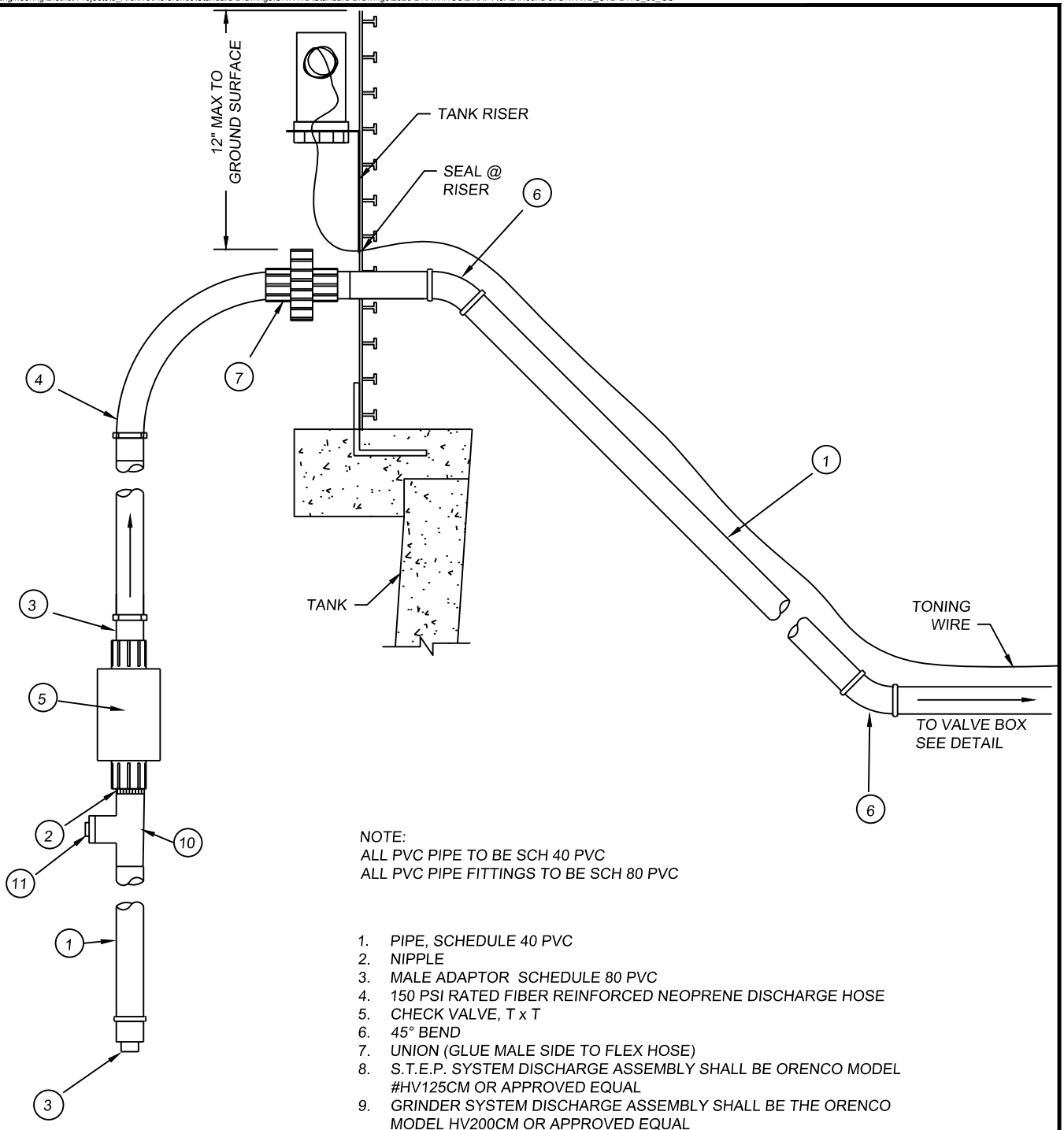
STANDARD DRAWING

NTS

57

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:41pm, Modified 03-31-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_58_GS



NOTE:
ALL PVC PIPE TO BE SCH 40 PVC
ALL PVC PIPE FITTINGS TO BE SCH 80 PVC

1. PIPE, SCHEDULE 40 PVC
2. NIPPLE
3. MALE ADAPTOR SCHEDULE 80 PVC
4. 150 PSI RATED FIBER REINFORCED NEOPRENE DISCHARGE HOSE
5. CHECK VALVE, T x T
6. 45° BEND
7. UNION (GLUE MALE SIDE TO FLEX HOSE)
8. S.T.E.P. SYSTEM DISCHARGE ASSEMBLY SHALL BE ORENCO MODEL #HV125CM OR APPROVED EQUAL
9. GRINDER SYSTEM DISCHARGE ASSEMBLY SHALL BE THE ORENCO MODEL HV200CM OR APPROVED EQUAL
10. TEE
11. ANTI-SIPHON VALVE

CLARK REGIONAL WASTEWATER DISTRICT

STEP / GRINDER DISCHARGE HOSE & VALVE ASSEMBLY

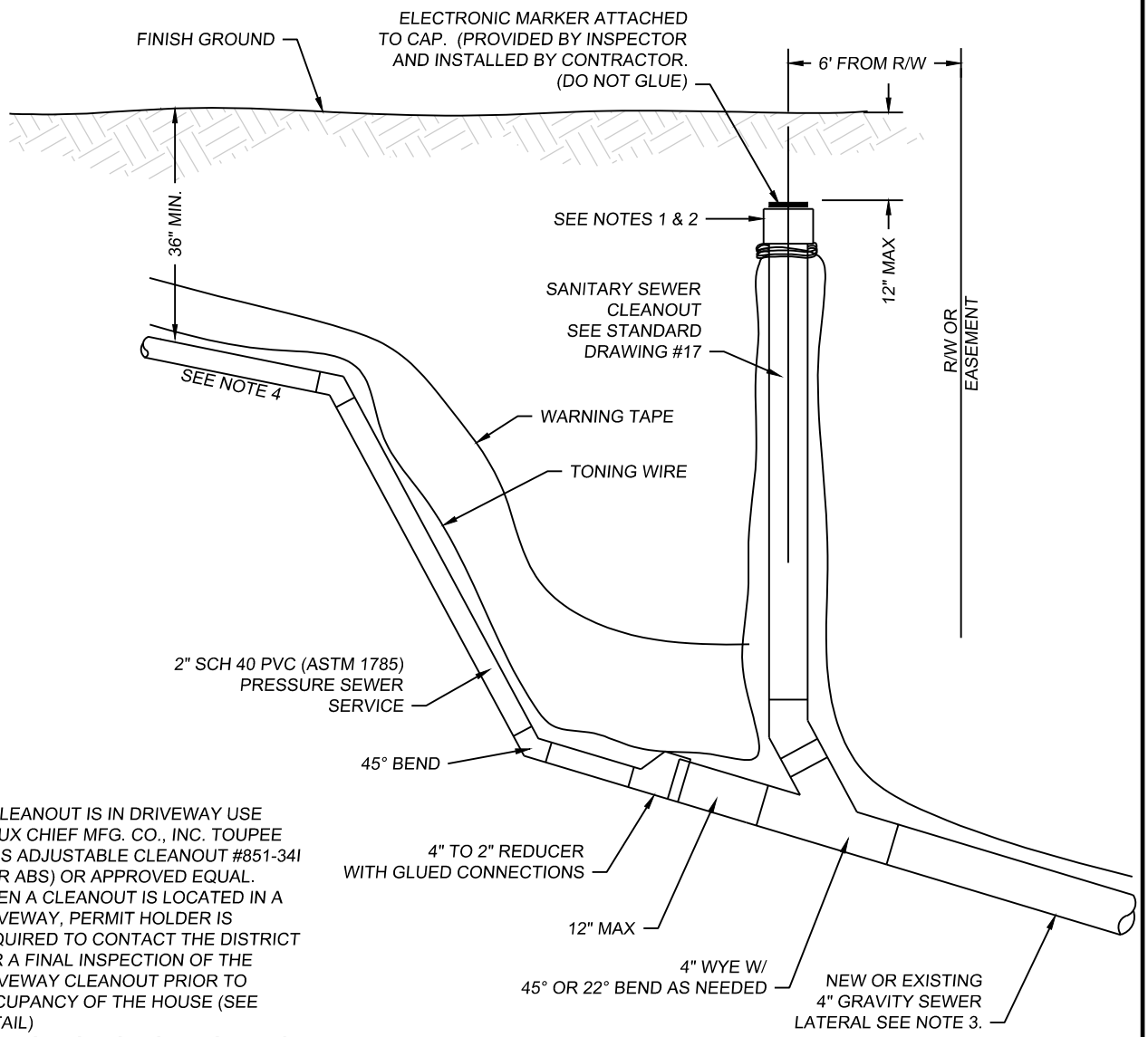
STANDARD DRAWING

NTS

58

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:42pm, Modified 04-04-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_59_GS



NOTES:

1. IF CLEANOUT IS IN DRIVEWAY USE SIOUX CHIEF MFG. CO., INC. TOUPEE PLUS ADJUSTABLE CLEANOUT #851-34I (FOR ABS) OR APPROVED EQUAL.
2. WHEN A CLEANOUT IS LOCATED IN A DRIVEWAY, PERMIT HOLDER IS REQUIRED TO CONTACT THE DISTRICT FOR A FINAL INSPECTION OF THE DRIVEWAY CLEANOUT PRIOR TO OCCUPANCY OF THE HOUSE (SEE DETAIL)
3. CONTACT DISTRICT FOR INFORMATION ON LOCATION & DEPTH FOR EXISTING GRAVITY SIDE SEWER. IF NEW SIDE SEWER IS REQUIRED, CONSTRUCT IN ACCORDANCE WITH DISTRICT SPECIFICATIONS AND DRAWINGS.
4. VALVE BOX NOT REQUIRED.
5. ALL PVC PRESSURE PIPE TO BE SCH 40 (ASTM 1785). SPEC #7-10.2(1)
6. ALL THREADED PVC PRESSURE FITTINGS TO BE SCH 80. SPEC #7-10.2(1)
7. GRAVITY SIDE SEWER MATERIAL MAY BE ABS OR PVC PLASTIC OR DUCTILE IRON PIPE.

CLARK REGIONAL WASTEWATER DISTRICT

PRESSURE TO GRAVITY SERVICE CONNECTION

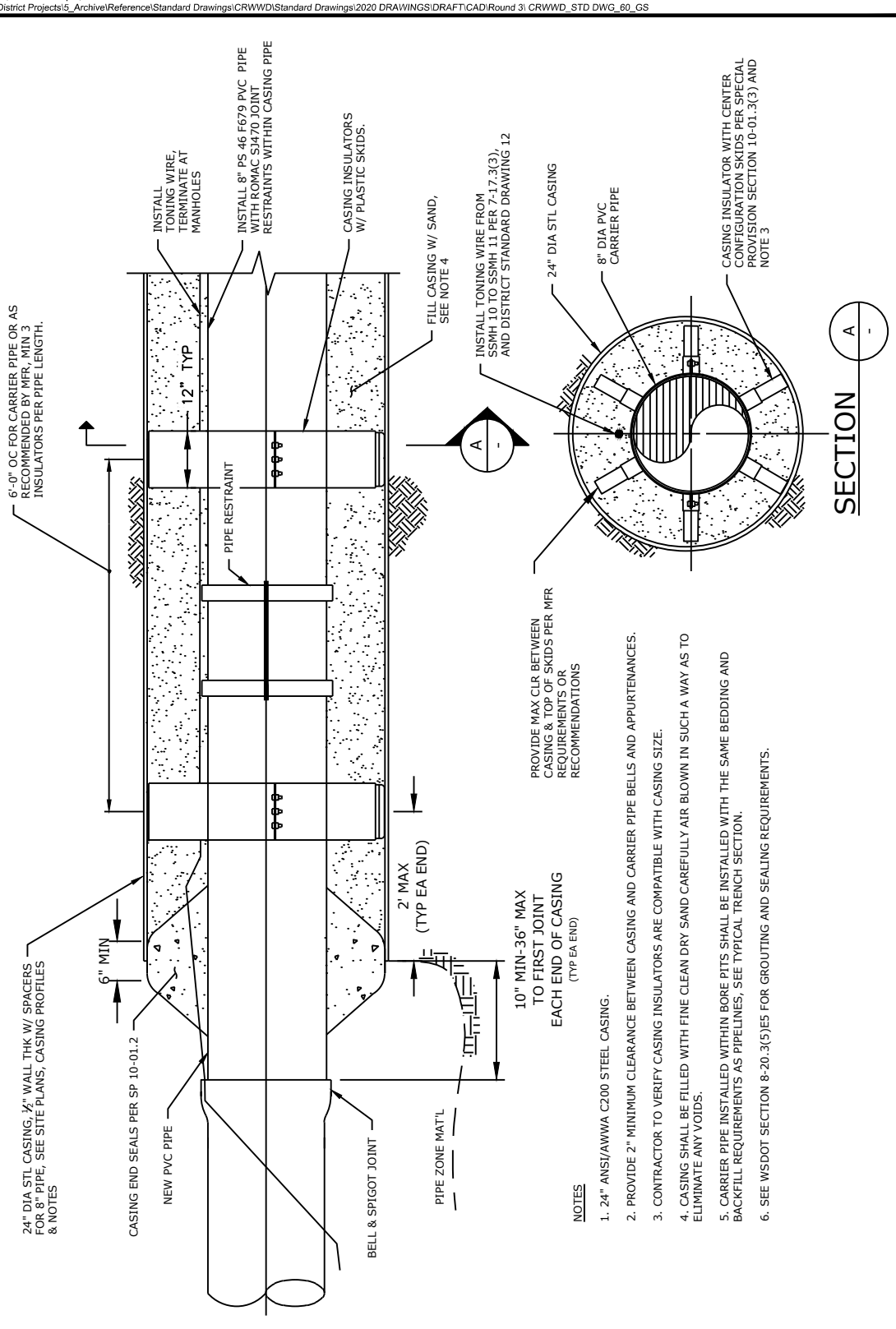
STANDARD DRAWING

NTS

59

APPROVED: APR 2020

Plotted on Apr 04, 2020 - 12:50pm, Modified 04-04-20
G:\Engineering\District Projects\5_Archive\Reference\Standard Drawings\CRWWD\Standard Drawings\2020 DRAWINGS\DRAFT\CAD\Round 3\ CRWWD_STD DWG_60_GS



NOTES

1. 24" ANSI/AWWA C200 STEEL CASING.
2. PROVIDE 2" MINIMUM CLEARANCE BETWEEN CASING AND CARRIER PIPE BELLS AND APPURTENANCES.
3. CONTRACTOR TO VERIFY CASING INSULATORS ARE COMPATIBLE WITH CASING SIZE.
4. CASING SHALL BE FILLED WITH FINE CLEAN DRY SAND CAREFULLY AIR BLOWN IN SUCH A WAY AS TO ELIMINATE ANY VOIDS.
5. CARRIER PIPE INSTALLED WITHIN BORE PITS SHALL BE INSTALLED WITH THE SAME BEDDING AND BACKFILL REQUIREMENTS AS PIPELINES, SEE TYPICAL TRENCH SECTION.
6. SEE WSDOT SECTION 8-20.3(5)E5 FOR GROUTING AND SEALING REQUIREMENTS.

CLARK REGIONAL WASTEWATER DISTRICT

JACK & BORE

STANDARD DRAWING

NTS

60

APPROVED: APR 2020