STORMWATER MANAGEMENT PLAN

For the

WOODMEN HILLS METROPOLITAN DISTRICT

Regional Water Reclamation Facility

August 2017

Prepared By:

JDS-HYDRO CONSULTANTS, INC.

545 EAST PIKES PEAK AVENUE • COLORADO SPRINGS, CO • 80903 • (719) 227-0072 • FAX (719) 471-3401

STORMWATER MANAGEMENT PLAN
Woodmen Hills Metropolitan District
Regional Water Reclamation Facility

TABLE OF CONTENTS

CONTACT INFORMATION

Applicant/Owner Information

Name:	Woodmen Hills Metropolitan District
Address:	8046 Eastonville Rd, Peyton, CO 80831
Contact:	Gene Cozzolino, Utilities Director
Telephone:	719-495-2500

Prepared by

Name:	JDS-Hydro Consultants, Inc.
Address:	545 E. Pikes Peak Ave., Ste. 300, Colorado Springs, CO 80903
Contact:	Ryan Mangino, P.E.
Telephone:	719-227-0072 ext. 103
Email:	rmangino@jdshydro.com

Designated Operator

Name:	Woodmen Hills Metropolitan District
Address:	8046 Eastonville Rd, Peyton, CO 80831
Contact:	Jerry Jacobson, Operator in Responsible Charge
Telephone:	719-495-2500

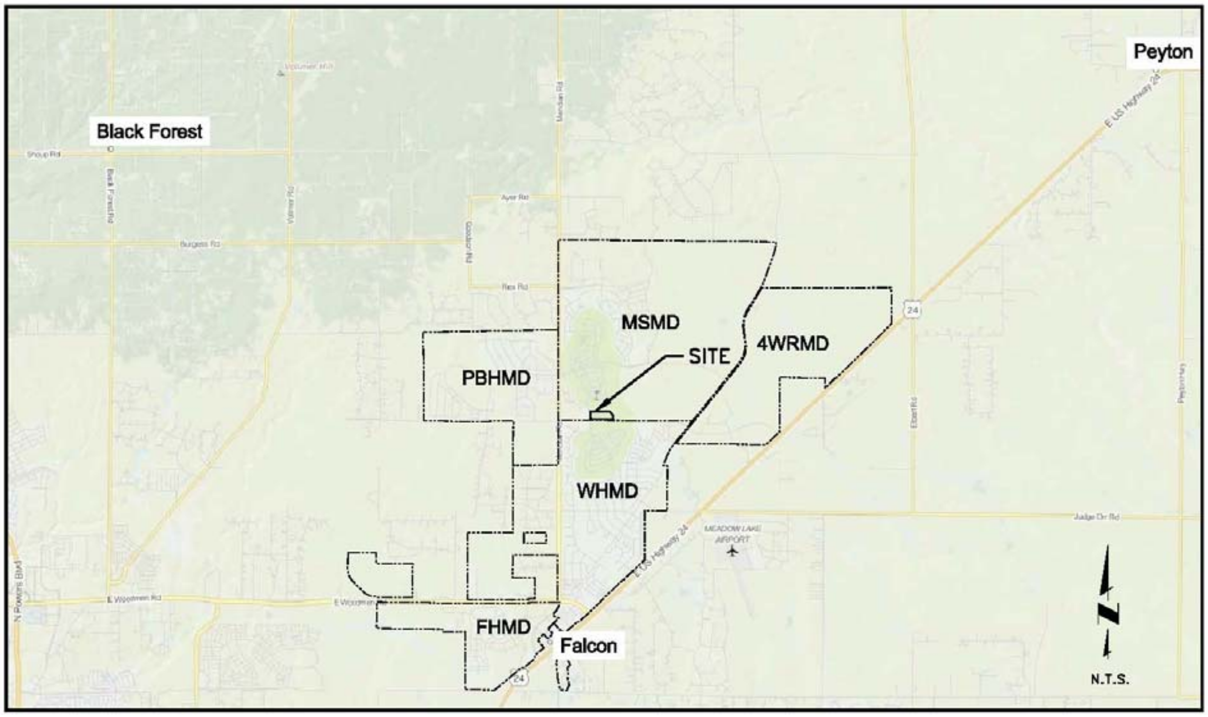
Contractor

Name:	RN Civil Construction, LLC
Address:	5975 South Quebec St, Centennial, CO 80111
Contact:	Tom Kelly
Telephone:	303-482-3059

1.0 SITE LOCATION AND DESCRIPTION

1.1 Site Location

The subject facility is a proposed plant upgrade to the existing Woodmen Hills Regional Water Reclamation Facility (RWRF). The RWRF is located north of Falcon, CO approximately 14 miles north east of downtown Colorado Springs. The vicinity map below shows the site location:



1.2 Description of Construction

The proposed upgrades include construction of concrete anoxic and oxic basins, secondary clarifiers, and a building housing the clarifiers, pumping equipment, dewatering equipment, a lab and office space. Additionally, onsite access roads will be constructed from aggregate base.

1.3 Steps for Construction

- Construction Staking
- Excavation
- Concrete forming and placement
- Backfill and grading
- Utility installation
- Metal building erection
- Process piping
- Interior building finish
- Final grading and revegetation

1.4 Estimates of Excavation

The total acreage of disturbed land for the construction of plant upgrades is approximately 5.7 acres. All disturbance and grading will take place on the existing wastewater treatment site.

Cut – 40,000 cu. yds.
Fill – 10,000 (*1.15 for fluff) = 11,500 cu. yds.
Net Cut – 28,500 cu. yds.

1.5 Drainage Characteristics

Given the nature of the proposed concrete treatment basins acting as “catch” basins for precipitation, changes in runoff are negligible (see the Drainage Letter Report for 5-, 10-, and 100-year peak flows). The concrete basins do not act as detention facilities, but they offset impervious areas by capturing precipitation during storm events.

The proposed concrete treatment basins comprise an area of approximately 39,300 square feet. Any precipitation that falls within the basins will be captured and not released downstream.

Site drainage will NOT be altered, but will continue to flow to from northwest to southeast, and eventually into existing stormwater infrastructure in Stapleton Drive.

The table below shows the runoff coefficients for the existing site which were taken from Table 6-6 of the City of Colorado Springs Drainage Criteria Manual (DCM) Volume 1.

Site Composition (SF)		**C_5**	**C_{10}**	**C_{100}**
Recycled Asphalt	22,600	0.59	0.63	0.7
Ponds	30,800	0	0	0
Native	194,892	0.09	0.17	0.36
Total	**248,292**	**0.12**	**0.19**	**0.35**

The table below contains the runoff coefficients for the proposed site improvements which were also taken from Table 6-6 of the DCM.

Site Composition (SF)		**C_5**	**C_{10}**	**C_{100}**
Roof	15,500	0.73	0.75	0.81
Pavement	1,700	0.9	0.92	0.96
Aggregate Base	33,200	0.59	0.63	0.7
Basins	39,300	0	0	0
Native	158,592	0.09	0.17	0.36
Total	**248,292**	**0.19**	**0.25**	**0.38**

1.6 Soils Description

Soils near the surface of the site are mostly silty or clayey sands and sandy clays. Sandstone bedrock underlays the surface soils and was encountered between 3 and 14 feet below existing grade. The soils are generally very permeable due to the relatively high sand content. ***Appendix B*** contains a geotechnical Soils Report for the project area.

1.7 Vegetation

Existing vegetation consists primarily of sparse native grasses (~30% ground cover) and ponderosa pines planted along the perimeter to screen the property.

1.8 Pollutants

During construction, the largest possible source of non-storm water pollution would be leakage of oils and other fluids from construction equipment and vehicles. Refueling of equipment will occur at the staging area.

The contractor will also be responsible for cleanup of any off-site vehicle tracking on paved roads. No other sources of pollution such as vehicle washing, chemical storage or waste disposal are anticipated. Portable restroom facilities will be used by the construction crew through the construction phase.

The contractor shall be responsible for any spill cleanup from construction equipment, in accordance with applicable local, county, and state regulations.

1.9 Discharge

Dewatering will be necessary for the excavation. The contractor shall obtain a Construction Dewatering Permit from CDPHE and shall comply with all conditions of that permit.

1.10 Receiving Waters

Drainage generally flows northwest to southeast across the site into stormwater infrastructure on Stapleton Drive which ultimately conveys it to an unnamed tributary of Black Squirrel Creek.

No portion of this site is located within the 100-Year floodplain.

2.0 EROSION CONTROL PLAN

This Stormwater Management Plan contains a Grading & Erosion Control Plan in ***Appendix D*** and should be used in conjunction with the design drawings. There will be no anticipated storage of wastes, nor will there be any asphalt or concrete batch plants located on the site. Location of erosion control facilities are shown on the plans.

3.0 BEST MANAGEMENT PRACTICES

3.1 Erosion and Sediment Controls

All erosion and sediment control will be installed immediately before any excavation. Straw bale check dams and silt fencing will be placed at areas shown on the construction drawings. Locate and develop borrow pits to minimize sediment.

Non-structure practices to control erosion and sedimentation will incorporate reseeding of ground cover in disturbed areas in accordance with the project specifications as soon as possible or at least during the same season. Additional methods will include brooms and shovels to relocate small amounts of soil erosion.

3.2 Material Handling and Spill Prevention

The most probable sources of non-storm water pollution are daily maintenance operations. If mobile fuel trucks are used to service equipment, absorbent materials and containers for the storage of used absorbent material will be nearby. Place debris, overburden, soil stockpiles and waste materials away from areas of runoff.

3.3 Final Stabilization and Long-Term Storm Water Management

Soil erosion control measures for all slopes, channels, ditches, or any disturbed land area shall be completed within twenty-one (21) calendar days after final grading, or final earth disturbance, has been completed. Disturbed areas and stockpiles which are not at final grade, but will remain dormant for longer than 30 days, shall also be mulched within 21 days after interim grading. An area that is going to remain in an interim state for more than 60 days shall also be seeded. All temporary soil erosion control measures and BMPs shall be maintained until permanent soil erosion control measures are implemented.

Vegetative cover density shall be a minimum of 70% of pre-disturbed levels to be considered stabilized.

3.4 Other Controls

There are several Best Management Practices than can be employed to prevent or mitigate the source of pollutants and contamination of storm water runoff. Some of these are:

- All refuse dumpsters and receptacles shall be equipped with functional lids to prevent rain and snow from entering. Lids must be closed when dumpsters and receptacles are not actively in use.
- Storage containers, drums, and bags shall be stored away from direct traffic routes to prevent accidental spills. Ensure packages and containers are intact.
- Empty drums shall be covered to prevent collection of precipitation.
- Containers shall be stored on pallets to prevent corrosion of containers, which can result when containers come in contact with moisture on the ground.
- Regularly scheduled removal of construction trash and debris.
- Tracking control must be implemented by the contractor to prevent unnecessary soil from entering paved surfaces. The measures to be used will be preventing equipment in the construction area from moving off-site. If the contractor cannot do this, then a vehicle tracking pad will be required according to El Paso County specifications. Brooms and shovels may be required for tracking control.

The contractor is certainly not limited to these measures which may require adjusting the BMP's as the project progresses and implement further controls as prudence and good judgment deem necessary.

3.5 Inspection and Maintenance

A thorough inspection of the storm water management system shall be performed every 14 days as well as after any rain or snowmelt event that causes surface erosion.

- Erosion of side slopes shall be repaired.
- Silt fences shall be cleaned whenever sediment has reached a depth of six (6) inches at the fence, and broken wooden parts or torn fabric shall be repaired or replaced.
- Any accumulated trash or debris shall be removed from these protected areas.
- In the case where additional BMP's are required in areas later determined as a risk but not included in the drawings, contractor will be required to install BMP's at these locations. These areas may include: excavated dirt piles, protection of existing drainage systems, and roadway drainage.

An Inspection and Maintenance Log is attached to this Storm Water Management Plan.

A copy of this SWMP is to be located at all times with the Foreman/Superintendant responsible for maintaining conditions set forth in this document. Said copy should be contained in a lockbox in the "Staging/Stockpile Area" noted on the plans.

This SWMP shall be revised by informing Engineer of deviations to original plan. Engineer will then update this report and all applicable drawings, forms, tables, etc… as deemed necessary.

4.0 INSPECTION AND MAINTENANCE LOG

WOODMEN HILLS METROPOLITAN DISTRICT
REGIONAL WATER RECLAMATION FACILITY
STORM WATER MANAGEMENT PLAN
INSPECTION AND MAINTENANCE LOG

(Record inspections, items found, maintenance, and corrective actions taken. Also record any training received by Contractor personnel with regard to erosion control, materials handling, and any inspections by outside agencies.)

DATE	ITEM	SIGNATURE OF PERSON MAKING ENTRY

APPENDIX A

EROSION AND STORMWATER QUALITY CONTROL PERMIT (ESQCP)
EL PASO COUNTY DEPARTMENT OF TRANSPORTATION
APPLICATION AND PERMIT

PERMIT NUMBER _ESQ-17-021 ______

APPLICANT INFORMATION

Applicant Contact Information	
Owner	Woodmen Hills Metropolitan District
Name (person of responsibility)	Gene Cozzolino
Company/Agency	Woodmen Hills Metropolitan District
Position of Applicant	Utilities Director
Address (physical address, not PO Box)	8046 Eastonville Road
City	Peyton
State	Colorado
Zip Code	80831
Mailing address, if different from above	
Telephone	719-495-2500
FAX number	
Email Address	gene@whmd.org
Cellular Phone number	

CONTRACTOR INFORMATION

Contractor	
Name (person of responsibility)	Tom Kelly
Company	RN Civil
Address (physical address, not PO Box)	5975 S Quebec St
City	Englewood
State	CO
Zip Code	80111
Mailing address, if different from above	N/A
Telephone	720-482-0090
FAX number	
Email Address	tkelly@rncivilconstruction.com
Cellular Phone number	N/A
Erosion Control Supervisor (ECS)*	N/A
ECS Phone number*	N/A
ECS Cellular Phone number*	N/A

*Required for El Paso County Depart of Transportation Projects. Recommended for others.

PROJECT INFORMATION

Project Specifications	
Project Name	WHMD Regional WRF
Legal Description	Tract K, Meridian Ranch Filing #1
Address (or nearest major cross streets)	9515 Meridian Ranch Blvd Peyton, CO 80831
Acreage (total and disturbed)	5.7 acres total/disturbed
Schedule	Construction Start: July 24, 2017 Construction Completion: August 30, 2018
Project Purpose	The purpose of the project is to construct WRF improvements to comply with the Discharge Permit.
Description of Project	The proposed upgrades include construction of concrete anoxic and oxic basins, secondary clarifiers, and a building housing the clarifiers, pumping equipment, dewatering equipment, a lab and office space. Additionally, onsite access roads will be constructed from aggregate base.
Tax Schedule Number	4230312001

FOR OFFICE USE ONLY
The following signature from the ECM Administrator signifies the approval of this ESQCP. All work shall be performed in accordance with the permit, the El Paso County Engineering Criteria Manual (ECM) Standards, City of Colorado Springs Drainage Criteria Manual, Volume 2 (DCM2) as adopted by El Paso County Addendum, approved plans, and any attached conditions. The approved plans are an enforceable part of the ESQCP. Construction activity, except for the installation of initial construction BMPs is not permitted until issuance of a Construction permit and Notice to Proceed.

Signature of ECM Administrator: ________________________________ Date ____________

1.1 REQUIRED SUBMISSIONS

In addition to this completed and signed application, the following items must be submitted to obtain an ESQCP:

- Permit fees
- Stormwater Management Plan (SWMP) meeting the requirements of DCM2 and ECM either as part of the plan set or as a separate document;
- Cost estimates of construction and maintenance of construction and permanent stormwater control measures (Cost estimates shall be provided on a unit cost basis for all stormwater BMPs);
- Financial surety in an amount agreeable to the ECM Administrator based on the cost estimates of the stormwater quality protection measures provided. The financial surety shall be provided in the form of a Letter of Credit, Surety with a Bonding Company, or other forms acceptable to El Paso County;
- Operation and Maintenance Plan for any proposed permanent BMPs; and
- Signed Private Stormwater Quality Structural Best Management Practices Agreement and Easement, if any private permanent BMPs are proposed.

1.2 RESPONSIBILITY FOR DAMAGE

The County and its officers and employees, including but not limited to the ECM Administrator, shall not be answerable or accountable in any manner, for injury to or death of any person, including but not limited to a permit holder, persons employed by the permit holder, persons acting in behalf of the permit holder, or for damage to property resulting from any activities undertaken by a permit holder or under the direction of a permit holder. The permit holder shall be responsible for any liability imposed by law and for injuries to or death of any person, including but not limited to the permit holder, persons employed by the permit holder, persons acting in behalf of the permit holder, or damage to property arising out of work or other activity permitted and done by the permit holder under a permit, or arising out of the failure on the permit holder's part to perform the obligations under any permit in respect to maintenance or any other obligations, or resulting from defects or obstructions, or from any cause whatsoever during the progress of the work, or other activity, or at any subsequent time work or other activity is being performed under the obligations provided by and contemplated by the permit.

To the extent allowed by law, the permit holder shall indemnify, save, and hold harmless the County and its officers and employees, including but not limited to the BOCC and ECM Administrator, from all claims, suits or actions of every name, kind and description brought for or on account of injuries to or death of any person, including but not limited to the permit holder, persons employed by the permit holder, persons acting in behalf of the permit holder and the public, or damage to property resulting from the performance of work or other activity under the permit, or arising out of the failure on the permit holder's part to perform his obligations under any permit in respect to maintenance or any other obligations, or resulting from defects or obstructions, or from any cause whatsoever during the progress of the work, or other activity or at any subsequent time work or other activity is being performed under the obligations provided by and contemplated by the permit, except as otherwise provided by state law. The permit holder waives any and all rights to any type of expressed or implied indemnity against the County, its officers or employees.

1.3 APPLICATION CERTIFICATION

I, as the Applicant or the representative of the Applicant, hereby certify that this application is correct and complete as per the requirements presented in this application and the El Paso County Engineering Criteria Manual and Drainage Criteria Manual, Volume 2 and El Paso County Addendum.

I, as the Applicant or the representative of the Applicant, have read and will comply with all of the requirements of the specified Stormwater Management Plan and any other documents specifying stormwater best management practices to be used on the site including permit conditions that may be required by the ECM Administrator. I understand that the Best Management Practices are to be maintained on the site and revised as necessary to protect stormwater quality as the project progresses. I further understand that a Construction Permit must be obtained and all necessary stormwater quality control BMPs are to be installed in accordance with the SWMP and the El Paso County Engineering Criteria Manual and Drainage Criteria Manual, Volume 2 and El Paso County Addendum before land disturbance begins and that failure to comply will result in a Stop Work Order and may result in other penalties as allowed by law. I further understand and agree to indemnify, save, and hold harmless the County and its officers and employees, including but not limited to the BOCC and ECM Administrator, from all claims, suits or actions of every name, kind and description as outlined in Section 1.2 Responsibility for Damage.

______________________________ Date: 08/21/17

Signature of Applicant or Representative

Killett Joshua D.

____

Print Name of Applicant or Representative

Permit Fee

Surcharge

Financial Surety ________ Type of Surety ________________

Total $________

APPENDIX B

CTL | THOMPSON INCORPORATED

GEOTECHNICAL INVESTIGATION
WASTEWATER TREATMENT PLANT EXPANSION
MERIDIAN RANCH BLVD. & STAPLETON DR.
FALCON, COLORADO

Prepared for:

WOODMEN HILLS METROPOLITAN DISTRICT
C/O JDS-Hydro Consultants, Inc.
545 East Pikes Peak Avenue, Suite 300
Colorado Springs, Colorado 80903

Attention: Ryan Mangino, P.E.

CTL|T Project No. CS18473-125

September 24, 2015

TABLE OF CONTENTS

SCOPE

This report presents the results of our Geotechnical Investigation for the proposed Woodmen Hills Metropolitan District wastewater treatment plant expansion in Falcon, Colorado (Fig. 1). The purpose of our investigation was to evaluate the subsurface conditions in order to provide geotechnical recommendations and criteria for design and construction of building foundations, floor systems, and below-grade basins, as well as surface drainage precautions. The scope of our services was described in our proposal (CS-15-0093) dated August 6, 2015. Evaluation of the property for the possible presence of potentially hazardous materials (Environmental Site Assessment) was beyond the scope of this investigation.

This report was prepared from data developed during our field exploration, laboratory testing, engineering analysis, and our experience. The design criteria presented in the report were based on our understanding of the planned construction. If changes occur, we should review the revised plans to determine their effect on our recommendations. The following section summarizes the report. More detailed descriptions of subsurface conditions, as well as our design and construction recommendations, are presented in the report.

SUMMARY

1. The near-surface soils encountered in our exploratory borings consisted predominantly of natural, slightly silty to silty or clayey sands and sandy to very sandy clays. In one boring, a layer of existing fill, about 6 feet thick, was found overlying the natural soils. Sandstone bedrock was encountered underlying the natural soils in each of the borings, at depths of 3 to 14 feet below the existing ground surface.

2. At the time of drilling, groundwater was encountered in each of the borings at depths of 8 to 28.5 feet below the existing ground surface. When groundwater levels were rechecked one day after the completion of drilling operations, water was again found in each of the borings at depths of 7 to 16 feet. Groundwater levels will fluctuate with seasonal precipitation and the water level in the ponds to the east.

3. A sophisticated dewatering system, such as well points and a sheet piling wall or a slurry wall cutoff trench, will probably be necessary to accomplish excavation and construction to the depth below the groundwater level that is anticipated.

4. We believe the proposed basins can be constructed on reinforced concrete mats underlain by the sandstone bedrock. The design will need to consider lateral earth pressures acting on the below-grade walls and possible buoyant forces resulting from the shallow groundwater.

5. In our opinion, the soil conditions encountered in boring TH-1 are conducive to constructing the proposed blower building using a spread footing foundation underlain by the natural soils and/or new, densely compacted granular fill. Design and construction criteria are presented in the report.

6. We anticipate the materials at and directly below the estimated floor slab elevation within the blower building footprint will likely consist predominantly of non-expansive, natural sand and possibly some new, granular grading fill. In our opinion, a low risk of poor slab performance (slab movement and damage) will exist for this subgrade condition.

7. Surface drainage should be designed, constructed, and maintained to provide rapid removal of runoff away from the proposed building and basins.

SITE CONDITIONS

The existing wastewater treatment plant is located on the northeast corner of Meridian Ranch Boulevard and Stapleton Drive in Falcon, Colorado. The general vicinity of the site is shown in Fig. 1. The proposed blower building is to be constructed near the northwest corner of Pond No. 1, at the location of boring TH-1. The proposed basins are planned to the northeast of Pond No. 1. The ground surface in the vicinity of the proposed improvements is comparatively flat and level. Vegetation on the site consists of a sparse stand of grasses and weeds. Some standing water was present in the ponds at the time of our field investigation.

PROPOSED CONSTRUCTION

We understand a small, one-story, wood-frame blower building with plan dimensions of about 8 feet by 10 feet is to be constructed near the northwest corner of existing Pond No. 1, along the western edge of the plant. No habitable below-grade construction is anticipated. Foundation loads are expected to be light. We anticipate the floor slab within the blower building will be near the existing grade.

Several concrete basins are planned in the central portion of the property, northeast of Pond No. 1, to replace the existing ponds. The basins will reportedly extend about 20 feet below the existing ground surface and will contain pumping equipment. One-story, wood-frame equipment buildings will be constructed over the tops of the basins. We have seen no specific plans or details for the construction of the new basins.

SITE GEOLOGY

The site lies within the High Plains topographic region adjacent to the Front Range topographic region. Geologic mapping by Ogden Tweto ("Geologic Map of Colorado," United States Geological Survey, 1979) indicates the near-surface materials are modern alluviums. The near-surface granular soils are underlain by the upper part of the Dawson Arkose. Our borings generally confirm the mapped conditions.

INVESTIGATION

Our field investigation included drilling five exploratory borings at the requested locations. The borings were advanced to a depth of 30 feet using 4-inch diameter, continuous-flight, solid-stem auger and a truck-mounted drill rig. Drilling was observed by our field representative who logged the conditions found in the borings and obtained samples. Summary logs of the borings, results of field penetration resistance tests, and laboratory test data are presented in Fig. 2.

Soil and bedrock samples obtained during drilling were returned to our laboratory and visually classified. Laboratory testing was then assigned to representative samples and included moisture content and dry density, sieve analysis (passing the No. 200 sieve), and water-soluble sulfate concentration tests. Laboratory test data are summarized in Table 1.

SUBSURFACE CONDITONS

The near-surface soils encountered in our exploratory borings consisted predominantly of natural sands and clays. In one boring, a layer of existing fill, about 6 feet thick, was found overlying the natural soils. Sandstone bedrock was encountered underlying the natural soils in each of the borings, at depths of 3 to 14 feet below the existing ground surface. Some of the pertinent engineering characteristics of the soils and bedrock encountered, as well as groundwater conditions, are described in the following paragraphs.

Existing Fill

A layer of existing fill, about 6 feet thick, was encountered at the ground surface at one boring location (TH-3). The fill consisted of clayey sand. The material was medium dense based on the results of field penetration resistance testing. No documentation regarding the placement of the fill, such as the results of field density testing, was available for our review. We must therefore consider the fill to be of suspect quality and unsuitable for support of the planned structures, in its current condition.

Natural Sand and Clay

Natural, slightly silty to silty or clayey sand and sandy to very sandy clay soils were encountered in each of the borings at the ground surface or underlying the existing fill. The natural soil layer was about 3 to 14 feet thick. The sands were medium dense and the clays were very stiff. Two samples of the sand tested in our laboratory contained 7 to 8 percent silt and clay-sized particles (passing the No. 200 sieve). One sample of the very sandy clay contained 63 percent silt and clay-sized particles. Our experience indicates the natural sands and clays are non-expansive or exhibit low measured swells when wetted.

Bedrock

Slightly silty to very clayey sandstone bedrock was found in each of the borings below the natural sand and clay soils. The sandstone was hard to very hard, but generally poorly cemented. Seven samples of the sandstone tested in our laboratory contained 7 to 47 percent silt and clay-sized particles (passing the No. 200 sieve).

Groundwater

At the time of drilling, groundwater was encountered in each of the borings at depths of 8 to 28.5 feet below the existing ground surface. When groundwater levels were rechecked one day after the completion of drilling operations, water was found in each of the borings at depths of 7 to 16 feet. Groundwater levels will fluctuate with seasonal precipitation and the water level in the ponds to the east.

Seismicity

This area, like most of central Colorado, is subject to a degree of seismic activity. We believe the soils on the property classify as Site Class C (dense soil and soft rock profile) according to the 2009 International Building Code (2009 IBC).

EXCAVATION

We understand an excavation depth of about 20 feet will be required for construction of the proposed basins. The surficial sands and clays are medium dense or very stiff, respectively, and the underlying sandstone is hard to very hard. We anticipate the near-surface soils and underlying sandstone bedrock can be excavated using conventional, heavy-duty equipment, above the groundwater level. We expect the sand and clay soils, and bedrock will classify as Type C and Type B materials, respectively, using Occupational Safety and Health Administration (OSHA) criteria. OSHA requires temporary construction slopes be no steeper than 1.5:1 (horizontal to vertical) for Type C soils and 1:1 for Type B materials. We believe these slope configurations are applicable in the absence of active seepage.

The sands and cleaner sandstone will likely flow into excavations made below the groundwater surface. Based on our understanding of the planned basins and conditions encountered in our borings, the excavations are expected to extend about 4 to 13 feet below the groundwater level and bottom in the sandstone. The shoring system for the excavations will need to be designed by a professional engineer and account for the locations of existing and planned facilities.

In our opinion, dewatering using local sump pits and pumps will not be effective during construction where the basin excavations extend more than about 2 feet below the groundwater surface. A more sophisticated dewatering system such as well points and a sheet piling wall, or a slurry wall cutoff trench will likely be needed to accomplish excavation and construction to the depth below the groundwater level that is anticipated. Construction documents should reflect that the contractor will need to employ sophisticated dewatering techniques. The dewatering system will need to account for potential influences on surrounding, off-site water wells, if present.

BASIN FOUNDATIONS

We anticipate the proposed basins will be cast-in-place, concrete structures. We believe the basins can be constructed on monolithically-placed, reinforced concrete mat foundations underlain by the sandstone bedrock. We recommend the concrete mats be designed for a maximum allowable soil pressure of

3,000 psf. Soils loosened or disturbed during excavation or the forming process should be removed before placing the mat. The completed excavations should be observed by a representative of our firm to verify the exposed conditions are as expected.

The basins will likely be subjected to uplift forces resulting from hydrostatic pressure. The basins should be designed and constructed as watertight structures capable of resisting the buoyant forces. We recommend a design moist density for overlying backfill of 125 pounds per cubic foot (pcf) for backfill used to “weight” the structures. Backfill that is under water will be buoyant, reducing its density by the unit weight of water to about 60 pcf.

BLOWER BUILDING FOUNDATION

Our investigation indicates the soils at the anticipated shallow foundation elevation for the proposed blower building consist of non-expansive, slightly silty, natural sands (boring No. 1). In our opinion, the proposed building can be constructed with a spread footing foundation underlain by the natural, on-site sands and/or new, densely compacted, granular fill materials placed to adjust the building pad elevation. The placement and compaction of below-footing fill should be observed and tested by a representative of our firm during construction. The following paragraphs present our design and construction recommendations for the spread footing foundation.

1. The footing foundation should be underlain by the natural, sand soils and/or new, densely compacted sand fill. Fill placed below the footings should consist of the on-site, sand soils that have been uniformly moisture conditioned to within 2 percent of optimum moisture content and compacted in thin lifts to at least 95 percent of maximum standard Proctor dry density (ASTM D 698), prior to concrete placement.

2. The spread footings can be designed for a maximum allowable soil pressure of 3,000 psf.

3. A coefficient of friction of 0.4 (mass concrete on sand) can be used in the foundation design to resist lateral sliding movements.

4. We recommend footings beneath continuous foundation walls be at least 16 inches wide. Larger footing sizes may be required to accommodate the anticipated loads.

5. We recommend designs consider total settlement of 1-inch and differential settlement of 1/2-inch.

6. Continuous foundation walls should be reinforced to span local anomalies in the subsoils. We recommend the reinforcement required to simply span an unsupported distance of at least 8 feet.

7. Exterior footings must be protected from frost action with a soil cover of at least 30 inches.

8. A representative of our firm should observe the completed foundation excavation to confirm the exposed conditions are similar to those encountered in our exploratory boring. The placement and compaction of below-footing fill and footing subgrade preparation should be observed and tested by a representative of our firm during construction.

FLOOR SYSTEM

We anticipate a slab-on-grade floor is considered the preferred floor system alternative for the proposed blower building. In our opinion, a low risk of poor slab performance (movement and damage) will exist for a floor slab underlain by the natural, on-site sands and densely compacted, granular fill. Fill placed below the slab should consist of the on-site, sand soils that have been uniformly moisture conditioned to within 2 percent of optimum moisture content and compacted in thin lifts to at least 95 percent of maximum standard Proctor dry density (ASTM D 698). The placement and compaction of below-slab fill should be observed and tested by a representative of our firm during construction.

Building foundations underlain by granular soils will settle relative to more lightly loaded slab-on-grade floors. We recommend a slab-on-grade floor within the blower building be separated from exterior walls with joints that allow for free vertical movement of the slab.

Control joints should be provided in the slab to reduce the effects of curling and to help control shrinkage cracking. Where underslab plumbing is necessary, service lines should be pressure tested for leaks during construction. Utility lines that penetrate the slab should be separated and isolated from the slab with joints to allow for free vertical movement.

From a geotechnical viewpoint, we believe the floor slab can be placed directly on the subgrade soils. The 2009 International Building Code (IBC) requires a vapor retarder be placed between a base course layer or the subgrade soils and the concrete slab-on-grade floor, unless the designer of the floor (structural engineer) waives this requirement. The merits of installation of a vapor retarder below a floor slab depend on the sensitivity of floor coverings and building use to moisture. A properly installed vapor retarder (10 mil minimum) is more beneficial below concrete slab-on-grade floors where floor coverings, painted floor surfaces or products stored on the floor will be sensitive to moisture. The vapor retarder is most effective when concrete is placed directly on top of it, rather than placing a sand or gravel leveling course between the vapor retarder and the floor slab. The placement of concrete on the vapor retarder may increase the risk of shrinkage cracking and curling. Use of concrete with reduced shrinkage characteristics including minimized water content, maximized coarse aggregate content, and reasonably low slump will reduce the risk of shrinkage cracking and curling. Considerations and recommendations for the installation of vapor retarders below concrete slabs are outlined in Section 3.2.3 of the 2006 report of the American Concrete Institute (ACI) Committee 302, “Guide for Concrete Floor and Slab Construction (ACI 302.R-96)”.

BELOW-GRADE CONSTRUCTION

We anticipate the below-grade walls of the basins will retain about 20 feet of backfill. The walls will be fixed and unable to rotate. We recommend the walls be backfilled with the on-site, silty to clayey sand and sandstone that has been mechanically broken done to have a maximum particle size of 2 inches. The wall backfill should be moisture conditioned to near optimum and compacted in thin lifts to at least 98 percent of maximum standard Proctor dry density (ASTM D 698). For level granular backfill compacted as specified, we recommend the foundation walls be designed to resist an “at-rest” earth pressure condition corresponding to an equivalent fluid density of at least 55 pcf for the portion of the walls above groundwater and 120 pcf equivalent fluid density for the walls below groundwater level, which includes hydrostatic pressures. Placement and compaction of the wall backfill should be observed and tested by a representative of our office during construction.

Potential design options for resisting the lateral loads include internal buttresses (full or partial height), external counterforts, T-shaped wall panels, tie-backs (helical or grouted anchors), internal bracing, and thickened walls. This list is not all inclusive and other alternatives are possible.

CONCRETE

Concrete in contact with soils can be subject to sulfate attack. We measured the water-soluble sulfate concentration in two samples from this site at less than 0.1 percent. Sulfate concentrations less than 0.1 percent indicate Class 0 exposure to sulfate attack for concrete in contact with the subsoils, according to ACI 201.2R-01 as published in the 2008 ACI Manual of Concrete Practice. For this level of sulfate concentration, the American Concrete Institute (ACI) indicates Type I cement can be used for concrete in contact with the subsoils. Superficial damage may occur to the exposed surfaces of highly permeable concrete, even though sulfate levels are relatively low. To control this risk and to resist freeze-thaw deterioration, the water-to-cementitious material ratio should not exceed 0.50 for concrete in contact with soils that are likely to stay moist due to surface drainage or high water tables. Concrete subjected to freeze-thaw cycles should be air entrained.

SURFACE DRAINAGE

Performance of the blower building and basin foundation systems and floor slabs at this site will be influenced, to a large degree, by the moisture conditions existing within the near-surface soils. Overall surface drainage patterns should be planned to provide for the rapid removal of storm runoff. Water should not be allowed to pond adjacent to the structures. We recommend the following precautions be observed during construction and maintained at all times after the building and basins are completed.

1. Excessive wetting or drying of the open foundation excavations should be avoided.

2. Foundation wall backfill should be graded to provide for the rapid removal of runoff. We recommend a slope equivalent to at least 6 inches in the first 10 feet.

3. Roof downspouts from the blower building and above-grade, basin equipment buildings should discharge well away from the structures. Downspout extensions and/or splash blocks should be provided to help reduce infiltration into the backfill adjacent to the structures.

CONSTRUCTION OBSERVATIONS

We recommend that CTL|Thompson, Inc. provide observation and testing services during construction to allow us the opportunity to verify whether soil conditions are consistent with those found during this investigation. If others perform these observations, they must accept responsibility to judge whether the recommendations in this report remain appropriate.

GEOTECHNICAL RISK

The concept of risk is an important aspect with any geotechnical evaluation primarily because the methods used to develop geotechnical recommendations do not comprise an exact science. We never have complete knowledge of subsurface conditions. Our analysis must be tempered with engineering judgment and experience. Therefore, the recommendations presented in any geotechnical evaluation should not be considered risk-free. Our recommendations represent our judgment of those measures that are necessary to increase the chances that the structure will perform satisfactorily. It is critical that all recommendations in this report are followed during construction.

LIMITATIONS

Our borings were drilled at the requested locations to obtain a reasonably accurate indication of subsurface conditions. The borings are representative of conditions encountered at the exact boring location only. Variations in subsurface conditions not indicated by the borings are possible. We recommend a representative of our office observe the completed foundation excavations to verify subsurface conditions are as anticipated from our borings. Representatives of our firm should be present during construction to provide construction observation and materials testing services.

We believe this investigation was conducted with that level of skill and care normally used by geotechnical engineers practicing in this area at this time. No warranty, express or implied, is made.

If we can be of further service in discussing the contents of this report or in the analysis of the influence of subsurface conditions on design of the blower building and basins from a geotechnical engineering point-of-view, please call.

CTL | THOMPSON, INC.

Richard A. Phillips, P. E.
Senior Principal Engineer

COLORADO REGISTERED PROFESSIONAL ENGINEER
RICHARD A. PHILLIPS
20889
9-24-15

Reviewed by:

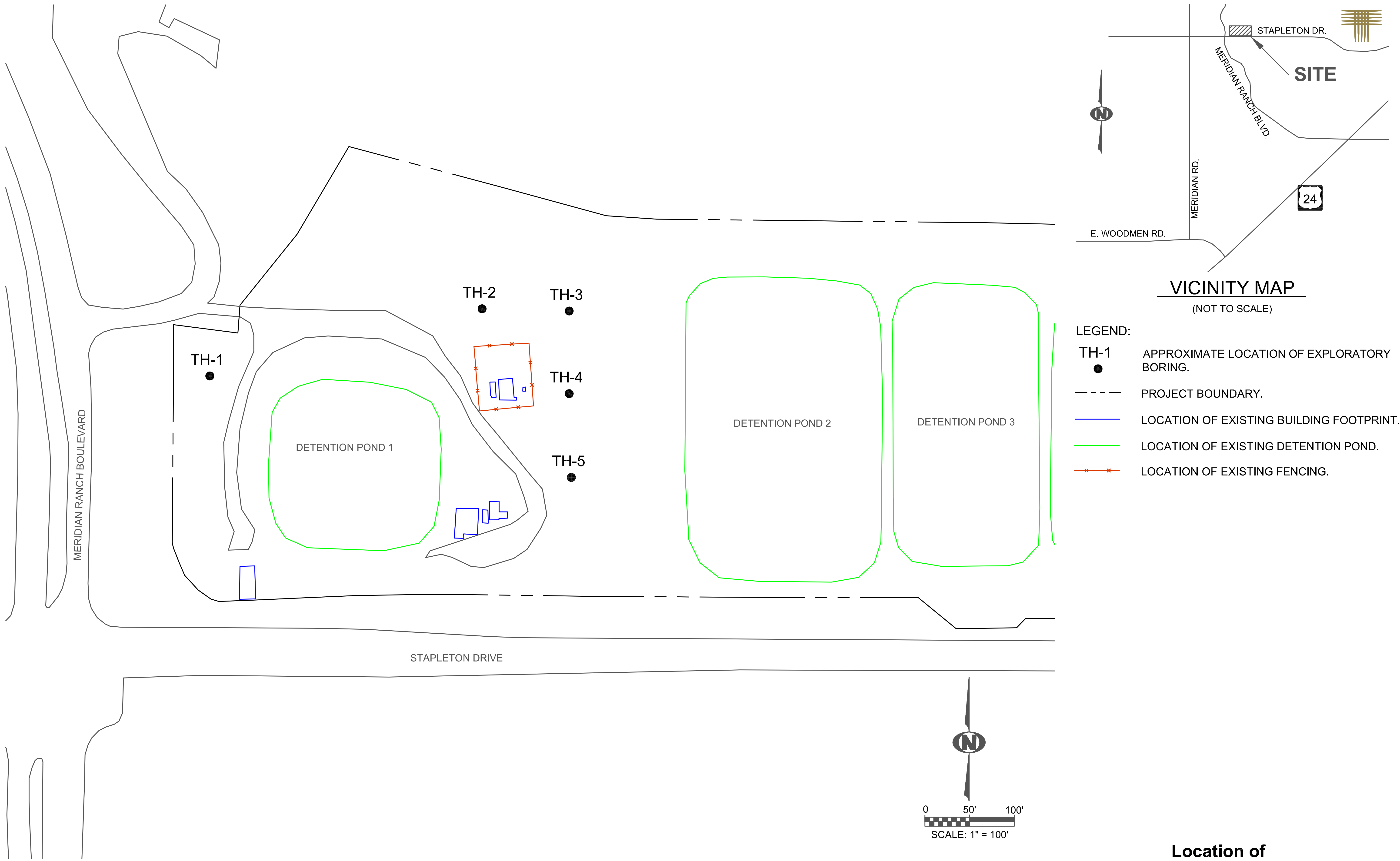
William C. Hoffmann Jr.

William C. Hoffmann, Jr., P. E.
Vice President

RAP:WCH:lc

(3 copies sent)

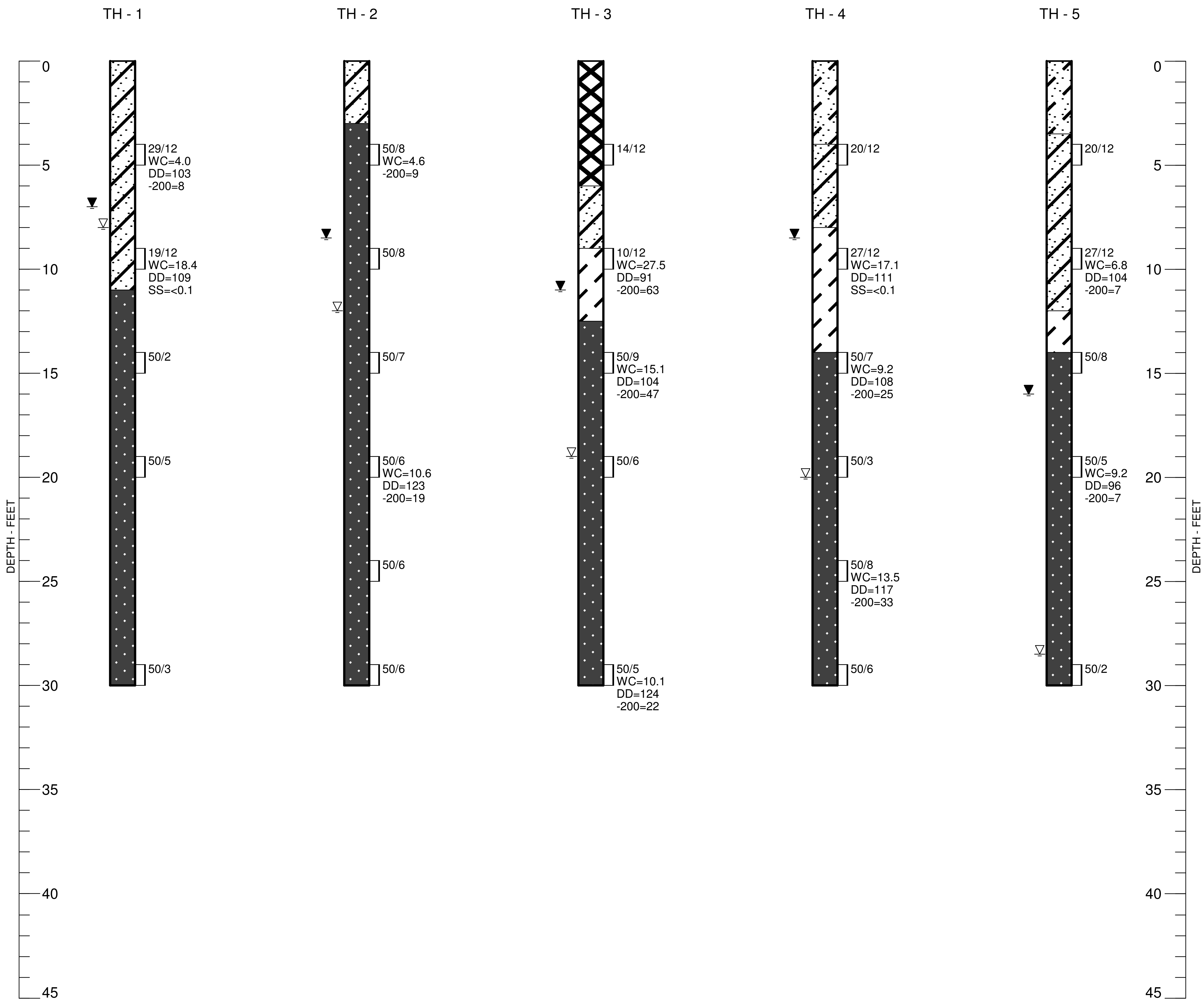
Via email: rmangino@jdshydro.com



WOODMEN HILL METROPOLITAN DISTRICT
WASTEWATER TREATMENT PLANT
CTL|T PROJECT NO. CS18473-125
S:\CS18000-18499\CS18473.000\125\2. REPORTS\CS18473-125_CAD.DWG

Location of Exploratory Borings

FIG. 1



LEGEND:

FILL, SAND, CLAYEY, MEDIUM DENSE, SLIGHTLY MOIST, MEDIUM BROWN.

SAND, SLIGHTLY SILTY TO SILTY, MEDIUM DENSE, SLIGHTLY MOIST TO MOIST, LIGHT TO MEDIUM BROWN. (SP-SM, SM)

SAND, CLAYEY, MEDIUM DENSE, MOIST, MEDIUM BROWN. (SC)

CLAY, SANDY TO VERY SANDY, VERY STIFF, MEDIUM BROWN. (CL)

BEDROCK. SANDSTONE, SLIGHTLY SILTY TO VERY CLAYEY, HARD TO VERY HARD, SLIGHTLY MOIST TO MOIST, LIGHT BROWN, LIGHT GRAY, GRAY BROWN, OLIVE.

DRIVE SAMPLE. THE SYMBOL 29/12 INDICATES 29 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. SAMPLER 12 INCHES.

▽ GROUNDWATER LEVEL MEASURED AT TIME OF DRILLING.

▼ GROUNDWATER LEVEL MEASURED ONE DAY AFTER DRILLING.

NOTES:

1. THE BORINGS WERE DRILLED SEPTEMBER 3, 2015 USING A 4-INCH DIAMETER, CONTINUOUS-FLIGHT AUGER AND A CME-45, TRUCK-MOUNTED DRILL RIG.
2. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS, AND CONCLUSIONS AS CONTAINED IN THIS REPORT.
3. WC - INDICATES MOISTURE CONTENT. (%)
   DD - INDICATES DRY DENSITY. (PCF)
   -200 - INDICATES PASSING NO. 200 SIEVE. (%)
   SS - INDICATES WATER-SOLUBLE SULFATE CONTENT. (%)

WOODMEN HILL METOPOLITAN DISTRICT
WASTEWATER TREATMENT PLANT
CTL|T PROJECT NO. CS18473-125
S:\CS18000-18499\CS18473.000\125\2. REPORTS\CS18473-125_GINT.GPJ

Summary Logs of Exploratory Borings

FIG. 2

TABLE 1

SUMMARY OF LABORATORY TESTING
CTL|T PROJECT NO. CS18473-125

				ATTERBERG LIMITS		SWELL TEST RESULTS*					
BORING	DEPTH (FEET)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	SWELL (%)	APPLIED PRESSURE (PSF)	SWELL PRESSURE (PSF)	PASSING NO. 200 SIEVE (%)	WATER SOLUBLE SULFATES (%)	DESCRIPTION
TH-1	4	4.0	103						8		SAND, SLIGHTLY SILTY (SP-SM)
TH-1	9	18.4	109							<0.1	SAND, SILTY (SM)
TH-2	4	4.6							9		SANDSTONE, SLIGHTLY SILTY
TH-2	19	10.6	123						19		SANDSTONE, CLAYEY
TH-3	9	27.5	91						63		CLAY, VERY SANDY (CL)
TH-3	14	15.1	104						47		SANDSTONE, VERY CLAYEY
TH-3	29	10.1	124						22		SANDSTONE, CLAYEY
TH-4	9	17.1	111							<0.1	CLAY, VERY SANDY (CL)
TH-4	14	9.2	108						25		SANDSTONE, CLAYEY
TH-4	24	13.5	117						33		SANDSTONE, CLAYEY
TH-5	9	6.8	104						7		SAND, SLIGHTLY SILTY (SP-SM)
TH-5	19	9.2	96						7		SANDSTONE, SLIGHTLY SILTY

* SWELL MEASURED UNDER ESTIMATED IN-SITU OVERBURDEN PRESSURE.
NEGATIVE VALUE INDICATES COMPRESSION.

APPENDIX C

2015 Financial Assurance

8/6/2015

Estimate Form (with pre-plat construction)

Project Information	
WHMD Regional Water Reclamation Facility	**8/21/2017**
Project Name	Date

Section 1 - Grading and Erosion Control BMPs	**Quantity**	**Units**		**Price**			**% Complete**	**Remaining**	
Earthwork*	28,500.00	CY	@	$ $5	=	$ 142,500.00		$ 142,500.00	*
Permanent Seeding* (inc. noxious weed mgmnt.)	2.50	AC	@	$ $582	=	$ 1,455.00		$ 1,455.00	*
Mulching*	2.50	AC	@	$ $507	=	$ 1,267.50		$ 1,267.50	*
Permanent Erosion Control Blanket*		SY	@	$ $6	=	$		$ -	*
Temporary Erosion Control Blanket		SY	@	$ $3		$		$ -	
Vehicle Tracking Control	1.00	EA	@	$ $1,625	=	$ 1,625.00		$ 1,625.00	
Safety Fence		LF	@	$ $3	=	$		$ -	
Silt Fence	2,000.00	LF	@	$ $4	=	$ 8,000.00		$ 8,000.00	
Temporary Seeding		AC	@	$ $485	=	$		$ -	
Temporary Mulch		AC	@	$ $507	=	$		$ -	
Erosion Bales	9.00	EA	@	$ $21	=	$ 189.00		$ 189.00	
Erosion Logs	30.00	LF	@	$ $6	=	$ 180.00		$ 180.00	
Rock Ditch Checks		EA	@	$	=	$		$ -	
Inlet Protection		EA	@	$ $153	=	$		$ -	
Sediment Basin		EA	@	$ $1,625	=	$		$ -	
Concrete Washout Basin	1.00	EA	@	$ $776	=	$ 776.00		$ 776.00	
			@	$	=	$		$ -	
* Subject to defect warranty financial assurance. DO NOT ENTER MORE THAN 80% COMPLETE. A minimum of 20% to be retained up to preliminary acceptance process.				**Section 1 Subtotal**	=	$ 155,992.50		$ 155,992.50	

Section 2 - Public Improvements**	**Quantity**	**Units**		**Price**			**% Complete**	**Remaining**	
- Roadway Improvements									
Construction Traffic Control	1.00	LS	@	$ 10,000	=	$ 10,000.00		$ 10,000.00	*
Aggregate Base Course		Tons	@	$ $18	=	$		$ -	*
Asphalt Pavement	25.00	Tons	@	$ $65	=	$ 1,625.00		$ 1,625.00	*
Raised Median, Paved		SF	@	$ $7	=	$		$ -	*
Electrical Conduit, Size =		LF	@	$ $14	=	$		$ -	*
Traffic Signal, complete intersection		EA	@	$ $250,000	=	$		$ -	*
Regulatory Sign	3.00	EA	@	$ $100	=	$ 300.00		$ 300.00	*
Advisory Sign		EA	@	$ $100	=	$		$ -	*
Guide/Street Name Sign		EA	@	$		$		$ -	*
Epoxy Pavement Marking		SF	@	$ $12	=	$		$ -	*
Thermoplastic Pavement Marking		SF	@	$ $22	=	$		$ -	*
Barricade - Type 3		EA	@	$ $115	=	$		$ -	*
Delineator (Type I)		EA	@	$ $21	=	$		$ -	*
Curb and Gutter, Type C (Ramp)		LF	@	$ $21	=	$		$ -	*
Curb and Gutter, Type A (6" Vertical)	50.00	LF	@	$ $16	=	$ 800.00		$ 800.00	*
Curb and Gutter, Type B (Median)		LF	@	$ $13	=	$		$ -	*
Pedestrian Ramp		SY	@	$ $108	=	$		$ -	*

Cross Pan		20.00	SY	@	$ $53	=	$ 1,060.00	$ 1,060.00	*
Curb Chase			EA	@	$ $1,300	=	$	$ -	*
Guardrail Type 3 (W-Beam)			LF	@	$ $18	=	$	$ -	*
Guardrail Type 7 (Concrete)			LF	@	$ $67	=	$	$ -	*
Guardrail End Anchorage			EA	@	$ $1,978	=	$	$ -	*
Guardrail Impact Attenuator			EA	@	$ $3,564	=	$	$ -	*
Sound Barrier Fence			LF	@	$ $100	=	$	$ -	*
- Storm Drain Improvements									
Concrete Box Culvert (M Standard), Size (W x H)			LF	@	$	=	$	$ -	*
Reinforced Concrete Pipe (RCP)	Size		LF	@	$	=	$	$ -	*
18" Reinforced Concrete Pipe			LF	@	$ $69	=	$	$ -	*
24" Reinforced Concrete Pipe			LF	@	$ $84	=	$	$ -	*
30" Reinforced Concrete Pipe			LF	@	$ $94	=	$	$ -	*
36" Reinforced Concrete Pipe			LF	@	$ $124	=	$	$ -	*
42" Reinforced Concrete Pipe			LF	@	$ $134	=	$	$ -	*
48" Reinforced Concrete Pipe			LF	@	$ $178	=	$	$ -	*
54" Reinforced Concrete Pipe			LF	@	$ $182	=	$	$ -	*
60" Reinforced Concrete Pipe			LF	@	$ $216	=	$	$ -	*
66" Reinforced Concrete Pipe			LF	@	$ $263	=	$	$ -	*
72" Reinforced Concrete Pipe			LF	@	$ $283	=	$	$ -	*
Corrugated Steel Pipe (CSP)	Size		LF	@	$	=	$	$ -	*
18" Corrugated Steel Pipe			LF	@	$ $66	=	$	$ -	*
24" Corrugated Steel Pipe			LF	@	$ $96	=	$	$ -	*
30" Corrugated Steel Pipe			LF	@	$ $101	=	$	$ -	*
36" Corrugated Steel Pipe			LF	@	$ $136	=	$	$ -	*
42" Corrugated Steel Pipe			LF	@	$ $147	=	$	$ -	*
48" Corrugated Steel Pipe			LF	@	$ $169	=	$	$ -	*
54" Corrugated Steel Pipe			LF	@	$ $193	=	$	$ -	*
60" Corrugated Steel Pipe			LF	@	$ $227	=	$	$ -	*
66" Corrugated Steel Pipe			LF	@	$ $278	=	$	$ -	*
72" Corrugated Steel Pipe			LF	@	$ $330	=	$	$ -	*
78" Corrugated Steel Pipe			LF	@	$ $381	=	$	$ -	*
84" Corrugated Steel Pipe			LF	@	$ $432	=	$	$ -	*
Flared End Section (FES) RCP			EA	@	$	=	$	$ -	*
Flared End Section (FES) CSP			EA	@	$	=	$	$ -	*
End Treatment- Headwall			EA	@	$	=	$	$ -	*
End Treatment- Wingwall			EA	@	$	=	$	$ -	*
End Treatment - Cutoff Wall			EA	@	$	=	$	$ -	*
Curb Inlet (Type R) L=5', Depth < 5 feet			EA	@	$ $3,791	=	$	$ -	*
Curb Inlet (Type R) L=5', 5'-10' Depth			EA	@	$ $5,044		$	$ -	*
Curb Inlet (Type R) L =5' , 10'-15' Depth			EA	@	$ $6,027	=	$	$ -	*
Curb Inlet (Type R) L =10', Depth < 5 feet			EA	@	$ $5,528	=	$	$ -	*
Curb Inlet (Type R) L =10' , 5'-10' Depth			EA	@	$ $6,694	=	$	$ -	*
Curb Inlet (Type R) L =10' , 10'-15' Depth			EA	@	$ $7,500	=	$	$ -	*
Curb Inlet (Type R) L =15' , Depth < 5 feet			EA	@	$ $7,923	=	$	$ -	*
Curb Inlet (Type R) L =15' , 5'-10' Depth			EA	@	$ $8,000	=	$	$ -	*
Curb Inlet (Type R) L =15' , 10'-15' Depth			EA	@	$ $8,800	=	$	$ -	*
Curb Inlet (Type R) L =20' , Depth < 5 feet			EA	@	$ $8,000	=	$	$ -	*
Curb Inlet (Type R) L =20' , 5'-10' Depth			EA	@	$ $8,830	=	$	$ -	*
Curb Inlet (Type R) L =_____', __' - __' Depth			EA	@	$	=	$	$ -	*
Curb Inlet (Type R) L =_____', __' - __' Depth			EA	@	$	=	$	$ -	*
Grated Inlet (Type C), < 5' deep			EA	@	$ $3,270	=	$	$ -	*
Grated Inlet (Type D), < 5' deep			EA	@	$ $3,908	=	$	$ -	*
Storm Sewer Manhole, Box Base, Depth < 15 feet			EA	@	$ $8,592	=	$	$ -	*
Storm Sewer Manhole, Slab Base, Depth < 15 feet			EA	@	$ $4,575	=	$	$ -	*
Geotextile (Erosion Control)			SY	@	$ $5	=	$	$ -	*

Rip Rap, d50 Size from 6" to 24"		CY	@	$ $98	=	$		$ -	*
Rip Rap, Grouted		CY	@	$ $215	=	$		$ -	*
Drainage Channel Construction, Size (W x H)		LF	@	$	=	$		$ -	*
Channel Lining, Concrete		CY	@	$ $450	=	$		$ -	*
Channel Lining, Rip Rap		CY	@	$ $98	=	$		$ -	*
Channel Lining, Grass		AC	@	$ $1,287	=	$		$ -	*
Channel Lining, Other Stabilization		SY	@	$ $3	=	$		$ -	*
Detention Outlet Structure		EA	@	$	=	$		$ -	*
Detention Emergency Spillway		EA	@	$	=	$		$ -	*
Permanent Water Quality Facility (Describe)		EA	@	$	=	$		$ -	*
* Subject to defect warranty financial assurance. DO NOT ENTER MORE THAN 80% COMPLETE. A minimum of 20% to be retained up to preliminary acceptance process. ┼ For flared end sections, multiply pipe LF cost by 6				**Section 2 Subtotal**	=	$ 13,785.00		13,785.00	**

Section 3 - Common Development Improvements (Private or District)***	Quantity	Units		Price			% Complete	Remaining
- Roadway Improvements								
(Include any applicable items from above Public Improvements list, that are to be private and NOT maintained by El Paso County)			@	$	=	$		$ -
			@	$	=	$		$ -
			@	$	=	$		$ -
Concrete Sidewalk		SY	@	$ $38	=	$		$ -
			@	$	=	$		$ -
			@	$	=	$		$ -
- Storm Drain Improvements								
(Include any applicable items from above Public Improvements list, that are to be private and NOT maintained by El Paso County)			@	$	=	$		$ -
			@	$	=	$		$ -
			@	$	=	$		$ -
18" Corrugated Steel Pipe	40.00		@	$ 66	=	$ 2,640.00		$ 2,640.00
			@	$	=	$		$ -
			@	$	=	$		$ -
- Water System Improvements								
Water Main Pipe (PVC), Size 8"		LF	@	$ $94	=	$		$ -
Water Main Pipe (Ductile Iron), Size 8"		LF	@	$ $137	=	$		$ -
Gate Valves, 8"		EA	@	$ $1,852	=	$		$ -
Fire Hydrant Assembly w/ all valves		EA	@	$ $6,430	=	$		$ -
Water Service Line Installation, including tap and valves		EA	@	$ 1,253	=	$		$ -
Fire Cistern Installation, complete		EA	@	$	=	$		$ -
- Sanitary Sewer Improvements								
Sewer Main Pipe (PVC), Size 8"		LF	@	$ $94	=	$		$ -
Sanitary Sewer Manhole, Depth < 15 feet		EA	@	$ $4,575	=	$		$ -
Sanitary Service Line Installation, complete		EA	@	$ 1,516	=	$		$ -
Sanitary Sewer Lift Station, complete		EA	@	$	=	$		$ -
- Landscaping (If Applicable)								
(List landscaping line items and cost - usually only in case of subdivision specific condition of approval, or PUD)		EA	@	$	=	$		$ -
		EA	@	$	=	$		
		EA	@	$	=	$		$ -
		EA	@	$	=	$		$ -
		EA	@	$	=	$		$ -
***items in this section are not subject to defect warranty financial assurance				**Section 3 Subtotal**	=	$ 2,640.00		2,640.00

Financial Assurance Totals

As-built drawings - **(FILL IN IF THERE ARE ANY PUBLICLY-MAINTAINED IMPROVEMENTS)**	$	
(Inc. survey to verify detention pond volumes.)	**Total Construction Financial Assurance**	**$172,417.50**
	(Sum of all section subtotals)	
	Total Remaining Construction Financial Assurance	**172,417.50**
	(Sum of all section totals less credit for items complete)	
	Total Defect Warranty Financial Assurance	**$31,801.50**
	(20% of all items identified as public improvements(*). To be collateralized at time of preliminary acceptance)	

Approvals

I hereby certify that this is an accurate and complete estimate of costs for the work as shown on the approved Construction Drawings associated with the Project.

COLORADO LICENSED RYAN M. MANGINO 43304 PROFESSIONAL ENGINEER

Engineer — Date: 08/21/2017

Approved by Owner / Applicant — Date: 21 Aug 2017

Approved by El Paso Couny Engineer / ECM Administrator — Date

APPENDIX D

WOODMEN HILLS METROPOLITAN DISTRICT
REGIONAL WATER RECLAMATION FACILITY – GRADING & EROSION CONTROL PLAN

SHEET INDEX

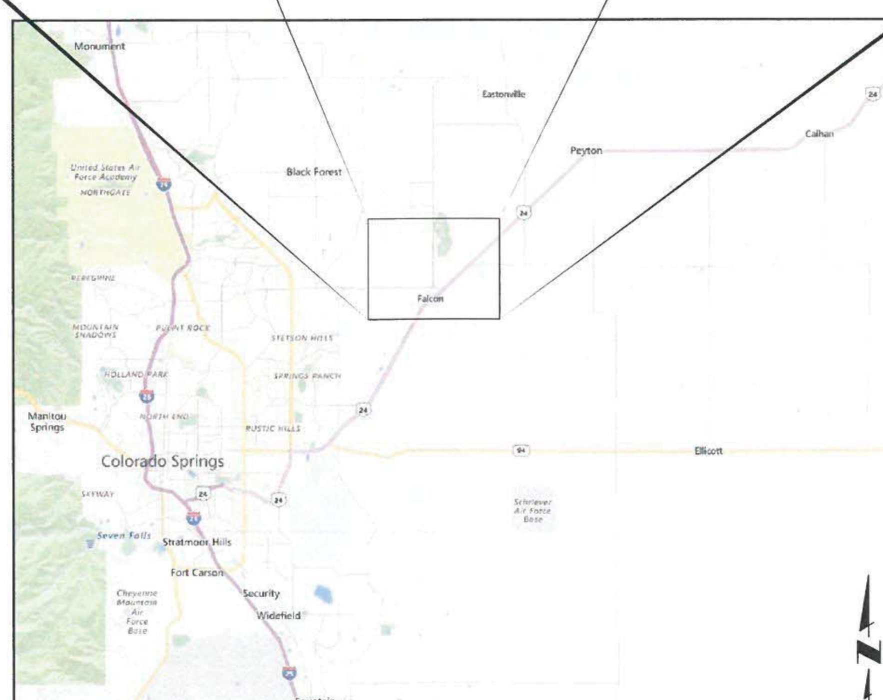
LEGEND

- BOUNDARY / RIGHT-OF-WAY
- EXISTING FENCE
- PROPOSED FENCE
- EXISTING WATER LINE (W)
- EXISTING RAW WATER LINE
- EXISTING SANITARY SEWER LINE
- EXISTING ON-SITE SEWER LINE
- EXISTING STORM SEWER
- EXISTING UNDERGROUND ELECTRIC
- EXISTING OVERHEAD ELECTRIC
- EXISTING GAS LINE
- EXISTING FIBER OPTIC LINE
- EXISTING VALVE
- 7270 EXISTING CONTOURS
- 7270 PROPOSED CONTOURS
- PROPOSED SEWER LINE
- PROPOSED WATERLINE

JDS-HYDRO CONSULTANTS, INC.
545 EAST PIKES PEAK AVENUE, SUITE 300
COLORADO SPRINGS, COLORADO 80903
PH: (719) 227-0072 - FAX: (719) 471-3401

LOCATION & VICINITY MAPS

VICINITY MAP
N.T.S.



LOCATION MAP
N.T.S.

SIGNATURES

ENGINEER'S STATEMENT:

THIS GRADING AND EROSION CONTROL PLAN WAS PREPARED UNDER MY DIRECTION AND SUPERVISION AND IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. SAID PLAN HAS BEEN PREPARED ACCORDING TO THE CRITERIA ESTABLISHED BY THE COUNTY FOR GRADING AND EROSION CONTROL PLANS. I ACCEPT RESPONSIBILITY FOR ANY LIABILITY CAUSED BY ANY NEGLIGENT ACTS, ERRORS OR OMISSIONS ON MY PART IN PREPARING THIS PLAN.

RYAN M. MANGINO, PE #43304 — 8/21/17
DATE

OWNER'S STATEMENT:

THE OWNER WILL COMPLY WITH THE REQUIREMENTS OF THE GRADING AND EROSION CONTROL PLAN.

WOODMEN HILLS METROPOLITAN DISTRICT — 22 Aug 2017
8046 EASTONVILLE ROAD
FALCON, CO 80831
DATE

EL PASO COUNTY:

COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/ OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/ OR ACCURACY OF THIS DOCUMENT.

FILED IN ACCORDANCE WITH THE REQUIREMENTS OF THE EL PASO COUNTY LAND DEVELOPMENT CODE, DRAINAGE CRITERIA, AND ENGINEERING CRITERIA MANUAL AS AMENDED.

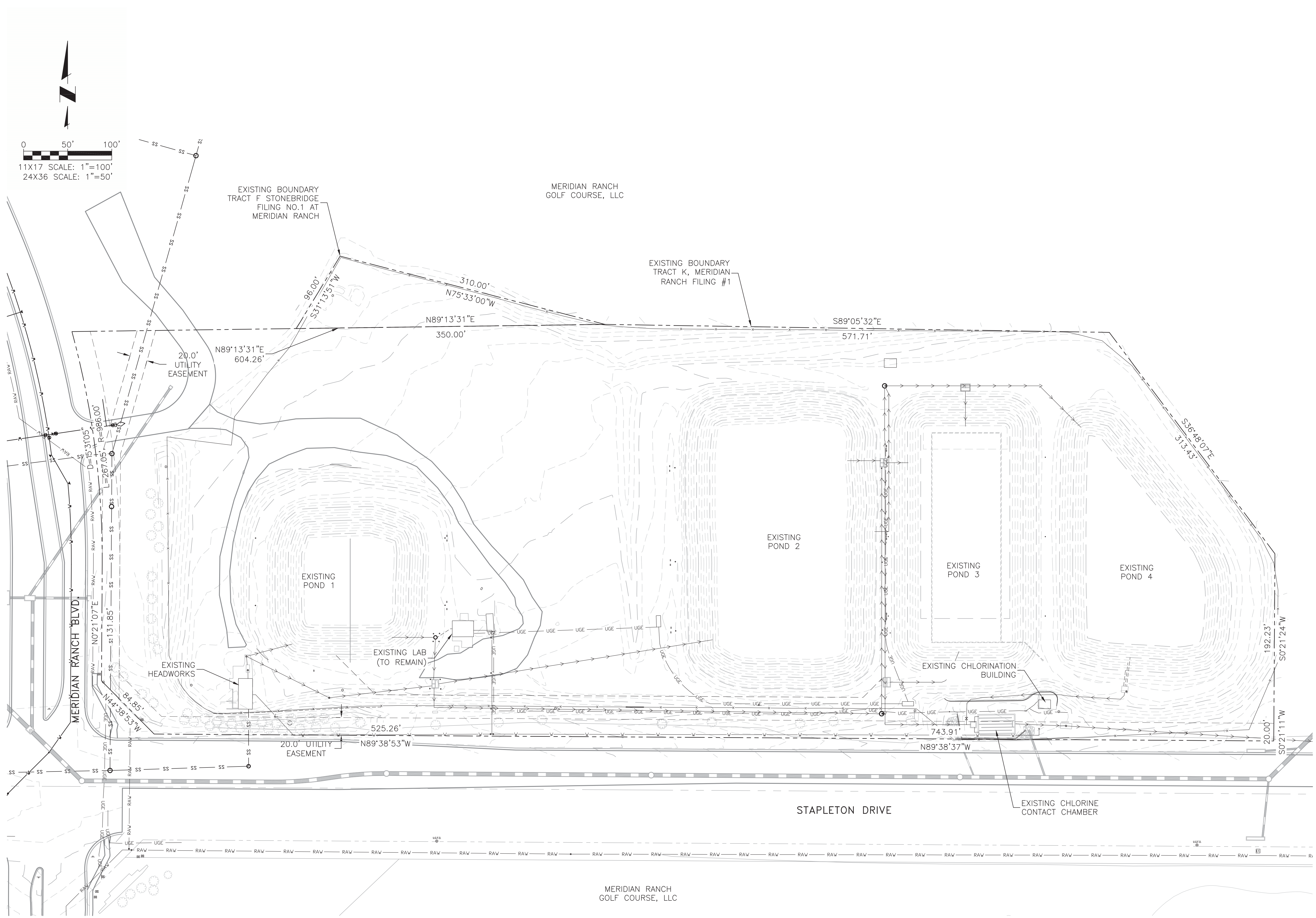
IN ACCORDANCE WITH ECM SECTION 1.12, THESE CONSTRUCTION DOCUMENTS WILL BE VALID FOR CONSTRUCTION FOR A PERIOD OF 2 YEARS FROM THE DATE SIGNED BY THE EL PASO COUNTY ENGINEER. IF CONSTRUCTION HAS NOT STARTED WITHIN THOSE 2 YEARS, THE PLANS WILL NEED TO BE RESUBMITTED FOR APPROVAL, INCLUDING PAYMENT OF REVIEW FEES AT THE PLANNING AND COMMUNITY DEVELOPMENT DIRECTOR'S DISCRETION.

JENNIFER IRVINE, P.E
COUNTY ENGINEER
DATE

LEGAL DESCRIPTION:

TRACT K, MERIDIAN RANCH FILING NO. 1.

PCD FILE NO.: PPR-17-027



JDS-HYDRO
CONSULTANTS, INC.
545 EAST PIKES PEAK AVENUE, SUITE 300
COLORADO SPRINGS, COLORADO 80903
PH: (719) 227-0072 - FAX: (719) 471-3401

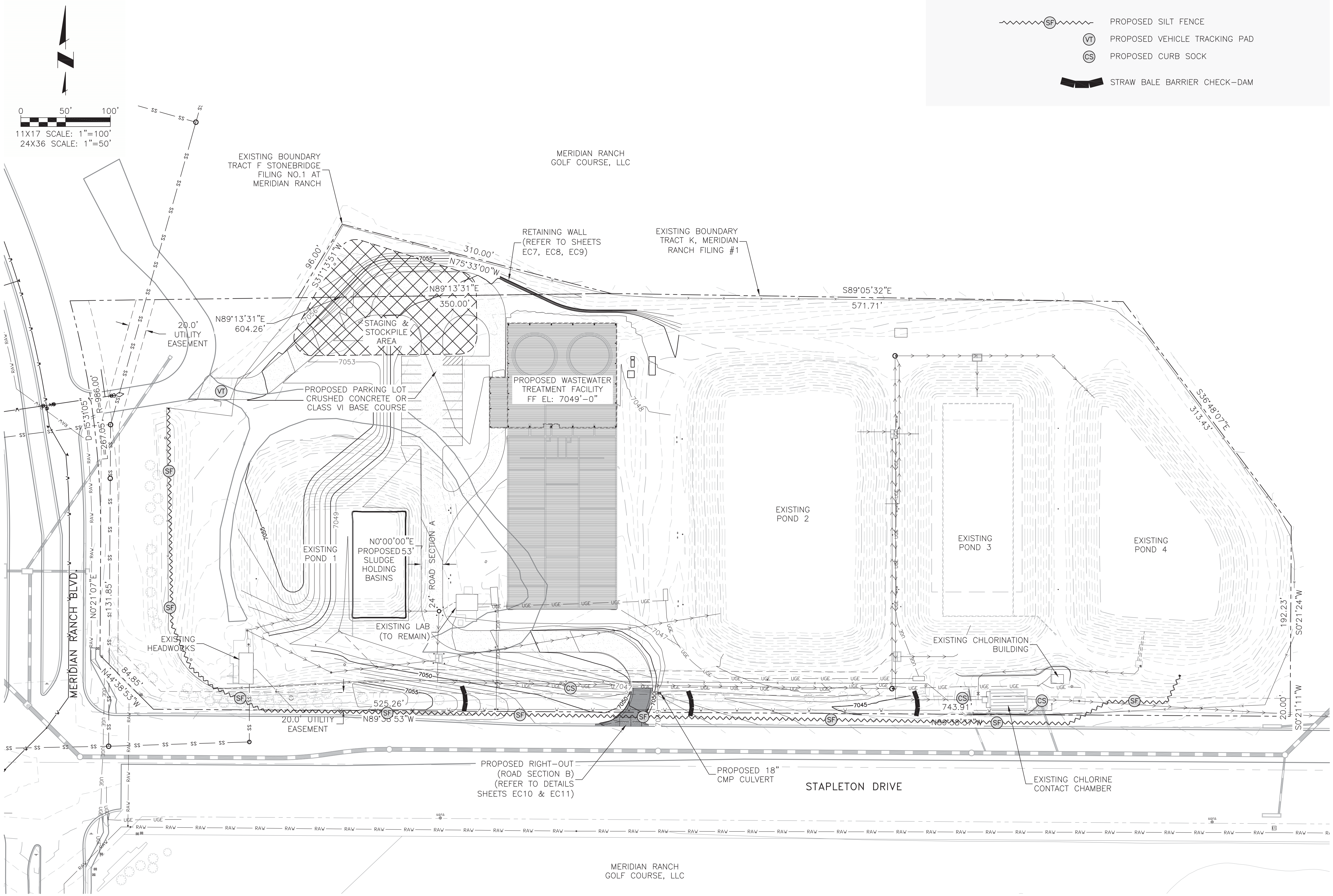
WOODMEN HILLS METROPOLITAN DISTRICT
REGIONAL WATER RECLAMATION FACILITY
EXISTING SITE PLAN

PCD FILE NO: PPR-17-027

Project No.:	112.88
Scale:	AS NOTED
Date:	08/21/17
Design:	RMM
Drawn:	RMM
Check:	JPM
Revised:	

EC1
of 11

NOTES:
1. SEED AND MULCH ALL DISTURBED AREAS.



JDS-HYDRO CONSULTANTS, INC.
545 EAST PIKES PEAK AVENUE, SUITE 300
COLORADO SPRINGS, COLORADO 80903
PH: (719) 227-0072 - FAX: (719) 471-3401

WOODMEN HILLS METROPOLITAN DISTRICT
REGIONAL WATER RECLAMATION FACILITY
GRADING & EROSION CONTROL PLAN
PCD FILE NO: PPR-17-027

Project No.:	112.88
Scale:	AS NOTED
Date:	08/21/17
Design:	RMM
Drawn:	RMM
Check:	JPM
Revised:	

EC2
of 11

EROSION CONTROL NOTES:

1. CONSTRUCTION MAY NOT COMMENCE UNTIL A CONSTRUCTION PERMIT IS OBTAINED FROM THE PLANNING & COMMUNITY DEVELOPMENT DEPARTMENT.

2. STORMWATER DISCHARGES FROM CONSTRUCTION SITES SHALL NOT CAUSE OR THREATEN TO CAUSE POLLUTION, CONTAMINATION, OR DEGRADATION OF STATE WATERS. ALL WORK AND EARTH DISTURBANCE SHALL BE DONE IN A MANNER THAT MINIMIZES POLLUTION OF ANY ON-SITE OR OFF SITE WATERS, INCLUDING WETLANDS.

3. NOTWITHSTANDING ANYTHING DEPICTED IN THESE PLANS IN WORDS OR GRAPHIC REPRESENTATION, ALL DESIGN AND CONSTRUCTION RELATED TO ROADS, STORM DRAINAGE AND EROSION CONTROL SHALL CONFORM TO THE STANDARDS AND REQUIREMENTS OF THE MOST RECENT VERSION OF THE RELEVANT ADOPTED EL PASO COUNTY STANDARDS, INCLUDING THE LAND DEVELOPMENT CODE, THE ENGINEERING CRITERIA MANUAL, THE DRAINAGE CRITERIA MANUAL, AND THE DRAINAGE CRITERIA MANUAL VOLUME 2. ANY DEVIATIONS TO REGULATIONS AND STANDARDS MUST BE REQUESTED, AND APPROVED, IN WRITING.

4. A SEPARATE STORMWATER MANAGEMENT PLAN (SWMP) FOR THIS PROJECT SHALL BE COMPLETED AND AN EROSION AND STORMWATER QUALITY CONTROL PERMIT (ESQCP) ISSUED PRIOR TO COMMENCING CONSTRUCTION. DURING CONSTRUCTION THE SWMP IS THE RESPONSIBILITY OF THE DESIGNATED STORMWATER MANAGER, SHALL BE LOCATED ON SITE AT ALL TIMES AND SHALL BE KEPT UP TO DATE WITH WORK PROGRESS AND CHANGES IN THE FIELD.

5. ONCE THE ESQCP HAS BEEN ISSUED, THE CONTRACTOR MAY INSTALL THE INITIAL STAGE EROSION AND SEDIMENT CONTROL BMPS AS INDICATED ON THE GEC. A PRECONSTRUCTION MEETING BETWEEN THE CONTRACTOR, ENGINEER, AND EL PASO COUNTY WILL BE HELD PRIOR TO ANY CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE APPLICANT TO COORDINATE THE MEETING TIME AND PLACE WITH COUNTY DSD INSPECTIONS STAFF.

6. SOIL EROSION CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES, OR ANY DISTURBED LAND AREA SHALL BE COMPLETED WITHIN 21 CALENDAR DAYS AFTER FINAL GRADING, OR FINAL EARTH DISTURBANCE, HAS BEEN COMPLETED. DISTURBED AREAS AND STOCKPILES WHICH ARE NOT AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN 30 DAYS SHALL ALSO BE MULCHED WITHIN 21 DAYS AFTER INTERIM GRADING. AN AREA THAT IS GOING TO REMAIN IN AN INTERIM STATE FOR MORE THAN 60 DAYS SHALL ALSO BE SEEDED. ALL TEMPORARY SOIL EROSION CONTROL MEASURES AND BMPS SHALL BE MAINTAINED UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED AND ESTABLISHED.

7. TEMPORARY SOIL EROSION CONTROL FACILITIES SHALL BE REMOVED AND EARTH DISTURBANCE AREAS GRADED AND STABILIZED WITH PERMANENT SOIL EROSION CONTROL MEASURES PURSUANT TO STANDARDS AND SPECIFICATION PRESCRIBED IN THE DCM VOLUME II AND THE ENGINEERING CRITERIA MANUAL (ECM) APPENDIX I.

8. ALL PERSONS ENGAGED IN EARTH DISTURBANCE SHALL IMPLEMENT AND MAINTAIN ACCEPTABLE SOIL EROSION AND SEDIMENT CONTROL MEASURES INCLUDING BMPS IN CONFORMANCE WITH THE EROSION CONTROL TECHNICAL STANDARDS OF THE DRAINAGE CRITERIA MANUAL (DCM) VOLUME II AND IN ACCORDANCE WITH THE STORMWATER MANAGEMENT PLAN (SWMP).

9. ALL TEMPORARY EROSION CONTROL FACILITIES INCLUDING BMPS AND ALL PERMANENT FACILITIES INTENDED TO CONTROL EROSION OF ANY EARTH DISTURBANCE OPERATIONS, SHALL BE INSTALLED AS DEFINED IN THE APPROVED PLANS, THESWMP AND THE DCM VOLUME II AND MAINTAINED THROUGHOUT THE DURATION OF THE EARTH DISTURBANCE OPERATION.

10. ANY EARTH DISTURBANCE SHALL BE CONDUCTED IN SUCH A MANNER SO AS TO EFFECTIVELY REDUCE ACCELERATED SOIL EROSION AND RESULTING SEDIMENTATION. ALL DISTURBANCES SHALL BE DESIGNED, CONSTRUCTED, AND COMPLETED SO THAT THE EXPOSED AREA OF ANY DISTURBED LAND SHALL BE LIMITED TO THE SHORTEST PRACTICAL PERIOD OF TIME.

11. ANY TEMPORARY OR PERMANENT FACILITY DESIGNED AND CONSTRUCTED FOR THE CONVEYANCE OF STORMWATER AROUND, THROUGH, OR FROM THE EARTH DISTURBANCE AREA SHALL BE DESIGNED TO LIMIT THE DISCHARGE TO A NON-EROSIVE VELOCITY.

12. CONCRETE WASH WATER SHALL BE CONTAINED AND DISPOSED OF IN ACCORDANCE WITH THE SWMP. NO WASH WATER SHALL BE DISCHARGED TO OR ALLOWED TO RUNOFF TO STATE WATERS, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR FACILITIES.

13. EROSION CONTROL BLANKETING IS TO BE USED ON SLOPES STEEPER THAN 3:1.

14. BUILDING, CONSTRUCTION, EXCAVATION, OR OTHER WASTE MATERIALS SHALL NOT BE TEMPORARILY PLACED OR STORED IN THE STREET, ALLEY, OR OTHER PUBLIC WAY, UNLESS IN ACCORDANCE WITH AN APPROVED TRAFFIC CONTROL PLAN. BMP'S MAY BE REQUIRED BY EL PASO COUNTY ENGINEERING IF DEEMED NECESSARY, BASED ON SPECIFIC CONDITIONS AND CIRCUMSTANCES.

15. VEHICLE TRACKING OF SOILS AND CONSTRUCTION DEBRIS OFF-SITE SHALL BE MINIMIZED. MATERIALS TRACKED OFFSITE SHALL BE CLEANED UP AND PROPERLY DISPOSED OF IMMEDIATELY.

16. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL WASTES FROM THE CONSTRUCTION SITE FOR DISPOSAL IN ACCORDANCE WITH LOCAL AND STATE REGULATORY REQUIREMENTS. NO CONSTRUCTION DEBRIS, TREE SLASH, BUILDING MATERIAL WASTES OR UNUSED BUILDING MATERIALS SHALL BE BURIED, DUMPED, OR DISCHARGED AT THE SITE.

17. THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL CONSTRUCTION DEBRIS, DIRT, TRASH, ROCK, SEDIMENT, AND SAND THAT MAY ACCUMULATE IN THE STORM SEWER OR OTHER DRAINAGE CONVEYANCE SYSTEM AND STORMWATER APPURTENANCES AS A RESULT OF SITE DEVELOPMENT.

18. THE QUANTITY OF MATERIALS STORED ON THE PROJECT SITE SHALL BE LIMITED, AS MUCH AS PRACTICAL, TO THAT QUANTITY REQUIRED TO PERFORM THE WORK IN AN ORDERLY SEQUENCE. ALL MATERIALS STORED ON-SITE SHALL BE STORED IN A NEAT, ORDERLY MANNER, IN THEIR ORIGINAL CONTAINERS, WITH ORIGINAL MANUFACTURER'S LABELS.

19. NO CHEMICALS ARE TO BE USED BY THE CONTRACTOR, WHICH HAVE THE POTENTIAL TO BE RELEASED IN STORMWATER UNLESS PERMISSION FOR THE USE OF A SPECIFIC CHEMICAL IS GRANTED IN WRITING BY THE ECM ADMINISTRATOR. IN GRANTING THE USE OF SUCH CHEMICALS, SPECIAL CONDITIONS AND MONITORING MAY BE REQUIRED.

20. BULK STORAGE STRUCTURES FOR PETROLEUM PRODUCTS AND OTHER CHEMICALS SHALL HAVE ADEQUATE PROTECTION SO AS TO CONTAIN ALL SPILLS AND PREVENT ANY SPILLED MATERIAL FROM ENTERING STATE WATERS, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR FACILITIES.

21. NO PERSON SHALL CAUSE THE IMPEDIMENT OF STORMWATER FLOW IN THE FLOW LINE OF THE CURB AND GUTTER OR IN THE DITCHLINE.

22. INDIVIDUALS SHALL COMPLY WITH THE "COLORADO WATER QUALITY CONTROL ACT" (TITLE 25, ARTICLE 8, CRS), AND THE "CLEAN WATER ACT" (33 USC 1344), IN ADDITION TO THE REQUIREMENTS INCLUDED IN THE DCM VOLUME II AND THE ECM APPENDIX I. ALL APPROPRIATE PERMITS MUST BE OBTAINED BY THE CONTRACTOR PRIOR TO CONSTRUCTION (NPDES, FLOODPLAIN, 404, FUGITIVE DUST, ETC.). IN THE EVENT OF CONFLICTS BETWEEN THESE REQUIREMENTS AND LAWS, RULES, OR REGULATIONS OF OTHER FEDERAL, STATE, OR COUNTY AGENCIES, THE MORE RESTRICTIVE LAWS, RULES, OR REGULATIONS SHALL APPLY.

23. ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE AT APPROVED CONSTRUCTION ACCESS POINTS.

24. PRIOR TO ACTUAL CONSTRUCTION THE PERMITEE SHALL VERIFY THE LOCATION OF EXISTING UTILITIES.

25. A WATER SOURCE SHALL BE AVAILABLE ON SITE DURING EARTHWORK OPERATIONS AND UTILIZED AS REQUIRED TO MINIMIZE DUST FROM EARTHWORK EQUIPMENT AND WIND.

26. THE SOILS REPORT FOR THIS SITE HAS BEEN PREPARED BY CTL-THOMPSON, INC. DATED SEPTEMBER 24, 2015, AND SHALL BE CONSIDERED A PART OF THESE PLANS.

27. AT LEAST TEN DAYS PRIOR TO THE ANTICIPATED START OF CONSTRUCTION, FOR PROJECTS THAT WILL DISTURB 1 ACRE OR MORE, THE OWNER OR OPERATOR OF CONSTRUCTION ACTIVITY SHALL SUBMIT A PERMIT APPLICATION FOR STORMWATER DISCHARGE TO THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, WATER QUALITY DIVISION. THE APPLICATION CONTAINS CERTIFICATION OF COMPLETION OF A STORMWATER MANAGEMENT PLAN (SWMP), OF WHICH THIS GRADING AND EROSION CONTROL PLAN MAY BE A PART. FOR INFORMATION OR APPLICATION MATERIALS CONTACT:

    COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
    WATER QUALITY CONTROL DIVISION
    WQCD – PERMITS
    4300 CHERRY CREEK DRIVE SOUTH
    DENVER, CO 80246-1530
    ATTN: PERMITS UNIT

28. ALL AREAS NOTED TO BE RESEEDED SHALL BE SEEDED WITH A NATIVE AND INTRODUCED GRASS MIXTURE. THE SEED WILL BE APPLIED USING MECHANICAL TYPE DRILLS AT 0.25"-0.5" INTO TOPSOIL. AREA NOT ACCESSIBLE TO A DRILL SEEDER AND SLOPES STEEPER THAN 2:1 SHALL BE HAND BROADCAST AT DOUBLE THE ABOVE SEED RATE AND RAKED AT 1/4 TO 1/2 INTO THE TOPSOIL. ALL SEEDED AREAS WILL BE MULCHED: 1-1/2 TONS CERTIFIED WEED FREE NATIVE HAY PER ACRE MECHANICALLY CRIMPED IN TOPSOIL IN COMBINATION WITH AN ORGANIC MULCH TACKIFIER. MAINTENANCE OF ANY SWALES WILL INCLUDE EROSION CONTROL AND PREVENTION, DEBRIS REMOVAL AND OCCASIONAL MOWING. CARE SHALL BE USED DURING THE REMOVAL OF SEDIMENT FROM ANY DRAINAGE WAYS. ANY SEEDING OR EROSION CONTROL MEASURE THAT IS DISTURBED DURING MAINTENANCE SHALL BE IMMEDIATELY REPAIRED. THE SEED MIX SHALL BE MADE UP OF THE FOLLOWING AS PER THE EL PASO COUNTY CONSERVATION DISTRICT (RECOMMENDATION OBTAINED APRIL 2015):

COMMON NAME (N=NATIVE, I=INTRODUCED)		SCIENTIFIC NAME	LBS PLS/ACRE
WHEATGRASS, SIBERIAN	I	AGROPYRON FRAGILE	2.04
WHEATGRASS, SLENDER	N	ELYMUS TRACHYCAULUS	10.90
WHEATGRASS, INTERMEDIATE	I	THINOPYRUM INTERMEDIUM	3.00
WILDRYE, RUSSIAN	I	PSATHYROSTACHYS JUNCEA	2.04
WHEATGRASS, WESTERN	N	PASCOPYRUM SMITHII	3.20
CLOVER, RED	I	TRIFOLIUM PRATENSE	0.40
FLAX, BLUE-APPAR	I	LINUM PERENNE	0.41
SULPHUR-FLOWER BUCKWHEAT	N	ERIOGONUM UMBELLATUM	0.55
TOTAL/POUNDS/ACRE			22.54

TIMING, CONSTRUCTION STAGING AND SEQUENCING:

EXPECTED START DATE: JUNE 2017
INSTALL TEMPORARY EROSION CONTROL – 2 DAYS
- PERIMETER SILT FENCING
- VEHICLE TRACKING CONTROL PAD
- STRAW BALE BARRIERS

ROUGH GRADING – 2 DAYS
INSTALL FINAL SITE IMPROVEMENTS – 14 MONTHS
REMOVE TEMPORARY EROSION CONTROL – 5 DAYS

MINIMUM BEST MANAGEMENT PRACTICES ELEMENTS:

STEP 1– EROSION AND SEDIMENT CONTROL
    INSTALL SEDIMENT TRAPPING DEVICES (PERIMETER CONTROLS) PRIOR TO THE START OF CONSTRUCTION.
STEP 2– SPILL PREVENTION AND RESPONSE
STEP 3– MATERIAL MANAGEMENT
    MATERIAL AND EQUIPMENT STORAGE AREAS SHALL BE SECURE AND CONTAINED TO PREVENT DISCHARGE OF ANY MATERIAL IN RUNOFF. WASTE SHALL BE CONTAINED AND DISPOSED OF PROPERLY. MAINTAIN BMP'S DURING BUILDING AND UTILITY CONSTRUCTION.
STEP 4– INSPECTION AND MAINTENANCE
    (SEE EROSION CONTROL NOTES)
STEP 5– INSTALL FINAL STABILIZATION – BASE COURSE, LANDSCAPING, EROSION CONTROL BLANKETS, AND SEEDING.
STEP 6– REMOVE TEMPORARY CONTROLS – SILT FENCING AFTER PERMANENT FEATURES ARE INSTALLED.

FINAL STABILIZATION AND LONG-TERM STORMWATER MANAGEMENT:

FINAL STABILIZATION MEASURES INCLUDE BASE COURSE, PARTIAL LANDSCAPE, AND REVEGETATION

EARTHWORK SUMMARY:

PROPOSED WASTEWATER TREATMENT SITE:
CUT – 40,000 CY
FILL – 10,000 (*1.15) = 11,500 CY
NET – 28,500 CY CUT

DISTURBED AREA – 5.70 AC

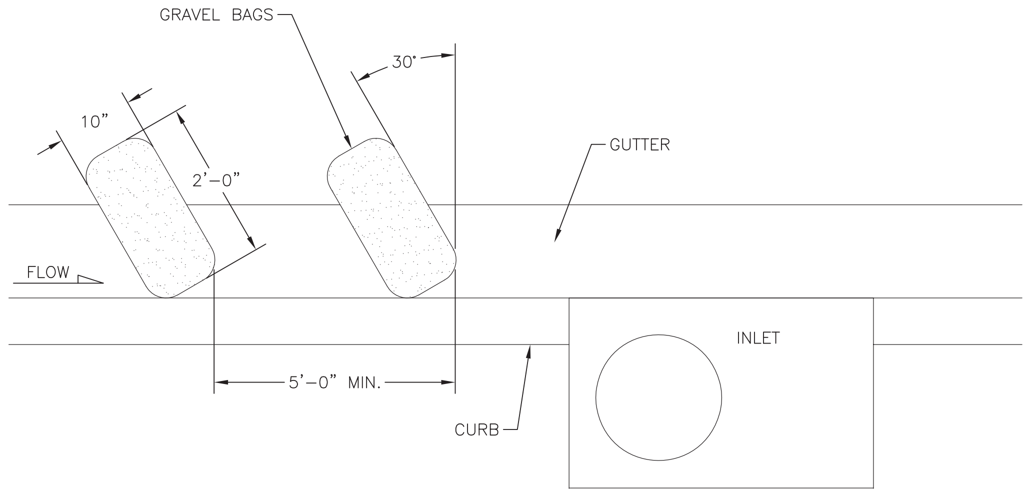
EROSION CONTROL FACILITIES:

SILT FENCE (SF) – 2,000 LF
VEHICLE TRACKING PAD (VT) – 1
STRAW BALE CHECK DAMS – 3

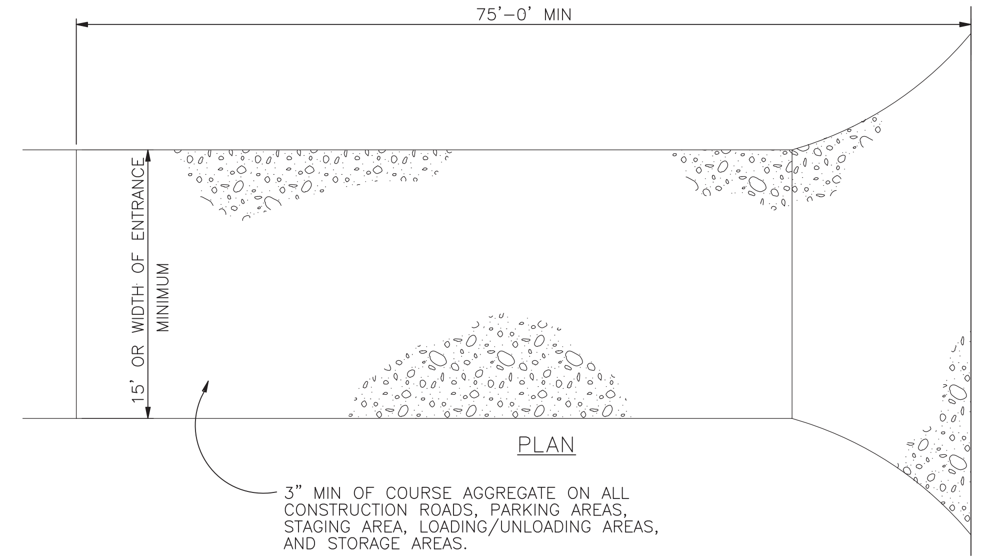
JDS-HYDRO CONSULTANTS, INC.
545 EAST PIKES PEAK AVENUE, SUITE 300
COLORADO SPRINGS, COLORADO 80903
PH: (719) 227-0072 - FAX: (719) 471-3401

WOODMEN HILLS METROPOLITAN DISTRICT
REGIONAL WATER RECLAMATION FACILITY
EROSION CONTROL NOTES
PCD FILE NO: PPR-17-027

Project No.:	112.88
Scale:	AS NOTED
Date:	08/21/17
Design:	RMM
Drawn:	RMM
Check:	JPM
Revised:	



CURB SOCK DETAIL
N.T.S.



PLAN

VEHICLE TRACKING PAD DETAIL
N.T.S.

INSTALLATION REQUIREMENTS:

1. CURB SOCKS SHALL BE INSTALLED PRIOR TO CONSTRUCTION AT EXISTING CURB AND GUTTER LOCATIONS UPSTREAM OF EXISTING INLETS.
2. SOCK IS TO BE MADE OF 1/4-INCH WIRE MESH (USED WITH GRAVEL ONLY) OR GEOTEXTILE.
3. WASHED SAND OR GRAVEL 3/4-INCH TO 4 INCHES IN DIAMETER IS PLACED INSIDE THE SOCK.
4. PLACEMENT OF THE SOCK IS TO BE 30-DEGREES FROM PERPENDICULAR IN THE OPPOSITE DIRECTION OF FLOW.
5. SOCKS ARE TO BE FLUSH WITH THE CURB AND SPACED AT A MINIMUM 5 FEET APART.
6. AT LEAST 2 CURB SOCKS IN SERIES ARE REQUIRED.

MAINTENANCE REQUIREMENTS:

1. CONTRACTOR SHALL INSPECT INLET PROTECTION IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL AND WEEKLY DURING PERIODS OF NO RAINFALL.
2. DAMAGED OR INEFFECTIVE INLET PROTECTION SHALL PROMPTLY BE REPAIRED OR REPLACED.
3. SEDIMENT SHALL BE REMOVED FROM BEHIND THE SOCK WHEN GUTTER WIDTH IS FILLED.
4. INLET PROTECTION SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED WITHIN THE UPSTREAM DRAINAGE AREA.

INSTALLATION REQUIREMENTS:

1. ALL ENTRANCES TO THE CONSTRUCTION SITE ARE TO BE STABILIZED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
2. CONSTRUCTION ENTRANCES ARE TO BE BUILT WITH AN APRON TO ALLOW FOR TURNING TRAFFIC, BUT SHOULD NOT BE BUILT OVER EXISTING PAVEMENT EXCEPT FOR A SLIGHT OVERLAP.
3. AREAS TO BE STABILIZED ARE TO BE PROPERLY GRADED AND COMPACTED.
4. CONSTRUCTION ROADS, PARKING AREAS, LOADING/UNLOADING ZONES, STORAGE AREAS, AND STAGING AREAS ARE TO BE STABILIZED.
5. CONSTRUCTION ROADS ARE TO BE BUILT TO CONFORM TO SITE GRADES, BUT SHOULD NOT HAVE SIDE SLOPES OR ROAD GRADES THAT ARE EXCESSIVELY STEEP.

MAINTENANCE REQUIREMENTS

1. REGULAR INSPECTIONS ARE TO BE MADE OF ALL STABILIZED AREAS, ESPECIALLY AFTER STORM EVENTS.
2. STONES ARE TO BE REAPPLIED PERIODICALLY AND WHEN REPAIR IS NECESSARY.
3. SEDIMENT TRACKED ONTO PAVED ROADS IS TO BE REMOVED DAILY BY SHOVELING OR SWEEPING. SEDIMENT IS NOT TO BE WASHED DOWN STORM SEWER DRAINS.
4. OTHER ASSOCIATED SEDIMENT CONTROL MEASURES ARE TO BE INSPECTED TO ENSURE GOOD WORKING CONDITION.
5. TO BE REMOVED JUST PRIOR TO FINAL SURFACING AND STABILIZATION.

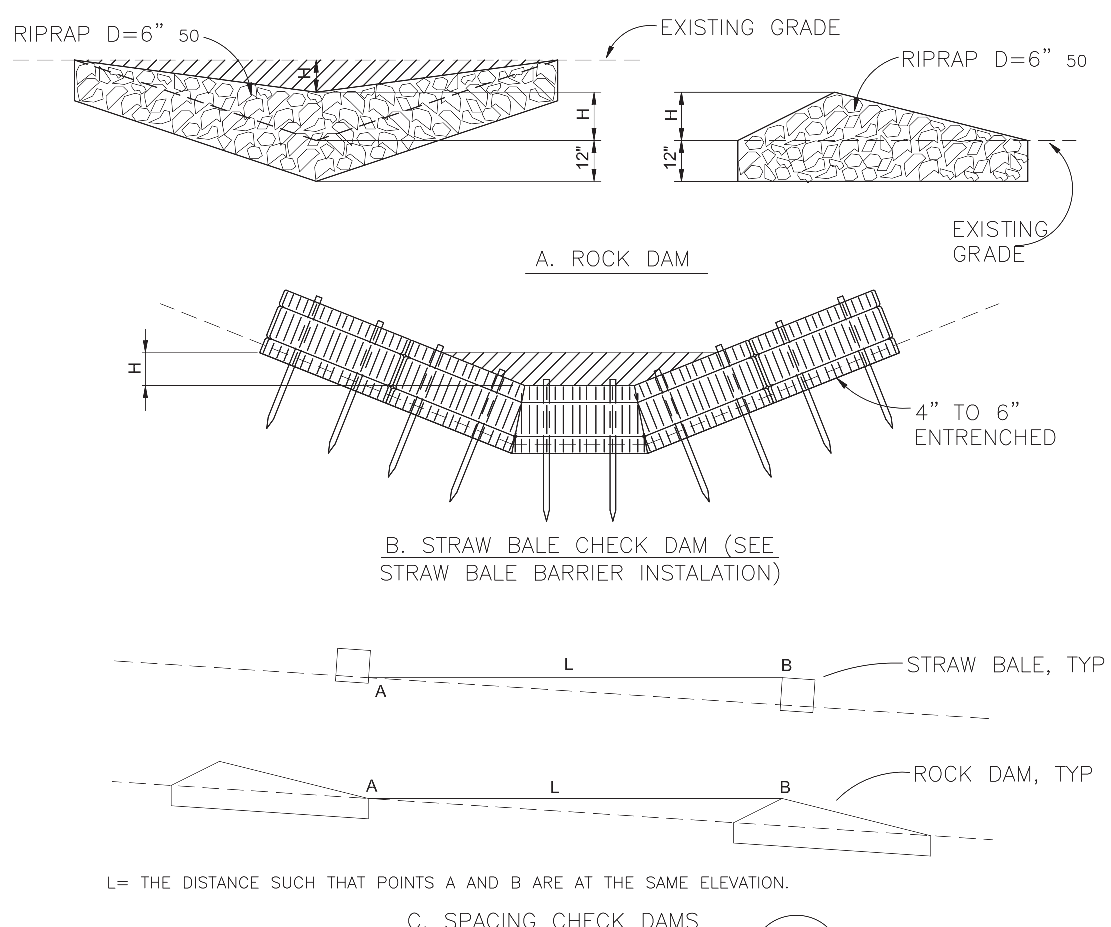
JDS-HYDRO CONSULTANTS, INC.
545 EAST PIKES PEAK AVENUE, SUITE 300
COLORADO SPRINGS, COLORADO 80903
PH: (719) 227-0072 - FAX: (719) 471-3401

WOODMEN HILLS METROPOLITAN DISTRICT
REGIONAL WATER RECLAMATION FACILITY
EROSION CONTROL DETAILS 1

PCD FILE NO: PPR-17-027

Project No.:	112.88
Scale:	AS NOTED
Date:	08/21/17
Design:	RMM
Drawn:	RMM
Check:	JPM
Revised:	

EC4 of 11



CHECK DAM
NTS

SB

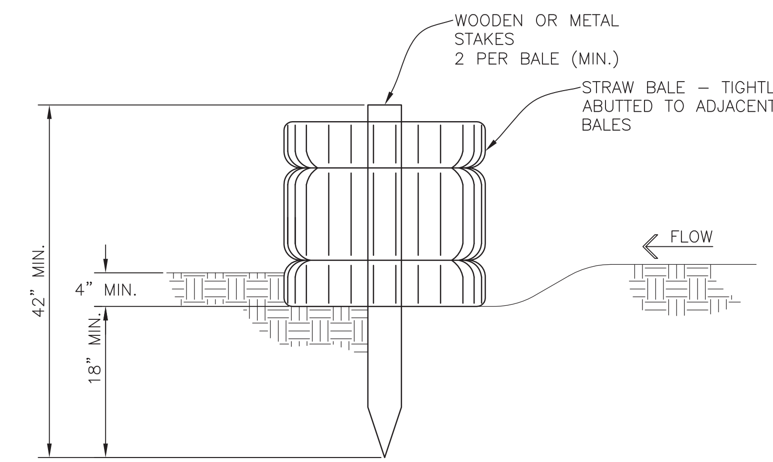
CHECK DAM NOTES

INSTALLATION REQUIREMENTS

1. STRAW BALES USED AS CHECK DAMS ARE TO MEET THE REQUIREMENTS STATED IN FIGURE STRAW BALE BARRIER DETAIL.
2. THE "H" DIMENSION SHALL BE SELECTED TO PROVIDE WEIR FLOW CONVEYANCE FOR 2-YEAR FLOW OR GREATER.

MAINTENANCE REQUIREMENTS

1. REGULAR INSPECTIONS ARE TO BE MADE OF ALL CHECK DAMS, ESPECIALLY AFTER STORM EVENTS.
2. REPLACE STONE AS NECESSARY TO MAINTAIN THE CORRECT HEIGHT OF THE DAM.
3. ACCUMULATED SEDIMENT AND DEBRIS IS TO BE REMOVED FROM BEHIND THE DAMS AFTER EACH STORM OR WHEN 1/2 OF THE ORIGINAL HEIGHT OF THE DAM IS REACHED.
4. CHECK DAMS ARE TO REMAIN IN PLACE AND OPERATIONAL UNTIL THE DRAINAGE AREA AND CHANNEL ARE PERMANENTLY STABILIZED.
5. WHEN CHECK DAMS ARE REMOVED THE CHANNEL LINING OR VEGETATION IS TO BE RESTORED.



STRAW BALE BARRIER
N.T.S.

SB

STRAW BALE BARRIER NOTES

INSTALLATION REQUIREMENTS

1. STRAW BALE BARRIERS SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.
2. BALES SHALL CONSIST OF APPROXIMATELY 5 CUBIC FEET OF CERTIFIED WEED FREE HAY OR STRAW AND WEIGH NOT LESS THAN 35 POUNDS.
3. BALES ARE TO BE PLACED IN A SINGLE ROW WITH THE END OF THE BALES TIGHTLY ABUTTING ONE ANOTHER.
4. EACH BALE IS TO BE SECURELY ANCHORED WITH AT LEAST TWO STAKES AND THE FIRST STAKE IS TO BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE TO FORCE THE BALES TOGETHER.
5. STAKES ARE TO BE A MINIMUM OF 42 INCHES LONG. METAL STAKES SHALL BE STANDARD "T" OR "U" TYPE WITH MINIMUM WEIGHT OF 1.33 POUNDS PER LINEAR FOOT. WOOD STAKES SHALL HAVE A MINIMUM DIAMETER OR CROSS SECTION DIMENSION OF 2 INCHES.
6. BALES ARE TO BE BOUND WITH EITHER WIRE OR STRING AND ORIENTED SUCH THAT THE BINDINGS ARE AROUND THE SIDES AND NOT ALONG THE TOPS AND BOTTOMS OF THE BALE.
7. GAPS BETWEEN BALES ARE TO BE CHINKED (FILLED BY WEDGING) WITH STRAW OR THE SAME MATERIAL OF THE BALE.
8. END BALES ARE TO EXTEND UPSLOPE SO THE TRAPPED RUNOFF CANNOT FLOW AROUND THE ENDS OF THE BARRIER.

MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT STRAW BALE BARRIERS IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS NO RAINFALL.
2. DAMAGED OR INEFFECTIVE BARRIERS SHALL PROMPTLY BE REPAIRED, REPLACING BALES IF NECESSARY, AND UNENTRENCHED BALES NEED TO BE REPAIRED WITH COMPACTED BACKFILL MATERIAL.
3. SEDIMENT SHALL BE REMOVED FROM BEHIND STRAW BALE BARRIERS WHEN IT ACCUMULATES TO APPROXIMATELY 1/2 THE HEIGHT OF THE BARRIER.
4. STRAW BALE BARRIERS SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED

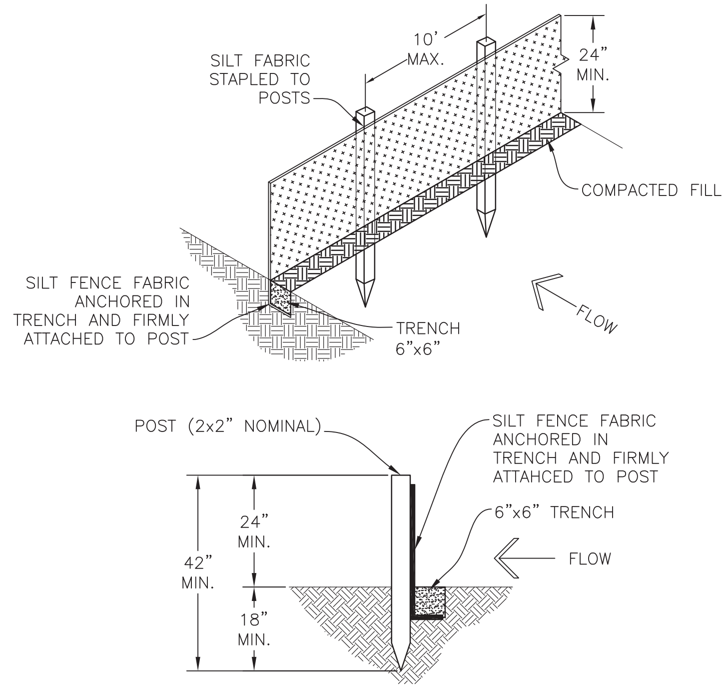
HAY BALE SPACING REQUIREMENTS

SLOPE	SPACING
0.5%	300'
1.0%	150'
2.0%	75'
3.0%	50'

JDS-HYDRO CONSULTANTS, INC.
545 EAST PIKES PEAK AVENUE, SUITE 300
COLORADO SPRINGS, COLORADO 80903
PH: (719) 227-0072 - FAX: (719) 471-3401

WOODMEN HILLS METROPOLITAN DISTRICT
REGIONAL WATER RECLAMATION FACILITY
EROSION CONTROL DETAILS 2
PCD FILE NO: PPR-17-027

Project No.:	112.88
Scale:	AS NOTED
Date:	08/21/17
Design:	RMM
Drawn:	RMM
Check:	JPM
Revised:	



SILT FENCE DETAIL
N.T.S.

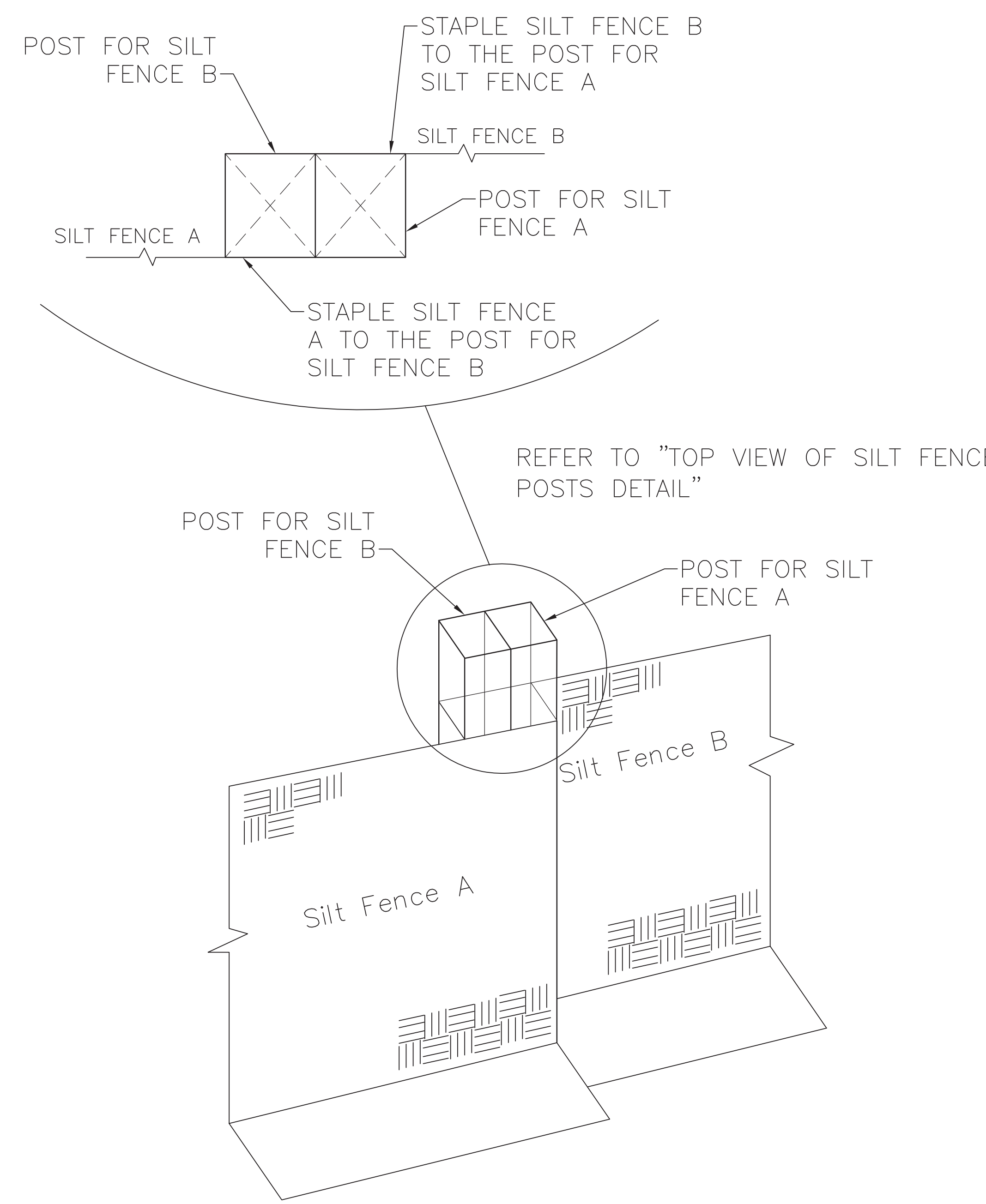
INSTALLATION REQUIREMENTS:

1. SILT FENCES SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.
2. WHEN JOINTS ARE NECESSARY, SILT FENCE GEOTEXTILE SHALL BE SPLICED TOGETHER ONLY AT SUPPORT POST AND SECURELY SEALED.
3. METAL POSTS SHALL BE "STUDDED TEE" OR "U" TYPE WITH MINIMUM WEIGHT OF 1.33 POUNDS PER LINEAR FOOT. WOOD POSTS SHALL HAVE A MINIMUM DIAMETER OR CROSS SECTION DIMENSION OF 2 INCHES.
4. THE FILTER MATERIAL SHALL BE FASTENED SECURELY TO METAL POSTS USING WIRE TIES, OR TO WOOD POSTS WITH 3/4" LONG #9 HEAVY-DUTY STAPLES. THE SILT FENCE GEOTEXTILE SHALL NOT BE STAPLED TO EXISTING TREES.
5. WHILE NOT REQUIRED, WIRE MESH FENCE MAY BE USED TO SUPPORT THE GEOTEXTILE. WIRE FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY-DUTY WIRE STAPLES AT LEAST 3/4" LONG, TIE WIRES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 6 INCHES AND SHALL NOT EXTEND MORE THAN 3 FEET ABOVE THE ORIGINAL GROUND SURFACE.
6. ALONG THE TOE OF FILLS, INSTALL THE SILT FENCE ALONG A LEVEL CONTOUR AND PROVIDE AN AREA BEHIND THE FENCE FOR RUNOFF TO POND AND SEDIMENT TO SETTLE. A MINIMUM DISTANCE OF 5 FEET FROM THE TOE OF THE FILL IS RECOMMENDED.
7. THE HEIGHT OF THE SILT FENCE FROM THE GROUND SURFACE SHALL BE MINIMUM OF 24 INCHES AND SHALL NOT EXCEED 36 INCHES. HIGHER FENCES MAY IMPOUND VOLUMES OF WATER SUFFICIENT TO CAUSE FAILURE OF THE STRUCTURE.

MAINTENANCE REQUIREMENTS:

1. CONTRACTOR SHALL INSPECT SILT FENCES IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS OF NO RAINFALL. DAMAGED, COLLAPSED, UNENTRENCHED OR INEFFECTIVE SILT FENCES SHALL BE PROMPTLY REPAIRED OR REPLACED.
2. SEDIMENT SHALL BE REMOVED FROM BEHIND SILT FENCE WHEN IT ACCUMULATES TO HALF THE EXPOSED GEOTEXTILE HEIGHT.
3. SILT FENCES SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED.

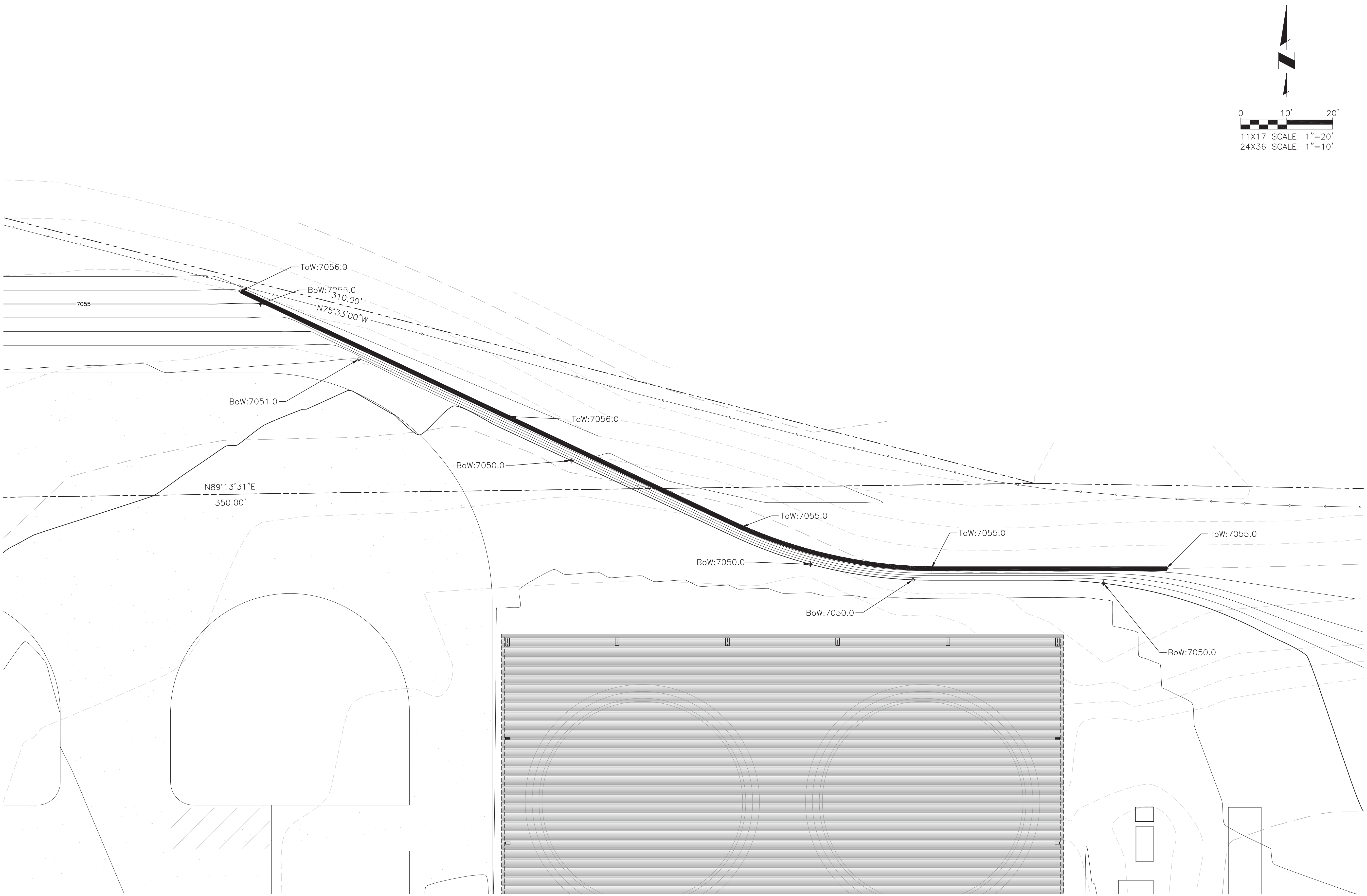
TOP VIEW OF SILT FENCE POSTS DETAIL



JDS-HYDRO CONSULTANTS, INC.
545 EAST PIKES PEAK AVENUE, SUITE 300
COLORADO SPRINGS, COLORADO 80903
PH: (719) 227-0072 - FAX: (719) 471-3401

WOODMEN HILLS METROPOLITAN DISTRICT
REGIONAL WATER RECLAMATION FACILITY
EROSION CONTROL DETAILS 3
PCD FILE NO: PPR-17-027

Project No.:	112.88
Scale:	AS NOTED
Date:	08/21/17
Design:	RMM
Drawn:	RMM
Check:	JPM
Revised:	



JDS-HYDRO CONSULTANTS, INC.
545 EAST PIKES PEAK AVENUE, SUITE 300
COLORADO SPRINGS, COLORADO 80903
PH: (719) 227-0072 - FAX: (719) 471-3401

WOODMEN HILLS METROPOLITAN DISTRICT REGIONAL WATER RECLAMATION FACILITY RETAINING WALL ELEVATIONS

PCD FILE NO: PPR-17-027

Project No.:	112.88
Scale:	AS NOTED
Date:	08/21/17
Design:	RMM
Drawn:	RMM
Check:	JPM
Revised:	

1.0 RETAINING WALL BLOCK:

1.1 MODULAR WALL UNITS

A. WALL UNITS SHALL BE ALLAN BLOCK RETAINING WALL UNITS AS PRODUCED BY A LICENSED MANUFACTURER.

B. WALL UNITS SHALL HAVE MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI (20.7 MPA) IN ACCORDANCE WITH ASTM C1372. THE CONCRETE UNITS SHALL HAVE ADEQUATE FREEZE-THAW PROTECTION WITH AN AVERAGE ABSORPTION RATE IN ACCORDANCE WITH ASTM C1372 OR AN AVERAGE ABSORPTION RATE OF7.5 LB/FT^3 (120 KG/M^3) FOR NORTHERN CLIMATES AND 10 LB/FT3 (160 KG/M^3) FOR SOUTHERN CLIMATES.

C. EXTERIOR DIMENSIONS SHALL BE UNIFORM AND CONSISTENT. MAXIMUM DIMENSIONAL DEVIATIONS ON THE HEIGHT OF ANY TWO UNITS SHALL BE 0.125 IN.

D. WALL UNITS SHALL PROVIDE A MINIMUM OF 110 LBS TOTAL WEIGHT PER SQUARE FOOT OF WALL FACE AREA (555 KG/M^2). FILL CONTAINED WITHIN THE UNITS MAY BE CONSIDERED 80% EFFECTIVE WEIGHT.

E. EXTERIOR FACE SHALL BE TEXTURED. COLOR AS SPECIFIED BY OWNER.

1.2 WALL ROCK

A. MATERIAL MUST BE WELL-GRADED COMPACTABLE AGGREGATE, 0.25 IN. TO 1.5 IN., WITH NO MORE THAN 10% PASSING THE #200 SIEVE.(ASTM D422)

B. MATERIAL BEHIND AND WITHIN THE BLOCKS MAY BE THE SAME MATERIAL.

1.3 INFILL SOIL

A. INFILL MATERIAL SHALL BE SITE EXCAVATED SOILS WHEN APPROVED BY THE ON-SITE SOILS ENGINEER UNLESS OTHERWISE SPECIFIED IN THE DRAWINGS. UNSUITABLE SOILS FOR BACKFILL (HEAVY CLAYS OR ORGANIC SOILS) SHALL NOT BE USED IN THE REINFORCED SOIL MASS. FINE GRAINED COHESIVE SOILS (F<31) MAYBE USED IN WALL CONSTRUCTION, BUT ADDITIONAL BACKFILLING, COMPACTION AND WATER MANAGEMENT EFFORTS ARE REQUIRED. POORLY GRADED SANDS, EXPANSIVE CLAYS AND/OR SOILS WITH A PLASTICITY INDEX (PI) >20 OR A LIQUID LIMIT (LL) >40 SHOULD NOT BE USED IN WALL CONSTRUCTION.

B. THE INFILL SOIL USED MUST MEET OR EXCEED THE DESIGNED FRICTION ANGLE AND DESCRIPTION NOTED ON THE DESIGN CROSS SECTIONS, AND MUST BE FREE OF DEBRIS AND CONSIST OF ONE OF THE FOLLOWING INORGANIC USCS SOIL TYPES: GP, GW, SW, SP MEETING THE FOLLOWING GRADATION AS DETERMINED IN ACCORDANCE WITH ASTM D422.

SIEVE SIZE	PERCENT PASSING
4 INCH (100 MM)	100 - 75
#4 (4.75 MM)	100 - 20
#40 (0.425 MM)	0 - 60
#200 (0.075 MM)	0 - 35

C. WHERE ADDITIONAL FILL IS REQUIRED, CONTRACTOR SHALL SUBMIT SAMPLE AND SPECIFICATIONS TO THE WALL DESIGN ENGINEER OR THE ONSITE SOILS ENGINEER FOR APPROVAL AND THE APPROVING ENGINEER MUST CERTIFY THAT THE SOILS PROPOSED FOR USE HAS PROPERTIES MEETING OR EXCEEDING ORIGINAL DESIGN STANDARDS.

2.0 WALL CONSTRUCTION:

2.1 EXCAVATION

A. CONTRACTOR SHALL EXCAVATE TO THE LINES AND GRADES SHOWN ON THE CONSTRUCTION DRAWINGS. CONTRACTOR SHALL USE CAUTION NOT TO OVER-EXCAVATE BEYOND THE LINES SHOWN, OR TO DISTURB THE BASE ELEVATIONS BEYOND THOSE SHOWN.

B. CONTRACTOR SHALL VERIFY LOCATIONS OF EXISTING STRUCTURES AND UTILITIES PRIOR TO EXCAVATION. CONTRACTOR SHALL ENSURE ALL SURROUNDING STRUCTURES ARE PROTECTED FROM THE EFFECTS OF WALL EXCAVATION.

2.2 FOUNDATION SOIL PREPARATION

A. FOUNDATION SOIL SHALL BE DEFINED AS ANY SOILS LOCATED BENEATH A WALL.

B. FOUNDATION SOIL SHALL BE EXCAVATED AS DIMENSIONED ON THE PLANS AND COMPACTED TO A MINIMUM OF 95% OF STANDARD PROCTOR (ASTM D698)PRIOR TO PLACEMENT OF THE BASE MATERIAL.

C. FOUNDATION SOIL SHALL BE EXAMINED BY THE ON-SITE SOILS ENGINEER TO ENSURE THAT THE ACTUAL FOUNDATION SOIL STRENGTH MEETS OR EXCEEDS ASSUMED DESIGN STRENGTH. SOIL NOT MEETING THE REQUIRED STRENGTH SHALL BE REMOVED AND REPLACED WITH ACCEPTABLE MATERIAL.

2.3 BASE

A. THE BASE MATERIAL SHALL BE THE SAME AS THE WALL ROCK MATERIAL (SECTION 1.2) OR A LOW PERMEABLE GRANULAR MATERIAL.

B. BASE MATERIAL SHALL BE PLACED AS SHOWN ON THE CONSTRUCTION DRAWING. TOP OF BASE SHALL BE LOCATED TO ALLOW BOTTOM WALL UNITS TO BE BURIED TO PROPER DEPTHS AS PER WALL HEIGHTS AND SPECIFICATIONS.

C. BASE MATERIAL SHALL BE INSTALLED ON UNDISTURBED NATIVE SOILS OR SUITABLE REPLACEMENT FILLS COMPACTED TO A MINIMUM OF 95% STANDARD PROCTOR(ASTM D698).

D. BASE SHALL BE COMPACTED AT 95% STANDARD PROCTOR (ASTM D698) TO PROVIDE A LEVEL HARD SURFACE ON WHICH TO PLACE THE FIRST COURSE OF BLOCKS. THE BASE SHALL BE CONSTRUCTED TO ENSURE PROPER WALL EMBEDMENT AND THE FINAL ELEVATION SHOWN ON THE PLANS. WELL-GRADED SAND CAN BE USED TO SMOOTH THE TOP 1/2 IN. ON THE BASE MATERIAL.

E. BASE MATERIAL SHALL BE A 4 IN. MINIMUM DEPTH FOR WALLS UNDER 4 FT AND A 6 IN. MINIMUM DEPTH FOR WALLS OVER 4FT.

2.4 UNIT INSTALLATION

A. THE FIRST COURSE OF WALL UNITS SHALL BE PLACED ON THE PREPARED BASE WITH THE RAISED LIP FACING UP AND OUT AND THE FRONT EDGES TIGHT TOGETHER. THE UNITS SHALL BE CHECKED FOR LEVEL AND ALIGNMENT AS THEY ARE PLACED.

B. ENSURE THAT UNITS ARE IN FULL CONTACT WITH BASE. PROPER CARE SHALL BE TAKEN TO DEVELOP STRAIGHT LINES AND SMOOTH CURVES ON BASE COURSE AS PER WALL LAYOUT.

C. FILL ALL CORES AND CAVITIES A MINIMUM OF 12 IN. BEHIND THE BASE COURSE WITH WALL ROCK. USE INFILL SOILS BEHIND THE WALL ROCK AND APPROVED SOILS IN FRONT OF THE BASE COURSE TO FIRMLY LOCK IN PLACE. CHECK AGAIN FOR LEVEL AND ALIGNMENT. USE A PLATE COMPACTOR TO CONSOLIDATE THE AREA BEHIND THE BASE COURSE. ALL EXCESS MATERIAL SHALL BE SWEPT FROM TOP OF UNITS.

D. INSTALL NEXT COURSE OF WALL UNITS ON TOP OF BASE COURSE. POSITION BLOCKS TO BE OFFSET FROM SEAMS OF BLOCKS BELOW. PERFECT RUNNING BOND IS NOT ESSENTIAL, BUT A 3 IN. MINIMUM OFFSET IS RECOMMENDED. CHECK EACH BLOCK FOR PROPER ALIGNMENT AND LEVEL. FILL ALL CAVITIES IN AND AROUND WALL UNITS TO A MINIMUM OF 12 IN. DEPTH BEHIND BLOCK WITH WALL ROCK. FOR TALLER WALL APPLICATION THE DEPTH OF WALL ROCK BEHIND THE BLOCK SHOULD BE INCREASED; WALLS FROM 15 FT TO 25 FT SHOULD HAVE A MINIMUM OF 2 FT AND WALLS ABOVE 25FT THE CONSOLIDATION ZONE SHALL BE DEFINED AS 3 FT BEHIND THE WALL. COMPACTION WITHIN THE CONSOLIDATION ZONE SHALL BE ACCOMPLISHED BY USING A HAND OPERATED PLATE COMPACTOR AND SHALL BEGIN BY RUNNING THE PLATE COMPACTOR DIRECTLY ON THE BLOCK AND THEN COMPACTING IN PARALLEL PATHS FROM THE WALL FACE UNTIL THE ENTIRE CONSOLIDATION ZONE HAS BEEN COMPACTED. A MINIMUM OF TWO PASSES OF THE PLATE COMPACTOR ARE REQUIRED WITH MAXIMUM LIFTS OF 8 IN. EXPANSIVE OR FINE-GRAINED SOILS MAY REQUIRE ADDITIONAL COMPACTION PASSES AND/OR SPECIFIC COMPACTION EQUIPMENT SUCH AS A SHEEPS FOOT ROLLER. MAXIMUM LIFTS OF 4 INCHES MAY BE REQUIRED TO ACHIEVE ADEQUATE COMPACTION WITHIN THE CONSOLIDATION ZONE. EMPLOY METHODS USING LIGHTWEIGHT COMPACTION EQUIPMENT THAT WILL NOT DISRUPT THE STABILITY OR BATTER OF THE WALL. FINAL COMPACTION REQUIREMENTS IN THE CONSOLIDATION ZONE SHALL BE ESTABLISHED BY THE ENGINEER OF RECORD.

E. AS WITH ANY CONSTRUCTION WORK, SOME DEVIATION FROM CONSTRUCTION DRAWING ALIGNMENTS WILL OCCUR. VARIABILITY IN CONSTRUCTION OF SRWS IS APPROXIMATELY EQUAL TO THAT OF CAST-IN-PLACE CONCRETE RETAINING WALLS. AS OPPOSED TO CAST-IN-PLACE CONCRETE WALLS, ALIGNMENT OF SRWS CAN BE SIMPLY CORRECTED OR MODIFIED DURING CONSTRUCTION. BASED UPON EXAMINATION OF NUMEROUS COMPLETED SRWS, THE FOLLOWING RECOMMENDED MINIMUM TOLERANCES CAN BE ACHIEVED WITH GOOD CONSTRUCTION TECHNIQUES:

VERTICAL CONTROL: +/-1.25 IN. MAX. OVER 10 FT DISTANCE
HORIZONTAL LOCATION CONTROL: +/-1.25 IN. OVER A 10 FT DISTANCE
ROTATION: FROM ESTABLISHED PLAN WALL BATTER: 2.0 DEG.
BULGING: 1.0 IN. OVER A 10 FT DISTANCE

3.0 GEOGRID REINFORCEMENT SYSTEM:

3.1 DEFINITIONS

A. GEOGRID PRODUCTS SHALL BE OF HIGH DENSITY POLYETHYLENE OR POLYESTER YARNS ENCAPSULATED IN A PROTECTIVE COATING SPECIFICALLY FABRICATED FOR USE AS A SOIL REINFORCEMENT MATERIAL.

B. CONCRETE RETAINING WALL UNITS ARE AS DETAILED ON THE DRAWINGS AND SHALL BE ALLAN BLOCK RETAINING WALL UNITS.

C. DRAINAGE MATERIAL IS FREE DRAINING GRANULAR MATERIAL AS DEFINED IN SECTION 1.2 WALL ROCK.

D. INFILL SOIL IS THE SOIL USED AS FILL FOR THE REINFORCED SOIL MASS.

E. FOUNDATION SOIL IS THE IN-SITU SOIL.

3.2 PRODUCTS

A. GEOGRID SHALL BE THE TYPE AS SHOWN ON THE DRAWINGS HAVING THE PROPERTY REQUIREMENTS AS DESCRIBED WITHIN THE MANUFACTURER'S SPECIFICATIONS.

3.3 ACCEPTABLE MANUFACTURERS

A. A MANUFACTURER'S PRODUCT SHALL BE APPROVED BY THE WALL DESIGN ENGINEER.

4.0 WALL CONSTRUCTION

4.1 FOUNDATION SOIL PREPARATION

A. FOUNDATION SOIL SHALL BE EXCAVATED TO THE LINES AND GRADES AS SHOWN ON THE CONSTRUCTION DRAWINGS, OR AS DIRECTED BY THE ON-SITE SOILS ENGINEER.

B. FOUNDATION SOIL SHALL BE EXAMINED BY THE ON-SITE SOILS ENGINEER TO ASSURE THAT THE ACTUAL FOUNDATION SOIL STRENGTH MEETS OR EXCEEDS ASSUMED DESIGN STRENGTH.

C. OVER-EXCAVATED AREAS SHALL BE FILLED WITH COMPACTED BACKFILL MATERIAL APPROVED BY ON-SITE SOILS ENGINEER.

D. CONTRACTOR SHALL VERIFY LOCATIONS OF EXISTING STRUCTURES AND UTILITIES PRIOR TO EXCAVATION. CONTRACTOR SHALL ENSURE ALL SURROUNDING STRUCTURES ARE PROTECTED FROM THE EFFECTS OF WALL EXCAVATION.

4.2 GEOGRID INSTALLATION

A. INSTALL ALLAN BLOCK WALL TO DESIGNATED HEIGHT OF FIRST GEOGRID LAYER. BACKFILL AND COMPACT THE WALL ROCK AND INFILL SOIL IN LAYERS NOT TO EXCEED 8IN. LIFTS BEHIND WALL TO DEPTH EQUAL TO DESIGNED GRID LENGTH BEFORE GRID IS INSTALLED.

B. CUT GEOGRID TO DESIGNED EMBEDMENT LENGTH AND PLACE ON TOP OF ALLAN BLOCK TO BACK EDGE OF LIP. EXTEND AWAY FROM WALL APPROXIMATELY 3% ABOVE HORIZONTAL ON COMPACTED INFILL SOILS.

C. LAY GEOGRID AT THE PROPER ELEVATION AND ORIENTATIONS SHOWN ON THE CONSTRUCTION DRAWINGS OR AS DIRECTED BY THE WALL DESIGN ENGINEER.

D. CORRECT ORIENTATION OF THE GEOGRID SHALL BE VERIFIED BY THE CONTRACTOR AND ON-SITE SOILS ENGINEER. STRENGTH DIRECTION IS TYPICALLY PERPENDICULAR TO WALL FACE.

E. FOLLOW MANUFACTURER'S GUIDELINES FOR OVERLAP REQUIREMENTS.

F. PLACE NEXT COURSE OF ALLAN BLOCK ON TOP OF GRID AND FILL BLOCK CORES WITH WALL ROCK TO LOCK IN PLACE. REMOVE SLACK AND FOLDS IN GRID AND STAKE TO HOLD IN PLACE.

G. ADJACENT SHEETS OF GEOGRID SHALL BE BUTTED AGAINST EACH OTHER AT THE WALL FACE TO ACHIEVE 100 PERCENT COVERAGE.

H. GEOGRID LENGTHS SHALL BE CONTINUOUS. SPLICING PARALLEL TO THE WALL FACE IS NOT ALLOWED.

4.3 FILL PLACEMENT

A. INFILL SOIL SHALL BE PLACED IN LIFTS AND COMPACTED.

B. INFILL SOIL SHALL BE PLACED, SPREAD AND COMPACTED IN SUCH A MANNER THAT MINIMIZES THE DEVELOPMENT OF SLACK OR MOVEMENT OF THE GEOGRID.

C. ONLY HAND-OPERATED COMPACTION EQUIPMENT SHALL BE ALLOWED WITHIN 3 FT BEHIND THE WALL. THIS AREA SHALL BE DEFINED AS THE CONSOLIDATION ZONE. COMPACTION IN THIS ZONE SHALL BEGIN BY RUNNING THE PLATE COMPACTOR DIRECTLY ON THE BLOCK AND THEN COMPACTING IN PARALLEL PATHS TO THE WALL FACE UNTIL THE ENTIRE CONSOLIDATION ZONE HAS BEEN COMPACTED. A MINIMUM OF TWO PASSES OF THE PLATE COMPACTOR ARE REQUIRED WITH MAXIMUM LIFTS OF 8 IN.

D. WHEN FILL IS PLACED AND COMPACTION CANNOT BE DEFINED IN TERMS OF STANDARD PROCTOR DENSITY, THEN COMPACTION SHALL BE PERFORMED USING ORDINARY COMPACTION PROCESS AND COMPACTED SO THAT NO DEFORMATION IS OBSERVED FROM THE COMPACTION EQUIPMENT OR TO THE SATISFACTION OF THE ENGINEER OF RECORD OR THE SITE SOILS ENGINEER.

E. TRACKED CONSTRUCTION EQUIPMENT SHALL NOT BE OPERATED DIRECTLY ON THE GEOGRID. A MINIMUM FILL THICKNESS OF 6 IN. IS REQUIRED PRIOR TO OPERATION OF TRACKED VEHICLES OVER THE GEOGRID. TURNING OF TRACKED VEHICLES SHOULD BE KEPT TO A MINIMUM TO PREVENT TRACKS FROM DISPLACING THE FILL AND DAMAGING THE GEOGRID.

F. RUBBER-TIRED EQUIPMENT MAY PASS OVER THE GEOGRID REINFORCEMENT AT SLOW SPEEDS, LESS THAN 10 MPH. SUDDEN BRAKING AND SHARP TURNING SHALL BE AVOIDED.

G. THE INFILL SOIL SHALL BE COMPACTED TO ACHIEVE 95% STANDARD PROCTOR (ASTM D698). COMPACTION TESTS SHALL BE TAKEN AT 3 FT BEHIND THE BLOCK AND AT THE BACK OF THE REINFORCED ZONE. THE FREQUENCY SHALL BE AS DETERMINED BY THE ON-SITE SOILS ENGINEER OR AS SPECIFIED ON THE PLAN. SOIL TESTS OF THE INFILL SOIL SHALL BE SUBMITTED TO THE ON-SITE SOILS ENGINEER FOR REVIEW AND APPROVAL PRIOR TO THE PLACEMENT OF ANY MATERIAL. THE CONTRACTOR IS RESPONSIBLE FOR ACHIEVING THE SPECIFIED COMPACTION REQUIREMENTS. THE ON-SITE SOILS ENGINEER MAY DIRECT THE CONTRACTOR TO REMOVE, CORRECT OR AMEND ANY SOIL FOUND NOT IN COMPLIANCE WITH THESE WRITTEN SPECIFICATIONS.

4.4 SPECIAL CONSIDERATIONS

A. GEOGRID CAN BE INTERRUPTED BY PERIODIC PENETRATION OF A COLUMN, PIER OR FOOTING STRUCTURE.

B. ALLAN BLOCK WALLS WILL ACCEPT VERTICAL AND HORIZONTAL REINFORCING WITH REBAR AND GROUT.

C. IF SITE CONDITIONS WILL NOT ALLOW GEOGRID EMBEDMENT LENGTH, CONSIDER THE FOLLOWING ALTERNATIVES:
- MASONRY REINFORCED WALLS
- SOIL NAILING
- INCREASED WALL BATTER
- EARTH ANCHORS
- DOUBLE ALLAN BLOCK WALL
- ROCK BOLTS
- NO-FINES CONCRETE

5.0 WALL DRAINAGE

5.1 SURFACE DRAINAGE

RAINFALL OR OTHER WATER SOURCES SUCH AS IRRIGATION ACTIVITIES COLLECTED BY THE GROUND SURFACE ATOP THE RETAINING WALL CAN BE DEFINED AS SURFACE WATER. RETAINING WALL DESIGN SHALL TAKE INTO CONSIDERATION THE MANAGEMENT OF THIS WATER.

A. AT THE END OF EACH DAY'S CONSTRUCTION AND AT FINAL COMPLETION, GRADE THE BACKFILL TO AVOID WATER ACCUMULATION BEHIND THE WALL OR IN THE REINFORCED ZONE.

B. SURFACE WATER MUST NOT BE ALLOWED TO POND OR BE TRAPPED IN THE AREA ABOVE THE WALL OR AT THE TOE OF THE WALL.

C. EXISTING SLOPES ADJACENT TO RETAINING WALL OR SLOPES CREATED DURING THE GRADING PROCESS SHALL INCLUDE DRAINAGE DETAILS SO THAT SURFACE WATER WILL NOT BE ALLOWED TO DRAIN OVER THE TOP OF THE SLOPE FACE AND/OR WALL. THIS MAY REQUIRE A COMBINATION OF BERMS AND SURFACE DRAINAGE DITCHES.

D. IRRIGATION ACTIVITIES AT THE SITE SHALL BE DONE IN A CONTROLLED AND REASONABLE MANNER. IF AN IRRIGATION SYSTEM IS EMPLOYED, THE DESIGN ENGINEER OR IRRIGATION MANUFACTURE SHALL PROVIDE DETAILS AND SPECIFICATION FOR REQUIRED EQUIPMENT TO ENSURE AGAINST OVER IRRIGATION WHICH COULD DAMAGE THE STRUCTURAL INTEGRITY OF THE RETAINING WALL SYSTEM.

E. SURFACE WATER THAT CANNOT BE DIVERTED FROM THE WALL MUST BE COLLECTED WITH SURFACE DRAINAGE SWALES AND DRAINED LATERALLY IN ORDER TO DISPERSE THE WATER AROUND THE WALL STRUCTURE.

5.2 GRADING

THE SHAPING AND RECONTOURING OF LAND IN ORDER TO PREPARE IT FOR SITE DEVELOPMENT IS GRADING. SITE GRADING SHALL BE DESIGNED TO ROUTE WATER AROUND THE WALLS.

A. ESTABLISH FINAL GRADE WITH A POSITIVE GRADIENT AWAY FROM THE WALL STRUCTURE. CONCENTRATIONS OF SURFACE WATER RUNOFF SHALL BE MANAGED BY PROVIDING NECESSARY STRUCTURES, SUCH AS PAVED DITCHES, DRAINAGE SWALES, CATCH BASINS, ETC.

B. GRADING DESIGNS MUST DIVERT SOURCES OF CONCENTRATED SURFACE FLOW, SUCH AS PARKING LOTS, AWAY FROM THE WALL.

5.3 DRAINAGE SYSTEM

THE INTERNAL DRAINAGE SYSTEMS OF THE RETAINING WALL CAN BE DESCRIBED AS THE MEANS OF ELIMINATING THE BUILDUP OF INCIDENTAL WATER WHICH INFILTRATES THE SOILS BEHIND THE WALL. DRAINAGE SYSTEM DESIGN WILL BE A FUNCTION OF THE WATER CONDITIONS ON THE SITE. POSSIBLE DRAINAGE FACILITIES INCLUDE TOE AND HEEL DRAINAGE COLLECTION PIPES AND BLANKET OR CHIMNEY ROCK DRAINS OR OTHERS. DESIGN ENGINEER SHALL DETERMINE THE REQUIRED DRAINAGE FACILITIES TO COMPLETELY DRAIN THE RETAINING WALL STRUCTURE FOR EACH PARTICULAR SITE CONDITION.

A. ALL WALLS WILL BE CONSTRUCTED WITH A MINIMUM OF 12 IN. OF WALL ROCK DIRECTLY BEHIND THE WALL FACING.

B. THE DRAINAGE COLLECTION PIPE (DRAIN PIPE) SHALL BE A 4 IN. PERFORATED OR SLOTTED PVC, OR CORRUGATED HDPE PIPE AS APPROVED BY ENGINEER OF RECORD.

C. ALL WALLS WILL BE CONSTRUCTED WITH A 4 IN. DIAMETER DRAIN PIPE PLACED AT THE LOWEST POSSIBLE ELEVATION WITHIN THE 12 IN. OF WALL ROCK. THIS DRAIN PIPE IS REFERRED TO AS A TOE DRAIN.

D. GEOGRID REINFORCED WALLS SHALL BE CONSTRUCTED WITH AN ADDITIONAL 4 IN. DRAIN PIPE AT THE BACK BOTTOM OF THE REINFORCED SOIL MASS. THIS DRAIN PIPE IS REFERRED TO AS A HEEL DRAIN.

5.4 TOE DRAIN

TOE DRAIN PIPE SHOULD BE LOCATED AT THE BACK OF THE WALL ROCK BEHIND THE WALL AS CLOSE TO THE BOTTOM OF THE WALL AS ALLOWED WHILE STILL MAINTAINING A POSITIVE GRADIENT FOR DRAINAGE TO DAYLIGHT, OR A STORM WATER MANAGEMENT SYSTEM. TOE DRAINS ARE INSTALLED FOR INCIDENTAL WATER MANAGEMENT NOT AS A PRIMARY DRAINAGE SYSTEM.

A. FOR SITE CONFIGURATIONS WITH BOTTOMS OF THE BASE ON A LEVEL PLANE IT IS RECOMMENDED THAT A MINIMUM ONE PERCENT GRADIENT BE MAINTAINED ON THE PLACEMENT OF THE PIPE WITH OUTLETS ON 50 FT CENTERS, OR 100 FT CENTERS IF PIPE IS CROWNED BETWEEN THE OUTLETS. THIS WOULD PROVIDE FOR A MAXIMUM HEIGHT ABOVE THE BOTTOM OF THE BASE IN A FLAT CONFIGURATION OF NO MORE THAN 6 IN.

B. FOR RIGID DRAIN PIPES WITH DRAIN HOLES THE PIPES SHOULD BE POSITIONED WITH THE HOLES LOCATED DOWN. ALLAN BLOCK DOES NOT REQUIRE THAT TOE DRAIN PIPES BE WRAPPED WHEN INSTALLED INTO BASE ROCK COMPLYING WITH THE SPECIFIED WALL ROCK MATERIAL.

C. PIPES SHALL BE ROUTED TO STORM DRAINS WHERE APPROPRIATE OR THROUGH OR UNDER THE WALL AT LOW POINTS WHEN THE JOB SITE GRADING AND SITE LAYOUT ALLOWS FOR ROUTING. APPROPRIATE DETAILS SHALL BE INCLUDED TO PREVENT PIPES FROM BEING CRUSHED, PLUGGED, OR INFESTED WITH RODENTS.

D. ON SITES WHERE THE NATURAL DROP IN GRADE EXCEEDS THE ONE PERCENT MINIMUM, DRAIN PIPES OUTLETS SHALL BE ON 100 FOOT CENTERS MAXIMUM. THIS WILL PROVIDE OUTLETS IN THE EVENT THAT EXCESSIVE WATER FLOW EXCEEDS THE CAPACITY OF PIPE OVER LONG STRETCHES.

5.5 HEEL DRAIN

THE PURPOSE OF THE HEEL DRAIN IS TO PICK UP ANY WATER THAT MIGRATES FROM BEHIND THE RETAINING WALL STRUCTURE AT THE CUT AND ROUTE THE WATER AWAY FROM THE REINFORCED MASS DURING THE CONSTRUCTION PROCESS AND FOR INCIDENTAL WATER FOR THE LIFE OF THE STRUCTURE.

A. THE PIPING USED AT THE BACK OF THE REINFORCED MASS SHALL HAVE A ONE PERCENT MINIMUM GRADIENT OVER THE LENGTH, BUT IT IS NOT CRITICAL FOR IT TO BE POSITIONED AT THE VERY BOTTOM OF THE CUT. ADDITIONALLY THE ENTIRE LENGTH OF THE PIPE MAY BE VENTED AT ONE POINT AND SHOULD NOT BE TIED INTO THE TOE DRAIN.

B. THE PIPE MAY BE A RIGID PIPE WITH HOLES AT THE BOTTOM WITH AN INTEGRAL SOCK ENCASING THE PIPE OR A CORRUGATED PERFORATED FLEXIBLE PIPE WITH A SOCK TO FILTER OUT FINES WHEN REQUIRED BASED ON SOIL CONDITIONS. FOR INFILL SOILS WITH A HIGH PERCENTAGE OF SAND AND/OR GRAVEL THE HEEL DRAIN PIPE DOES NOT NEED TO BE SURROUNDED BY DRAINAGE ROCK. WHEN WORKING WITH SOILS CONTAINING MORE THAN FIFTY PERCENT CLAY, ONE CUBIC FOOT OF DRAINAGE ROCK IS REQUIRED FOR EACH FOOT OF PIPE.

5.6 GROUND WATER

GROUND WATER CAN BE DEFINED AS WATER THAT OCCURS WITHIN THE SOIL. IT MAY BE PRESENT BECAUSE OF SURFACE INFILTRATION OR WATER TABLE FLUCTUATION. GROUND WATER MOVEMENT MUST NOT BE ALLOWED TO COME IN CONTACT WITH THE RETAINING WALL IF WATER IS ENCOUNTERED IN THE AREA OF THE WALL DURING EXCAVATION OR CONSTRUCTION.

A. STANDARD RETAINING WALL DESIGNS DO NOT INCLUDE HYDROSTATIC FORCES ASSOCIATED WITH THE PRESENCE OF GROUND WATER. IF ADEQUATE DRAINAGE IS NOT PROVIDED THE RETAINING WALL DESIGN MUST CONSIDER THE PRESENCE OF THE WATER.

B. WHEN NON-FREE DRAINING SOILS ARE USED IN THE RETAINED ZONE, THE INCORPORATION OF A CHIMNEY AND BLANKET DRAIN SHOULD BE ADDED TO MINIMIZE THE WATER PENETRATION INTO THE REINFORCED MASS.

5.7 CONCENTRATED WATER SOURCES

ALL COLLECTION DEVICES SUCH AS ROOF DOWNSPOUTS, STORM SEWERS, AND CURB GUTTERS ARE CONCENTRATED WATER SOURCES. THEY MUST BE DESIGNED TO ACCOMMODATE MAXIMUM FLOW RATES AND TO VENT OUTSIDE OF THE WALL AREA.

A. ALL ROOF DOWNSPOUTS OF NEARBY STRUCTURES SHALL BE SIZED WITH ADEQUATE CAPACITY TO CARRY STORM WATER FROM THE ROOF AWAY FROM THE WALL AREA.THEY SHALL BE CONNECTED TO A DRAINAGE SYSTEM IN CLOSED PIPE AND ROUTED AROUND THE RETAINING WALL AREA.

B. SITE LAYOUT MUST TAKE INTO ACCOUNT LOCATIONS OF RETAINING WALL STRUCTURES AND ALL SITE DRAINAGE PATHS. DRAINAGE PATHS SHOULD ALWAYS BE AWAY FROM RETAINING WALL STRUCTURES.

C. STORM SEWERS AND CATCH BASINS SHALL BE LOCATED AWAY FROM RETAINING WALL STRUCTURES AND DESIGNED SO AS NOT TO INTRODUCE ANY INCIDENTAL WATER INTO THE REINFORCED SOIL MASS.

D. A PATH TO ROUTE STORM SEWER OVERFLOW MUST BE INCORPORATED INTO THE SITE LAYOUT TO DIRECT WATER AWAY FROM THE RETAINING WALL STRUCTURE.

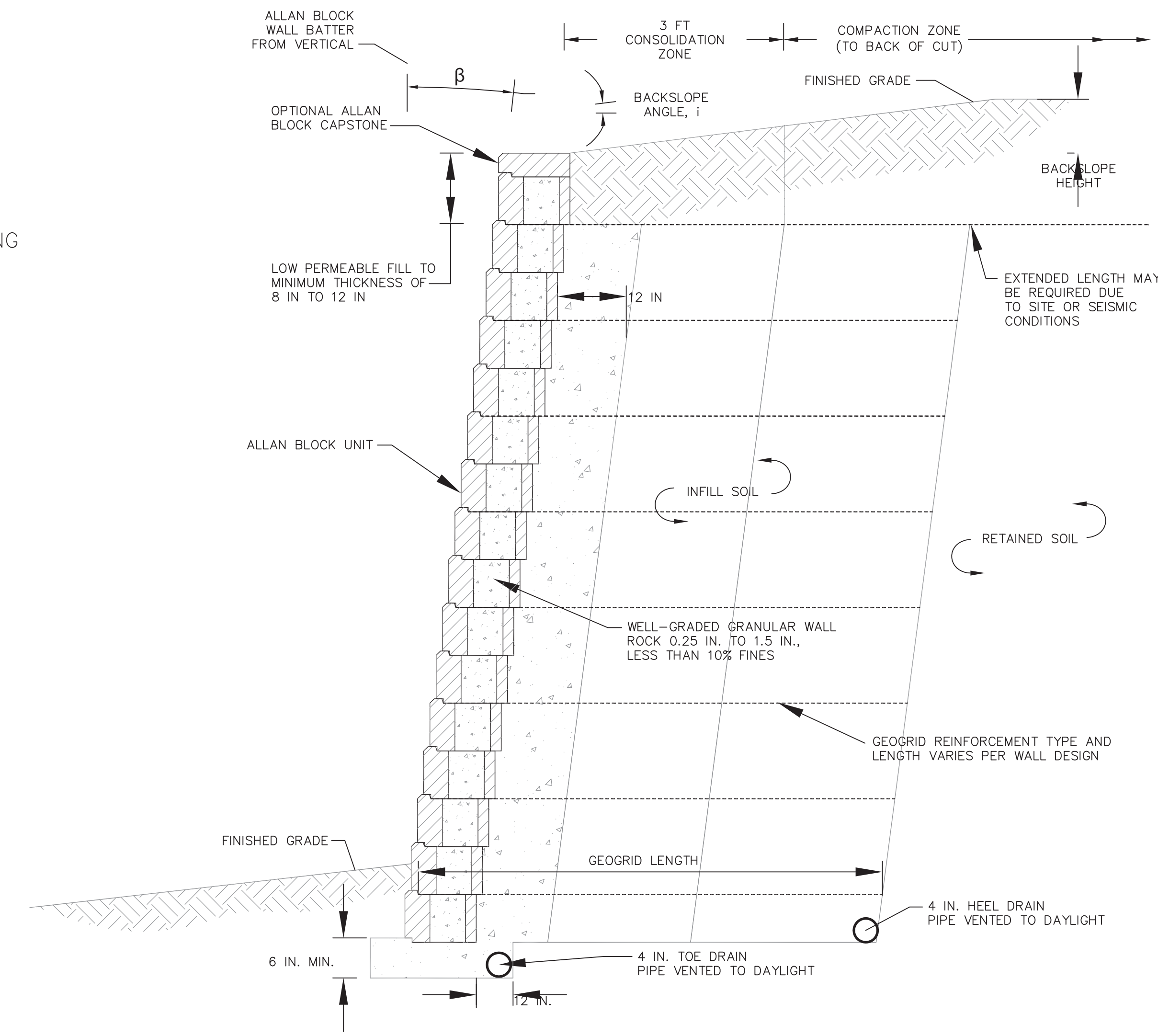
JDS-HYDRO CONSULTANTS, INC.
545 EAST PIKES PEAK AVENUE, SUITE 300
COLORADO SPRINGS, COLORADO 80903
PH: (719) 227-0072 - FAX: (719) 471-3401

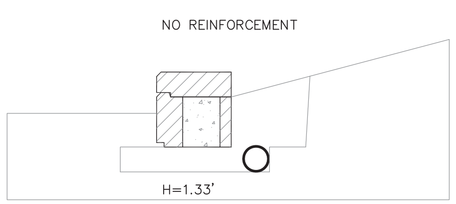
WOODMEN HILLS METROPOLITAN DISTRICT
REGIONAL WATER RECLAMATION FACILITY
RETAINING WALL NOTES
PCD FILE NO: PPR-17-027

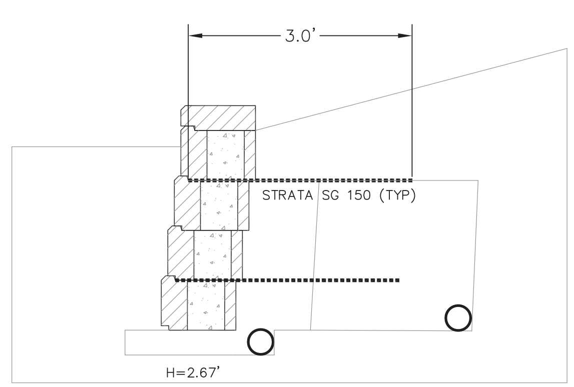
Project No.:	112.88
Scale:	AS NOTED
Date:	08/21/17
Design:	RMM
Drawn:	RMM
Check:	JPM
Revised:	

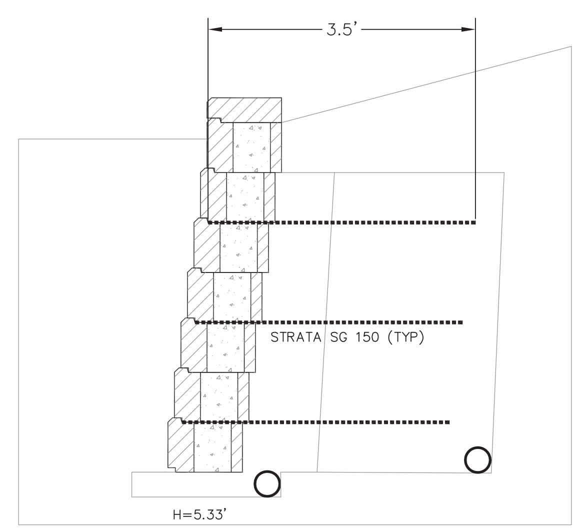
NOTE:

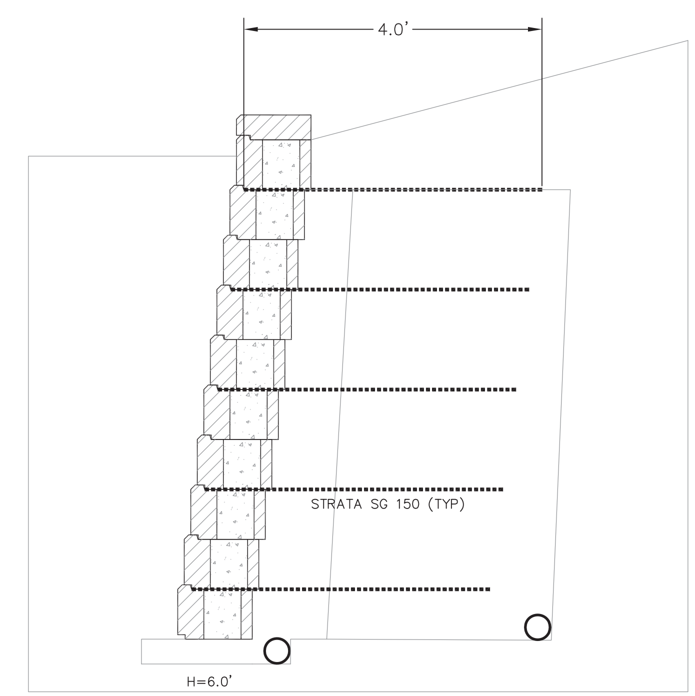
A BUILDING PERMIT IS REQUIRED FOR RETAINING WALLS OVER FOUR FEET (4') IN HEIGHT.







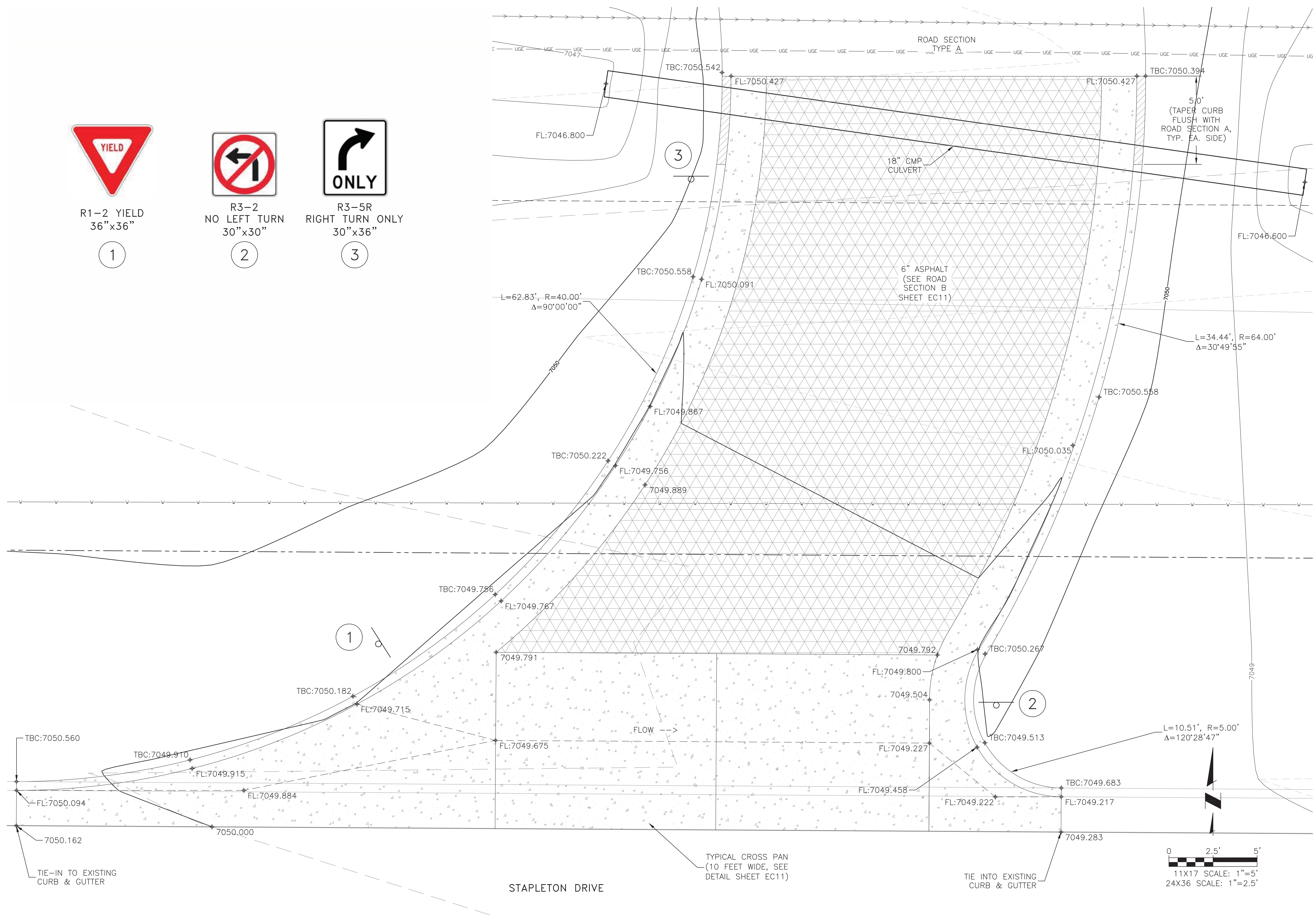




JDS-HYDRO CONSULTANTS, INC.
545 EAST PIKES PEAK AVENUE, SUITE 300
COLORADO SPRINGS, COLORADO 80903
PH: (719) 227-0072 - FAX: (719) 471-3401

WOODMEN HILLS METROPOLITAN DISTRICT
REGIONAL WATER RECLAMATION FACILITY
RETAINING WALL DETAILS
PCD FILE NO: PPR-17-027

Project No.:	112.88
Scale:	AS NOTED
Date:	08/21/17
Design:	RMM
Drawn:	RMM
Check:	JPM
Revised:	

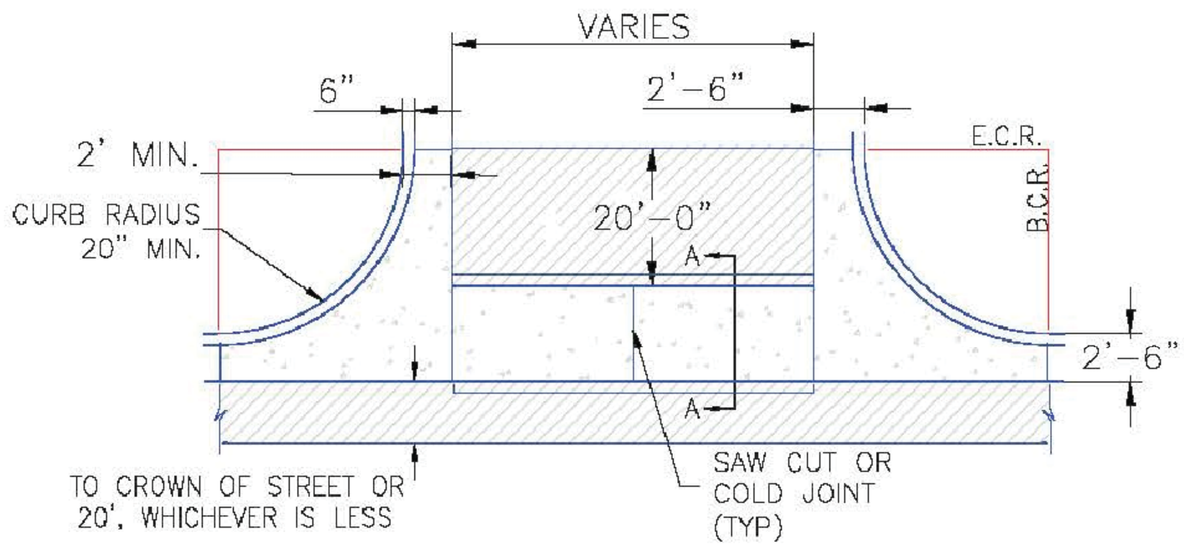


JDS-HYDRO CONSULTANTS, INC.
545 EAST PIKES PEAK AVENUE, SUITE 300
COLORADO SPRINGS, COLORADO 80903
PH: (719) 227-0072 - FAX: (719) 471-3401

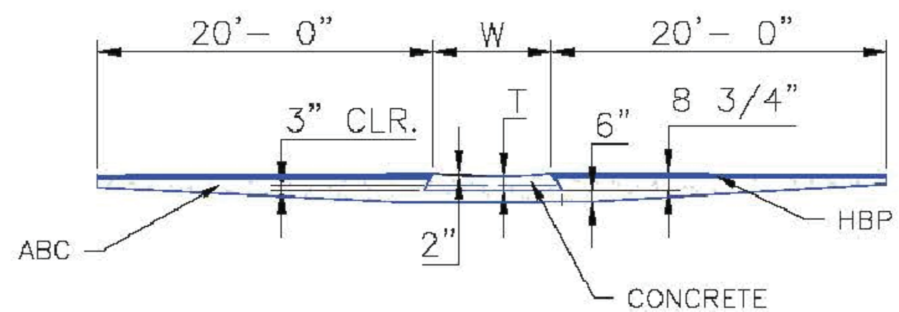
WOODMEN HILLS METROPOLITAN DISTRICT
REGIONAL WATER RECLAMATION FACILITY
RIGHT-OUT DETAILS

PCD FILE NO: PPR-17-027

Project No.:	112.88
Scale:	AS NOTED
Date:	08/21/17
Design:	RMM
Drawn:	RMM
Check:	JPM
Revised:	



PLAN VIEW



SECTION A–A

NOTES

1. W – WIDTH SHALL BE 6' FOR LOCAL, 8' FOR COLLECTORS, AND 10' FOR ARTERIAL ROADS.

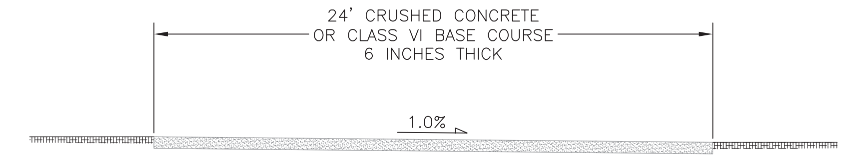
2. T – SQUARED–OFF RETURN TO BE POURED MONOLITHICALLY, 8" PCC FOR LOCAL ROADS, 9" FOR COLLECTORS WITH 6x6 – 4.4 W.W.F. OR #4 REINFORCING BAR @ 18" EACH WAY.

3. [hatched symbol] = 3" MINIMUM ASPHALT DEPTH (2 LIFTS).

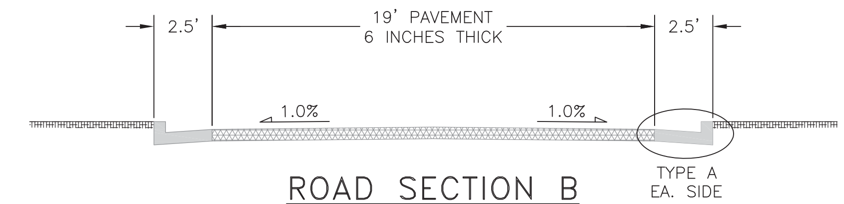
4. DESIGN TO SPECIFY ELEVATIONS AT PI AND PCR.

SCALE: NOT TO SCALE

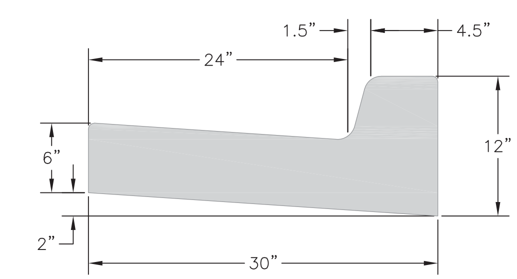
8/11/11 DATE APPROVED: André P. Brackin DEPARTMENT OF TRANSPORTATION	Typical Cross Pan Layout Detail Standard Drawing	EL PASO COUNTY DEPARTMENT OF TRANSPORTATION
	REVISION DATE: 12/8/15	FILE NAME: SD_2–26



ROAD SECTION A
SCALE N.T.S.



ROAD SECTION B
SCALE N.T.S.



EPC TYPE A
(REVERSE SLOPE OF PAN FOR SPILL CURB)
SCALE N.T.S.

JDS-HYDRO CONSULTANTS, INC.
545 EAST PIKES PEAK AVENUE, SUITE 300
COLORADO SPRINGS, COLORADO 80903
PH: (719) 227-0072 - FAX: (719) 471-3401

WOODMEN HILLS METROPOLITAN DISTRICT
REGIONAL WATER RECLAMATION FACILITY
MISC. DETAILS
PCD FILE NO: PPR–17–027

Project No.:	112.88
Scale:	AS NOTED
Date:	08/21/17
Design:	RMM
Drawn:	RMM
Check:	JPM
Revised:	

EC11
of 11