

MUNICIPAL DRAINAGE AND EROSION CONTROL

CADD plan production sample 03

All 14 source sheets included in original order.

Identifying details redacted.

**CIVIL REEL
MUNICIPAL CADD
PLAN PRODUCTION**

Sample 03 | Sheet 1 of 14

Portfolio reference only.
Not for construction.

Production support under the client engineering team. Supporting third-party
sheets included for context.

GENERAL NOTES

GENERAL

- General Notes and General Legends shall apply to all project locations in the contract,unless otherwise specified or shown on the site specific plans.
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- All items of work required to complete the work as shown or implied by the plans and as specified in the contract documents which are not listed as a pay item in the proposal shall be considered subsidiary.
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- Where existing improvements including,but not limited to,fences,driveways,sidewalks,pavement, curbs,utility pipelines and drainage structures are cut,broken,or damaged,the contractor shall replace or repair with the same type of original material and construction as approved by the Engineer. NO SEPARATE PAY ITEM
- The Contractor shall document the preconstruction conditions at each location with photographs and video,as required.Any item damaged or impacted due to construction shall be restored to existing or better conditions,per OWNER approval. NO SEPARATE PAY ITEM.
- The Contractor is completely responsible for the verification of the accuracy of the dimension control furnished herein. Any discrepancies found by the contractor shall be reported in writing to the Engineer immediately for reconciliation.
- The Contractor shall contact Texas Excavation Safety System (800-DIG-TESS:800-344-8377) and relevant utility companies 48 hours prior to locating existing utilities and/or construction activities.
- The Contractor shall preserve and protect all existing utilities at all times during construction. Any damage to utilities resulting from the Contractor's operation shall be restored at his expense.
- The Contractor shall support telephone conduits,storm drains,water and wastewater mains when going under sold utilities. NO SEPARATE PAY ITEM.
- Power poles may have to be braced at the Contractor's expense.
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- The Contractor shall secure all necessary permits before any work may begin. All permit fees shall be incidental to pay items provided.
- The Contractor shall contact the engineer should any discrepancies be found in the construction plans and/or special provisions. The contractor will not be compensated for any work not authorized by the Engineer.
- If cultural resources (archeological findings unearthed) are located during construction,work shall stop immediately in that area and Owner shall be notified.
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- For any projects impacting Park property,the Contractor shall coordinate with the Parks and Recreation department for establishment of any staging areas and access routes at least 1 month prior to beginning any construction.NO SEPARATE PAY ITEM.

- Unless otherwise noted in the plans or specifications,any temporary shoring and associated design shall be at contractor's expense.

TREES AND LANDSCAPING

- Contractor shall not damage or remove any trees or landscaping unless otherwise authorized by the Owner. Any trees or landscaping that are damaged or removed during the construction shall be replaced by the contractor at his expense.
- Contractor is responsible for protecting trees as specified in the drawings. NO SEPARATE PAY ITEM.
- Any tree smaller than 6" that is to be removed is considered clearing and grubbing and shall be paid through a clearing and grubbing bid item.If it exists,Otherwise,it is NO SEPARATE PAY ITEM and shall be considered general site preparation.
- Removal of snag and fallen trees that obstruct the path of proposed improvements shall be incidental to clearing and grubbing. NO SEPARATE PAY ITEM.
- All waste material and/or excess excavation not used as part of the work shall be removed from the job site and disposed of in a timely manner at acceptable locations in accordance with all local,state and federal regulations. NO SEPARATE PAY ITEM.
- The pay limit for grass spot or block sodding replacement due to construction shall be 2 feet outside the excavated trench. All other grass damaged or destroyed during this installation shall be replaced at the sole expense of the Contractor,unless otherwise indicated.
- Areas disturbed construction staging and access shall receive minimum of 4-inch topsoil and seeded and irrigated to establish vegetation. Maintenance and Irrigation shall continue until 70 percent vegetation coverage is achieved for all disturbed areas or to the satisfaction of the Owner. NO SEPARATE PAY ITEM.

ENVIRONMENTAL

- No excess excavated material shall be deposited in low areas or along any natural drainage way without written permission from the Engineer. If the Contractor places excess material in areas without written permission,damage resulting from such fill will be the responsibility of the Contractor. Such fill material shall be removed at Contractor's own cost and the area shall be restored to equal or better than original condition. NO SEPARATE PAY ITEM
- All waste material and/or excess excavation not used as part of the work shall be removed from the job site and disposed of in a timely manner at acceptable locations in accordance with all local,state and federal regulations. NO SEPARATE PAY ITEM.
- The Contractor shall have an on-site spill response kit. Construction personnel shall be trained on how to use the spill response kit. The contractor shall meet the requirements of the City of Dallas environmental policy. No spills will be allowed to enter the storm drainage system.
- The Contractor is responsible for keeping streets and sidewalks adjacent to the project free of mud and debris from construction at all times.NO SEPARATE PAY ITEM.
- The Contractor is responsible for maintaining slope stability during construction for all sites. NO SEPARATE PAY ITEM.
- Contractor is responsible for dewatering and construction of diversion dikes) and coffer dam(s), if necessary,unless otherwise noted in the specifications.NO SEPARATE PAY ITEM.

STORM DRAIN AND APPURTENANCES

- The Contractor shall maintain positive drainage at all times. Any temporary drainage measures shall meet or exceed the capacity of the existing drainage systems and are incidental to construction. NO SEPARATE PAY ITEM.
- All manholes on abandoned stormwater mains shall be abandoned.NO SEPARATE PAY ITEM.
- All storm drain pipes shall be Class III reinforced concrete pipes per ASTM C76 unless otherwise indicated.
- The backfill around manholes located in existing or new pavement shall be flowable backfill as per NCTCOG Specification Item 6.2J(O)(G). NO SEPARATE PAY ITEM.
- All storm drain boxes shall be precast reinforced concrete boxes per ASTM C1577-15 unless noted otherwise in the Contract Documents. At no additional cost to the Owner, the Contractor may provide alternative designs for precast reinforced concrete boxes and utilize precast concrete boxes fabricated in accordance with said design,if provided by the Contractor,the precast concrete boxes shall be designed in accordance with 1) ASTM C1577-15, and 2) the recommendations listed in the applicable geotechnical engineering studies. In addition,the concrete box designs shall account for forces associated with the following (as appropriate): depth of installation,hydrostatic pressures,HIS-20 traffic live loads,installation methods such as jacking,and all other applicable forces. The designs shall also address all penetrations and connections. The shop drawing submittal shall be prepared under the supervision of a Professional Engineer licensed in the State of Texas and competent in designing precast concrete boxes,2) be sealed by said Engineer, and 3) include the basis of design.
- All storm drain wyes shall be plant fabricated,no field connections are allowed unless otherwise indicated on the plans.NO SEPARATE PAY ITEM.
- All storm drain wyes shall be 60 degrees unless otherwise indicated on the plans.
- Storm drain lines shall be video inspected at the end of the project and prior to final acceptance. Contractor shall note and correct all deficiencies.

WATER MAIN AND APPURTENANCES

- All 6",8" and 12" water mains shall be PVC C900 (DR-14) water pipe,with Class "C" embedment, except as noted.
- All water mains with no profiles shall have a minimum cover of four (4) feet below street grade in an improved street and five (5) feet of cover in an unimproved street or alley.
- Compact fittings are not authorized for this project. All ductile iron pipe,fittings and fire hydrant bases shall be poly-wrapped.
- All bends,tees fire hydrants and plugs are to be restrained type fittings and to be blocked with Class "B" Concrete as per DWU Standard Drawings *229-234. In addition to restrained joints.
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- The Contractor will ensure that fire hydrants are accessible to fire trucks at all times. NO SEPARATE PAY ITEM.
- The Contractor shall sequence his construction such that no more than one fire hydrant is out of service at any given time.
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- Backfill made on break repairs to existing water mains may have been made with crushed rock. This could present a cave-in danger to a new ditch; therefore,precautions should be taken by the Contractor. NO SEPARATE PAY ITEM.
- Abandon all water valves on existing mains being killed as per DWU Standard Drawing *219. NO SEPARATE PAY ITEM.
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- The Contractor shall verify the location and number of all existing active water services and construct new services up to the meter prior to killing existing main.
- Water services greater than 30 feet shall be a minimum of one (1) inch in diameter.

WASTEWATER MAIN AND APPURTENANCES

- The Contractor shall maintain existing wastewater flow at all times. NO SEPARATE PAY ITEM.
- All manholes on abandoned wastewater mains shall be abandoned.NO SEPARATE PAY ITEM.
- The Contractor shall verify the location of all wastewater laterals and construct new laterals from the wastewater main to the property line with cleanouts and reconnect to the existing laterals. Dye testing maybe required at no additional cost to the owner.
- The backfill around manholes located in existing or new pavement shall be flowable backfill as per NCTCOG Specification Item 6.2J(O)(G). NO SEPARATE PAY ITEM.

ENCASEMENT PIPE AND B.O.T.O.C.

- Tunnel liner plate or steel encasement pipe shall be designed by the contractor to suit his construction and pipeline installation methods. The Contractor shall submit a design confirming the adequacy of thickness for the liner plate or steel encasement pipe and sealed by a Professional Engineer licensed in the State of Texas.
- Tunnel liner plate shall be hot dip galvanized and coated with bituminous coating as per Items 2J2J9(e) and 2J2J9(f) of COG.
- Grout shall be applied to all voids between the carrier pipe and the encasement pipe.
- In tunnel sections,voids between earth or rock and encasement pipe shall be filled in with 2:7 grout including 5% air entrainment by pressure injection.
- Carrier pipe shall be supported on a continuous 6" thick class "B" concrete cradle within corrugated metal and flanged liner encasements. See detail on DWU Std. Dwg.*108.
- Construct tapered concrete tunnel approach at each end of the encasement pipe. See detail on DWU Std. dwg.*108
- When standard pipe is made up inside large encasement pipe,the carrier pipe shall be laid to grade on a class "B" concrete cradle which shall extend to the point of the diameter of the carrier pipe.
- Where circumstances necessitate the excavation of a bore pit or trench close to the edge of the pavement,a guard fence or another approved protective device shall be installed for the protection of the traveling public.
- The Contractor shall be responsible for conducting a settlement monitoring program for the duration of the work. NO SEPARATE PAY ITEM.

EROSION CONTROL

Gabion Structures

- Gabion Structures shall consist of rectangular,compartmented wire baskets filled with stone used to build earth retaining and erosion control structures. Where mattress or other types of structures are indicated,the same requirements as those for gabion structures shall apply.
- Gabion baskets shall be of single unit construction;the base,end,and sides are to be either woven into a single unit,or one edge of these members connected to the base section of the unit in such a manner that strength and flexibility at the point of connection is at least equal to that of the mesh. Where the length of the gabion basket exceeds its horizontal width,the gabion basket shall be divided into compartments of approximately equal size by diaphragms,using the same mesh and gauge as the body of the gabion, into cells whose length does not exceed the horizontal width. The diaphragms shall be secured in proper position on the base in such manner that no additional tying is necessary. Mesh opening of the gabions shall be approximately 3/4" x 4/2" and shall be fabricated in a uniform hexagonal shaped,double twisted,non-ravelling pattern.
- All gabion baskets and mattresses shall be PVC coated in accordance with ASTM A975-11(2016),unless otherwise noted.
- All wire used in the construction of gabions,including tie wire,shall conform to ASTM A853-04(2017) and ASTM A-641. Minimum zinc coating shall be tested in accordance with ASTM A-90-91,unless otherwise noted.
- The rock (gabion stone) shall be clean,hard,durable washed limestone,4" to 8" in size,as specified and approved by the Engineer in all facing baskets. Prior to placing stone,samples shall be delivered to the site and shall be approved for gradation and approval.
- The Contractor shall field verify the elevation of bearing strata along the centerline before beginning gabion placement. Any geotechnical boring logs provided are for reference only.

Earthwork & Tieback

- The tieback design shall be in accordance with the geotechnical report prepared for each site and provided by the Engineer. Refer to report for all earthworking operations.
- All existing vegetation beneath the gabion toe such as trees,brush,and stumps shall be removed from the site. Removal of vegetation shall be considered subsidiary to tiebacks and shall not be paid separately.
- Any sloughed,loose,or soft materials near the base of the foundation excavation shall be removed. In addition,compacted fill shall be tied-in with the excavation slopes using benches as necessary.
- All reinforcing steel and dowel bars in concrete shall be supported and maintained at the correct clearances by the use of bar chairs or other approved support.
- The tieback design penetration shall be excavated in a continuous operation and concrete placed as soon as practical after completion of the drilling and inspection in order to prevent deterioration of bonding surfaces and to reduce the possibility of seepage problems. No drill hole shall be left open for more than 8 hours.
- Tieback components,including thread bar tendons and hex nut shells shall be manufactured by Dwydag Systems, International, USA, Inc. or approved equal.
- All tieback assemblies shall be capable of developing 95% of the ultimate tensile strength of the steel.
- The anchor tendon shall be a solid,continuous coil thread bar conforming to ASTM A-722 made of 150 KSI steel (size as indicated on construction drawings). Rods shall be protected from dirt,rust, or deleterious substances. Rods with heavy corrosion or pitting shall not be used. Rods shall be stored and handled in such manner as to avoid damage or corrosion.
- Steel rods,plates,and nuts used in the tieback assembly shall be epoxy coated per ASTM A-775 or hot-dip galvanized per ASTM A-153.
- A highly permeable filter fabric such as MIRAFI 140N or approved substitute shall be placed directly behind the structure to separate the fill material from the gabion baskets. Filter fabric is subsidiary to gabion structures,unless otherwise noted.

Concrete & Grout

- All concrete shall develop a minimum compressive strength of 3,000 psi at 28 days, unless otherwise specified in the drawings.
- All concrete shall be designed,mixed,transported,and placed in accordance with the ACI and the North Central Texas Council of Governments.
- Water for mixing grout shall be potable.

Materials Testing

- The owner will employ a Testing Laboratory to perform lab tests of the concrete,fill,and miscellaneous materials used for construction and to observe contractor's operations and methods.
- The Contractor is responsible for coordinating with City Inspector to schedule Testing Laboratory for sample collection and observation.

TRAFFIC CONTROL

- The Contractor shall maintain proper barricades and safety measures for the protection of the travelling public during the construction of this project.
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- Roads shall be closed during construction,but shall maintain driveway access at all times. Contractor is responsible for detour signs and is included in the TCP cost.
- When closing side streets,two working days notification is required for Fire,Police,Streets and Sanitation Departments. Please contact Gary Maxwell at 670-5896 or mobile 683-5189 to notify traffic restrictions.
- Contractor shall maintain access to private driveways at all times during construction. NO SEPARATE PAY ITEM.
- Vehicular ingress and egress (entrance and exit) to a business property shall be maintained at all times. If not,specific signs along with business name and direction arrow(s) shall be used for any temporary access locations. Additional signs may be necessary if there is a detour. NO SEPARATE PAY ITEM.

PAVEMENT

- Sawcut, remove and replace pavements,sidewalks,curbs and gutters shall conform to City Of Dallas Public Works & Transportation, Pavement Cuts & Repair Standards Manual, Latest Edition.
-
- The Contractor shall notify the Owner at least 24 hours in advance of any concrete-placing or asphalt-laying operation.
- All dimensions are to face of curb or edge of pavement where there is no curb,unless otherwise noted.
- The Contractor shall submit to the Owner the complete concrete mix (batch) design(s) for review prior to the start of any concrete placing operations.
- All reinforcing steel and dowel bars in pavement shall be supported and maintained at the correct clearances by the use of bar chairs or other approved support.
- Sidewalks, curbs and drive approaches damaged by the Contractor shall be removed and replaced to match pre-construction conditions or better. Storm drain pipe under the drive approaches damaged by the Contractor shall be replaced or repaired to equal or better than pre-construction condition. NO SEPARATE PAY ITEM.

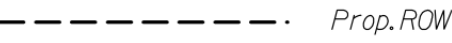
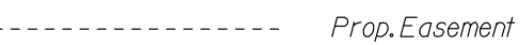
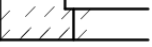
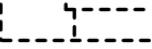
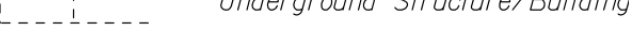
CIVIL REEL MUNICIPAL CADD PLAN PRODUCTION

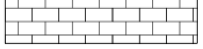
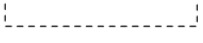
Sample 03 | Sheet 2 of 14

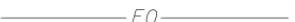
Portfolio reference only.
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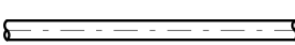
Production support under the client engineering team. Supporting third-party sheets included for context.

GENERAL LEGENDS

GENERAL	
	Benchmark
	Control Point
	Iron Pin Found
	Iron Pin Set
	Existed Minor Contour Line
	Existed Major Contour Line
	Proposed Minor Contour Line
	Proposed Major Contour Line
	Existed ROW
	Proposed ROW
	ROW Centerline
	Alley ROW
	Block Line
	Lot Line
	Existed Easement
	Proposed Easement
	Corporation Line Marker
	Existed Structure/Building
	Proposed Structure/Building
	Underground Structure/Building
	Bank/Slope Line
	Flow Line/Stream Line
	Bore Hole

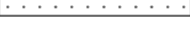
PAVEMENT	
	Existed Gravel
	Existed Asphalt
	Existed Brick
	Existed Concrete
	Proposed Pavement

UTILITIES	
	Existed Gas Line
	Existed Gas Manhole
	Existed Underground Electric Line
	Existed Overhead Electric Line
 ET	Existed Electric Pad Mounted Transformer
	Existed Electric Power Pole
	Existed Electric Pole Anchor
	Existed Electric Utility Manhole
 EV	Existed Electric Vault
	Existed Telephone Line
	Existed Telephone Utility Manhole
 TP	Existed Telephone Pedestal
	Existed Fiber Optic Line
	Existed Fiber Optic Manhole
	Existed Cable TV Line
	Existed Cable TV Manhole

WATER MAINS & APPURTENANCES	
	Existed 6" Water Main
	Existed 8" to 27" Water Main
	Existed 30" or Larger Water Main
	Proposed 6" Water Main
	Proposed 8" to 27" Water Main
	Proposed 30" or Larger Water Main
	Future Water Main

	Existed Water Meter
	Existed Water Manhole
	Existed Water Vault
 FH	Existed Fire Hydrant
	Proposed Water Manhole
	Proposed Water Vault
	Proposed Fire Hydrant
	Existed 11.25" Fitting
	Existed 22.5" Fitting
	Existed 45" Fitting
	Existed 90" Fitting
	Existed Reducer
	Existed Tee
	Existed Tapping Sleeve
	Existed Cross
	Existed Plug
	Existed Blind Flange
	Cut & Plug
	Proposed 11.25" Fitting
	Proposed 22.5" Fitting
	Proposed 45" Fitting
	Proposed 90" Fitting
	Proposed Reducer
	Proposed Tee
	Proposed Tapping Sleeve
	Proposed Plug
	Proposed Blind Flange
	Existed Gate Valve
	Existed High/Low Valve
	Existed Check Valve
 AP	Existed Flush Point
 AV	Existed Air Valve
 TS	Existed Cathodic Test Station
	Proposed Gate Valve
	Proposed High/Low Valve
	Proposed Check Valve
 AP	Proposed Flush Point
 AV	Proposed Air Valve
 TS	Proposed Cathodic Test Station

WASTEWATER MAINS & APPURTENANCES	
	Existed 6" to 27" Wastewater Main
	Existed 30" or Larger Wastewater Main
	Proposed 6" to 27" or Larger WW Main
	Proposed 30" or Larger Wastewater Main
	Existed Wastewater Manhole
	Existed Wastewater Access Device
 CO	Existed Wastewater Cleanout
	Proposed Wastewater Manhole
	Proposed Wastewater Access Device
	Proposed Wastewater Cleanout
	Remove & Replace Existed Manhole

STORM DRAIN & EROSION CONTROL	
	Existed Storm Drain Smaller than 18"
	Existed 18" or Larger Storm Drain
 S	Existed Storm Manhole
	Existed Storm Inlet
	Proposed Storm Drain Smaller than 18"
	Proposed 18" or Larger Storm Drain
 S	Proposed Storm Manhole
	Proposed Storm Inlet
 S	Remove and Replace Existed Storm Manhole
	Remove and Replace Existed Inlet
	Proposed Gabion Basket/Mattress
	Proposed Stone RipRap
	Proposed Flexamat
	Proposed Geomat
	Proposed Anchor
	Proposed Sodding

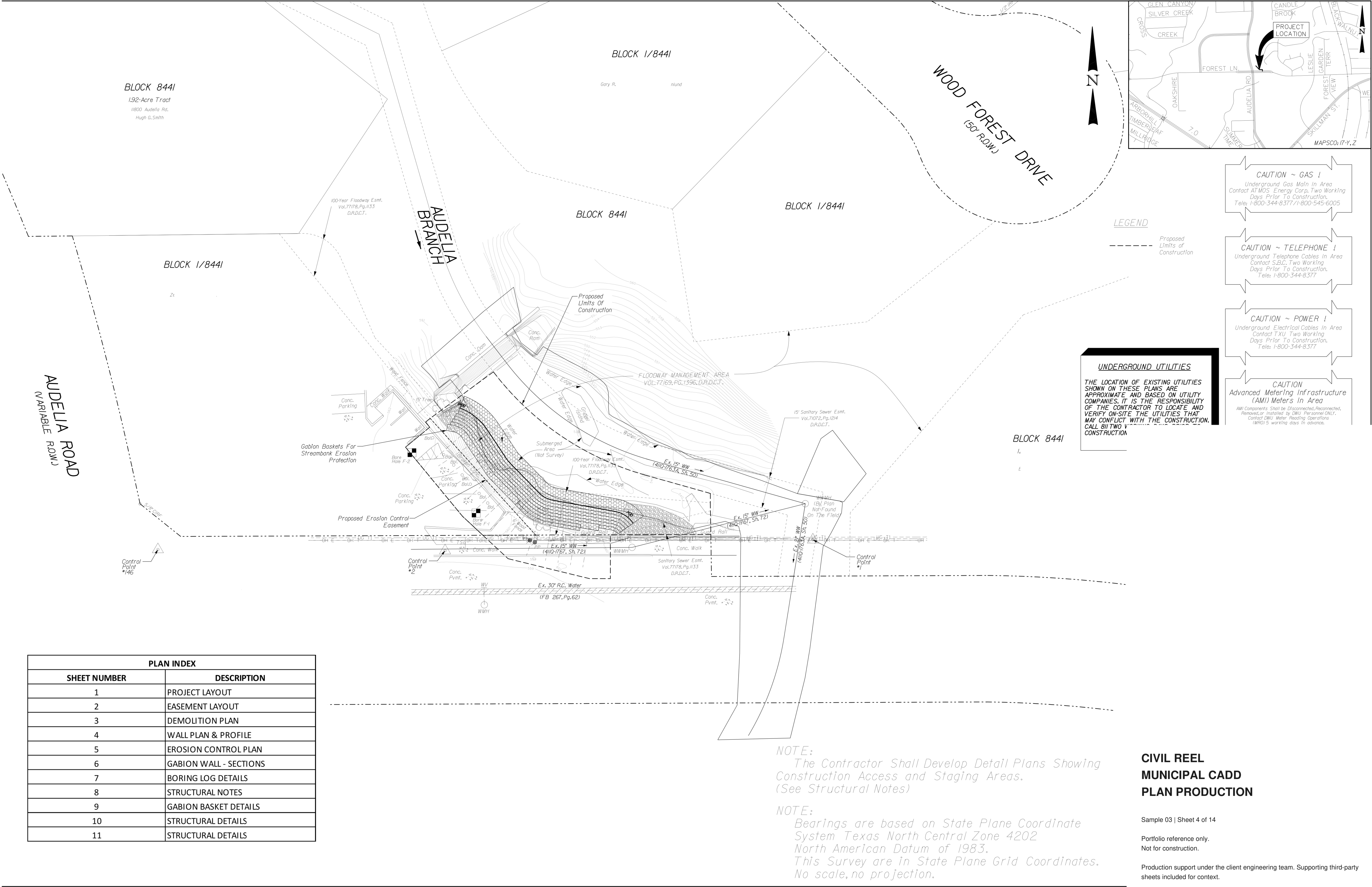
TOPOGRAPHIC FEATURES	
	Existed Tree
	Existed Tree to be Removed
	Existed Tree to be Protected
	Brush, Shrub, Wood
	Swamp
 M	Mail Box
	Ballards
 ICV	Irrigation Control Valve
	Chain Link/Other Fence
	Wood Fence
	Wrought Iron Fence
	Brick Wall
	Concrete Wall
	Retaining Wall
 P	Parking Meter
	Traffic Sign
 TSP	Traffic Signal Pole
	Street Lamp
	Railroad, Each Track

CIVIL REEL MUNICIPAL CADD PLAN PRODUCTION

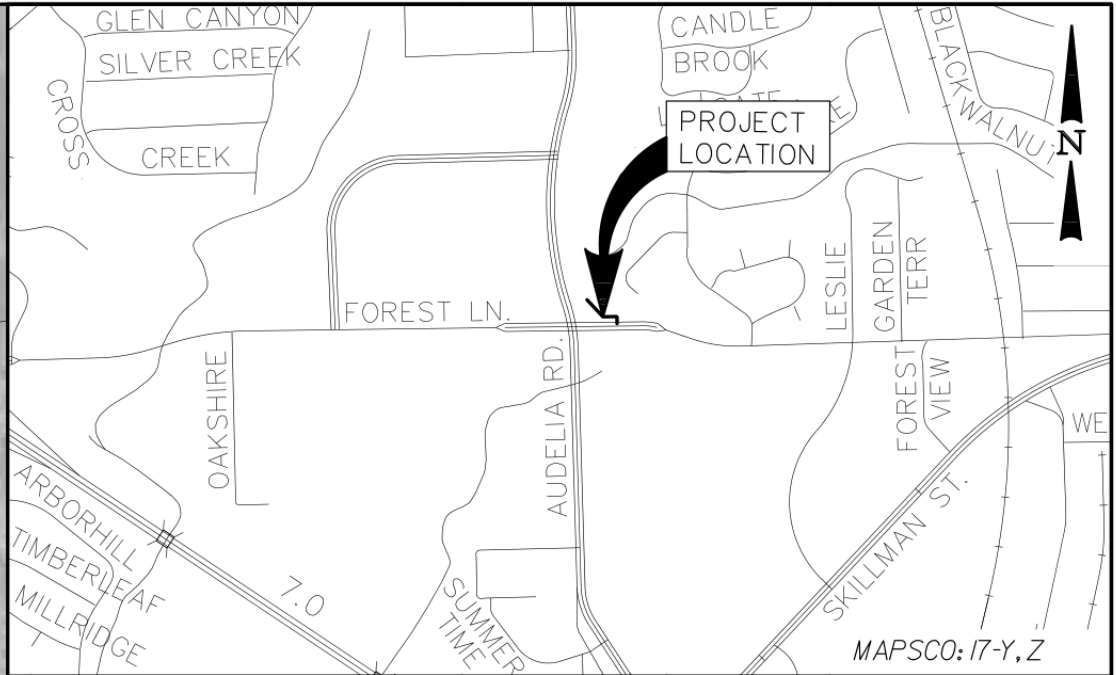
Sample 03 | Sheet 3 of 14

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PLAN INDEX	
SHEET NUMBER	DESCRIPTION
1	PROJECT LAYOUT
2	EASEMENT LAYOUT
3	DEMOLITION PLAN
4	WALL PLAN & PROFILE
5	EROSION CONTROL PLAN
6	GABION WALL - SECTIONS
7	BORING LOG DETAILS
8	STRUCTURAL NOTES
9	GABION BASKET DETAILS
10	STRUCTURAL DETAILS
11	STRUCTURAL DETAILS



CAUTION ~ GAS !
Underground Gas Main In Area
Contact AT&MOS Energy Corp. Two Working
Days Prior To Construction.
Tele: 1-800-344-8377/1-800-545-6005

CAUTION ~ TELEPHONE !
Underground Telephone Cables In Area
Contact S.B.C. Two Working
Days Prior To Construction.
Tele: 1-800-344-8377

CAUTION ~ POWER !
Underground Electrical Cables In Area
Contact TXU Two Working
Days Prior To Construction.
Tele: 1-800-344-8377

CAUTION
Advanced Metering Infrastructure
(AMI) Meters In Area
AMI Components Shall be Disconnected, Reconnected,
Removed or Installed by DMU Personnel ONLY.
Contact DMU Meter Reading Operations
(MRO) 5 working days in advance.

UNDERGROUND UTILITIES

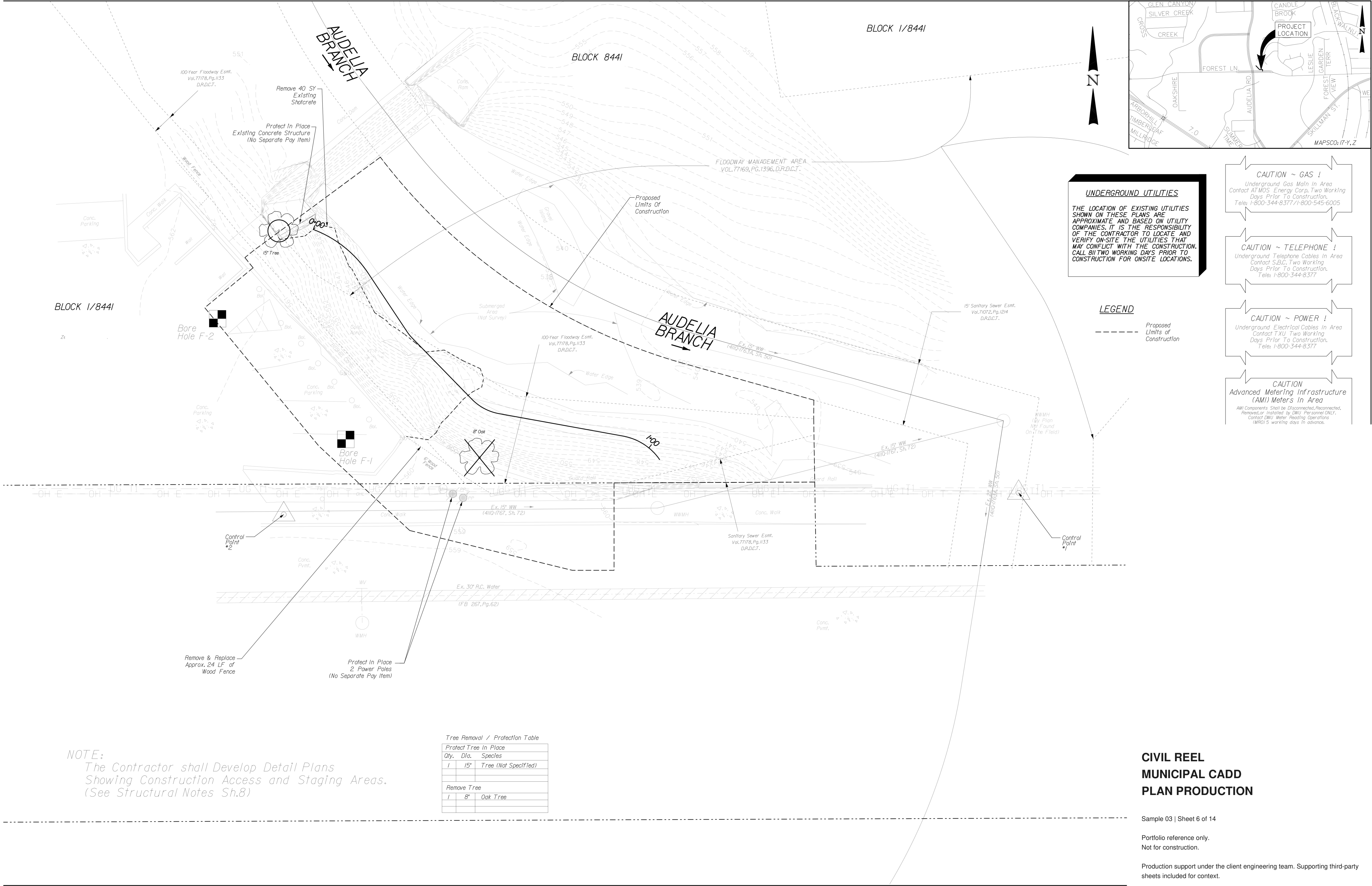
THE LOCATION OF EXISTING UTILITIES
SHOWN ON THESE PLANS ARE
APPROXIMATE AND BASED ON UTILITY
COMPANIES. IT IS THE RESPONSIBILITY
OF THE CONTRACTOR TO LOCATE AND
VERIFY ON-SITE THE UTILITIES THAT
MAY CONFLICT WITH THE CONSTRUCTION.
CALL 811 TWO WORKING DAYS PRIOR TO
CONSTRUCTION FOR ONSITE LOCATIONS.

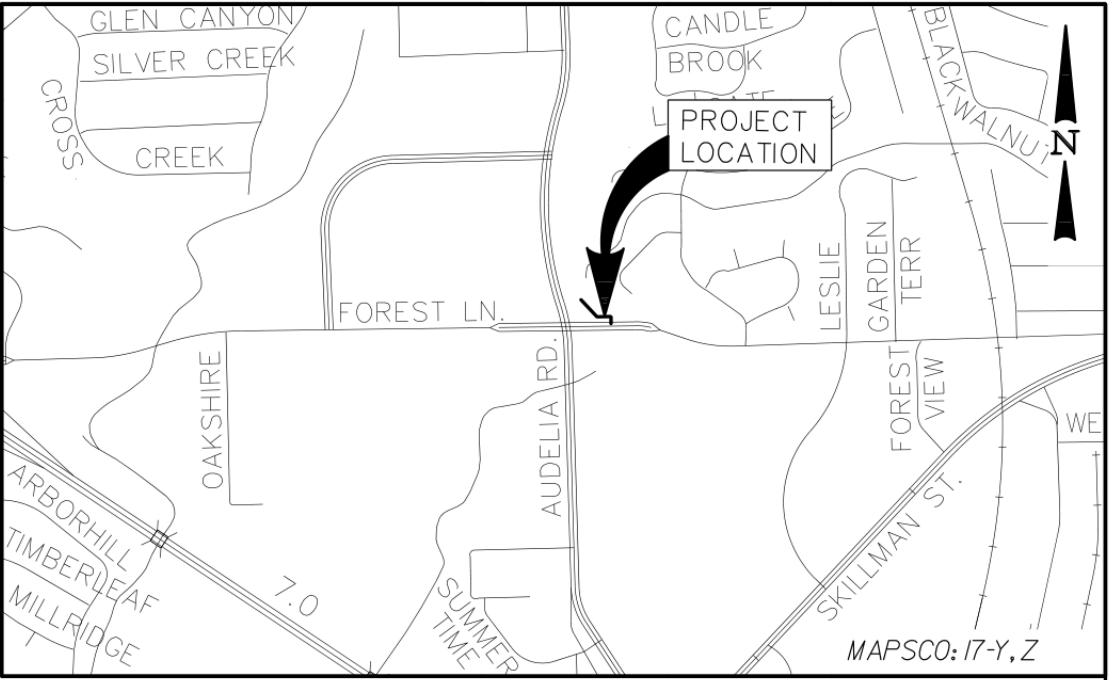
**CIVIL REEL
MUNICIPAL CADD
PLAN PRODUCTION**

Sample 03 | Sheet 5 of 14

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THE LOCATION OF EXISTING UTILITIES SHOWN ON THESE PLANS ARE APPROXIMATE AND BASED ON UTILITY COMPANIES. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE AND VERIFY ON-SITE THE UTILITIES THAT MAY CONFLICT WITH THE CONSTRUCTION. CALL 811 TWO WORKING DAYS PRIOR TO CONSTRUCTION FOR ONSITE LOCATIONS.

Contact ATMOS Energy Corp. Two Working Days Prior To Construction.
Tele: 1-800-344-8377/1-800-545-6005

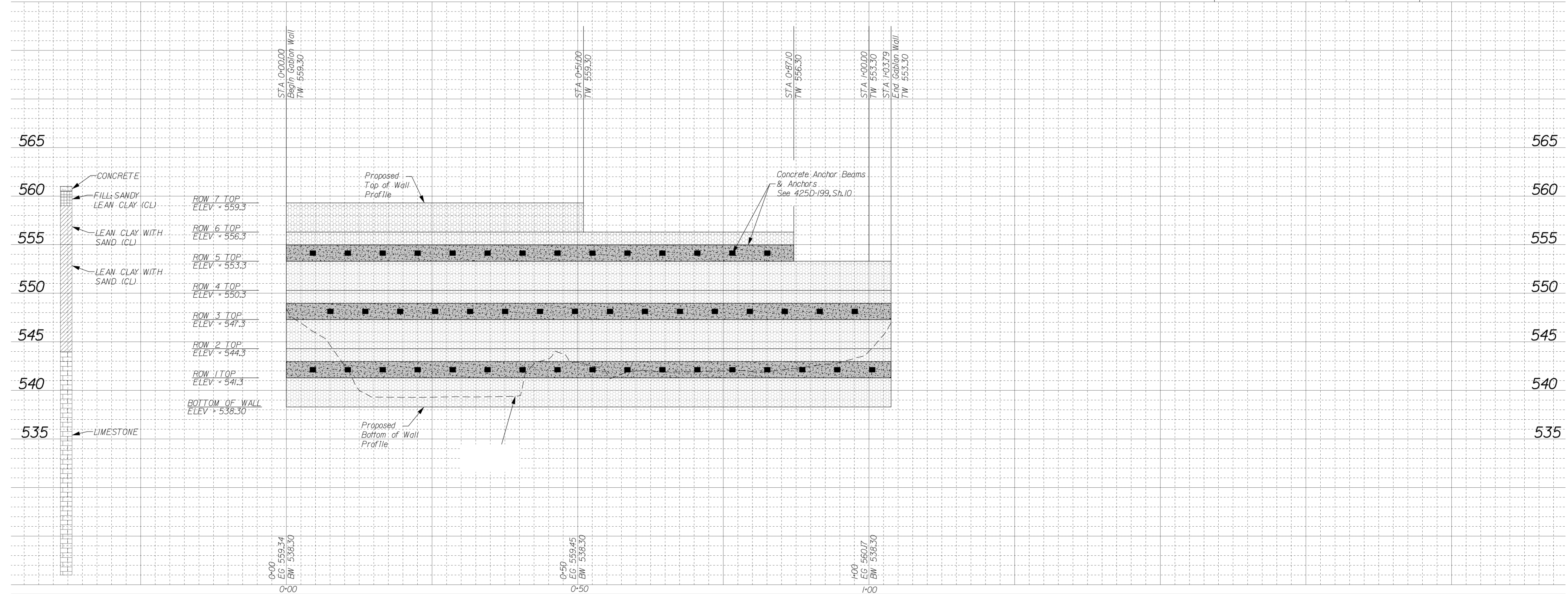
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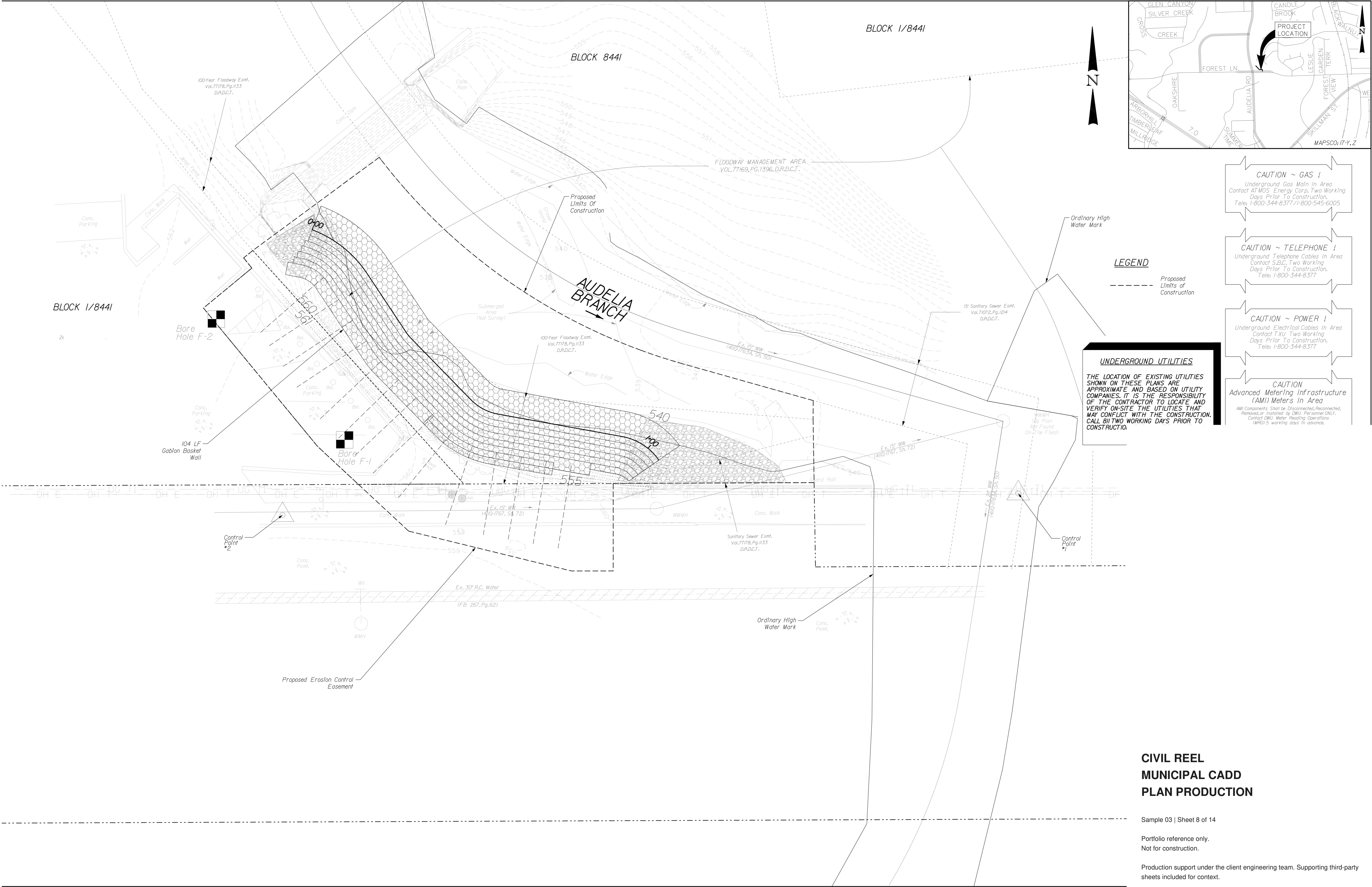
Contact TXU Two Working Days Prior To Construction.
Tele: 1-800-344-8377

*Advanced Metering Infrastructure
(AMI) Meters In Area*

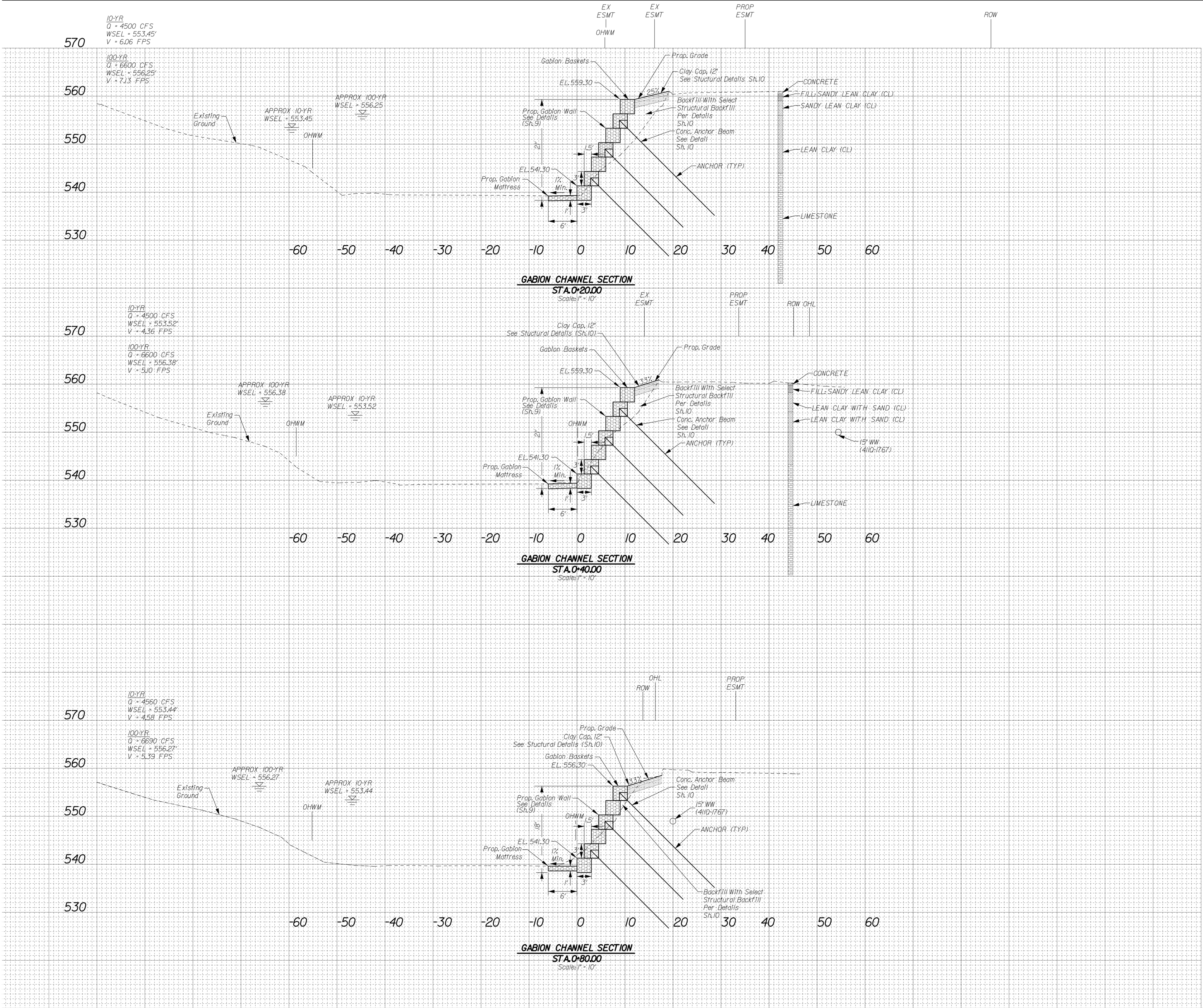
*AMI Components Shall be Disconnected, Reconnected,
Removed, or Installed by DWU Personnel ONLY.
Contact DWU Meter Reading Operations
(MRO) 5 working days in advance.*

----- Proposed
Limits of
Construction





CIVIL REEL
MUNICIPAL CADD
PLAN PRODUCTION



CIVIL REEL
MUNICIPAL CADD
PLAN PRODUCTION

Sample 03 | Sheet 9 of 14

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GENERAL NOTES

1. THE CONTRACTOR SHALL DEVELOP DETAIL PLANS SHOWING CONSTRUCTION ACCESS AND STAGING AREAS. THE CONTRACTOR SHALL SUBMIT A DETAILED PLAN FOR REVIEW AND APPROVAL BY THE OWNER AND ENGINEER PRIOR TO MOBILIZING AND SETTING UP FOR CONSTRUCTION.
2. THE CONTRACTOR IS TO PREPARE A STORMWATER PREVENTION PLAN (SWPPP) FOR APPROVAL BY OWNER AND ENGINEER PRIOR TO CONSTRUCTION ACTIVITIES. TEMPORARY EROSION/SEDIMENTATION CONTROL MEASURES SHALL BE IN PLACE PRIOR TO BEGINNING ANY CONSTRUCTION.
3. THE CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING AND MAINTAINING EROSION CONTROL MEASURES IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS UNTIL THE SITE HAS BEEN STABILIZED, INCLUDING DUST AND DEBRIS CONTROL.
4. THE CONTRACTOR IS RESPONSIBLE FOR SECURITY OF THE SITE FOR THE DURATION OF CONSTRUCTION UNTIL SUBSTANTIAL COMPLETION.
5. THE CONTRACTOR IS RESPONSIBLE FOR EXCAVATION AND TRENCH SAFETY AND COMPLIANCE WITH RELATED FEDERAL, STATE, AND LOCAL REGULATIONS.
6. GABIONS AND ANCHORS SHALL BE CONSTRUCTED AT THE LOCATIONS AND ELEVATIONS SHOWN. ANY REVISIONS TO DESIGN OR GEOMETRY BY THE CONTRACTOR REQUIRES THE ENGINEER'S APPROVAL PRIOR TO PROCEEDING WITH CONSTRUCTION, INCLUDING ENGINEER'S REVIEW OF DESIGN PLANS AND CALCULATIONS SUBMITTAL.
7. CONSTRUCTION INSTALLATION SEQUENCING IS THE CONTRACTOR'S RESPONSIBILITY AND SHALL BE SUPPORTED BY ENGINEERING CALCULATIONS AND SUBMITTALS.
8. THE CONTRACTOR SHALL HAVE AN APPROVED SET OF CONTRACT DRAWINGS AND SPECIFICATIONS ON-SITE AT ALL TIMES DURING CONSTRUCTION OF THE WALL STRUCTURE. THE CONTRACTOR SHALL ALSO HAVE A SET OF ALL RELATED MANUFACTURER REQUIREMENTS ON-SITE AT ALL TIMES DURING CONSTRUCTION OF THE WALL STRUCTURE.
9. THE GROUND SURFACE SHALL BE GRADED AWAY FROM THE WALL FACE A MINIMUM OF 1 PERCENT AND A TEMPORARY SOIL BERM SHALL BE CONSTRUCTED NEAR THE WALL CREST TO PREVENT SURFACE AND WATER RUNOFF FROM OVERTOPPING THE WALL DURING CONSTRUCTION. AFTER COMPACTED, THE SURFACE OF THE EXPOSED BACKFILL SHALL BE FINISHED WITH A SMOOTH WHEEL ROLLER TO MINIMIZE PONDING OF WATER AND SATURATION OF THE BACKFILL. THE REQUIRED GRADING AND SMOOTHING SHALL BE PERFORMED AT THE END OF EACH WORK DAY AS NEEDED TO MEET THESE REQUIREMENTS.
10. THE CONTRACTOR SHALL PROVIDE COMPACTION OF FILL MATERIALS RELATED TO WALL CONSTRUCTION. EARTHWORK AND COMPACTION REQUIREMENTS ARE PROVIDED IN THE CONTRACT SPECIFICATIONS.
11. DESIGN: THE ENGINEER'S DESIGN IS BASED ON THE FOLLOWING ITEMS. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER OF DIFFERING SUBSURFACE AND/OR GROUNDWATER CONDITIONS:

DESIGN STRENGTH PARAMETERS				
PARAMETER:	FRICTION ANGLE (DEG) EFFECT./TOTAL	COHESION (PSF) EFFECT./TOTAL	UNIT DRY WT. (PCF)	ANCHOR BOND STRESS (PSI)
LEAN CLAY (CL)	26/0	100/2,000	125	13
LIMESTONE	38/38	5,000/5,000	130	34

STABILITY ANALYSIS CRITERIA:	
SLIDING STABILITY:	F.S. ≥ 1.5
INTERNAL STABILITY:	F.S. ≥ 1.5
OVERTURNING:	RESULTANT IN MIDDLE THIRD
BEARING CAPACITY:	F.S. ≥ 2.0 ULT. CAPACITY = 6,500 PSF (AT BASE) ULT. CAPACITY = 3,000 PSF (AT REACTION BEAM)
GLOBAL STABILITY:	F.S. ≥ 1.5 FOR STEADY STATE (EFFECTIVE) F.S. ≥ 1.2 FOR DRAWDOWN (TOTAL)
SEISMIC LOADING:	NONE
SURCHARGE:	NONE

GROUND WATER: GROUNDWATER LEVELS ARE BASED ON GEOTECHNICAL AND/OR ADDITIONAL LEGACY DATA FOR THE PROJECT. GROUNDWATER IS ASSUMED TO DRAW DOWN TO TOE OF THE WALL FROM ELEVATION 554.0 FOR STEADY STATE CONDITIONS. DRAWDOWN FROM THE 100-YEAR EVENT INCLUDES TEMPORARY SATURATION OF THE RETAINED SOIL DIRECTLY BEHIND THE GABION WALL BACKFILL MEDIUM.

REINFORCED CONCRETE

1. CONCRETE COVER OVER REINFORCING STEEL SHALL BE 3 INCHES, UNLESS NOTED OTHERWISE. CONSTRUCTION JOINTS ARE NOT SHOWN ON THE CONTRACT DOCUMENTS AND SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.
2. PENETRATIONS OTHER THAN SHOWN SHALL NOT BE ALLOWED WITHOUT PRIOR APPROVAL FROM THE ENGINEER.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF ALL FORMING, TEMPORARY BRACING, AND SHORING. THE CONTRACTOR SHALL SUBMIT A PLAN FOR REVIEW AND APPROVAL BY THE OWNER AND ENGINEER FOR ALL SHORING, MONITORING, AND PROTECTION OF EXISTING INFRASTRUCTURE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE AND SHALL RESTORE, REPAIR, OR REPLACE DAMAGED INFRASTRUCTURE TO AN EQUAL OR BETTER CONDITION AS APPROVED AND REQUESTED BY THE OWNER.

ANCHORS

1. CORROSION PROTECTION: ANCHORS SHALL BE CONSIDERED PERMANENT WITH CLASS I CORROSION PROTECTION, AS DEFINED IN PTI DC35.1-4, "RECOMMENDATIONS FOR PRESTRESSED ROCK AND SOIL ANCHORS." CONTRACTOR SHALL PROVIDE CORROSION PROTECTION AS INDICATED IN THE CONTRACT DOCUMENTS. ALL STEEL COMPONENTS SHALL BE HOT-DIPPED GALVANIZED.
2. ANCHOR BARS, COUPLERS AND ACCESSORIES: ANCHOR BARS, COUPLERS AND ACCESSORIES SHALL BE WILLIAMS FORM ENGINEERING BRAND OR APPROVED EQUAL. ALL COMPONENTS SHALL BE HIGH-STRENGTH, GRADE 150 STEEL CONFORMING TO ASTM A722 WITH A MINIMUM ULTIMATE STRENGTH OF 150 KSI. THE MINIMUM DIAMETER OF ALL-THREAD STEEL BARS SHALL BE 1.0 INCH. BARS SHALL NOT BE SUBJECTED TO TORCH CUTTING OR WELDING. COUPLERS, SPHERICAL AND/OR BEVELED WASHERS SHALL BE USED WHERE REQUIRED. ALL ANCHOR INSTALLATIONS SHALL INCLUDE MANUFACTURER-APPROVED CENTRALIZERS SPACED A MAXIMUM OF 10 FEET FROM CENTER-TO-CENTER.
3. ANCHOR LENGTH: ALL ANCHORS SHALL INCLUDE THE MINIMUM BOND LENGTH SHALL BE AS SHOWN. THE UPPER 1 FOOT OF THE BEDROCK SHALL BE NEGLECTED FOR THE MINIMUM BOND LENGTH. THE MINIMUM UNBONDED LENGTH SHALL BE 10 FEET REGARDLESS OF DEPTH TO BEDROCK. THE MINIMUM TOTAL ANCHOR LENGTH (FREE STRESSING, UNBONDED LENGTH PLUS BOND LENGTH) SHALL BE AS SHOWN.
4. ANCHOR SPACING AND INCLINATION: THE MAXIMUM ANCHOR SPACING SHALL BE AS SHOWN (CENTER-TO-CENTER) IN THE PLANE OF THE EXCAVATED FACE. ANCHORS SHALL BE INSTALLED AT THE SHOWN INCLINATION FROM THE HORIZONTAL WITH A TOLERANCE OF 5 DEGREES. ANCHOR BORE HOLES SHALL BE AS SHOWN. DRILL HOLE DIAMETERS SHALL BE INCREASED AS NECESSARY TO PROVIDE MINIMUM GROUT COVER.
5. REACTION BLOCKS: REACTION BLOCKS AT EACH ANCHOR LOCATION SHALL BE CONSTRUCTED USING PNEUMATICALLY-PLACED, REINFORCED CONCRETE, AS SHOWN. THE CONCRETE SHALL ACHIEVE THE SPECIFIED MINIMUM COMPRESSIVE STRENGTH PRIOR TO ANY ANCHOR TEST.
6. DRAINAGE STRIPS: EXCAVATED FACES THAT ARE CONTINUOUSLY COVERED WITH PNEUMATICALLY-PLACED CONCRETE SHALL INCLUDE A COMPOSITE DRAINAGE SYSTEM. THE DRAINAGE SYSTEM SHALL BE PLACED VERTICALLY ON THE EXCAVATED FACE BETWEEN EACH ROW OF ANCHORS BEFORE PLACING CONCRETE, AS SHOWN. THE DRAIN SHALL BE A MANUFACTURED COMPOSITE SYSTEM WITH A FORMED POLYSTYRENE CORE AND A BONDED FILTER FABRIC. THE FILTER FABRIC SHALL BE A NEEDLE-PUNCHED, NON-WOVEN POLYPROPYLENE WITH A #100 APPARENT OPENING SIZE (AOS).
7. PERFORMANCE AND PROOF LOAD TESTING: ALL ANCHORS SHALL BE STRESSED AND LOAD TESTED TO DEMONSTRATE THAT EACH ANCHOR MEETS THE ACCEPTANCE CRITERIA IN ACCORDANCE WITH THE SPECIFICATIONS. ALL LOAD TESTING SHALL BE FIELD DOCUMENTED AND SUBMITTED TO THE ENGINEER ON A DAILY BASIS. LOAD TESTING SHALL INCLUDE:

ANCHOR TESTING	
PERFORMANCE TESTING:	SHALL BE PERFORMED ON THE FIRST THREE ANCHORS INSTALLED, AND SHALL ALSO BE PERFORMED ON AN ADDITIONAL FIVE PERCENT OF THE REMAINING ANCHORS.
PROOF TESTING:	ALL ANCHORS NOT SUBJECTED TO PERFORMANCE TESTING SHALL BE PROOF TESTED.

8. UPON SUCCESSFUL COMPLETION OF THE REQUIRED LOAD TESTING, ANCHORS SHALL BE TENSIONED TO NOT MORE THAN 70 PERCENT OF THE ULTIMATE TENDON STRENGTH TO ACHIEVE LOCK-OFF. ONCE THE LOAD HAS BEEN TRANSFERRED TO THE ANCHORAGE, A LIFT-OFF LOAD TEST SHALL BE PERFORMED ON EACH ANCHOR TO CONFIRM THE MAGNITUDE OF THE LOAD IN THE ANCHOR TENDON. LOADS MEASURED DURING LIFT-OFF SHALL BE WITHIN FIVE PERCENT OF THE DESIGNED LOCK-OFF LOAD. ANY ANCHOR NOT MEETING THIS REQUIREMENT SHALL BE ADJUSTED, AND THE LIFT-OFF TEST REPEATED.

GABIONS

1. UNPACKING AND ASSEMBLY: CONTRACTOR SHALL UNPACK AND ASSEMBLE GABIONS IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS.
2. GABION UNITS: CONTRACTOR SHALL USE STANDARD SIZE GABIONS WITH A 3-FOOT WIDTH AND HEIGHT, WITH LENGTHS IN 1.5- OR 3-FOOT INCREMENTS. GABION WALL UNITS SHALL BE 8X10 HEXAGONAL DOUBLE TWIST, WOVEN WIRE MESH TYPE. GABIONS SHALL BE DIVIDED INTO CELLS BY DIAPHRAGMS POSITIONED AT APPROXIMATELY 3-FOOT CENTERS. ALL MESH PANEL EDGES SHALL BE SELVEDGED. GABIONS SHALL BE MANUFACTURED AND SHIPPED WITH ALL COMPONENTS MECHANICALLY CONNECTED AT THE PRODUCTION FACILITY. GABIONS SHALL BE OF UNIFORM SIZE WITH DIMENSION TOLERANCE LIMITS OF +5%. THE CONTRACTOR SHALL SUBMIT A NOTARIZED, SWORN AFFIDAVIT FROM THE GABION MANUFACTURER SHOWING COMPLIANCE WITH THE CONTRACT DOCUMENT REQUIREMENTS.
3. ASSEMBLY: OPEN AND UNFOLD EACH GABION ON A FLAT, HARD SURFACE AND REMOVE ANY SHIPPING FOLDS. CONNECT THE EDGES OF THE GABION AND DIAPHRAGMS BY USING EITHER LACING WIRE OR RING FASTENERS AS RECOMMENDED BY THE MANUFACTURER. TYING DURING GABION ASSEMBLY SHALL GENERALLY OCCUR IN THE FOLLOWING ORDER:

TYING ORDER:	
FIRST	INITIAL GABION ASSEMBLY AND TYING
SECOND	TIE TO ADJACENT GABIONS ALONG ALL CONTACTING EDGES
THIRD	TIE LID TO GABION SIDES
FOURTH	TIE LID TO TOP OF DIAPHRAGMS
LAST	TIE CUT GABIONS

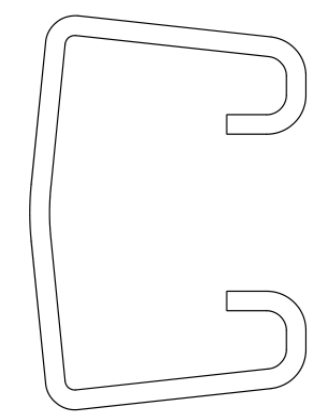
4. TYING AND FASTENING PROCEDURE: WHEN USED, LACING WIRE SHALL BE APPROXIMATELY 15 TIMES THE LENGTH OF THE EDGE TO BE TIED. LONGER EDGES SHALL BE JOINED BY SEVERAL LENGTHS OF WIRE. TIE WIRES SHALL BE SECURED AROUND THE SELVEDGE WIRE OR HEAVIER EDGE WIRE, WHERE PRESENT, BY LOOPING AND TWISTING THE LACING WIRE AROUND ITSELF. CONTINUE TYING WITH ALTERNATE DOUBLE AND SINGLE LOOPS. DOUBLE LOOPS SHALL BE MADE AT INTERVALS NOT GREATER THAN 6 IN. BASKETS SHALL BE TIGHTLY PULLED TOGETHER DURING THE TYING OPERATION. THE OTHER END OF THE TIE WIRE SHALL BE SECURED BY LOOPING AND TWISTING THE WIRE AROUND ITSELF. WHEN USED, STEEL RING FASTENERS SHALL BE FASTENED WITH EITHER A MECHANICAL OR A PNEUMATIC FASTENING TOOL. SPACING OF THE RINGS SHALL BE IN ACCORDANCE WITH ASTM A975-II, TABLE 2 - MINIMUM STRENGTH REQUIREMENTS OF MESH AND CONNECTIONS. RING FASTENERS SPACING SHALL NOT EXCEED 6 INCHES. RINGS SHALL BE INSTALLED AT THE END AND CENTER DIAPHRAGMS AND ALONG ALL EDGES. CARE SHALL BE TAKEN TO ENSURE THAT EACH STEEL RING FASTENER IS COMPLETELY CLOSED AFTER INSTALLATION.
5. INSTALLATION AND FILLING: GABIONS SHALL BE PROPERLY CONNECTED AND TIED TOGETHER, AND ALIGNED BEFORE FILLING. GABIONS SHALL BE FILLED TO MAXIMUM DENSITY WITH VOID SPACES MINIMIZED. MACHINE-ASSISTED FILLING IS ALLOWED, BUT MANUAL STONE PLACEMENT SHALL BE PERFORMED DURING THE FILLING OPERATION AS NECESSARY TO MINIMIZE VOIDS. PLACEMENT SHALL NOT DAMAGE OR BEND THE WIRES OR DAMAGE THE CORROSION PROTECTION, AND ROCK FILL SHALL NOT BE DROPPED FROM A HEIGHT GREATER THAN 3 FEET. ROCK FILL SHALL BE CAREFULLY HAND PLACED TO GIVE A NEAT, FLAT, AND COMPACT APPEARANCE AT ALL EXPOSED VERTICAL FACES. THE CELLS SHALL BE FILLED IN ONE-FOOT STAGES, WITH NO CELL FILLED TO A DEPTH EXCEEDING ONE-FOOT HIGHER THAN THE ADJOINING CELL. STIFFENERS OR CROSSTIES SHALL BE INSTALLED, AS INDICATED, AND FIXED AT 1/3 AND 2/3 OF THE HEIGHT FOR 3 FOOT GABIONS AS THE CELL IS BEING FILLED. THE STIFFENERS SHALL BE FIXED AT THE HALF-HEIGHT LEVEL FOR 1.5-FOOT HIGH UNITS. PREFORMED CORNER STIFFENERS SHALL BE INSTALLED AT 45-DEG TO THE UNIT FACE/SIDES AND EXTEND AN EQUAL DISTANCE ALONG EACH SIDE BEING BRACED (APPROXIMATELY ONE-FOOT). THE NEXT COURSE OF GABIONS SHALL BE CONNECTED TO THE LAYER UNDERNEATH AFTER THE UNDERLYING COURSE HAS BEEN SECURELY CLOSED.
6. CLOSING: GABIONS SHALL BE FILLED 1 TO 1.5 INCH ABOVE THE TOP EDGE OF THE MESH. FOLD THE LID DOWN AND PULL THE EDGES OF THE PANELS TO BE CONNECTED USING A MANUFACTURER RECOMMENDED LID CLOSING TOOL. THE LIDS SHALL BE TIGHTLY LACED ALONG ALL EDGES, ENDS AND DIAPHRAGMS IN THE SAME MANNER AS DESCRIBED BY THE MANUFACTURER FOR ASSEMBLING UNITS. ADJACENT LIDS MAY BE SECURELY ATTACHED SIMULTANEOUSLY. ALL END WIRES SHALL BE TURNED IN TO AVOID PROTRUSIONS.
7. CUTTING: GABION BASKETS MAY BE CUT TO FORM CURVES OR BEVELS, OR TO ACCOMMODATE OBSTRUCTIONS. PENETRATIONS AND EXISTING STRUCTURES, WHERE INDICATED OR WHEN APPROVED BY THE ENGINEER, ALL CUT GABIONS SHALL BE CONNECTED/OVERLAPPED AND TIED AS INDICATED, AND IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS. CUT WIRES SHALL BE CUT FLUSH OR NEATLY LACED DOWN SUCH THAT NO PROJECTING ENDS ARE PRESENT. ALL TYING OF CUTS SHALL CREATE A CLOSED CELL UPON COMPLETION.
8. PROTECTION OF FILLED GABIONS: TRACKED CONSTRUCTION EQUIPMENT SHALL NOT BE OPERATED DIRECTLY ON GABION WALLS. A MINIMUM CUSHION FILL THICKNESS OF 6 INCHES SHALL BE PLACED BEFORE OPERATION OF TRACKED VEHICLES OVER THE GABION WALL IS ALLOWED. A TEMPORARY LAYER OF FILTER FABRIC SHALL BE PLACED BEFORE PLACING CUSHION FILL THAT HAS MORE THAN 5% FINES. TURNING OF TRACKED VEHICLES SHALL BE KEPT TO A MINIMUM TO PREVENT DISPLACING THE FILL AND / OR THE GABION WALL.

CIVIL REEL
MUNICIPAL CADD
PLAN PRODUCTION

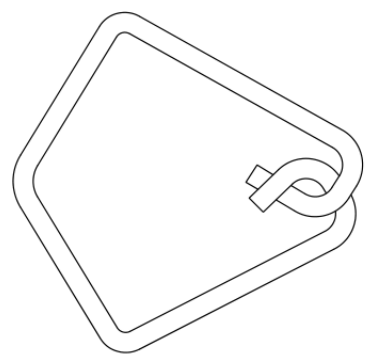
Sample 03 | Sheet 11 of 14

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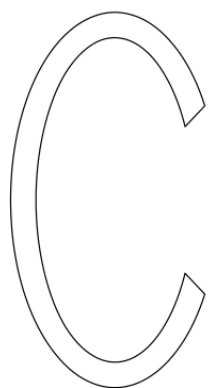
BEFORE CLOSURE



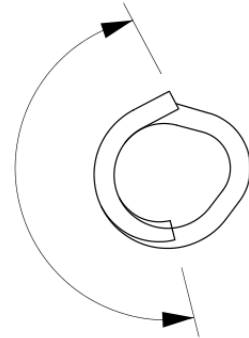
AFTER CLOSURE

INTERLOCKING WIRE FASTENER

NOTE:
All dimensions
are nominal



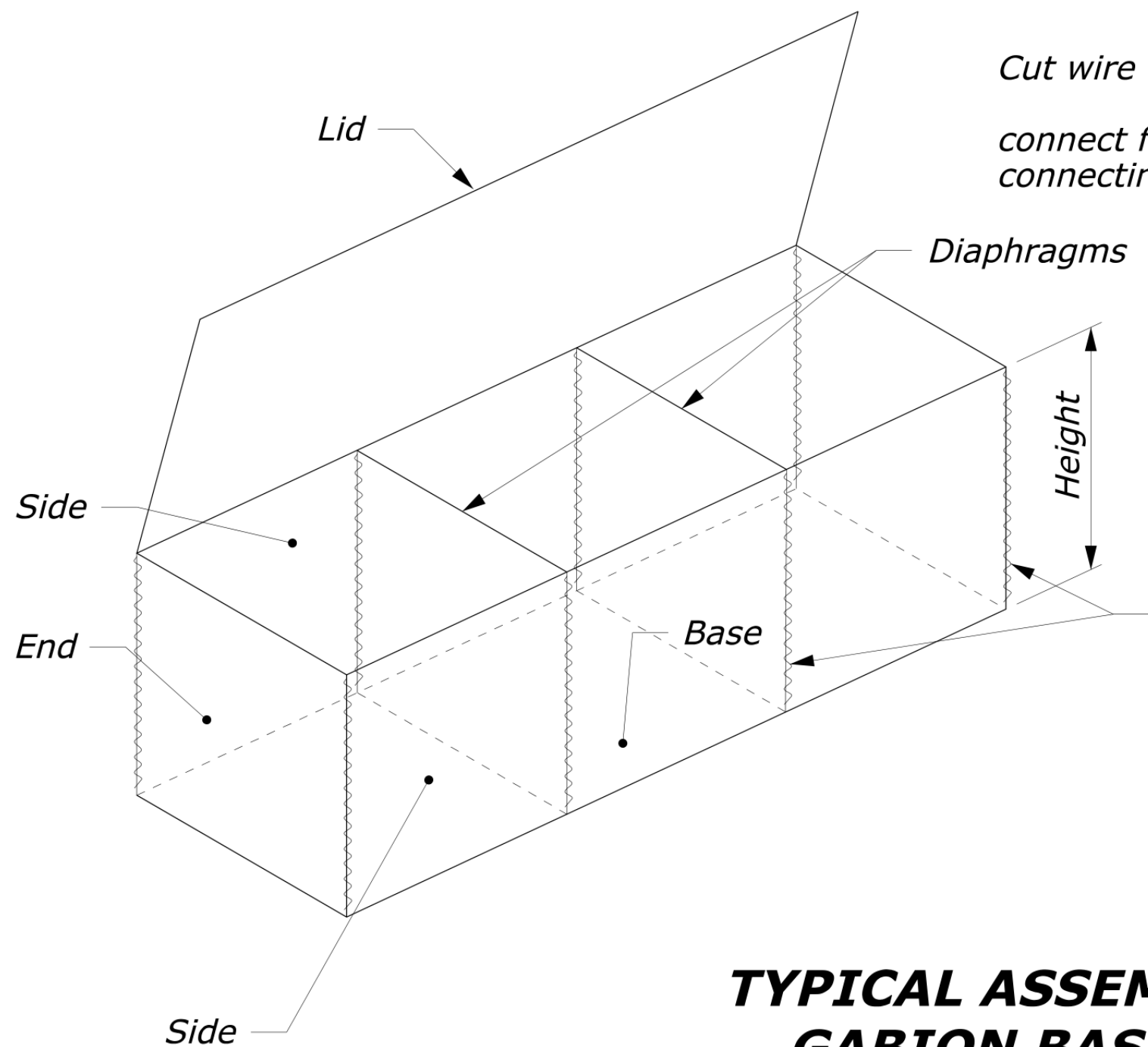
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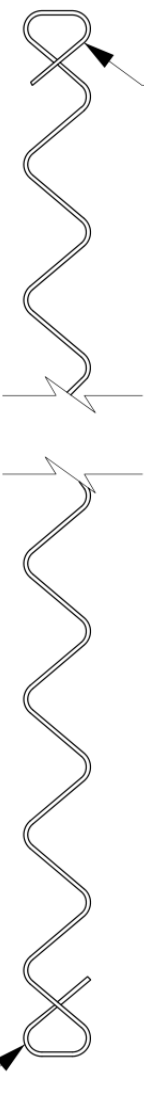
AFTER CLOSURE

OVERLAPPING RING WIRE FASTENER
(Not allowed for basket to basket connection)

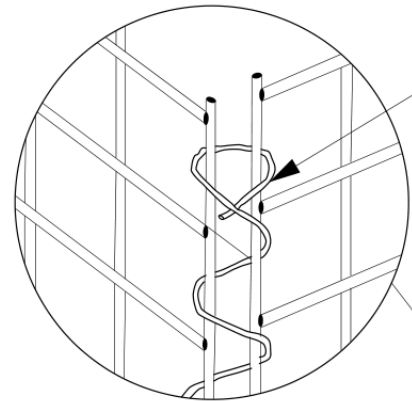
ALTERNATE TYING FASTENERS



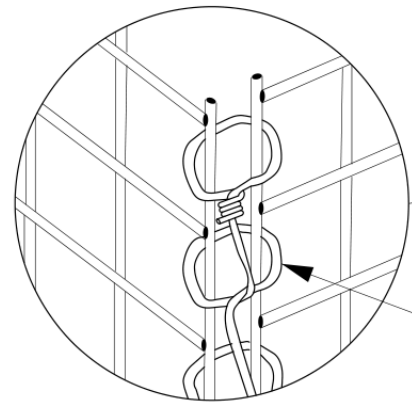
TYPICAL ASSEMBLED
GABION BASKET



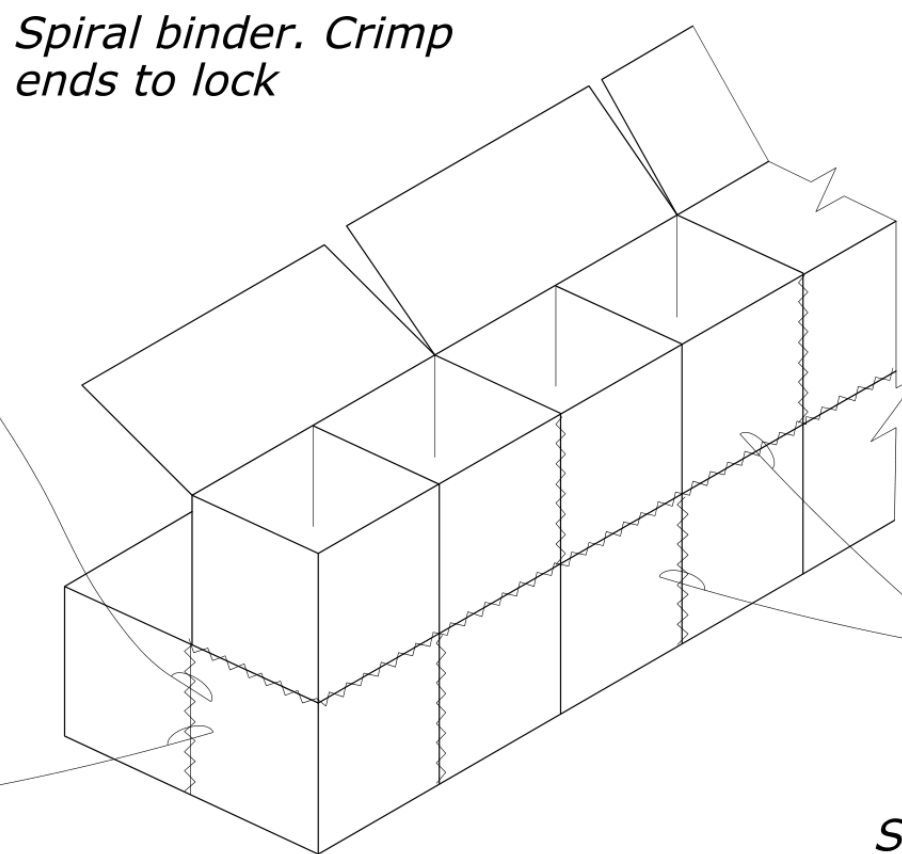
Crimped
end of joint



SPIRAL BINDER TIE
(Welded wire mesh)

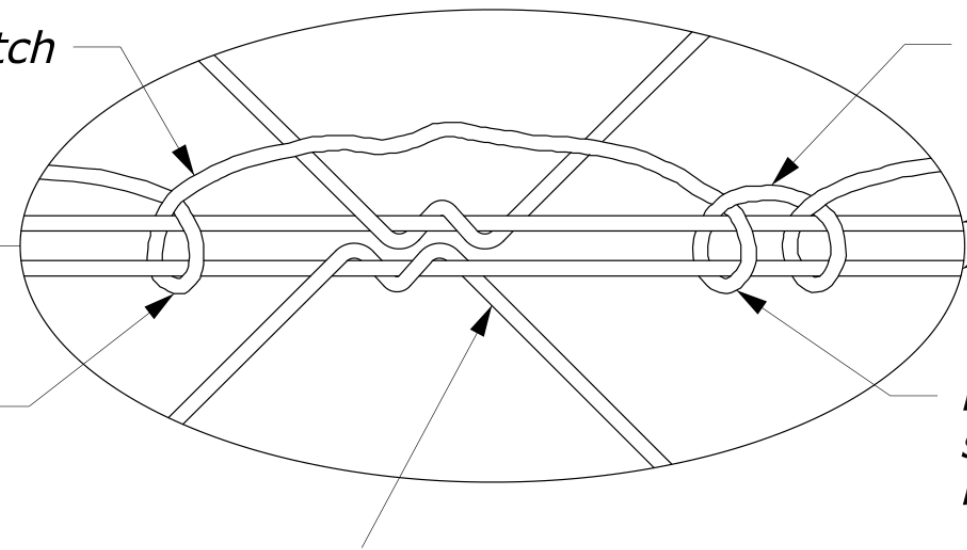


HALF HITCH TYING DETAIL
(Welded wire mesh)



Continuous tie
wire to next
double half hitch

Single half hitch



Continuous tie wire to
next single half hitch

Double half hitch. Alternate
single and double half
hitches as shown

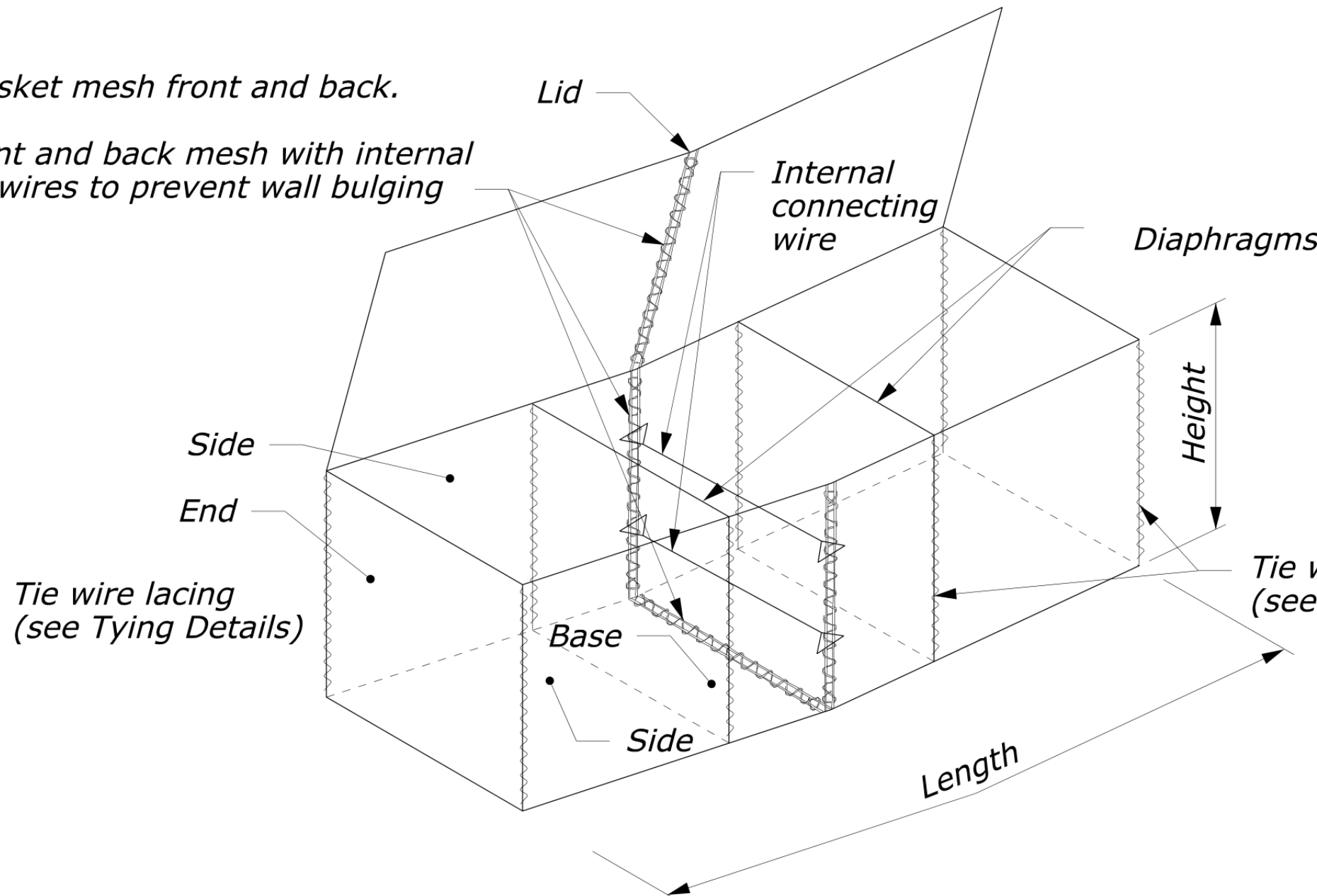
HALF HITCH TYING DETAIL
(Twisted wire mesh)

TYPICAL INSTALLATION GABION BASKETS

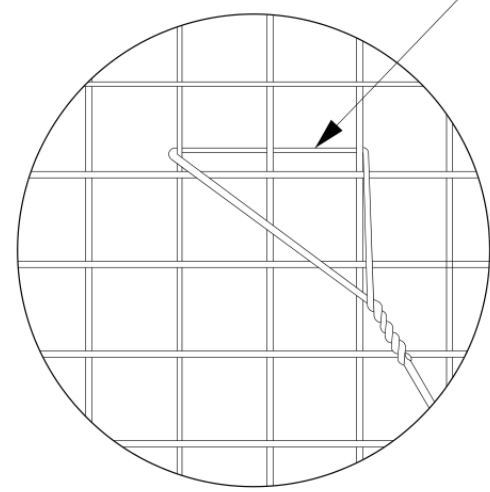
SPIRAL BINDER

Cut wire basket mesh front and back.

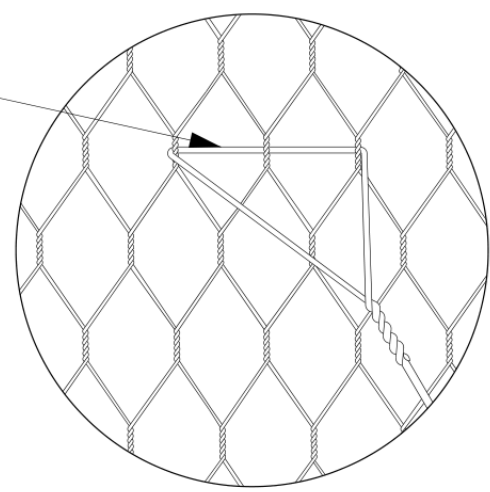
connect front and back mesh with internal
connecting wires to prevent wall bulging



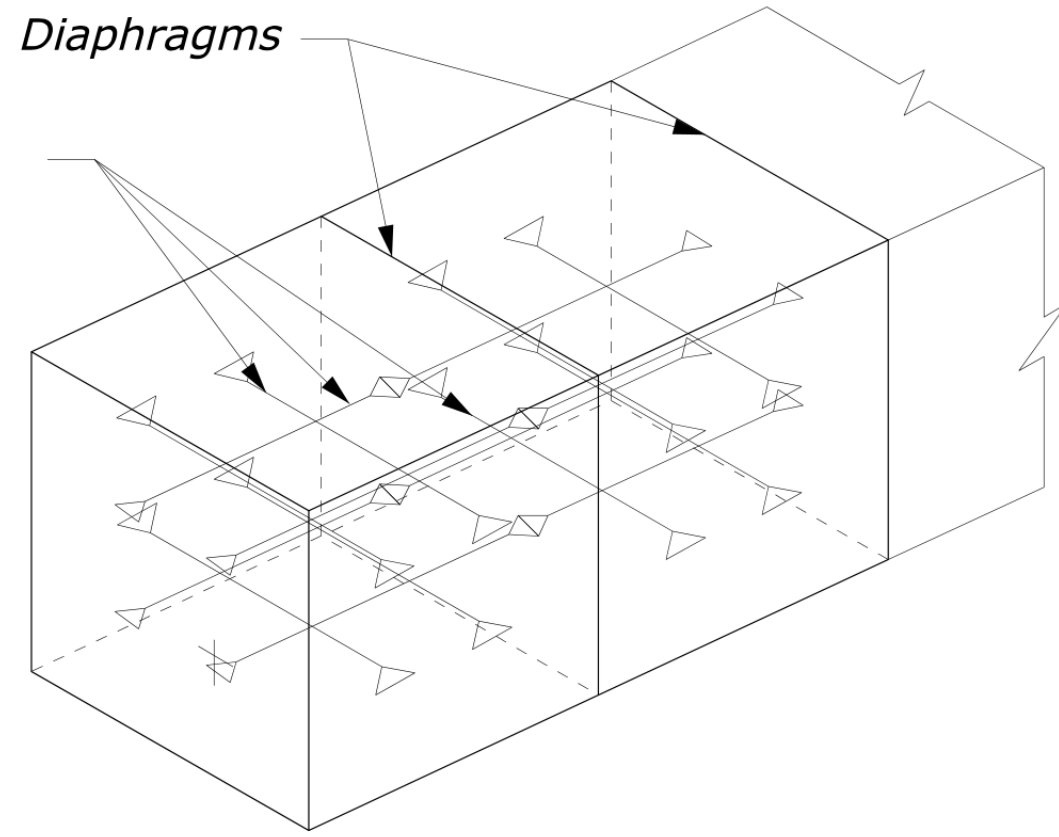
ASSEMBLED GABION BASKET IN
WALL GRADE TRANSITION AREAS



WELDED WIRE MESH



TWISTED WIRE MESH



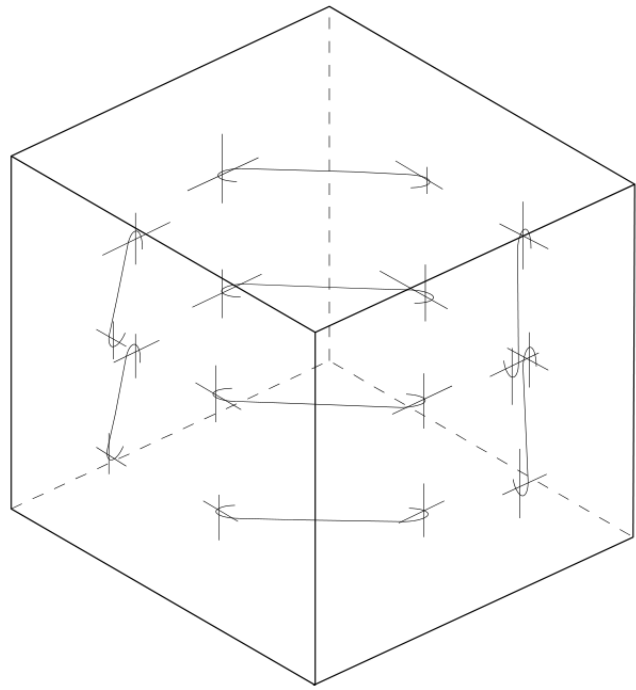
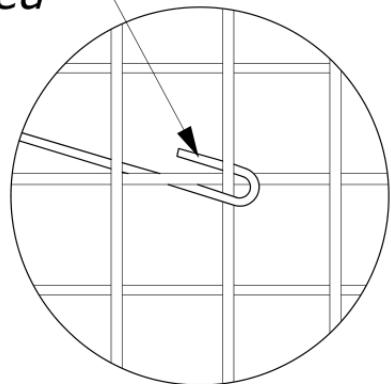
ALL END GABION CELLS

ALL

TYPICAL INTERNAL CON

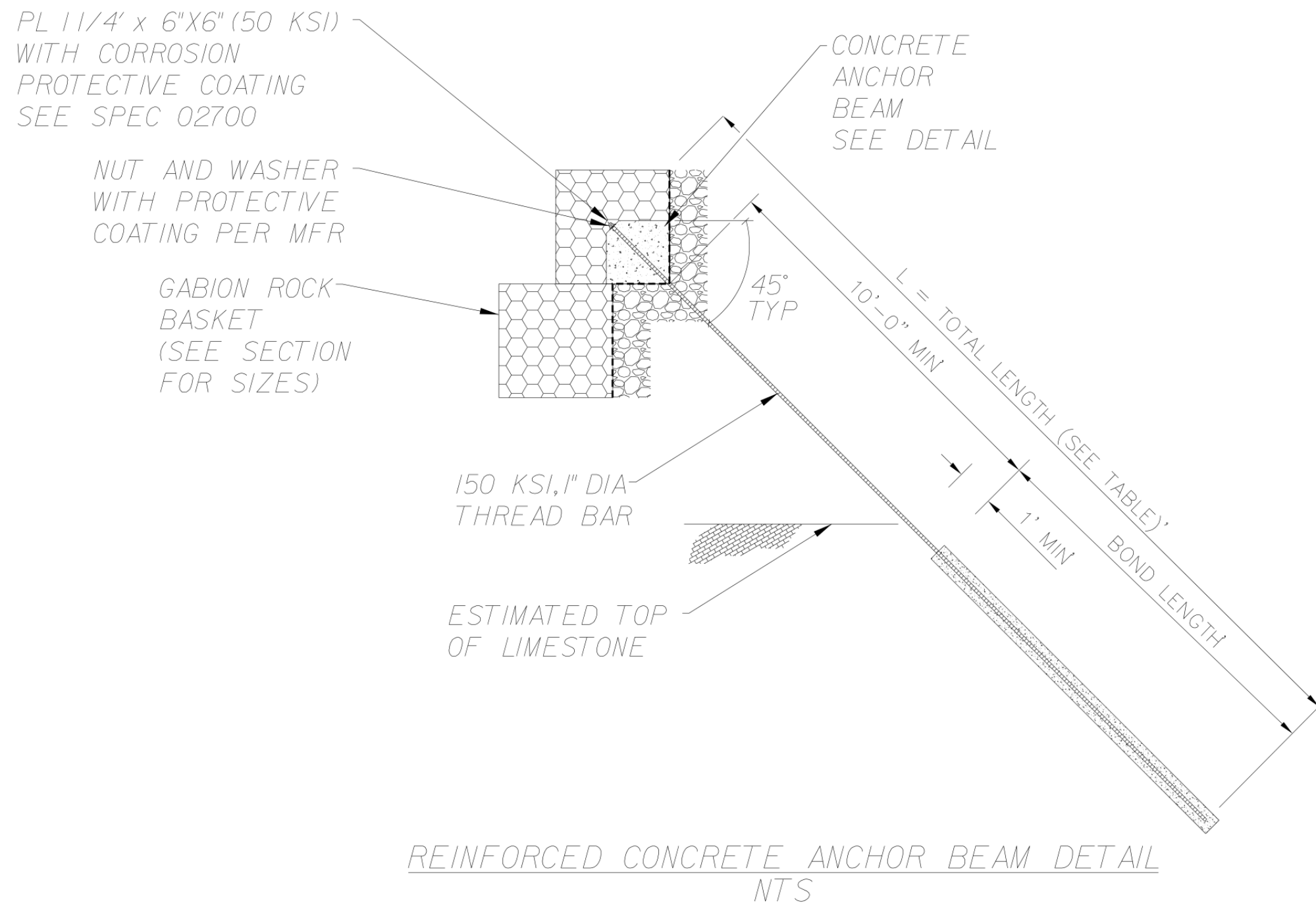
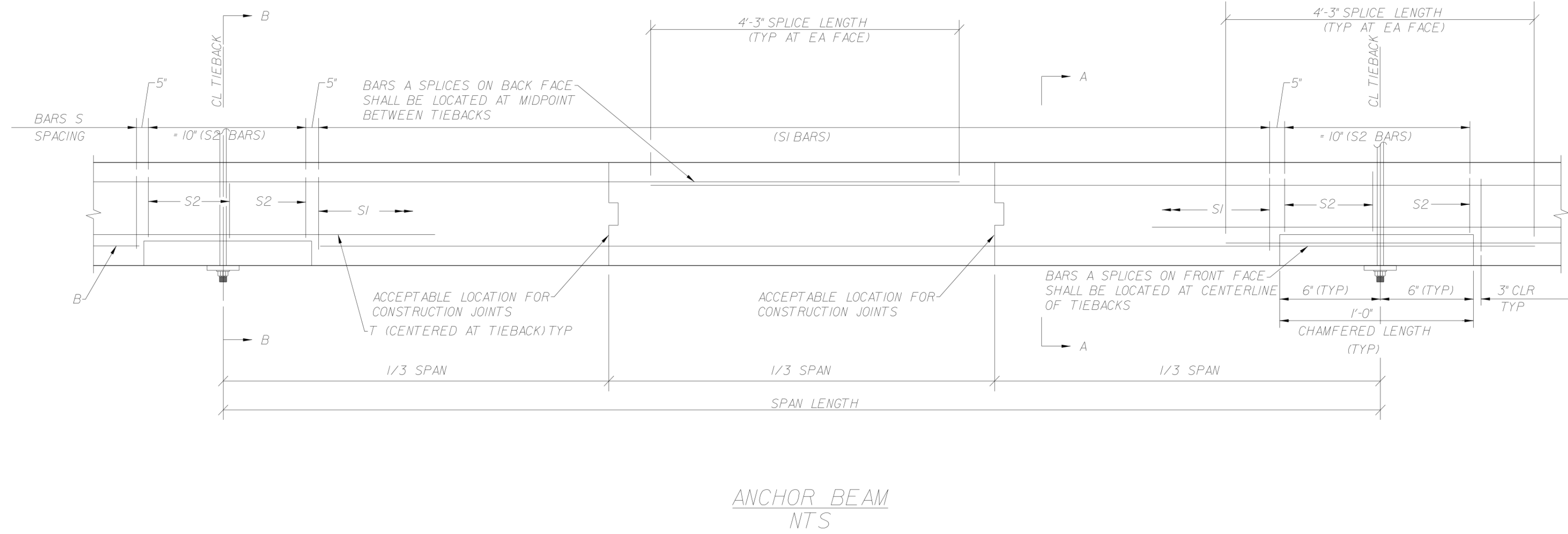
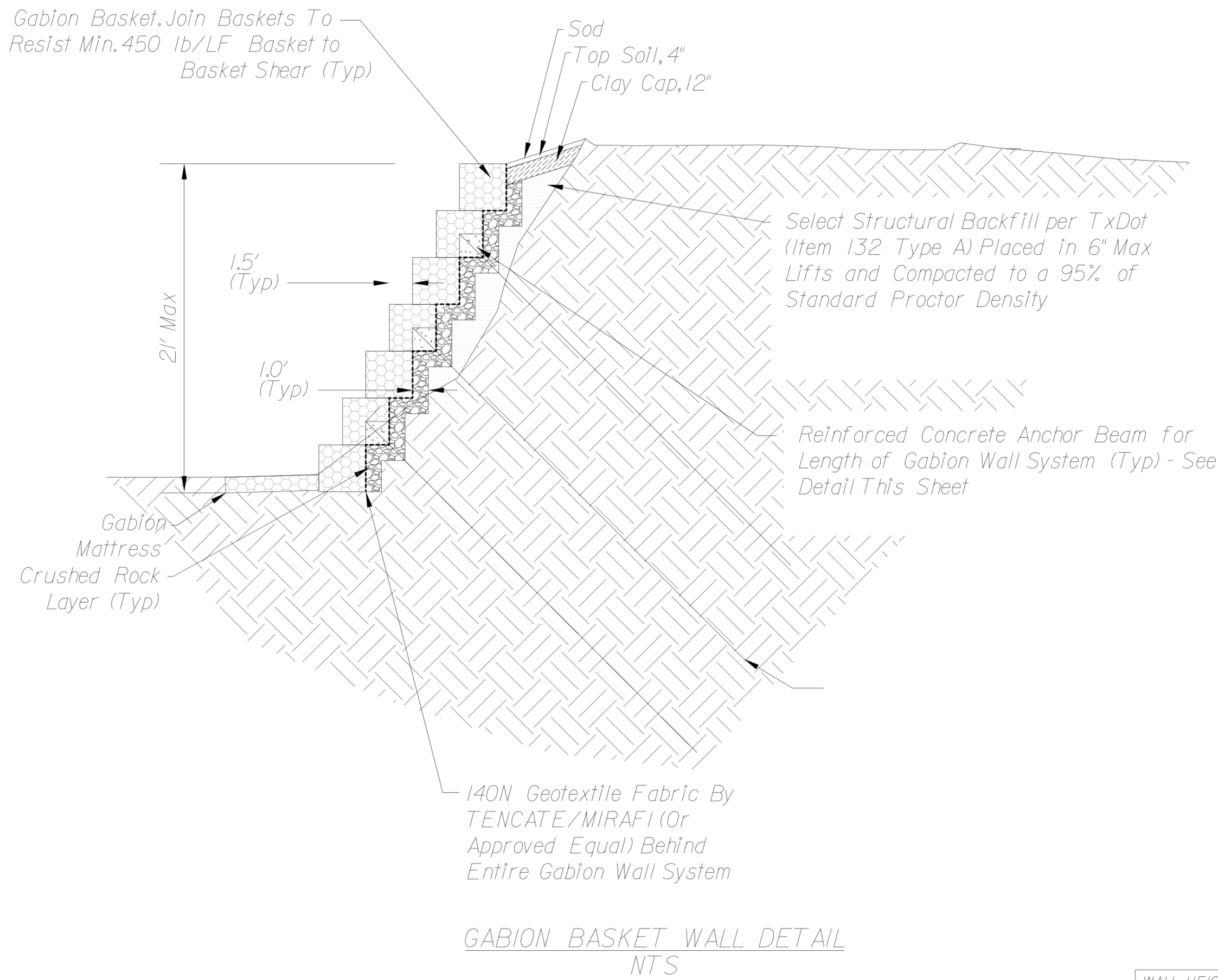
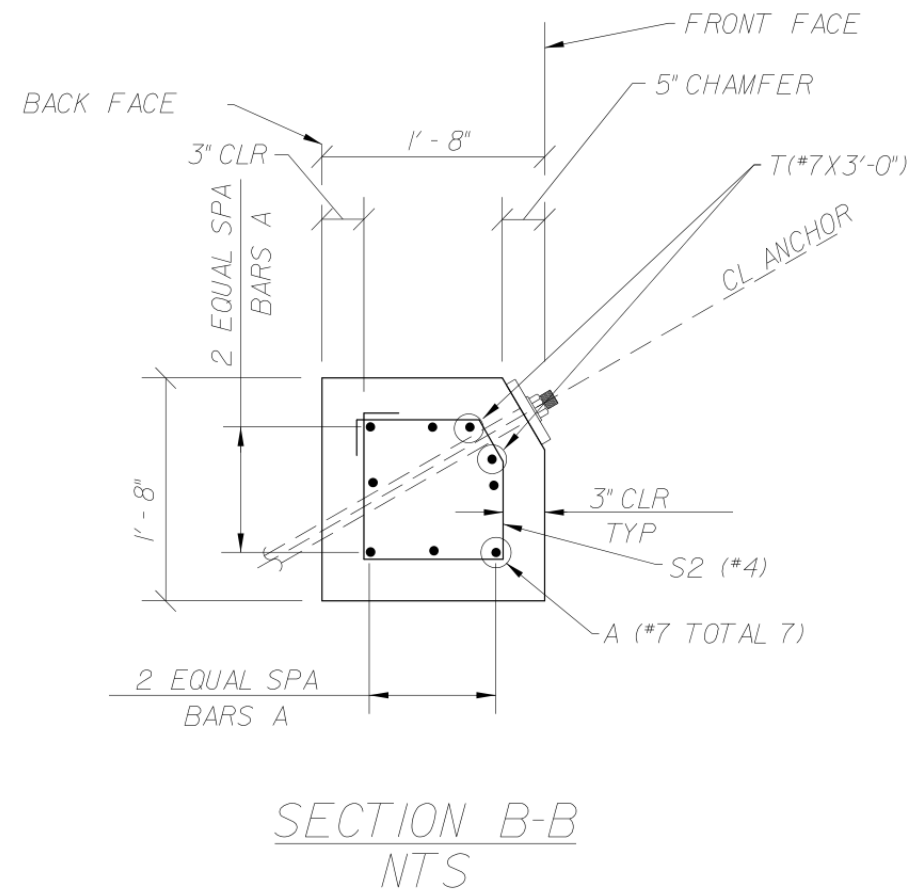
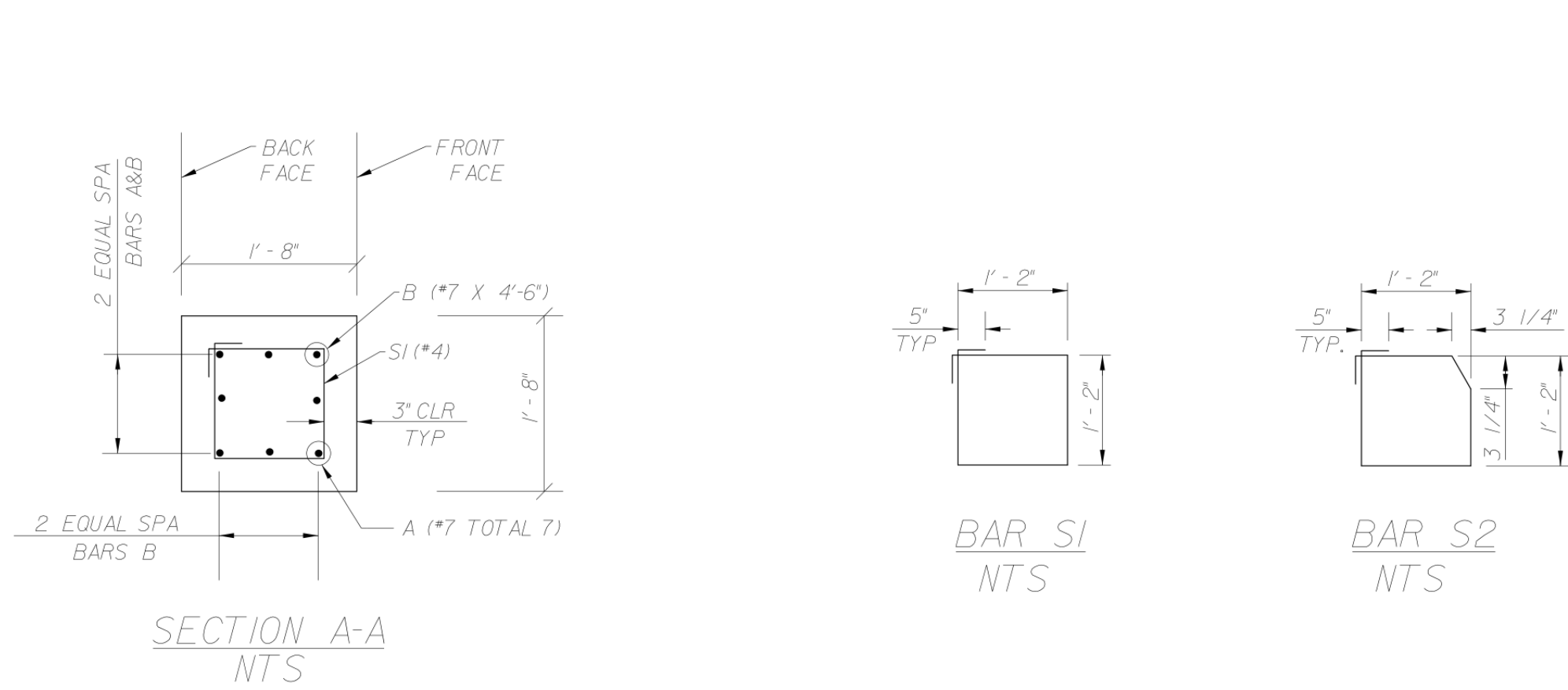
GABION BASKET NOMINAL SIZES AND CAPACITY				
Size Code Letter	Length	Height	Diaphragm Partitions	Capacity
A	6	3.0	1	2.00
B	9	3.0	2	3.00
C	12	3.0	3	4.00
X	15	3.0	4	5.00
Y	18	3.0	5	6.00
D	6	1.5	1	1.00
E	9	1.5	2	1.50
F	12	1.5	3	2.00
G	6	1.0	1	0.67
H	9	1.0	2	1.00
I	12	1.0	3	1.33

Crimp
hook closed



ALL GABION CELLS

OPTIONAL INTERNAL CONNECTING WIRES
WELDED WIRE GABION BASKET



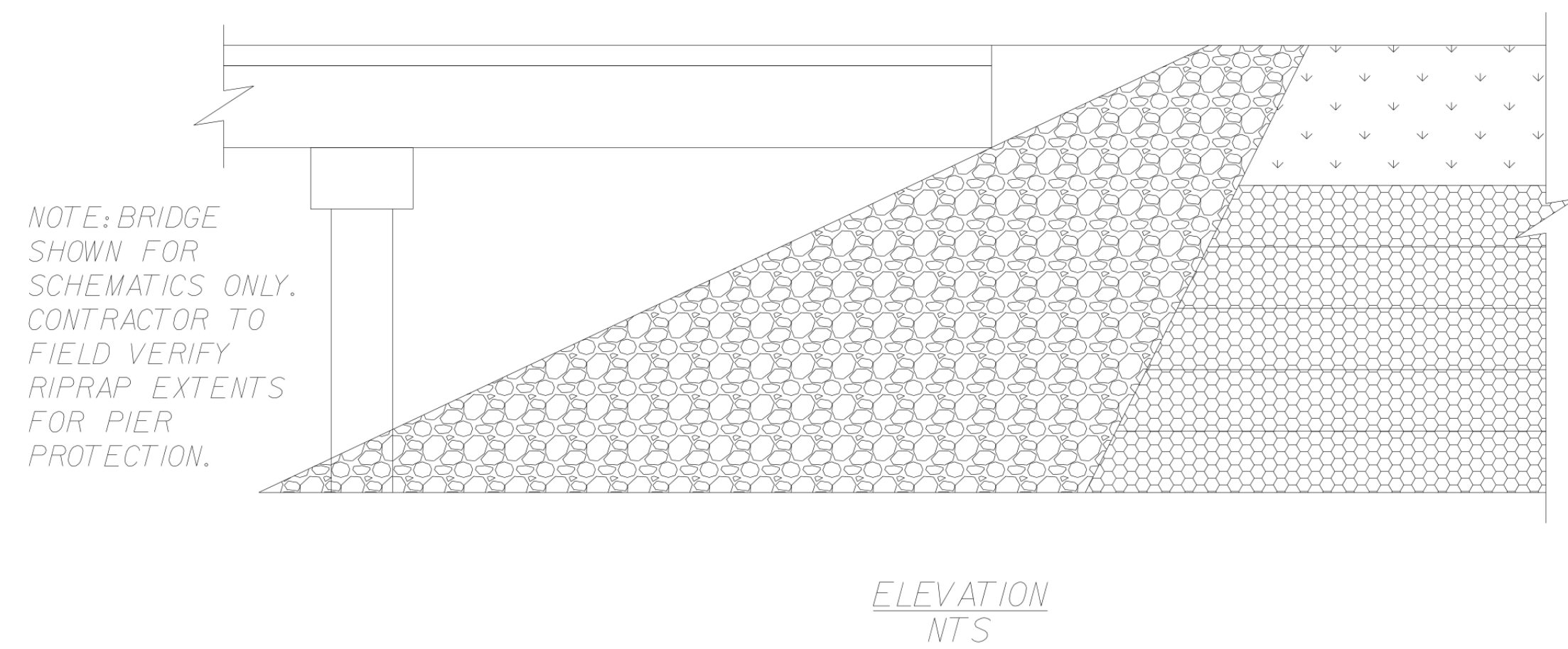
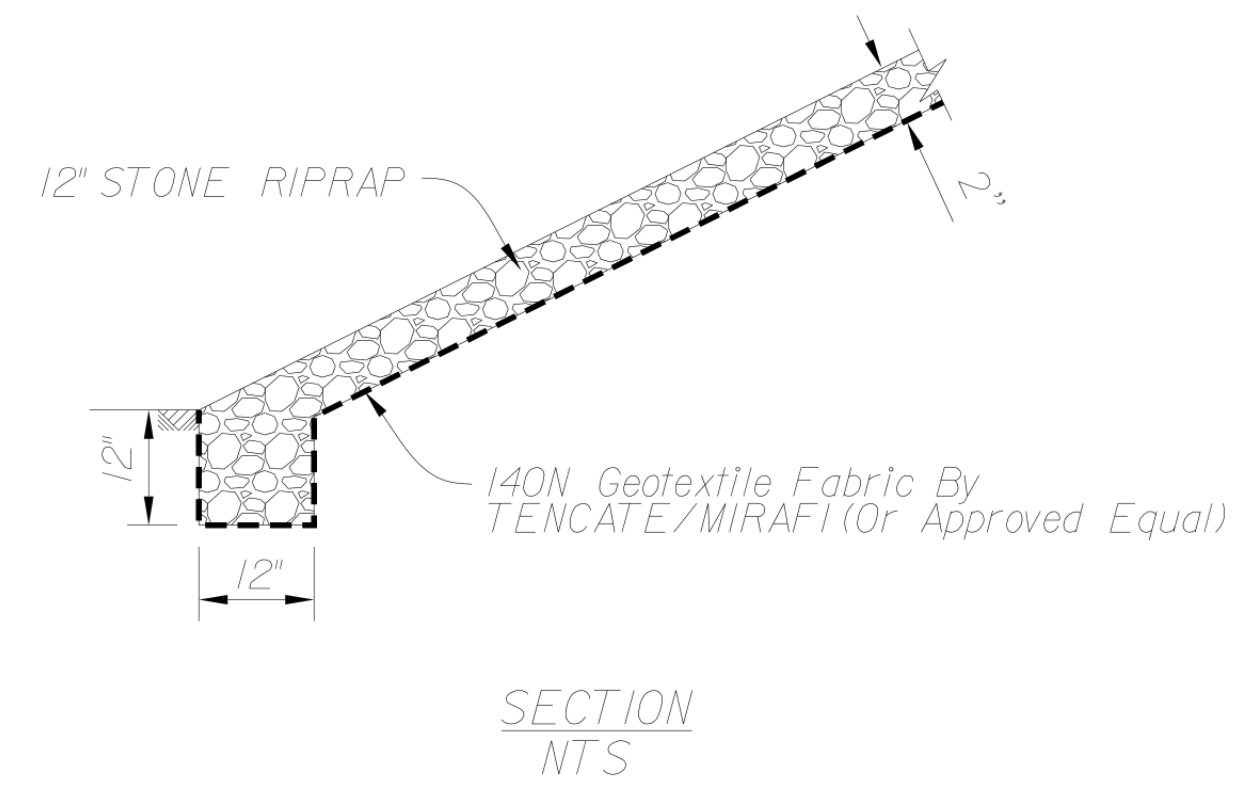
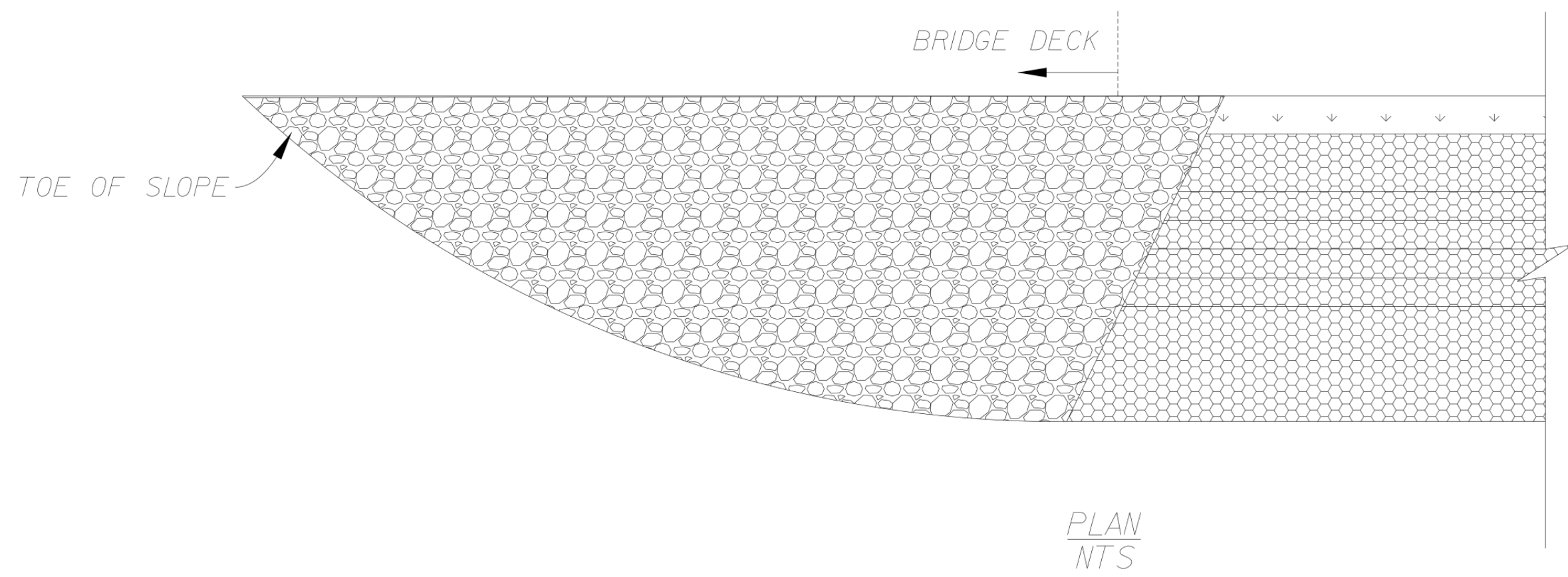
WALL HEIGHT H (FT)	ANCHOR LENGTH L (LT)			BOND LENGTH			ANCHOR HOLE DIAMETER D (INCH)	ANCHOR HORIZ SPACING (FT)	ANCHOR DESIGN LOAD (KIP)		
	TOP ROW	MIDDLE ROW	BOTTOM ROW	TOP ROW	MIDDLE ROW	BOTTOM ROW			TOP ROW	MIDDLE ROW	BOTTOM ROW
21'-0" (Max)	28'	23'	23'	10'-0"	10'-0"	10'-0"	6"	6'-0"	25 KIPS	35 KIPS	50 KIPS

CIVIL REEL
MUNICIPAL CADD
PLAN PRODUCTION

Sample 03 | Sheet 13 of 14

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STONE RIPRAP DETAILS
NTS

**CIVIL REEL
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Sample 03 | Sheet 14 of 14

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