CIVIL PLANS

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FLYING W MUNICIPAL UTILITY DISTRICT
CONSTRUCTION DOCUMENTS FOR

FLYING W SUBDIVISION UNIT 2

BEING A TOTAL OF 19.08 ACRE TRACT OUT OF THE 361.98 ACRES OF LAND LOCATED IN THE NANCY KENNER SURVEY 3, ABSTRACT 306, COMAL COUNTY, TEXAS AND BEING COMPRISED OF A CALLED 258.9 ACRES OF LAND AS DESCRIBED IN DOCUMENT 202106066282 AND OF A CALLED 103.1 ACRES OF LAND AS DESCRIBED IN 202206006901 BOTH OF THE OFFICIAL PUBLIC RECORDS OF COMAL COUNTY, TEXAS

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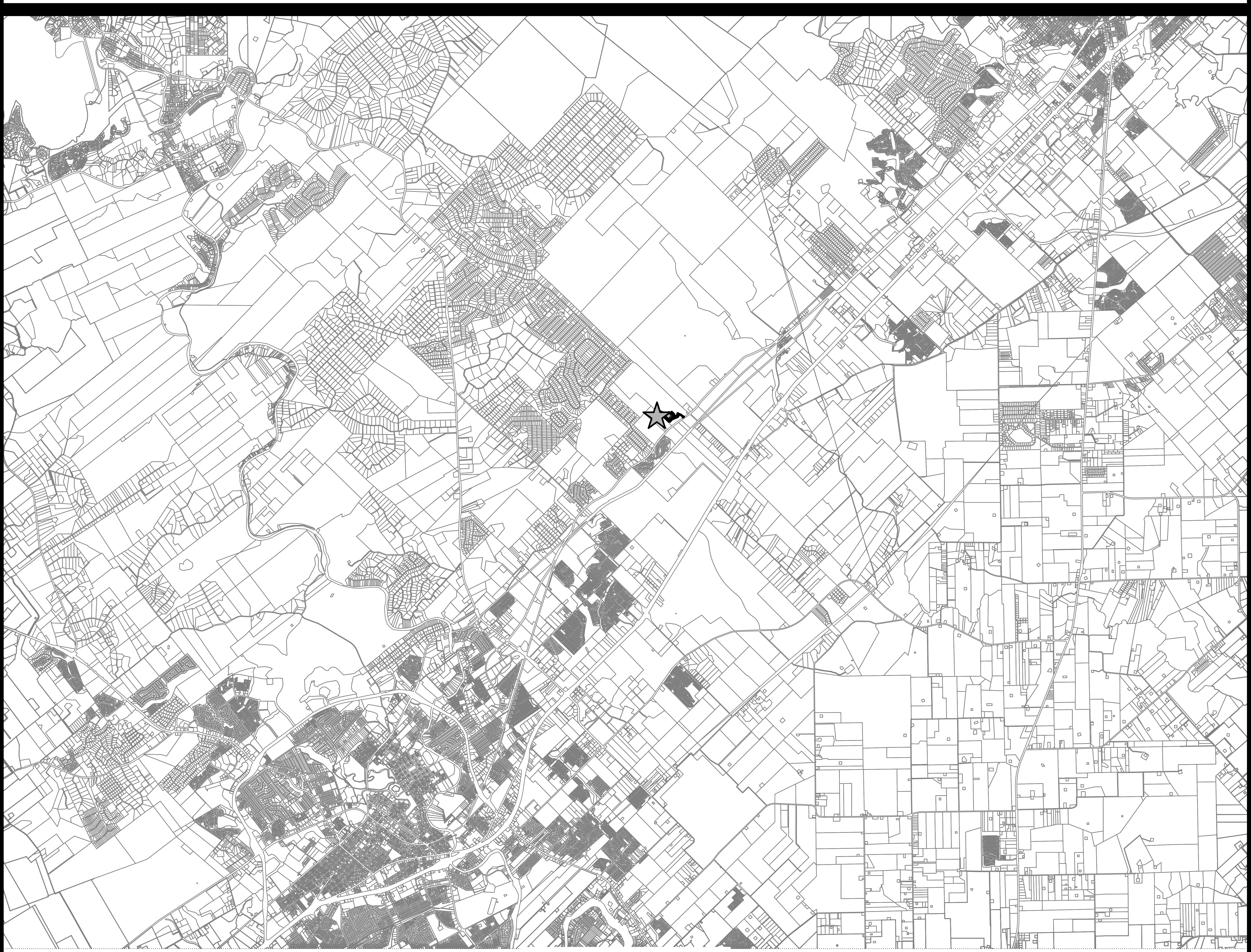
C8.00	TRAFFIC SIGNANGE PLAN

* **DENOTES STANDARD DETAILS ADOPTED FOR USE ON THIS PROJECT**

- ALL RESPONSIBILITY FOR THE ADEQUACY OF THESE PLANS REMAINS WITH THE ENGINEER OF RECORD. IN ACCEPTING THESE PLANS, COMAL COUNTY MUST RELY UPON THE ADEQUACY OF THE WORK OF THE ENGINEER OF RECORD.
- GAS UTILITIES ARE NOT INCLUDED IN THE CIVIL CONSTRUCTION PLANS. FINAL GAS UTILITY DESIGN SHALL BE APPROVED BY THE COUNTY FOR ANY WORK WITHIN PUBLIC RIGHT-OF-WAY.
- NO PORTION OF THIS SUBDIVISION IS LOCATED WITHIN THE SPECIAL FLOOD HAZARD AREA, ZONE AE, AS DEFINED BY THE COMAL COUNTY, TEXAS COMMUNITY PANEL NUMBER 48209C0470F, EFFECTIVE DATE SEPTEMBER 9, 2005 AS PREPARED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY.
- THIS SUBDIVISION IS LOCATED WITHIN THE EDWARDS AQUIFER TRANSITION ZONE.



VICINITY MAP
N.T.S.

EST. 1980 CUDE ENGINEERS

SAN ANTONIO | AUSTIN | SAN MARCOS

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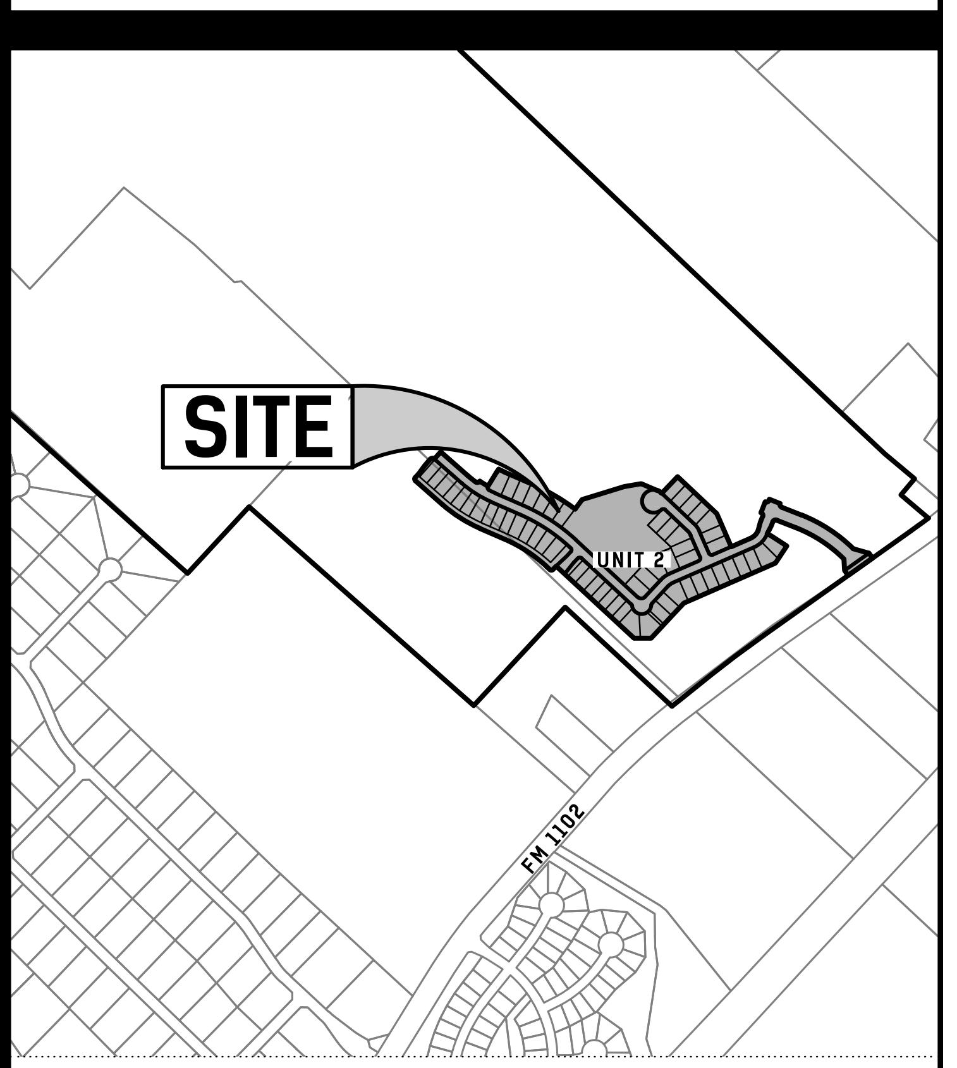
TBPELS FIRM # 10048500



LOCATION MAP
SCALE: 1" = 1000'

Pulte Homes®

DEVELOPER:
PULTE HOMES
CONTACT PERSON: STEPHAN MORENO
927 E. SONTERRA, STE. 316
SAN ANTONIO, 78258
TEL: 210.496.1985
FAX: 210.496.0449

N
W E
S

PROJECT NUMBER:
04024.018

4/16/26

TORY DUANE MILLER
135598

Tony Miller

I HAVE REVIEWED THIS PLAN SET FOR QUALITY ASSURANCE AND QUALITY CONTROL PURPOSES.

4/16/26

JOSE A. LOZANO
126773

THIS PLAN SET HAS BEEN PREPARED, DESIGNED AND REVIEWED UNDER MY DIRECT SUPERVISION.

R:\04024\018\2-DWG\4-Plans\C0.00 CVR-OVRLL - COVER.dwg 2026/04/16 8:38am sgonzales

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CONSTRUCTION PLAN NOTES

REVISED 03/2020

IF CONSTRUCTION HAS NOT COMMENCED WITHIN ONE-YEAR OF COUNTY APPROVAL FOR CONSTRUCTION INSPECTION, THAT APPROVAL IS NO LONGER VALID.

THE MOST CURRENT EDITIONS OF THE COMAL COUNTY STANDARD SPECIFICATIONS AND THE TEXAS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION OF HIGHWAYS, STREETS AND BRIDGES SHALL BE FOLLOWED FOR ALL CONSTRUCTION EXCEPT AS AMENDED BY THE COMAL COUNTY STANDARD DETAILS.

ALL RESPONSIBILITY FOR THE ADEQUACY OF THESE PLANS REMAINS WITH THE ENGINEER OF RECORD. IN ACCEPTING THESE PLANS, COMAL COUNTY MUST RELY UPON THE ADEQUACY OF THE WORK OF THE ENGINEER OF RECORD.

PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR SHALL CONTACT COMAL COUNTY TO SCHEDULE A PRECONSTRUCTION MEETING. FOR PUBLIC INFRASTRUCTURE ALL INSPECTIONS ARE TO BE CALLED IN AT 830-608-2090. COMAL COUNTY WILL NOT INSPECT UTILITIES. CONTRACTOR AND UTILITY PROVIDER TO COORDINATE INSPECTIONS AND PROVIDE NOTICE TO THE COUNTY ON INSPECTION TIMELINES.

IT IS THE CONTRACTOR'S RESPONSIBILITY TO SEE THAT ALL TEMPORARY AND PERMANENT TRAFFIC CONTROL DEVICES ARE PROPERLY INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE PLANS AND LATEST EDITION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES. IF, IN THE OPINION OF THE ENGINEERING REPRESENTATIVE AND THE CONSTRUCTION INSPECTOR, THE BARRICADES AND SIGNS DO NOT CONFORM TO ESTABLISHED STANDARDS OR ARE INCORRECTLY PLACED OR ARE INSUFFICIENT IN QUANTITY TO PROTECT THE GENERAL PUBLIC, THE CONSTRUCTION INSPECTOR SHALL HAVE THE OPTION TO STOP OPERATIONS UNTIL SUCH TIME AS THE CONDITIONS ARE CORRECTED. IF THE NEED ARISES, ADDITIONAL TEMPORARY TRAFFIC CONTROL DEVICES MAY BE ORDERED BY THE ENGINEERING REPRESENTATIVE AT THE CONTRACTOR'S EXPENSE. A TXDOT TYPE II B-B BLUE REFLECTIVE RAISED PAVEMENT MARKER SHALL BE INSTALLED IN THE CENTER OF THE ROADWAY ADJACENT TO ALL FIRE HYDRANTS. IN LOCATIONS WHERE HYDRANTS ARE SITUATED ON CORNERS, BLUE REFLECTIVE RAISED PAVEMENT MARKERS SHALL BE INSTALLED ON BOTH APPROACHES WHICH FRONT THE HYDRANT. THE RAISED PAVEMENT MARKER SHALL MEET TXDOT MATERIAL, EPOXY AND ADHESIVE SPECIFICATIONS.

GROUNDWATER:

IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER, CONTRACTOR, SUBCONTRACTORS, BUILDERS, GEO-TECHNICAL ENGINEER, AND PROJECT ENGINEER TO IMMEDIATELY NOTIFY THE OFFICE OF THE COUNTY ENGINEER AND PROJECT ENGINEER IF THE PRESENCE OF GROUNDWATER WITHIN THE SITE IS EVIDENT. UPON NOTIFICATION THE PROJECT ENGINEER SHALL RESPOND WITH PLAN REVISIONS FOR THE MITIGATION OF THE GROUNDWATER ISSUE. THE COUNTY ENGINEER SHALL RESPOND WITHIN TWO (2) BUSINESS DAYS UPON RECEIPT OF THE MITIGATION PLAN. ALL CONSTRUCTION ACTIVITY, IMPACTED BY THE DISCOVERY OF GROUNDWATER, SHALL BE SUSPENDED UNTIL THE COUNTY ENGINEER GRANTS A WRITTEN APPROVAL OF THE GROUNDWATER MITIGATION PLAN.

RECORD DRAWINGS:

AS PER PLATTING ORDINANCE SECTION 118-38M.: WHEN ALL OF THE IMPROVEMENTS ARE FOUND TO BE CONSTRUCTED AND COMPLETED IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS AND WITH THE COUNTY'S STANDARDS, AND UPON RECEIPT OF ONE SET OF "RECORD DRAWING" PLANS, AND A DIGITAL COPY OF ALL PLANS (PDF COPY) THE COUNTY ENGINEER SHALL ACCEPT SUCH IMPROVEMENTS FOR COMAL COUNTY, SUBJECT TO THE GUARANTY OF MATERIAL AND WORKMANSHIP PROVISIONS IN THIS SECTION.

CONSTRUCTION NOTE:

ENGINEER OF RECORD IS RESPONSIBLE TO ENSURE THAT EROSION CONTROL MEASURES AND STORMWATER CONTROL SUFFICIENT TO MITIGATE OFF SITE IMPACTS ARE IN PLACE AT ALL STAGES OF CONSTRUCTION.

DRAINAGE NOTE:

DRAINAGE IMPROVEMENTS SUFFICIENT TO MITIGATE THE IMPACT OF CONSTRUCTION SHALL BE INSTALLED PRIOR TO ADDING IMPERVIOUS COVER.

FINISHED FLOOR ELEVATIONS:

THE ELEVATION OF THE LOWEST FLOOR SHALL BE AT LEAST 10 INCHES ABOVE THE FINISHED GRADE OF THE SURROUNDING GROUND, WHICH SHALL BE SLOPED IN A FASHION SO AS TO DIRECT STORMWATER AWAY FROM THE STRUCTURE. PROPERTIES ADJACENT TO STORMWATER CONVEYANCE STRUCTURES MUST HAVE FLOOR SLAB ELEVATION OR BOTTOM OF FLOOR JOISTS A MINIMUM OF ONE FOOT ABOVE THE 100-YEAR WATER FLOW ELEVATION IN THE STRUCTURE. DRIVEWAYS SERVING HOUSES ON THE DOWNHILL SIDE OF THE STREET SHALL HAVE A PROPERLY SIZED CROSS SWALE PREVENTING RUNOFF FROM ENTERING THE GARAGE.

SOILS TESTING:

PROCTORS SHALL BE SAMPLED FROM ON-SITE MATERIAL (ON-SITE IS DEFINED AS LIMITS OF CONSTRUCTION FOR THIS- PLAN SET) AND A COPY OF THE PROCTOR RESULTS SHALL BE DELIVERED TO COMAL COUNTY PRIOR TO ANY DENSITY TESTS.

ROADWAY:

ALL ROADWAY COMPACTION TESTS SHALL BE THE RESPONSIBILITY OF THE DEVELOPER'S GEOTECHNICAL ENGINEER. FLEXIBLE BASE OR FILL/EMBANKMENT MATERIAL SHALL BE PLACED IN UNIFORM LAYERS NOT TO EXCEED EIGHT INCHES (8") LOOSE. THE REQUIRED DENSITY FOR THE FILL/EMBANKMENT MATERIAL SHALL MEET THE REQUIREMENTS OF TXDOT'S SPECIFICATION ITEM 132. THE REQUIRED DENSITY FOR THE FLEXIBLE BASE MATERIAL SHALL MEET THE REQUIREMENTS OF TXDOT'S SPECIFICATION ITEM 247. EACH LAYER OF MATERIAL, INCLUSIVE OF SUBGRADE, SHALL BE COMPACTED AS SPECIFIED AND TESTED FOR DENSITY AND MOISTURE IN ACCORDANCE WITH TEST METHODS TEX-113-E, TEX-114-E, TEX-115-E. THE NUMBER AND LOCATION OF REQUIRED TESTS SHALL BE DETERMINED BY THE GEOTECHNICAL ENGINEER AND APPROVED BY THE COMAL COUNTY INSPECTOR. AT A MINIMUM, TESTS SHALL BE TAKEN EVERY 200 LF FOR EACH LIFT. UPON COMPLETION OF TESTING, THE GEOTECHNICAL ENGINEER WILL PROVIDE THE COMAL COUNTY INSPECTOR WITH ALL TESTING DOCUMENTATION AND A CERTIFICATION STATING THAT THE PLACEMENT OF FLEXIBLE BASE, AND FILL MATERIAL, AND SUBGRADE, HAS BEEN COMPLETED IN ACCORDANCE WITH THE PLANS. ADDITIONAL DENSITY TESTS MAY BE REQUESTED BY THE COMAL COUNTY INSPECTOR.

ITEM 340:

ASPHALTIC CONCRETE PAVEMENT SHALL BE THE TYPE OF HOT MIX ASPHALT AS DEFINED IN TXDOT'S STANDARD SPECIFICATIONS FOR CURRENT TXDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION OF HIGHWAYS, STREET AND BRIDGES.

COMAL COUNTY WILL NOT ACCEPT THE USE OF RECYCLED ASPHALT PAVEMENT (RAP) OR RECYCLED ASPHALT SHINGLES (RAS) IN ASPHALT MIXTURES FOR NEW ROADWAYS. ANY DEBRIS INCLUSIONS WITHIN NEW ASPHALT PAVEMENTS WILL RESULT IN ASPHALT REMOVAL AND REPLACEMENT FROM CURB TO CURB FOR LIMITS TO BE DETERMINED BY THE COMAL COUNTY.

THE ASPHALTIC CONCRETE PAVEMENT SURFACE COURSE SHALL BE PLANT MIXED, HOT LAID TYPE "D" MEETING THE SPECIFICATION REQUIREMENTS OF TXDOT ITEM 340. THE ASPHALTIC CONCRETE PAVEMENT SUB-SURFACE COURSES SHALL BE PLANT MIXED, HOT LAID TYPE "B" MEETING THE SPECIFICATION REQUIREMENTS OF TXDOT ITEM 340. THE MIXTURE SHALL BE DESIGNED PER THE DESIGN REQUIREMENTS SPECIFIED IN TXDOT ITEM 340 AND SHALL BE COMPACTED TO BETWEEN 91 AND 95 PERCENT OF THE MAXIMUM THEORETICAL DENSITY AS DETERMINED BY TXDOT TEST METHOD TEX-227-F. PLACE THE MIXTURE WHEN THE ROADWAY SURFACE TEMPERATURE IS AT OR ABOVE 60°F. COMPLETE ALL COMPACTION OPERATIONS BEFORE THE PAVEMENT TEMPERATURE DROPS BELOW 160°F. THE ASPHALT CEMENT CONTENT BY PERCENT OF TOTAL MIXTURE WEIGHT SHALL FALL WITHIN A TOLERANCE OF +0.5 PERCENT FROM A SPECIFIC MIX DESIGN.

UTILITY TRENCH COMPACTION (ADDED TO THE CONSTRUCTION PLANS ON ALL UTILITY PLAN SHEETS):

ALL UTILITY TRENCH COMPACTION TESTS WITHIN THE STREET PAVEMENT/SIDEWALK SECTION SHALL BE THE RESPONSIBILITY OF THE DEVELOPER'S GEOTECHNICAL ENGINEER. FILL MATERIAL SHALL BE PLACED IN UNIFORM LAYERS NOT TO EXCEED TWELVE INCHES (12") LOOSE. DETERMINE THE MAXIMUM LIFT THICKNESS BASED ON THE ABILITY OF THE COMPACTING OPERATION AND EQUIPMENT USED TO MEET THE REQUIRED DENSITY. EACH LAYER OF MATERIAL SHALL BE COMPACTED TO A MINIMUM 95% DENSITY AND TESTED FOR DENSITY AND MOISTURE IN ACCORDANCE WITH TEST METHODS TEX-113-E, TEX-114-E, TEX-115-E. THE NUMBER AND LOCATION OF REQUIRED TESTS SHALL BE DETERMINED BY THE GEOTECHNICAL ENGINEER AND APPROVED BY THE UTILITY PROVIDER INSPECTOR. AT A MINIMUM, TESTS SHALL BE TAKEN EVERY 200 LF FOR EACH LIFT AND EVERY OTHER SERVICE LINE. UPON COMPLETION OF TESTING THE GEOTECHNICAL ENGINEER SHALL PROVIDE THE UTLITY PROVIDER INSPECTOR WITH ALL TESTING DOCUMENTATION AND A CERTIFICATION STATING THAT THE PLACEMENT OF FILL MATERIAL HAS BEEN COMPLETED IN ACCORDANCE WITH THE PLANS. ADDITIONAL DENSITY TESTS MAY BE REQUESTED BY THE UTILITY PROVIDER INSPECTOR.

CURB CUT DUE TO CONSTRUCTION OF NEW RIGHT-OF-WAY CONSTRUCTION:

1. SAWCUT EXISTING STREET AND MATCH TO NEW CONSTRUCTION.
2. SAWCUT EXISTING CURB TO TIE INTO EXISTING CONSTRUCTION.

CONSTRUCTION STABILIZED ENTRANCE:

SAWCUT CURB FOR CONSTRUCTION ENTRANCE. STABILIZED CONSTRUCTION AREA SHALL BE CONSTRUCTED OF 3"X5" ROCK TO BE PLACED A MINIMUM LENGTH OF 25-FT. AND MAINTAINED SO THAT CONSTRUCTION DEBRIS DOES NOT FALL WITHIN THE COUNTY RIGHT-OF-WAY. RIGHT-OF-WAY MUST BE CLEARED FROM MUD, ROCKS, ETC. AT ALL TIMES.

(NOTES TO BE PLACED ON ALL WW PLAN & DETAIL SHEETS):

ENSURE ALL DRIVEWAY APPROACHES ARE BUILT IN GENERAL ACCORDANCE WITH A.D.A. SPECIFICATIONS. NO VALVES, HYDRANTS, ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.

SIGNING AND PAVEMENT MARKING PLAN NOTES:

ALL PAVEMENT MARKINGS SHALL BE THERMOPLASTICS AS PER TXDOT ITEM NO. 666. COMAL COUNTY WILL INSTALL COUNTY ROAD SIGNS AND INVOICE THE OWNER. THE CONTRACTOR IS TO INSTALL PAVEMENT MARKINGS. ALL ROAD SIGNS AND PAVEMENT MARKINGS SHALL BE INSTALLED IN ACCORDANCE WITH THE APPROVED ENGINEERING PLANS. THE COUNTY WILL INSPECT ALL SIGNS AT FINAL INSPECTION. THE CONTRACTOR SHALL INSTALL ALL PAVEMENT MARKINGS IN ACCORDANCE WITH APPROVED ENGINEERING PLANS. THE CONTRACTOR SHALL NOTIFY THE COUNTY AT LEAST 24 HOURS PRIOR TO THE INSTALLATION OF ALL SEALER AND FINAL MARKINGS. THE COUNTY WILL INSPECT ALL MARKINGS AT FINAL APPLICATION.

SEEDING AND ESTABLISHMENT OF VEGETATION WITHIN EARTHEN CHANNELS, STORMWATER BASINS AND DISTURBED AREAS:

SEEDING FOR THE PURPOSE OF ESTABLISHING VEGETATION WITHIN CONSTRUCTED EARTHEN CHANNELS, BASINS AND DISTURBED AREAS SHALL BE CONDUCTED IN ACCORDANCE WITH ITEM 164 (SEEDING FOR EROSION CONTROL OF TXDOT'S STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS AND BRIDGES MANUAL. ONLY SEED TYPES AND MIXES SPECIFIED FOR THE SAN ANTONIO DISTRICT (DISTRICT 15 IN TABLES 1 AND 2 UNDER ITEM 164 SHALL BE UTILIZED. DURING THE COOL SEASON (SEPT 1-NOV 30, CEREAL RYE AND SEED SPECIES SPECIFIED FOR THE SAN ANTONIO DISTRICT IN TABLE 3 MAY BE USED. FOR COOL SEASON SEEDING APPLICATIONS, COOL SEASON SEED MIXES SHALL BE USED IN CONJUNCTION WITH SEED MIXES FOR THE SAN ANTONIO DISTRICT AS SPECIFIED IN TABLE 1 AND 2 UNDER ITEM 164.

IT MAY BE DEEMED NECESSARY TO INCORPORATE TOPSOIL AND SOIL AMENDMENTS (I.E. COMPOST/ FERTILIZER INTO EXISTING SOIL IN ORDER TO FACILITATE VEGETATION GROWTH. TOPSOIL COMPOST AND FERTILIZER ADDITIONS SHALL BE CONDUCTED ACCORDING TO ITEMS 160, 161 AND 166 OF TXDOT'S STANDARD SPECIFICATIONS MANUAL, RESPECTIVELY.

AREAS REQUIRING PERMANENT VEGETATION (EARTHEN CHANNELS, PONDS, ETC.) ARE REQUIRED TO MEET TXDOT SPECIFICATIONS FOR ITEM 160 TOPSOIL. TESTING PER TEX-128-E WILL BE REQUIRED AT THE COUNTY'S REQUEST.

WATERING MAY ALSO BE NECESSARY TO FACILITATE AND EXPEDITE THE SPROUTING AND GROWTH OF VEGETATION. ITEM 168 OF TXDOT'S STANDARD SPECIFICATIONS MANUAL SHALL BE ADHERED TO FOR VEGETATIVE WATERING.

IF EXTENDED DROUGHT CONDITIONS EXIST THAT HINDER OR PROHIBIT THE GROWTH AND ESTABLISHMENT OF VEGETATION, THE CONTRACTOR/ DEVELOPER SHALL PROVIDE A PLAN TO COMAL COUNTY DESCRIBING THE MEASURES THAT WILL BE TAKEN TO STABILIZE EARTHEN DRAINAGE INFRASTRUCTURE UNTIL A TIME WHEN GROWING CONDITIONS BECOME MORE FAVORABLE.

SEQUENCE OF CONSTRUCTION

A) INSTALLATION OF TEMPORARY CONSTRUCTION ENTRANCE/EXIT
B) INSTALLATION OF EROSION AND SEDIMENTATION CONTROLS
C) SITE CLEARING
D) GRADING
E) SANITARY SEWER INSTALLATION
F) WATER MAIN INSTALLATION
G) DRY UTILITY INSTALLATION
H) STREET AND DRAINAGE INFRASTRUCTURE INSTALLATION
I) REMOVAL OF TEMPORARY EROSION AND SEDIMENTATION CONTROLS
J) SITE CLEAN UP
K) SINGLE-FAMILY RESIDENTIAL HOME CONSTRUCTION

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FLYING W
UNIT 2

GENERAL NOTES

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
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4/16/26
TORY DUANE MILLER
135598

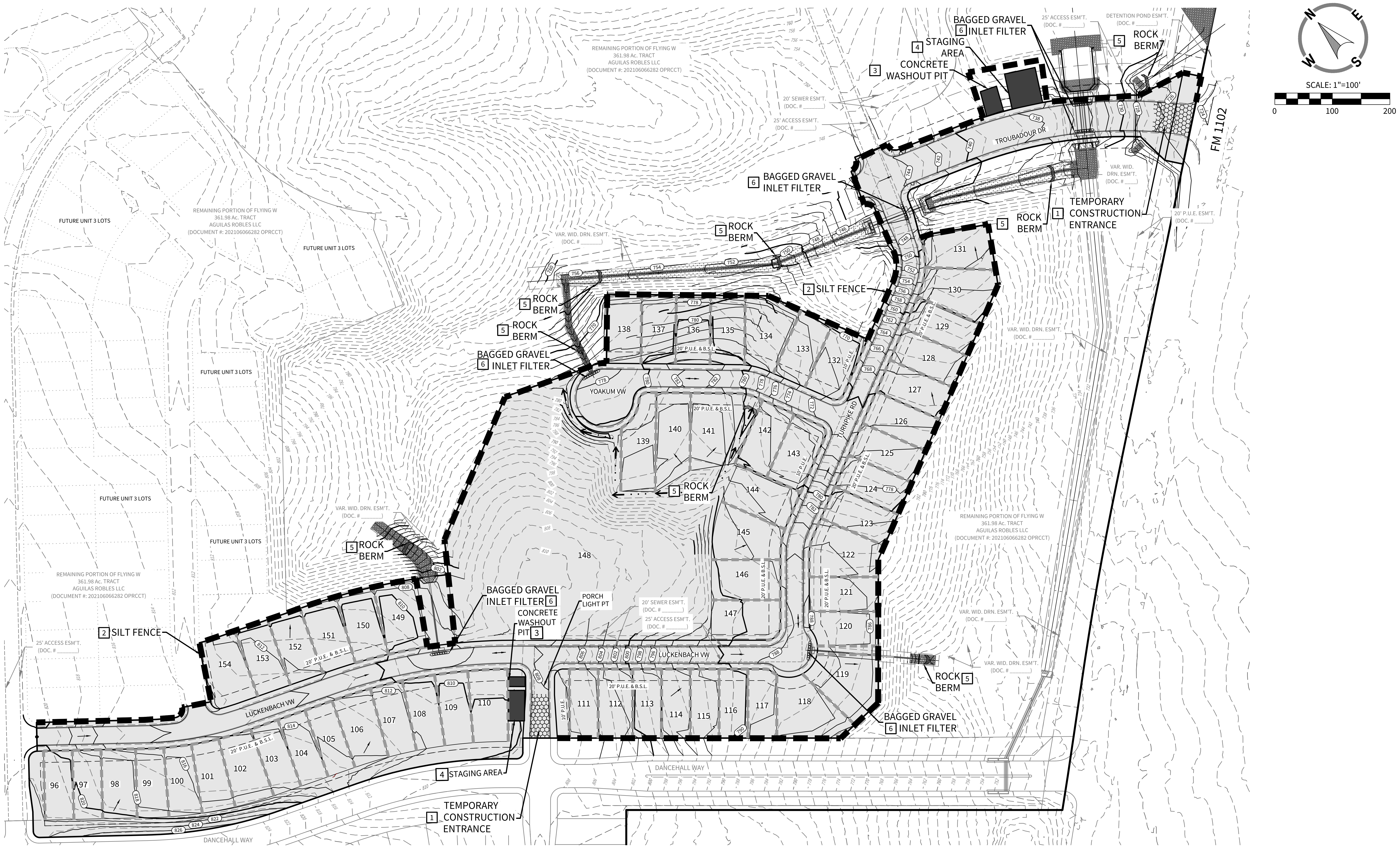
CUDE ENGINEERS
TBPELS No. 10048500

-

C0.01

LEGEND

PROPERTY LINE	━━━
EXISTING CONTOURS	— — 930 — —
BMP ITEM NUMBER	1
TEMPORARY CONSTRUCTION ENTRANCE/EXIT	▨
ROCK BERM	▨
SILT FENCE	▬ ▬ ▬
FLOW ARROW	→
STAGING AREA	■
CONCRETE WASHOUT PIT	■
LIMITS OF DISTURBANCE	□
PHASE 2 SILT FENCE	- - - - -
REVEGETATION	□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BAGGED GRAVEL INLET FILTER 6
STAGING AREA 4
CONCRETE WASHOUT PIT 3
ROCK BERM 5
DETENTION POND ESM'T.
25' ACCESS ESM'T.
REMAINING PORTION OF FLYING W 361.98 Ac. TRACT AGUILAS ROBLES LLC (DOCUMENT #: 202106066282 OPRCCT)
TROUBADOUR DR
FM 1102
TEMPORARY CONSTRUCTION ENTRANCE 1
SILT FENCE 2
FUTURE UNIT 3 LOTS
YOAKUM VW
TURNPIKE RD
LUCKENBACH VW
DANCEHALL WAY
PORCH LIGHT PT
20' SEWER ESM'T.
25' ACCESS ESM'T.
VAR. WID. DRN. ESM'T.
20' P.U.E. & B.S.L.
10' P.U.E.
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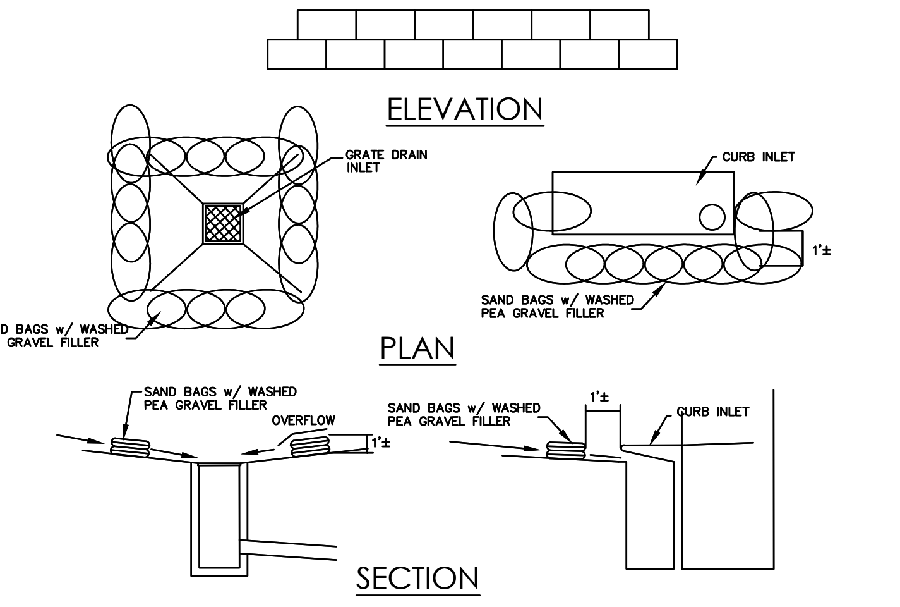
NOTES:

1. ALL SILT FENCES AND/OR ROCK BERMS AND TEMPORARY CONSTRUCTION ENTRANCES/EXITS SHALL BE PLACED AT THE MOST DOWN-GRADIENT POINT OF CONSTRUCTION AS SHOWN ON THIS SITE PLAN. CONTRACTOR SHALL TAKE INTO CONSIDERATION ANY PROPOSED CONSTRUCTION THAT MAY TAKE PLACE AT THESE LOCATIONS. ANY RELOCATION OF THE SILT FENCE, ROCK BERMS AND/OR TEMPORARY CONSTRUCTION ENTRANCES/EXITS SHALL BE AT THE CONTRACTOR'S EXPENSE.
2. AREA OF SOIL DISTURBANCES INCLUDE STREET RIGHT-OF-WAYS, EASEMENTS AND LOTS.
3. THERE WILL BE NO STORMWATER DISCHARGES INTO THE FEMA FLOOD PLAIN.
4. THE CONTRACTOR IS REQUIRED TO MAINTAIN EROSION CONTROLS THROUGHOUT THE DURATION OF THE PROJECT.
5. THE CITY AND/OR COUNTY INSPECTOR HAS THE AUTHORITY TO HAVE THE CONTRACTOR MODIFY THE EROSION CONTROLS AT THE DEVELOPER'S EXPENSE. THE DEVELOPER SHALL BE NOTIFIED OF THESE MODIFICATIONS PRIOR TO COMMENCEMENT OF MODIFICATIONS.
6. PER TPDES REQUIREMENTS, DISTURBED AREAS ON WHICH CONSTRUCTION ACTIVITIES HAVE CEASED (TEMPORARY OR PERMANENTLY) SHALL BE STABILIZED WITHIN 14 DAYS UNLESS ACTIVITY RESUMENS WITHIN 21 DAYS. SEEDING DOES NOT CONSTITUTE AS STABILIZATION

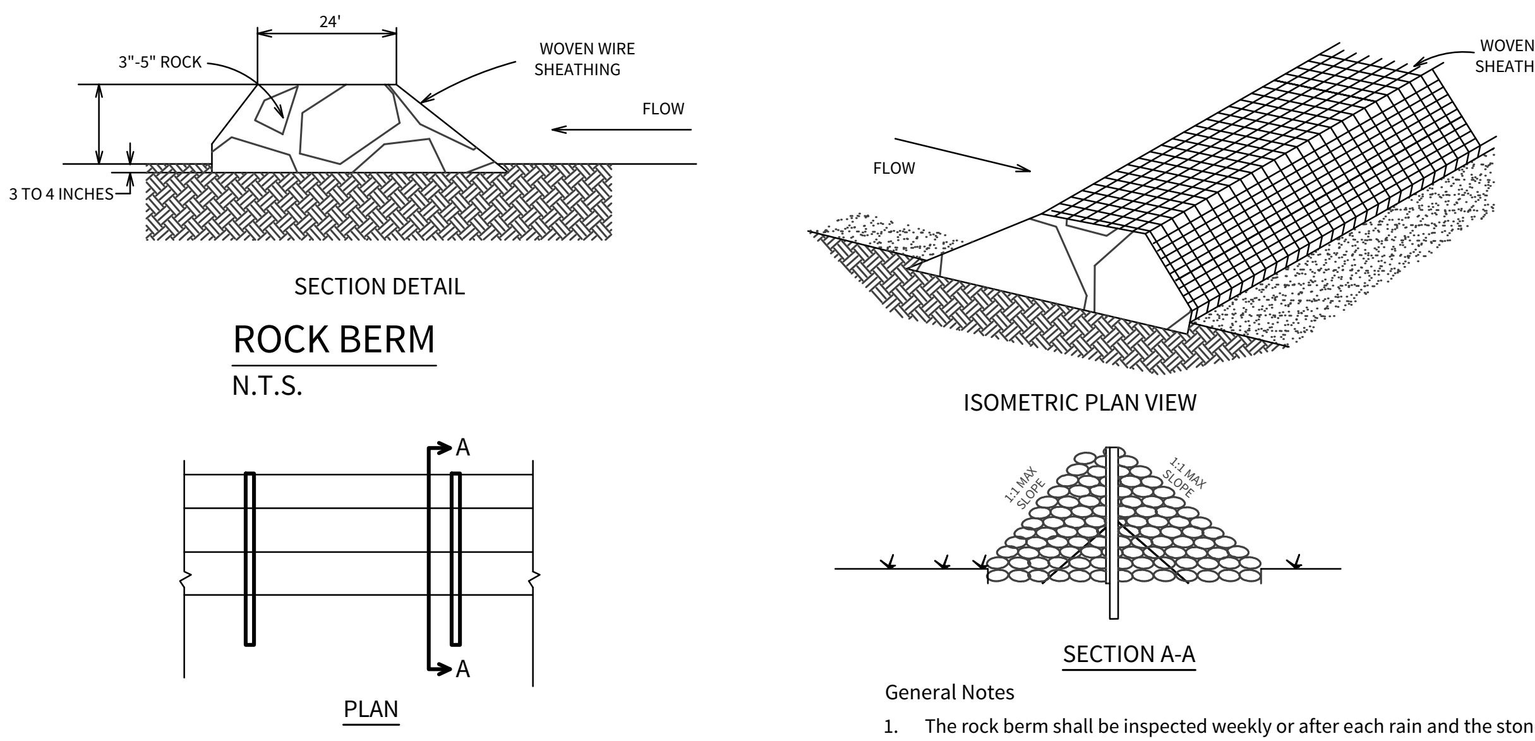

ELEVATION
GRATE DRAIN INLET
CURB INLET
1'±
SAND BAGS w/ WASHED PEA GRAVEL FILLER
PLAN
OVERFLOW
SECTION

BAGGED GRAVEL INLET FILTER NOTES

1. THE GRAVEL BAG MATERIAL SHOULD BE POLYPROPYLENE, POLYETHYLENE, POLYAMIDE OR COTTON BURLAP WOVEN FABRIC, MINIMUM UNIT WEIGHT 4 OZ/YD 2 , MULLEN BURST STRENGTH EXCEEDING 300 PSI AND ULTRAVIOLET STABILITY EXCEEDING 70 PERCENT.
2. THE BAG LENGTH SHOULD BE 24 INCHES, WIDTH SHOULD BE 18 INCHES AND THICKNESS SHOULD BE 6 INCHES.
3. THE GRAVEL BAGS SHOULD BE FILLED WITH ¾" GRAVEL .
4. WHEN A GRAVEL BAG IS FILLED WITH GRAVEL, THE OPEN END OF THE GRAVEL BAG SHOULD BE STAPLED OR TIED WITH NYLON OR POLY CORD.
5. THE GRAVEL BAGS SHOULD BE PLACED AS SHOWN ON THE DETAIL. THE GRAVEL BAGS SHALL BE STACKED TO FORM A CONTINUOUS BARRIER AROUND THE INLETS. THE BAGS SHOULD BE TIGHTLY ABUTTED AGAINST EACH OTHER TO PREVENT RUNOFF FROM FLOWING BETWEEN THE BAGS.
6. INSPECTION SHOULD BE MADE WEEKLY AND AFTER EACH RAINFALL. REPAIR OR REPLACEMENT SHOULD BE MADE PROMPTLY AS NEEDED BY THE CONTRACTOR.
7. CHECK PLACEMENT OF DEVICE TO PREVENT GAPS BETWEEN DEVICE AND CURB.
8. REMOVE SEDIMENT WHEN BUILDUP REACHES A DEPTH OF 3 INCHES. REMOVED SEDIMENT SHOULD BE DEPOSITED IN A SUITABLE AREA AND IN SUCH A MANNER THAT IT WILL NOT ERODE.
9. STRUCTURES SHOULD BE REMOVED AND THE AREA STABILIZED ONLY AFTER THE REMAINING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

6 BAGGED GRAVEL INLET FILTER NOTES

N.T.S.

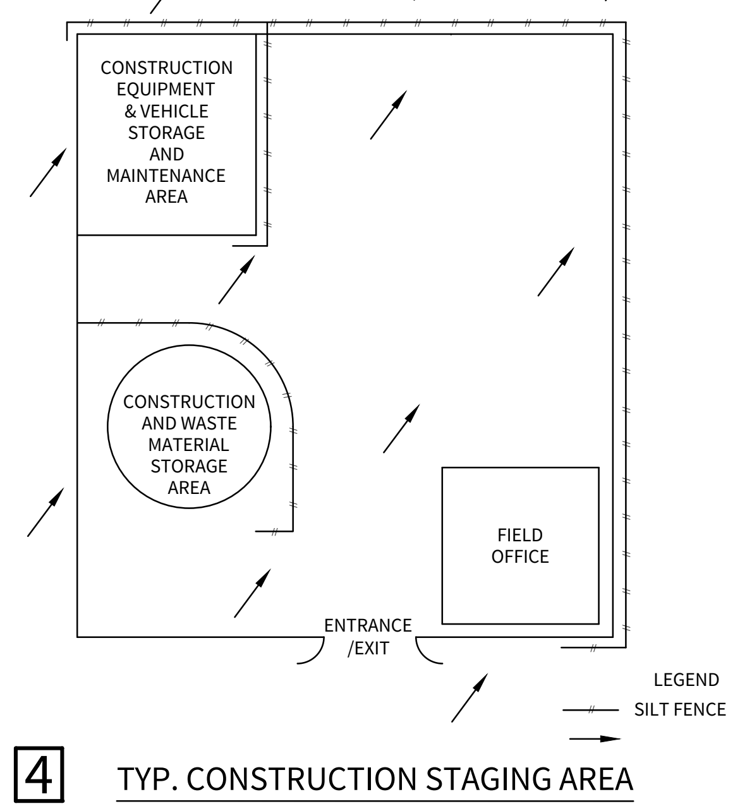

24'
3"-5" ROCK
WOVEN WIRE SHEATHING
FLOW
3 TO 4 INCHES
SECTION DETAIL
ROCK BERM
N.T.S.
A
A
PLAN
FLOW
WOVEN WIRE SHEATHING
ISOMETRIC PLAN VIEW
1:1 MAX SLOPE
1:1 MAX SLOPE
SECTION A-A

General Notes

1. The rock berm shall be inspected weekly or after each rain and the stone shall be replaced when the structure ceases to function as intended due to silt accumulation, washout, etc.
2. When silt reaches a depth of 12", the silt shall be removed and disposed of at an approved site.

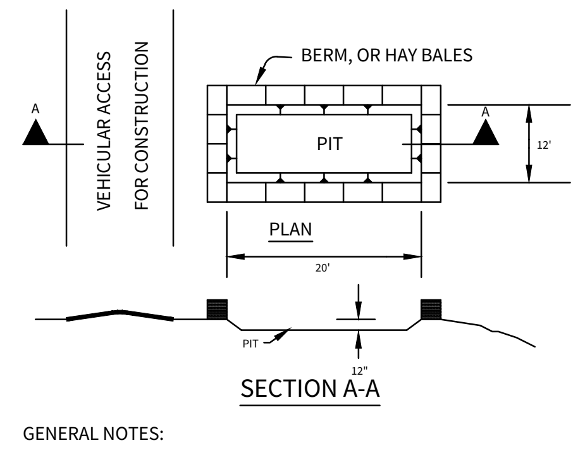
5 ROCK BERM W/ SILT FENCE DETAIL

N.T.S.


CONSTRUCTION EQUIPMENT & VEHICLE STORAGE AND MAINTENANCE AREA
CONSTRUCTION AND WASTE MATERIAL STORAGE AREA
FIELD OFFICE
ENTRANCE /EXIT
LEGEND
SILT FENCE

4 TYP. CONSTRUCTION STAGING AREA

N.T.S.

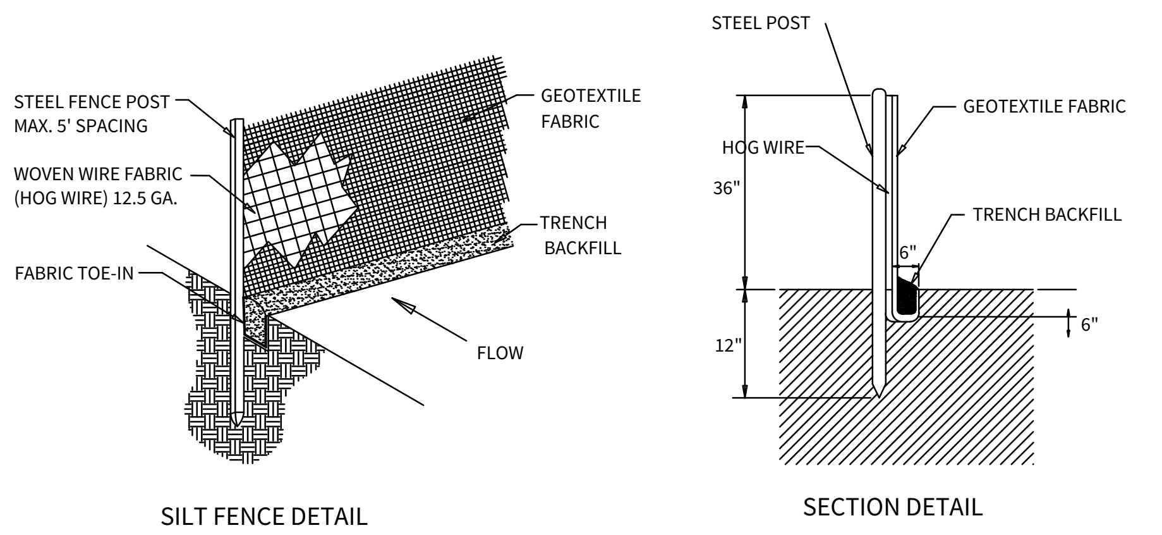

A
A
VEHICULAR ACCESS FOR CONSTRUCTION
BERM, OR HAY BALES
PIT
12'
PLAN
20'
PIT
12"
SECTION A-A

GENERAL NOTES:

- Detail above illustrates minimum dimensions. Pit can be increased in size depending on expected frequency of use.
- If hay bales are used, they shall be placed in accordance with details shown on Exhibit for hay bales.
- Washout pit shall be located in an area easily accessible to construction traffic.
- Washout pit shall not be located in areas subject to inundation from storm water runoff.
- Washout pit shall be lined with a 10-mil thick polyethylene sheeting free of holes, tears and other defects.

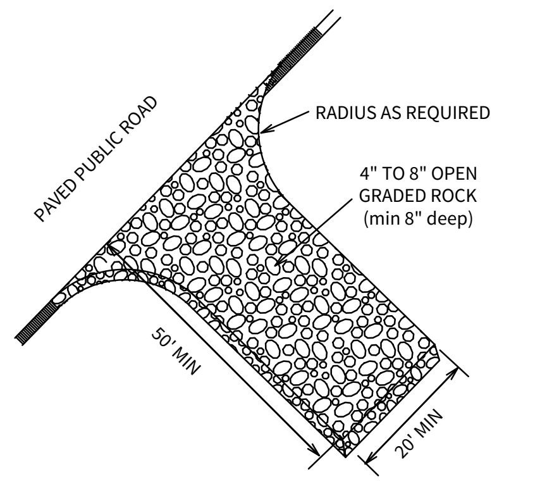
3 CONCRETE TRUCK WASHOUT PIT

N.T.S.


STEEL FENCE POST MAX. 5' SPACING
WOVEN WIRE FABRIC (HOG WIRE) 12.5 GA.
FABRIC TOE-IN
GEOTEXTILE FABRIC
TRENCH BACKFILL
FLOW
SILT FENCE DETAIL
STEEL POST
HOG WIRE
GEOTEXTILE FABRIC
TRENCH BACKFILL
36"
12"
6"
6"
SECTION DETAIL

2 STANDARD SILT FENCE

N.T.S.


PAVED PUBLIC ROAD
RADIUS AS REQUIRED
4" TO 8" OPEN GRADED ROCK (min 8" deep)
50' MIN
20' MIN

STABILIZED CONSTRUCTION EXIT NOTES:

1. WHEN NECESSARY, WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ON PUBLIC ROADWAY.
2. THE EXIT SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC ROADWAYS. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND, AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO PUBLIC ROADWAYS MUST BE REMOVED IMMEDIATELY.

TEMPORARY CONSTRUCTION ENTRANCE/EXIT 1

N.T.S.

CUDEENGINEERS.COM

EST. 1980 CUDE ENGINEERS

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

STORMWATER POLLUTION PREVENTION PLAN

DATE	04/16/2026
PROJECT NO.	04024-018
DRAWN BY	C7
CHECKED BY	JL/TM

REVISIONS
1.
2.
3.
4.
5.
6.
7.
8.

4/16/26
TORY DUANE MILLER
135598

CUDE ENGINEERS
TBPELS No. 10048500

C1.00

R:\04024\018\2-DWG\4-Plans\Unit 2 SWPP.dwg 2026/04/16 8:40am sgonzales

REPRODUCTION OF THE ORIGINAL SIGNED AND SEALED PLAN AND/OR ELECTRONIC MEDIA MAY HAVE BEEN INADVERTENTLY ALTERED. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE SCALE OF THE DOCUMENT AND CONTACTING CUDE ENGINEERS TO VERIFY DISCREPANCIES PRIOR TO CONSTRUCTION.

LEGEND

PROPOSED CONTOUR	1000
EXISTING CONTOUR	1000
PROPOSED ELEVATION	× 1000.00
TYPE OF LOT GRADING	A, B, OR C
LIMITS OF GRADING	
BUILDING SETBACK	
E.G.T.CA. EASEMENT	
SWALE	← · · · ← · · ·
PROPOSED RETAINING WALL (BY OTHERS)	
EXISTING RETAINING WALL/ROCK CUT	
BUILDING PAD (70'-75')	▨

GENERAL SPECIFICATIONS FOR SITE PREPARATION

1. GENERAL DESCRIPTION
THIS ITEM SHALL CONSIST OF ALL CLEARING AND GRUBBING, DEMOLITION, PREPARATION OF LAND TO BE FILLED, FILLING OF THE LAND, SPREADING, COMPACTION TESTING AND INSPECTION OF THE FILL, AND ALL SUBSIDIARY WORK NECESSARY TO COMPLETE THE GRADING OF THE CUT AND FILL AREAS TO CONFORM WITH THE LINES, GRADES AND SLOPES AS SHOWN ON THE APPROVED PLANS.

2. CLEARING THE AREA TO BE FILLED
ALL TIMBER, LOGS, TREES, BRUSH AND RUBBISH SHALL BE REMOVED FROM THE SITE.

3. SCARIFYING THE AREA TO BE FILLED
ALL ORGANIC MATTER SHALL BE REMOVED FROM THE SURFACE UPON WHICH THE FILL IS TO BE PLACED, AND THE SURFACE SHALL THEN BE DISKED OR SCARIFIED TO A MINIMUM DEPTH OF SIX INCHES (6"), ALL SURFACE RUTS OR OTHER UNEVEN FEATURES WILL BE LEVELED PRIOR TO FIELD DENSITY TESTING. WHERE FILLS ARE MADE ON HILLSIDES OR SLOPES, THE SLOPE OF THE ORIGINAL GROUND UPON WHICH THE FILL IS TO BE PLACED SHALL BE DISKED OR SCARIFIED. WHERE THE SLOPE RATIO OF THE ORIGINAL GROUND IS STEEPER THAN 5 HORIZONTAL TO 1 VERTICAL, THE BANK SHALL BE STEPPED OR BENCHED. GROUND SLOPES WHICH ARE FLATTER THAN 5 TO 1 SHALL BE BENCHED WHEN CONSIDERED NECESSARY BY THE GEOTECHNICAL ENGINEER.

4. COMPACTING THE AREA TO BE FILLED
FOLLOWING THE CLEARING AND DISKING OR SCARIFYING OF THE FILL AREA, IT SHALL BE BLADED UNTIL IT IS UNIFORM AND FREE FROM LARGE CLODS. THE AREA SHALL BE BROUGHT TO THE ADEQUATE MOISTURE CONTENT AND COMPACTED (TYPICALLY) TO NOT LESS THAN NINETY PERCENT (90%) OF MAXIMUM DENSITY IN ACCORDANCE WITH THE CURRENT ASTM D 1557 COMPACTION PROCEDURE, OR 95% OF MAXIMUM DENSITY IN ACCORDANCE WITH THE CURRENT THD--TEX--113--E COMPACTION PROCEDURE.

5. FILL MATERIALS
THE MATERIALS USED SHALL BE FREE FROM ORGANIC MATTER AND OTHER DELETERIOUS SUBSTANCES, SUCH AS TREES, BRUSH AND RUBBISH.

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7. ROCK
WHEN FILL MATERIAL INCLUDES ROCK, THE MAXIMUM ROCK SIZE SHALL BE AS APPROVED BY THE GEOTECHNICAL ENGINEER. NO LARGE ROCKS SHALL BE ALLOWED TO NEST AND ALL VOIDS MUST BE FILLED WITH SMALL STONES OR SOIL AND ADEQUATELY COMPACTED. NO LARGE ROCKS WILL BE PERMITTED WITHIN EIGHTEEN INCHES (18") OF THE FINISHED GRADE.

8. COMPACTION OF FILL LAYER
COMPACTION EQUIPMENT SHALL BE CAPABLE OF COMPACTING THE FILL TO THE SPECIFIED DENSITY. COMPACTION SHALL BE ACCOMPLISHED WHILE THE FILL MATERIAL IS AT OR NEAR THE APPROPRIATE MOISTURE CONTENT. COMPACTION OF EACH LAYER SHALL BE CONTINUOUS OVER THE ENTIRE STRUCTURAL AREA (BENEATH PROPOSED STRUCTURES).

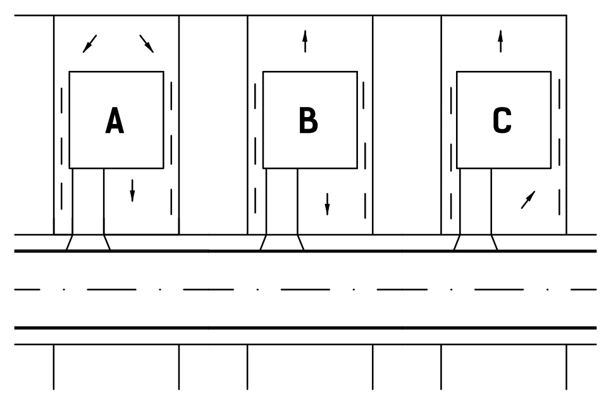
9. COMPACTION OF SLOPES
THE FACES OF FILL SLOPES SHALL BE COMPACTED. COMPACTING OPERATIONS SHALL BE CONTINUED UNTIL THE SLOPE FACES ARE STABLE BUT NOT TOO DENSE FOR PLANTING ON THE SLOPES. COMPACTION OF THE SLOPE FACES MAY BE DONE PROGRESSIVELY IN INCREMENTS OF THREE TO FIVE FEET (3' TO 5') IN FILL HEIGHT AS THIS FILL PROGRESSES OR AFTER THE FILL HAS BEEN BROUGHT TO ITS TOTAL HEIGHT.

10. MOISTURE CONTENT
THE FILL MATERIAL SHALL BE COMPACTED AT THE APPROPRIATE MOISTURE CONTENT SPECIFIED FOR THE SOILS BEING USED. APPROPRIATE MOISTURE CONTENT IS DEFINED, TYPICALLY, AS OPTIMUM MOISTURE CONTENT; HOWEVER, FOR EXPANSIVE SOILS IT MAY BE GREATER THAN OPTIMUM MOISTURE CONTENT, AND OTHER MOISTURE CONTENTS MAY BE NECESSARY TO PRODUCE THE DESIRED RESULTS WITH CERTAIN SOILS.

11. DENSITY TESTS
FIELD DENSITY TESTS SHALL BE PERFORMED ON LAYERS OF FILL WHEN THE FILL IS BEING PLACED AS DIRECTED BY THE GEOTECHNICAL ENGINEER. THE MAXIMUM FILL HEIGHT BETWEEN DENSITY TESTING SHALL BE EIGHTEEN INCHES (18"). ALL TESTING SHALL BE REQUESTED BY THE CONTRACTOR TO MEET THE CONTRACTOR'S CONSTRUCTION SCHEDULE. NOTIFICATION BY THE CONTRACTOR TO CONDUCT TESTS SHALL BE AT LEAST THE DAY BEFORE. THIS NOTIFICATION SHALL INCLUDE THE FILL AREA LOCATION (LOT AND BLOCK), THE LIFT OR HEIGHT OF FILL AND APPROXIMATE DESIRED TIME OF TESTING. WHEN THESE TESTS INDICATE THAT THE DENSITY OF ANY LAYER OF FILL OR PORTION THEREOF IS BELOW THE REQUIRED DENSITY, THE PARTICULAR LAYER OR PORTION SHALL BE REWORKED AND RETESTED AT THE EXPENSE OF THE CONTRACTOR UNLESS THE CONTRACTOR CAN SHOW EVIDENCE THAT CIRCUMSTANCES BEYOND HIS CONTROL REQUIRED THE RETESTING. GENERALLY, THE SPECIFIC TESTING WILL BE AS FOLLOWS AND CONDUCTED BY GEOTECHNICAL ENGINEER.

A. THE LAND TO BE FILLED (PREPARED SUBGRADE) SHALL BE PREPARED AND TESTED AT A FREQUENCY AS DETERMINED BY THE GEOTECHNICAL ENGINEER.
B. THE FIRST LIFT OF COMPACTED FILL (GENERALLY 8 TO 12-IN.) SHALL BE TESTED AS DETERMINED BY THE GEOTECHNICAL ENGINEER. ANY AREAS SUPPORTING THE PROPOSED STRUCTURES REQUIRING FILL SHALL BE TESTED FOR DENSITY COMPLIANCE.
C. FILLS SHALL BE TESTED A MAXIMUM OF EACH EIGHTEEN INCHES (18") OF FILL.
D. TEST RESULTS WILL BE PROVIDED BY THE FIELD TECHNICIAN TO THE CONTRACTOR WHEN POSSIBLE; HOWEVER, ALL TEST RESULTS ARE TO BE REVIEWED BY THE GEOTECHNICAL ENGINEER FOR COMPLIANCE. THE ENGINEER WILL NOTIFY THE CONTRACTOR OF ALL TEST RESULTS.

12. CUT/FILL LOTS
AREAS INVOLVING CUT ON ONE PORTION AND FILL ON ANOTHER PORTION OF A SPECIFIC LOT SHALL BE PREPARED TO A MINIMUM DEPTH OF 6-IN. AND WILL BE THE SAME MATERIAL CLASSIFICATION AT THE SAME COMPACTION AND MOISTURE CONTENT. A MINIMUM OF TWO (2) FIELD DENSITY TESTS SHALL BE REQUIRED ON EACH CUT/FILL LOT FOR THE PURPOSE OF DETERMINING UNIFORMITY OF THE AREA SUPPORTING THE PROPOSED STRUCTURES.



TYPICAL LOT SITE PLAN

N.T.S.

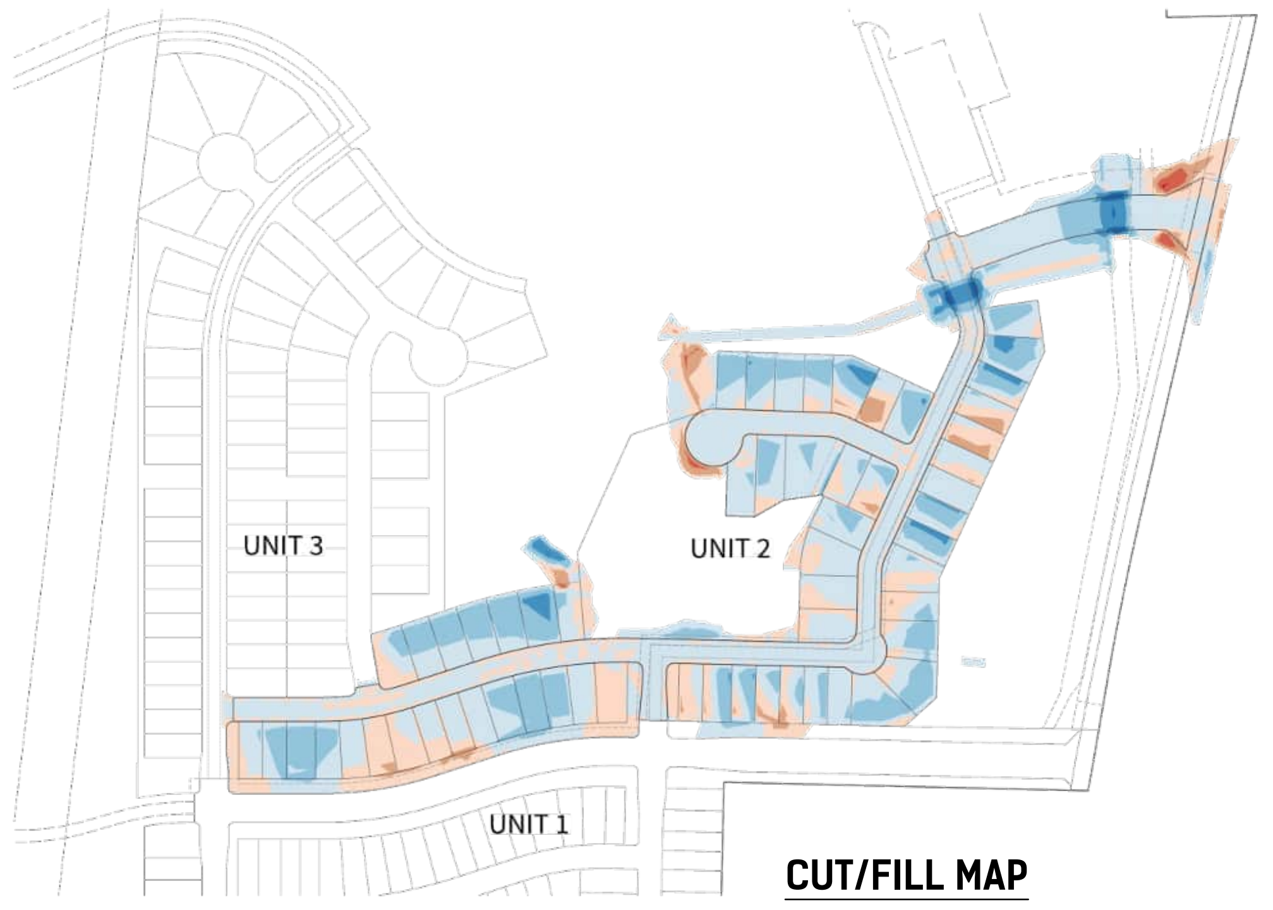
NOTES:

LOT GRADING BASED ON SLABS BEING 20' BEHIND FRONT PROPERTY LINE.

MINIMUM SLAB EXPOSURE IS 1.0'.

TYPICAL PAD SIZES IS 30' X 80' UNLESS NOTED OTHERWISE ON PLAN.

CONTOURS SHOWN ON STREET ARE TO STREET TOP ELEVATIONS.


UNIT 3
UNIT 2
UNIT 1

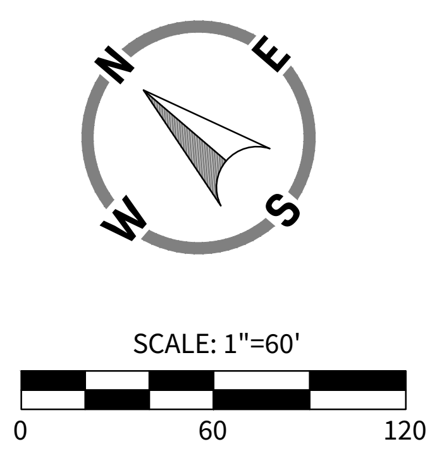
CUT/FILL MAP

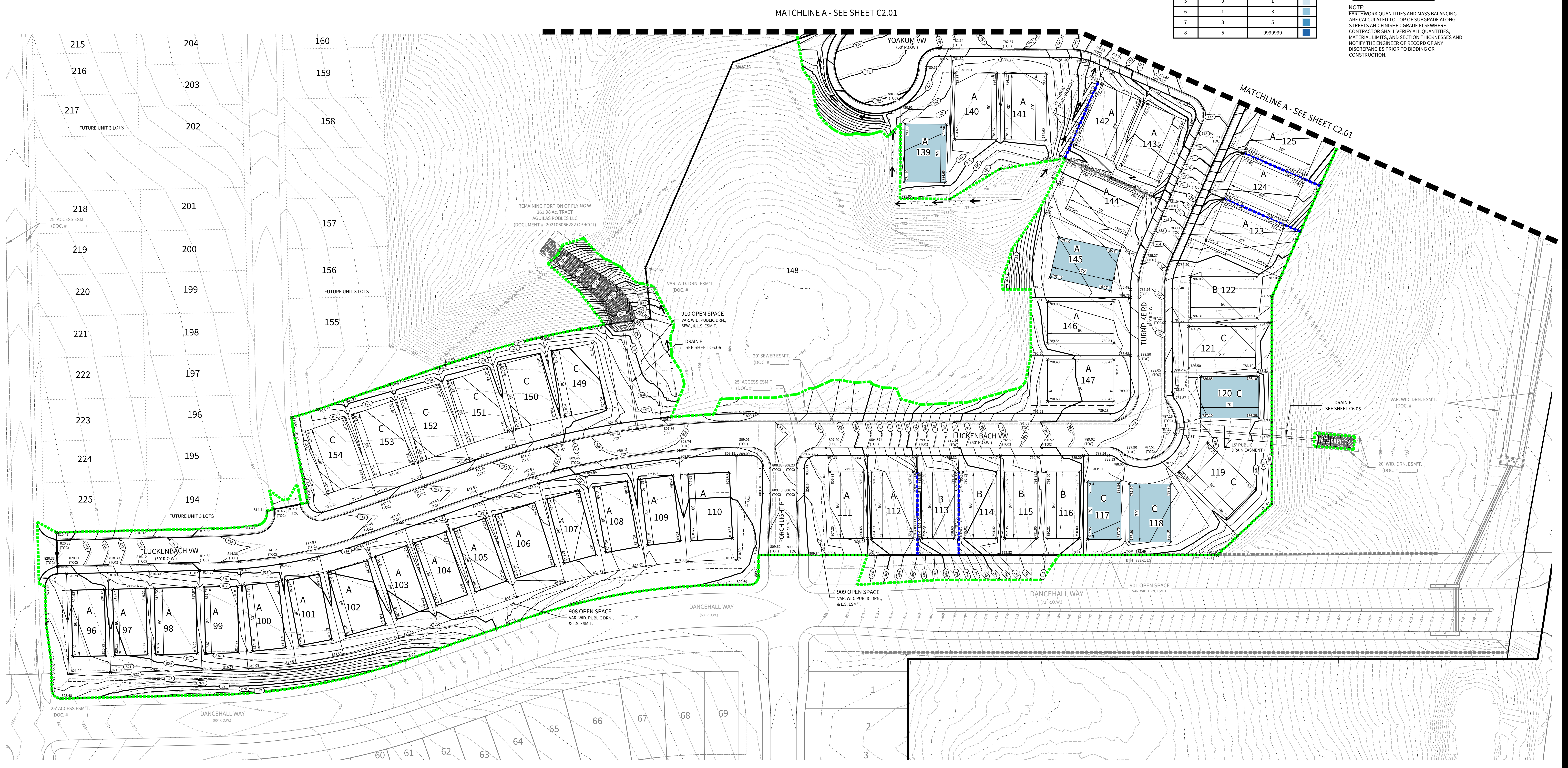
N.T.S.

Elevations Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	-9999999	-5	🟥
2	-5	-3	🟥
3	-3	-1	🟧
4	-1	0	🟧
5	0	1	🟦
6	1	3	🟦
7	3	5	🟦
8	5	9999999	🟦

CUT/FILL	
CUT	3,361 CY
FILL	15,334 CY
NET (FILL)	11,973 CY

NOTE:
EARTHWORK QUANTITIES AND MASS BALANCING ARE CALCULATED TO TOP OF SUBGRADE ALONG STREETS AND FINISHED GRADE ELSEWHERE. CONTRACTOR SHALL VERIFY ALL QUANTITIES, MATERIAL LIMITS, AND SECTION THICKNESSES AND NOTIFY THE ENGINEER OF RECORD OF ANY DISCREPANCIES PRIOR TO BIDDING OR CONSTRUCTION.


N
E
S
W
SCALE: 1"=60'
0
60
120


MATCHLINE A - SEE SHEET C2.01
MATCHLINE A - SEE SHEET C2.01
YOAKUM VW (50' R.O.W.)
TURNPIKE RD (50' R.O.W.)
LUCKENBACH VW (50' R.O.W.)
PORCH LIGHT PT (50' R.O.W.)
DANCEHALL WAY
REMAINING PORTION OF FLYING W 361.98 Ac. TRACT AGUILAS ROBLES LLC (DOCUMENT #: 20210606622 OPRCCT)
FUTURE UNIT 3 LOTS
910 OPEN SPACE VAR. WID. PUBLIC DRN., SEW., & L.S. ESM'T.
908 OPEN SPACE VAR. WID. PUBLIC DRN., & L.S. ESM'T.
909 OPEN SPACE VAR. WID. PUBLIC DRN., & L.S. ESM'T.
901 OPEN SPACE VAR. WID. DRN. ESM'T.
DRAIN F SEE SHEET C6.06
DRAIN E SEE SHEET C6.05
VAR. WID. DRN. ESM'T. (DOC. # ___)
20' SEWER ESM'T. (DOC. # ___)
25' ACCESS ESM'T. (DOC. # ___)
15' PUBLIC DRAIN EASMENT
20' WID. DRN. ESM'T. (DOC. # ___)
148
96 97 98 99 100 101 102 103 104 105 106 107 108 109 110
111 112 113 114 115 116 117 118 119 120 121 122 123 124 125
139 140 141 142 143 144 145 146 147 149 150 151 152 153 154
155 156 157 158 159 160 194 195 196 197 198 199 200 201 202 203 204
215 216 217 218 219 220 221 222 223 224 225
1 2 3 60 61 62 63 64 65 66 67 68 69

CUDEENGINEERS.COM

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

GRADING PLAN

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
1.
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4/16/26
TORY DUANE MILLER
135598

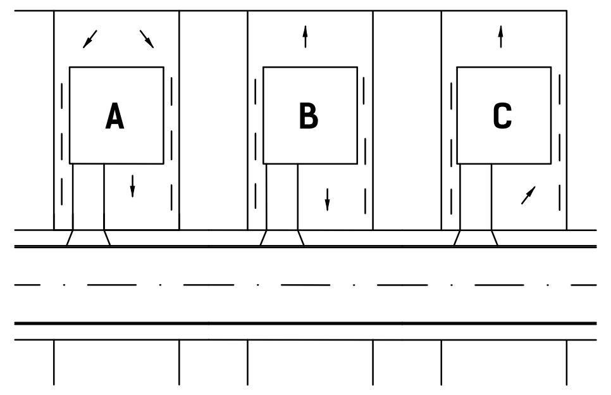
CUDE ENGINEERS
TBPELS No. 10048500

C2.00

R:\04024\018\2-DWG\4-Plans\C2.00 GRADING PLAN.dwg 2026/04/16 8:41am sgonzales

LEGEND

PROPOSED CONTOUR	── 1000 ──
EXISTING CONTOUR	- - - 1000 - - -
PROPOSED ELEVATION	× 1000.00
TYPE OF LOT GRADING	A, B, OR C
LIMITS OF GRADING	▬ ▬ ▬
BUILDING SETBACK	—— - - —— - - ——
E.G.T.CA. EASEMENT	— — — — —
SWALE	← · · · ← · · ·
PROPOSED RETAINING WALL (BY OTHERS)	■■■■■■■■
EXISTING RETAINING WALL/ROCK CUT	▪▪▪▪▪▪▪▪
BUILDING PAD (70'-75')	▭



TYPICAL LOT SITE PLAN

N.T.S.

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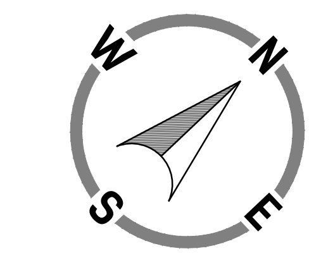
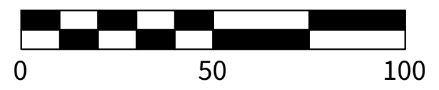
12. CUT/FILL LOTS

AREAS INVOLVING CUT ON ONE PORTION AND FILL ON ANOTHER PORTION OF A SPECIFIC LOT SHALL BE PREPARED TO A MINIMUM DEPTH OF 6-IN. AND WILL BE THE SAME MATERIAL CLASSIFICATION AT THE SAME COMPACTION AND MOISTURE CONTENT. A MINIMUM OF TWO (2) FIELD DENSITY TESTS SHALL BE REQUIRED ON EACH CUT/FILL LOT FOR THE PURPOSE OF DETERMINING UNIFORMITY OF THE AREA SUPPORTING THE PROPOSED STRUCTURES.



SCALE: 1"=50'

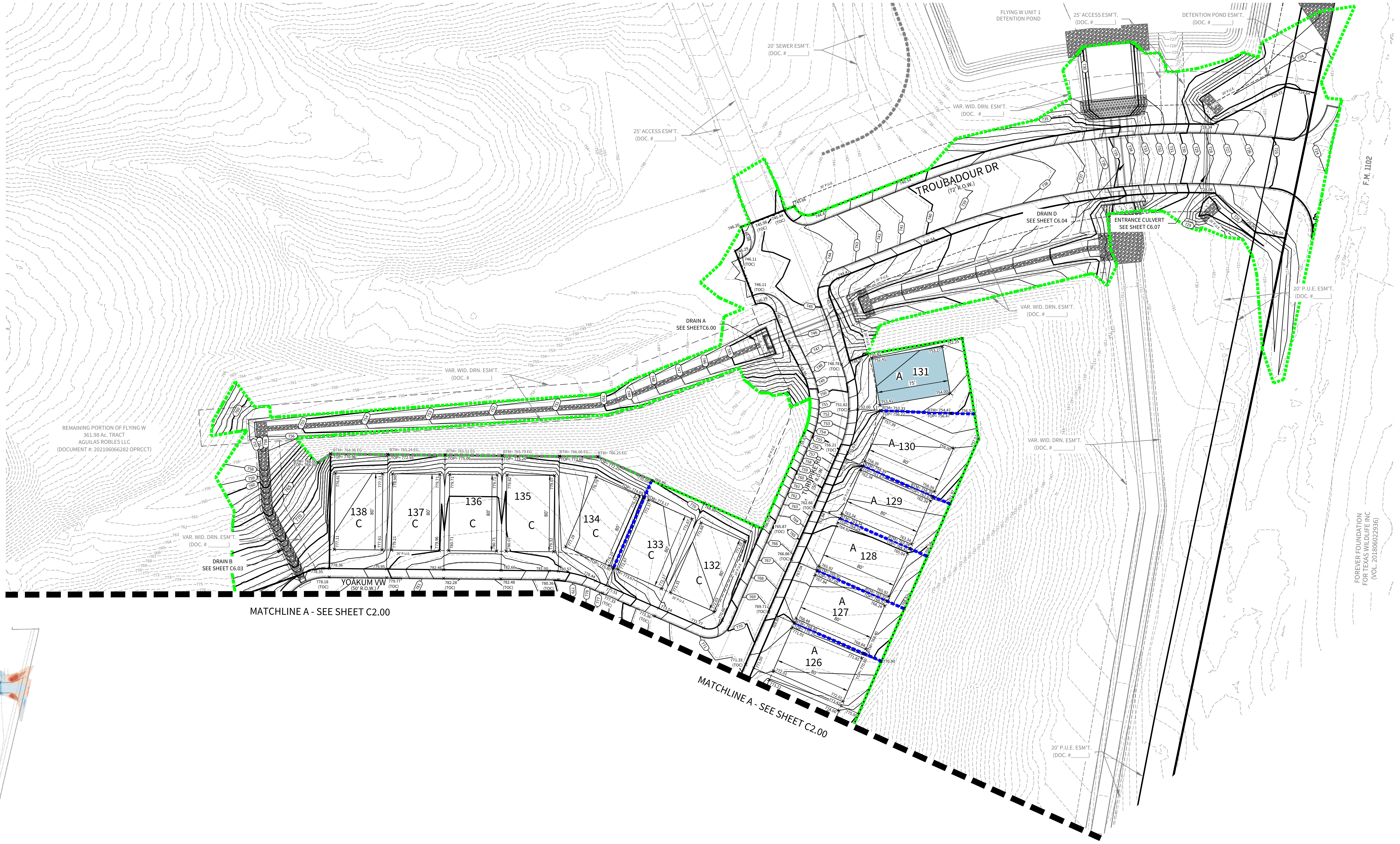


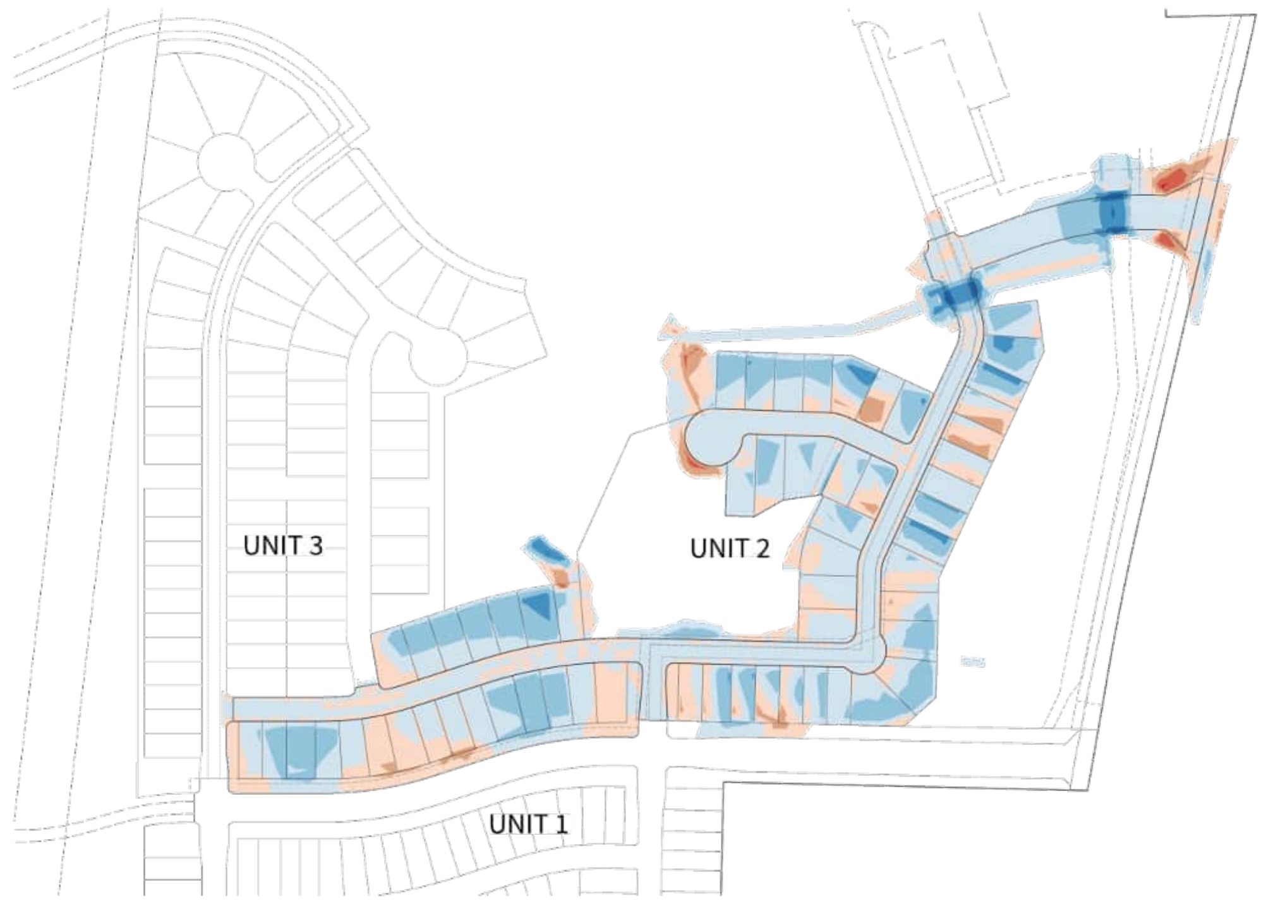
CUT/FILL	
CUT	3,361 CY
FILL	15,334 CY
NET (FILL)	11,973 CY

NOTE:
EARTHWORK QUANTITIES AND MASS BALANCING ARE CALCULATED TO TOP OF SUBGRADE ALONG STREETS AND FINISHED GRADE ELSEWHERE. CONTRACTOR SHALL VERIFY ALL QUANTITIES, MATERIAL LIMITS, AND SECTION THICKNESSES AND NOTIFY THE ENGINEER OF RECORD OF ANY DISCREPANCIES PRIOR TO BIDDING OR CONSTRUCTION.

Elevations Table

Number	Minimum Elevation	Maximum Elevation	Color
1	-9999999	-5	🟥
2	-5	-3	🟥
3	-3	-1	🟧
4	-1	0	▫
5	0	1	▫
6	1	3	🟦
7	3	5	🟦
8	5	9999999	🟦





CUT/FILL MAP

N.T.S.

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4122 Pond Hill Road, Suite 101
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P:(210) 681.2951 F: (210) 523.7112

FLYING W UNIT 2

GRADING PLAN

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
1.
2.
3.
4.
5.
6.
7.
8.

4/16/26
TORY DUANE MILLER
135598

CUDE ENGINEERS
TBPELS No. 10048500

CRYSTAL CLEAR SPECIAL UTILITY DISTRICT (CCSUD) WASTEWATER NOTES:

1. THE CONTRACTOR SHALL MAINTAIN SERVICE TO EXISTING WASTEWATER SYSTEM AT ALL TIMES DURING CONSTRUCTION.
2. A MINIMUM OF 8" WASTEWATER PIPE AND FITTINGS (P.V.C. SDR-26, ASTM, D3034, D-3212, F-477) ARE REQUIRED ON NEW INSTALLATION.
3. ALL RESIDENTIAL WASTEWATER SERVICE LATERALS SHALL BE EXTENDED TO THE PROPERTY LINE AND A CLEANOUT SHALL BE INSTALLED AT THE PROPERTY LINE. SERVICES TO LOTS WILL EXTEND FOUR (4) FEET PAST THE UNDERGROUND ELECTRIC CONDUIT IF ELECTRIC IS INSTALLED IN THE FRONT EASEMENT. ALL SEWER CLEANOUTS THAT LEAD TO CCSUD MAINS SHALL BE INSTALLED WITH A PROTECTIVE UTILITY SHROUD AND PIVOTING MARKER POLE DURING TIME OF CONSTRUCTION.
4. PIPE BEDDING MATERIAL OF WASTEWATER MAINS SHALL BE COMPOSED OF WELLGRADED, CRUSHED STONE, OR GRAVEL PER SECTION 01230 OF CCSUD'S SPECIFICATIONS.
5. SECONDARY AND GENERAL BACKFILL OF WASTEWATER MAINS SHALL BE APPROVED SOIL MATERIALS FOR BACKFILL AND FILL, FREE OF CLAY, ROCK, OR GRAVEL LARGER THAN 2-INCHES IN ANY DIMENSION, DEBRIS, WASTE, FROZEN MATERIALS, VEGETABLE, AND OTHER ORGANIC MATTER AND DELETERIOUS MATERIALS. PREVIOUSLY EXCAVATED MATERIALS MEETING THESE REQUIREMENTS MAY BE USED FOR BACKFILL.
6. ALL WASTEWATER MAINS SHALL HAVE COMPRESSION OR MECHANICAL JOINTS AS PER 30 TAC §217.53 (C) (2).
7. FOR WASTEWATER LINES LESS THAN 24" IN DIAMETER, SELECT INITIAL BACKFILL MATERIAL SHALL BE PLACED IN TWO LIFTS.
   a.) THE FIRST LIFT SHALL BE SPREAD UNIFORMLY AND SIMULTANEOUSLY ON EACH SIDE AND UNDER THE SHOULDERS OF THE PIPE TO THE MID POINT OR SPRING LINE OF THE PIPE.
   b.) THE SECOND LIFT SHALL BE PLACED TO A DEPTH AS SHOWN ON THE PIPE BACKFILL DETAIL. MAINS LARGER THAN 24", 12" MAXIMUM LIFTS SHALL BE USED.
8. ALL MANHOLES MUST BE WATERTIGHT, EITHER MONOLITHIC, CAST-IN-PLACE CONCRETE STRUCTURES OR PREFABRICATED MANHOLES SPECIFICALLY APPROVED BY CCSUD. THE MANHOLES SHALL HAVE WATER-TIGHT RINGS AND COVERS. WHEREVER THEY ARE WITHIN THE 100 YEAR FLOODPLAIN, THE MANHOLE COVERS SHALL BE CCSUD. EVERY THIRD MANHOLE IN SEQUENCE SHALL HAVE AN ALTERNATE MEANS OF VENTING. 30 TAC §213.5 (C) (3) (A) AND 30 TAC §217.55 (O).
9. ALL MANHOLES SHALL BE CONSTRUCTED SO THAT THE TOP OF THE RING IS TWO INCHES (2") ABOVE SURROUNDING GROUND EXCEPT WHEN LOCATED IN PAVED AREA. IN PAVED AREAS, THE MANHOLE RING SHALL BE FLUSH WITH PAVEMENT.
10. ALL NEW MANHOLES, UNLESS APPROVED BY CCSUD, ARE TO HAVE COVERS WITH 32" OPENINGS.
11. WASTEWATER MAIN CONNECTIONS TO PRE-CAST MANHOLES WILL BE COMPRESSION JOINTS OR MECHANICAL "BOOT TYPE" JOINT AS APPROVED BY CCSUD.
12. WASTEWATER MAINS SHALL BE TESTED FROM MANHOLE TO MANHOLE. CCSUD. 03/2022
13. IN AREAS WHERE A NEW WASTEWATER MANHOLE IS TO BE CONSTRUCTED OVER AN EXISTING WASTEWATER SYSTEM, IT SHALL BE THE CONTACTOR'S RESPONSIBILITY TO TEST THE EXISTING MANHOLES BEFORE CONSTRUCTION. AFTER THE PROPOSED MANHOLE(S) HAS BEEN BUILT, THE CONTRACTOR SHALL RE-TEST THE EXISTING SYSTEM TO THE SATISFACTION OF THE CONSTRUCTION INSPECTOR. (NO SEPARATE PAY ITEM).
14. WHERE THE MINIMUM 9 FOOT SEPARATION DISTANCE BETWEEN WASTEWATER LINES AND WATER LINES CANNOT BE MAINTAINED, THE INSTALLATION OF WASTEWATER LINES SHALL BE IN STRICT ACCORDANCE WITH TCEQ. THE WASTEWATER LINE SHALL BE CONSTRUCTED OF CAST IRON, DUCTILE IRON OR PVC MEETING THE ASTM SPECIFICATION FOR BOTH PIPES AND JOINTS OF 160 PSI AND SHALL BE IN ACCORDANCE WITH 30 TAC § 217.53 (D) AND 30 TAC § 290.44 (E).
16. NO TESTING WILL BE PERFORMED PRIOR TO 30 DAYS FROM COMPLETE INSTALLATION OF THE WASTEWATER LINES. THE FOLLOWING SEQUENCE WILL BE STRICTLY ADHERED TO:

a. PULL MANDREL
b. PERFORM AIR TEST
c. CLEANING OF ANY DEBRIS
d. FLUSHING OF SYSTEM
e. TV INSPECTION (WITHIN 72 HOURS OF FLUSHING)

17. A MINIMUM OF 3 FEET OF COVER IS TO BE MAINTAINED OVER THE WASTEWATER MAIN AND LATERALS AT SUBGRADE, OTHERWISE CONCRETE ENCASEMENT WILL BE REQUIRED.
18. TCEQ AND EPA REQUIRE EROSION AND SEDIMENTATION CONTROL FOR CONSTRUCTION OF WASTEWATER COLLECTION SYSTEMS. DEVELOPER OR AUTHORIZED REPRESENTATIVE SHALL PROVIDE EROSION AND SEDIMENTATION CONTROL AS NOTES ON THE PROJECT'S PLAN AND PROFILE SHEETS. ALL TEMPORARY EROSION AND SEDIMENTATION CONTROLS SHALL BE REMOVED BY THE CONTRACTOR AT FINAL ACCEPTANCE OF THE PROJECT BY CCSUD.
19. ALL MANHOLES NOT WITHIN PAVED STREETS SHALL HAVE LOCKING CONCRETE COLLAR TO SECURE RING AND COVER TO MANHOLE CONE PER CCSUD DETAIL DRAWING #329.
20. ALL MANHOLES OVER THE EDWARDS AQUIFER RECHARGE ZONE SHALL HAVE LOCKING CONCRETE COLLAR TO SECURE RING AND COVER TO MANHOLE CONE PER CCSUD DETAIL DRAWING #329.

CRYSTAL CLEAR SPECIAL UTILITY DISTRICT (CCSUD) WATER MAIN NOTES:

1. THE CONTRACTOR SHALL COORDINATE PRESSURE TESTING OF NEW WATER MAINS WITH OWNER AND ENGINEER AT LEAST TWO BUSINESS DAYS PRIOR. PRESSURE TESTING REQUIREMENTS ARE INCLUDED IN THE SPECIFICATIONS.
2. ALL WATER MAINS SHALL BE DISINFECTED PER AWWA AND TCEQ STANDARDS.
3. THE CONNECTION LOCATIONS LISTED IN THE PLANS ARE BASED ON BEST AVAILABLE INFORMATION. THE CONTRACTOR SHALL FIELD LOCATE EXISTING WATER MAIN LOCATIONS AT ALL TIE-IN LOCATIONS TO VERIFY SIZE, ELEVATION, AND MATERIAL PRIOR TO ORDERING MATERIALS FOR CONNECTION.
4. THE CONTRACTOR SHALL MAINTAIN MINIMUM SEPARATION BETWEEN UTILITIES PER TCEQ STANDARDS.
5. WATER MAINS SHALL BE RESTRAINED WITH RESTRAINT LENGTHS OF FITTINGS SHOWN IN PLANS.
6. UNLESS OTHERWISE SPECIFIED, ALL PVC WATER MAINS SHALL BE C900/C905 DR 18, COLORED BLUE.
7. UNLESS OTHERWISE SPECIFIED, ALL DUCTILE IRON WATER MAINS SHALL BE PRESSURE CLASS 350 CONFORMING TO AWWA C150 AND AWWA C151 AND CEMENT LINED.
8. LOCATIONS OF COMBINATION AIR VALVES SHOWN ARE APPROXIMATE. INSTALL AIR RELEASE VALVES AT THE HIGH POINT IN THE WATER MAIN FOR THE LOCATIONS GIVEN.
9. THRUST BLOCKING IS REQUIRED AT ALL FITTINGS AND BENDS IN ACCORDANCE WITH THE THRUST BLOCKING DETAIL PROVIDED AND SPECIFICATION SECTION 02680 - JOINT RESTRAINTS AND THRUST BLOCKING.
10. THE OWNER SHALL SUPPLY ALL WATER NEEDED FOR CONSTRUCTION TESTING AND DISINFECTION. THE CONTRACTOR SHALL NOT BE REQUIRED TO PAY FOR THIS WATER.
11. UNLESS NOTED OTHERWISE, ALL WATER MAIN P.I.'S SHALL BE ACHIEVED USING THE WATER MAIN MANUFACTURER'S ALLOWABLE JOINT DEFLECTION.
12. WATER MAINS AND VALVES THAT ARE ABANDONED IN PLACE SHALL BE CUT AND PLUGGED PER SPECIFICATION SECTION 02500 – ABANDONMENT OF WATER INFRASTRUCTURE.
13. REMOVE ONLY VEGETATION, TREES, STUMPS, RUBBISH, AND OTHER MATERIAL NECESSARY FOR CONSTRUCTION AND DISPOSE OF OFF SITE.
14. CONSTRUCTION OF ALL CCSUD WATER UTILITY INFRASTRUCTURE MUST ADHERE TO CCSUD'S TECHNICAL SPECIFICATIONS, DETAILS AND APPROVED EQUIPMENT LIST

CUDEENGINEERS.COM

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

SSUD GENERAL NOTES

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
1.
2.
3.
4.
5.
6.
7.
8.

4/16/26

TORY DUANE MILLER
135598

CUDE ENGINEERS
TBPELS No. 10048500

C3.00

R:\04024\018\2-DWG\4-Plans\C3.00 SSUD GENERAL NOTES.dwg 2026/04/16 8:39am sgonzales

LEGEND

PROPOSED SANITARY SEWER	8"SS
PROPOSED SANITARY SEWER MANHOLE	●
EXISTING SANITARY SEWER	8"SS
EXISTING SANITARY SEWER MANHOLE	●
PROPOSED WATER MAIN	8"W
PROPOSED STANDARD FIRE HYDRANT	⧓
PROPOSED STANDARD GATE VALVE	●
EXISTING WATER MAIN	8"W
EXISTING STANDARD FIRE HYDRANT	⧓
EXISTING STANDARD GATE VALVE	●
PUBLIC UTILITY EASMENT	P.U.E.
PROPOSED LIGHT POLE	◉
LATERALS TYING INTO EXISTING WYES	S*

ENSURE ALL DRIVEWAY APPROACHES ARE BUILT IN GENERAL ACCORDANCE WITH A.D.A. SPECIFICATIONS. NO VALVES, HYDRANTS, ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.

CONTRACTORS TO LOCATE AND TIE INTO EXISTING SEWER WYES THAT WERE INSTALLED IN UNIT 1. LOTS WITH * NEXT TO SEWER LATERALS ARE CONNECTING TO EXISTING WYES.

NOTES

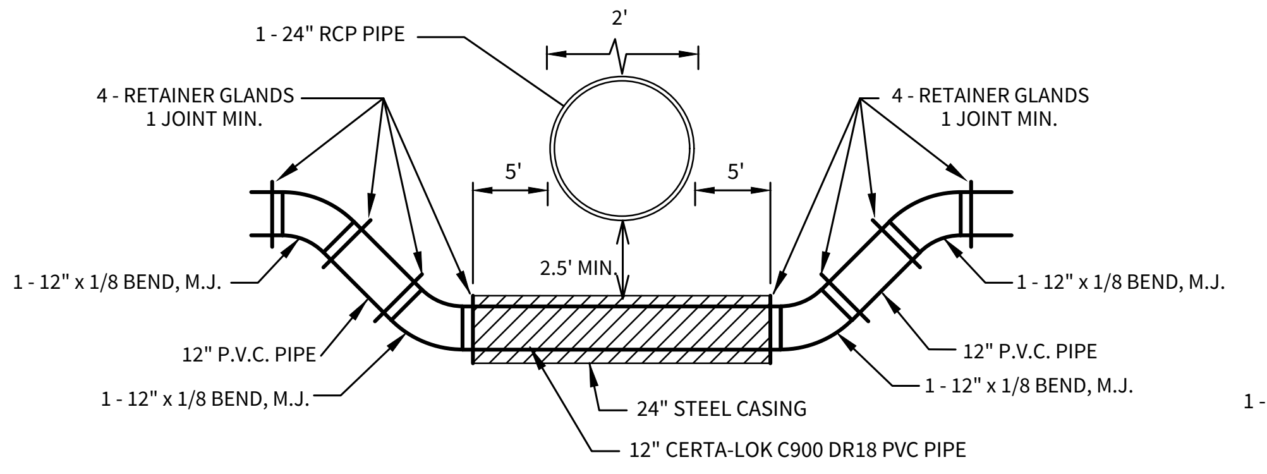
THE LOCATIONS AND DEPTHS OF ALL EXISTING UTILITIES, INCLUDING SERVICE LATERALS AND DRAINAGE STRUCTURES SHOWN ON THE PLANS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION AND DEPTHS OF UNDERGROUND UTILITIES AT LEAST 48 HOURS PRIOR TO CONSTRUCTION WHETHER SHOWN ON PLANS OR NOT,AND TO PROTECT THE SAME DURING CONSTRUCTION.

CRYSTAL CLEAR SPECIAL UTILITY DISTRICT	830-372-1031
TEXAS STATE WIDE ONE CALL LOCATOR	1-800-545-6005

BENCHMARK BM-1

BENCHMARK TO BE SET BY ENGINEER PRIOR TO CONSTRUCTION.

NOTE: ALL LATERALS TO BE INSTALLED @ MIN. 2.0% SLOPE. UNLESS OTHERWISE NOTED, ALL SANITARY SEWER PIPE SHALL BE P.V.C. THAT MEETS ASTM SPECIFICATION D-3034, SDR-26.

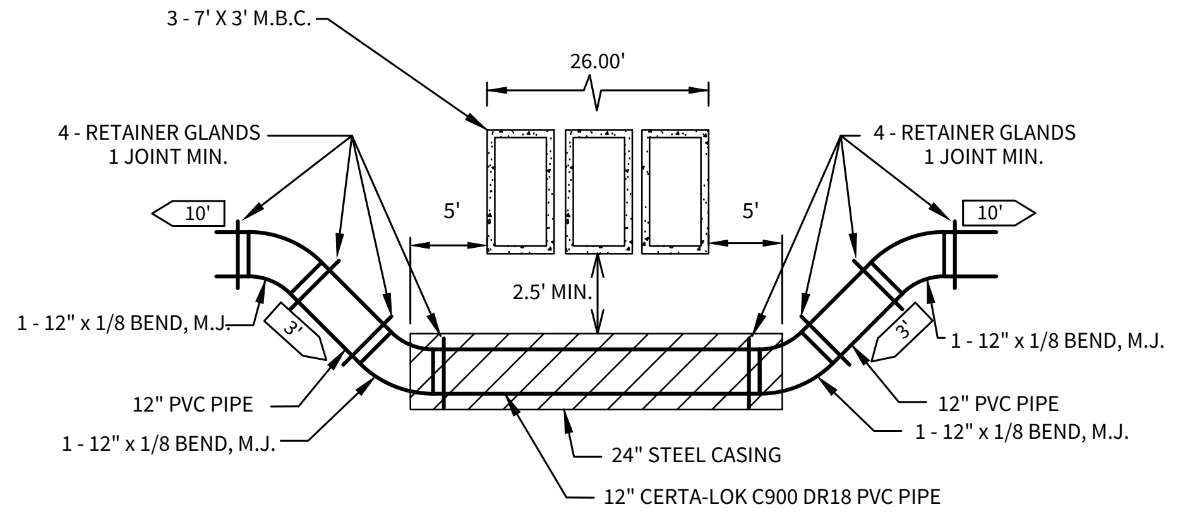

1 - 24" RCP PIPE
2'
4 - RETAINER GLANDS 1 JOINT MIN.
4 - RETAINER GLANDS 1 JOINT MIN.
5'
5'
2.5' MIN.
1 - 12" x 1/8 BEND, M.J.
1 - 12" x 1/8 BEND, M.J.
12" P.V.C. PIPE
12" P.V.C. PIPE
1 - 12" x 1/8 BEND, M.J.
1 - 12" x 1/8 BEND, M.J.
24" STEEL CASING
12" CERTA-LOK C900 DR18 PVC PIPE

ALL RETAINDER GLANDS TO BE "MEGA-LUG" TYPE.

WATER / ENTRANCE CULVERT CROSSING DETAIL

SIDE VIEW (THIS DETAIL IS VERTICAL ONLY, NOT HORIZONTAL.)

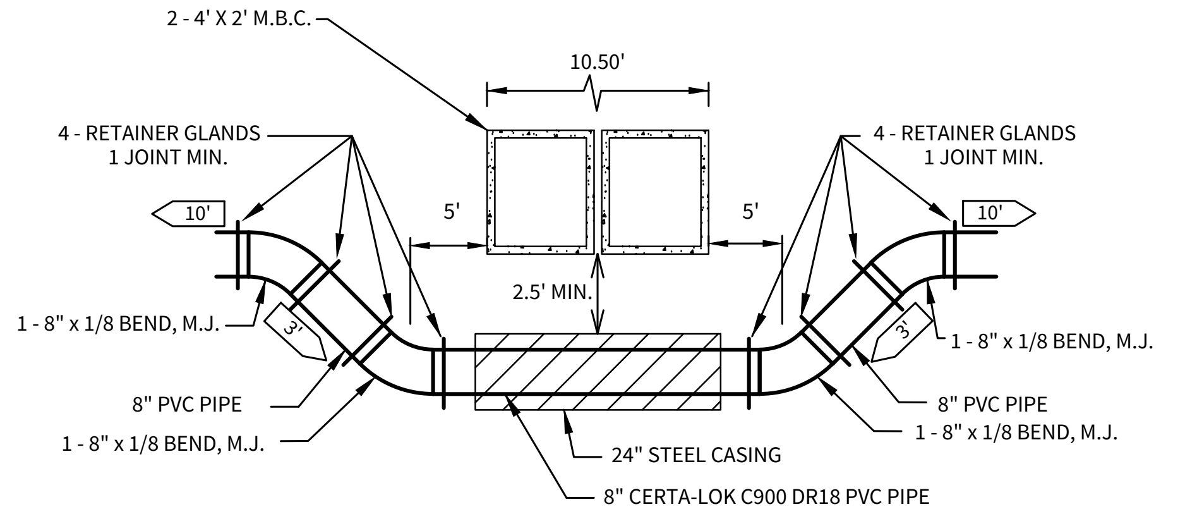
(N.T.S.)


3 - 7' X 3' M.B.C.
26.00'
4 - RETAINER GLANDS 1 JOINT MIN.
4 - RETAINER GLANDS 1 JOINT MIN.
10'
10'
5'
5'
3'
3'
2.5' MIN.
1 - 12" x 1/8 BEND, M.J.
1 - 12" x 1/8 BEND, M.J.
12" PVC PIPE
12" PVC PIPE
1 - 12" x 1/8 BEND, M.J.
1 - 12" x 1/8 BEND, M.J.
24" STEEL CASING
12" CERTA-LOK C900 DR18 PVC PIPE

ALL RETAINDER GLANDS TO BE "MEGA-LUG" TYPE.

WATER / DRAIN "D" CROSSING

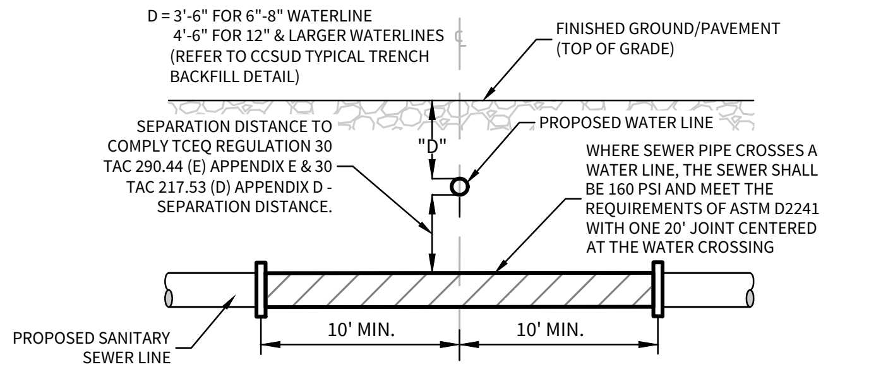
SIDE VIEW (THIS DETAIL IS VERTICAL ONLY, NOT HORIZONTAL.)


2 - 4' X 2' M.B.C.
10.50'
4 - RETAINER GLANDS 1 JOINT MIN.
4 - RETAINER GLANDS 1 JOINT MIN.
10'
10'
5'
5'
3'
3'
2.5' MIN.
1 - 8" x 1/8 BEND, M.J.
1 - 8" x 1/8 BEND, M.J.
8" PVC PIPE
8" PVC PIPE
1 - 8" x 1/8 BEND, M.J.
1 - 8" x 1/8 BEND, M.J.
24" STEEL CASING
8" CERTA-LOK C900 DR18 PVC PIPE

ALL RETAINDER GLANDS TO BE "MEGA-LUG" TYPE.

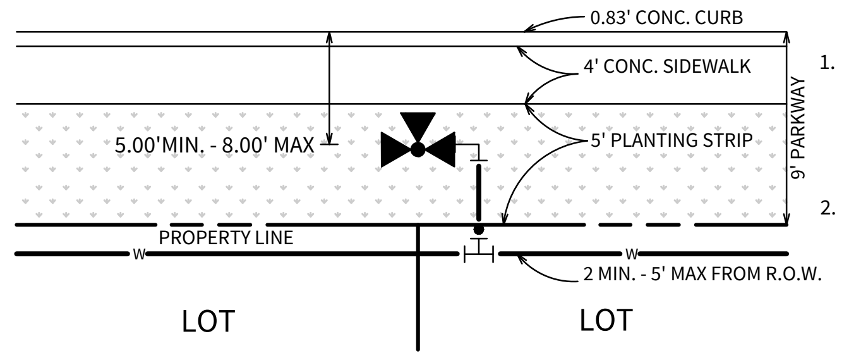
WATER / DRAIN "A" CROSSING

SIDE VIEW (THIS DETAIL IS VERTICAL ONLY, NOT HORIZONTAL.)


D = 3'-6" FOR 6"-8" WATERLINE
4'-6" FOR 12" & LARGER WATERLINES
(REFER TO CCSUD TYPICAL TRENCH BACKFILL DETAIL)
FINISHED GROUND/PAVEMENT (TOP OF GRADE)
SEPARATION DISTANCE TO COMPLY TCEQ REGULATION 30 TAC 290.44 (E) APPENDIX E & 30 TAC 217.53 (D) APPENDIX D - SEPARATION DISTANCE.
"D"
PROPOSED WATER LINE
WHERE SEWER PIPE CROSSES A WATER LINE, THE SEWER SHALL BE 160 PSI AND MEET THE REQUIREMENTS OF ASTM D2241 WITH ONE 20' JOINT CENTERED AT THE WATER CROSSING
PROPOSED SANITARY SEWER LINE
10' MIN.
10' MIN.

TYPICAL SANITARY SEWER/ WATER CROSSING DETAIL

N.T.S.

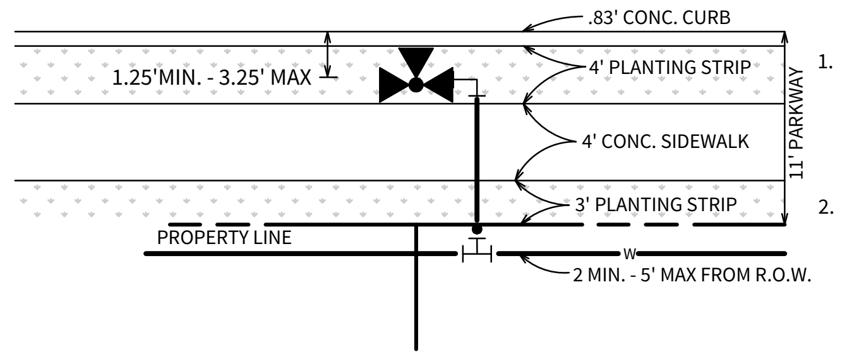

0.83' CONC. CURB
4' CONC. SIDEWALK
5.00'MIN. - 8.00' MAX
5' PLANTING STRIP
9' PARKWAY
PROPERTY LINE
2 MIN. - 5' MAX FROM R.O.W.
LOT
LOT

NOTE:

1. EXCLUSIVE OF THE TEE, PAYMENT FOR THE FIRE HYDRANT SHALL INCLUDE ALL FITTINGS, 6" D.I. PIPE AND 6" GATE VALVE & BOX.
2. FIRE HYDRANT TO BE INSTALLED OUTSIDE OF THE LIMITS OF ALL PROPOSED SIDEWALKS.

RESIDENTIAL FIRE HYDRANT DETAIL (4' SIDEWALK / 50' R.O.W.)

N.T.S.

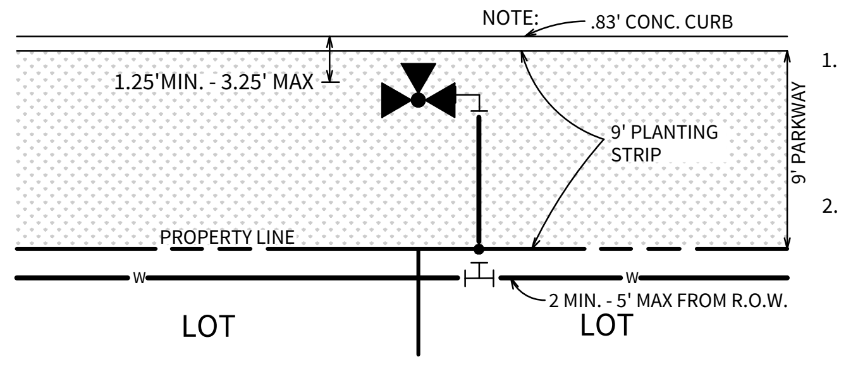

.83' CONC. CURB
1.25'MIN. - 3.25' MAX
4' PLANTING STRIP
4' CONC. SIDEWALK
3' PLANTING STRIP
11' PARKWAY
PROPERTY LINE
2 MIN. - 5' MAX FROM R.O.W.

NOTE:

1. EXCLUSIVE OF THE TEE, PAYMENT FOR THE FIRE HYDRANT SHALL INCLUDE ALL FITTINGS, 6" D.I. PIPE AND 6" GATE VALVE & BOX.
2. FIRE HYDRANT TO BE INSTALLED OUTSIDE OF THE LIMITS OF ALL PROPOSED SIDEWALKS.

RESIDENTIAL COLLECTOR FIRE HYDRANT DETAIL (4' SIDEWALK / 60' R.O.W.)

N.T.S.


.83' CONC. CURB
1.25'MIN. - 3.25' MAX
9' PLANTING STRIP
9' PARKWAY
PROPERTY LINE
2 MIN. - 5' MAX FROM R.O.W.
LOT
LOT

NOTE:

1. EXCLUSIVE OF THE TEE, PAYMENT FOR THE FIRE HYDRANT SHALL INCLUDE ALL FITTINGS, 6" D.I. PIPE AND 6" GATE VALVE & BOX.
2. FIRE HYDRANT TO BE INSTALLED OUTSIDE OF THE LIMITS OF ALL PROPOSED SIDEWALKS.

MINOR COLLECTOR FIRE HYDRANT DETAIL (72' R.O.W.)

N.T.S.

NOTES:

1. ALL EXCAVATED MATERIAL SHALL BE PLACED ON THE UPGRADIENT SIDE OF THE SEWER TRENCH THUS ALLOWING THE TRENCH TO INTERCEPT ANY SILT CONTAMINATED RUNOFF.
2. ALL SANITARY SEWER PIPE SHALL BE P.V.C. THAT MEETS ASTM SPECIFICATION D-3034, SDR-26 UNLESS OTHERWISE NOTED.
3. ALL LATERALS TO BE INSTALLED @ MIN. 2.0% SLOPE. UNLESS OTHERWISE NOTED.
4. LATERALS TO BE BUILT TO FRONT UTILITY EASEMENT LINE OR SANITARY SEWER EASEMENT LINE.
5. ENSURE ALL DRIVEWAY APPROACHES ARE BUILT IN GENERAL ACCORDANCE WITH A.D.A. SPECIFICATIONS. NO VALVES, HYDRANTS, ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.
6. THE LOCATIONS AND DEPTHS OF ALL EXISTING UTILITIES, INCLUDING SERVICE LATERALS AND DRAINAGE STRUCTURES SHOWN ON THE PLANS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION AND DEPTHS OF UNDERGROUND UTILITIES AT LEAST 48 HOURS PRIOR TO CONSTRUCTION WHETHER SHOWN ON PLANS OR NOT, AND TO PROTECT THE SAME DURING CONSTRUCTION.
7. ALL UTILITIES TO BE CONSTRUCTED PRIOR TO SHEETS
8. NO VALVES, HYDRANTS, CLEANOUTS ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.
9. THIS PROJECT INCLUDES UTILITY INSTALLATIONS GREATER THAN 5-FEET IN DEPTH LOCATED IN PUBLIC RIGHT-OF-WAY OR EASEMENTS. DEEP TRENCHES POSE COMPACTION TESTING AND CONSTRUCTION CHALLENGES AND CITY METHODS FOR TESTING AND COMPACTION MAY NOT BE ACHIEVABLE. A UTILITY COMPACTION PLAN WILL BE REQUIRED AND MUST BE SUBMITTED FOR APPROVAL TO CITY PRIOR TO UTILITY INSTALLATION.
10. UTILITY TRENCH COMPACTION (ADDED TO THE CONSTRUCTION PLANS ON ALL UTILITY PLAN SHEETS): ALL UTILITY TRENCH COMPACTION TESTS WITHIN THE STREET PAVEMENT/SIDEWALK SECTION SHALL BE THE RESPONSIBILITY OF THE DEVELOPER'S GEOTECHNICAL ENGINEER. FILL MATERIAL SHALL BE PLACED IN UNIFORM LAYERS NOT TO EXCEED TWELVE INCHES (12") LOOSE. DETERMINE THE MAXIMUM LIFT THICKNESS BASED ON THE ABILITY OF THE COMPACTING OPERATION AND EQUIPMENT USED TO MEET THE REQUIRED DENSITY. EACH LAYER OF MATERIAL SHALL BE COMPACTED TO A MINIMUM 95% DENSITY AND TESTED FOR DENSITY AND MOISTURE IN ACCORDANCE WITH TEST METHODS TEX-113-E, TEX-114-E, TEX-115-E. THE NUMBER AND LOCATION OF REQUIRED TESTS SHALL BE DETERMINED BY THE GEOTECHNICAL ENGINEER AND APPROVED BY COMAL COUNTY STREET INSPECTOR. AT A MINIMUM, TESTS SHALL BE TAKEN EVERY 200 LF FOR EACH LIFT AND EVERY OTHER SERVICE LINE. UPON COMPLETION OF TESTING THE GEOTECHNICAL ENGINEER SHALL PROVIDE COMAL COUNTY STREET INSPECTOR WITH ALL TESTING DOCUMENTATION AND A CERTIFICATION STATING THAT THE PLACEMENT OF FILL MATERIAL HAS BEEN COMPLETED IN ACCORDANCE WITH THE PLANS. ADDITIONAL DENSITY TESTS MAY BE REQUESTED BY COMAL COUNTY INSPECTOR.
11. FOR WATER METER BOX INSTALLATION, SEE 5.D1 - SERVICE CONNECTION DETAILS.
12. CONTRACTOR TO EXTEND WATER SERVICE TRENCH PAST WATER SERVICE METER THROUGH PUBLIC UTILITY EASEMENT AT MINIMUM DEPTH OF 1'. WATER SERVICE PAST METER TO BE INSTALLED WITH HOMEBUILDING.

NOTE

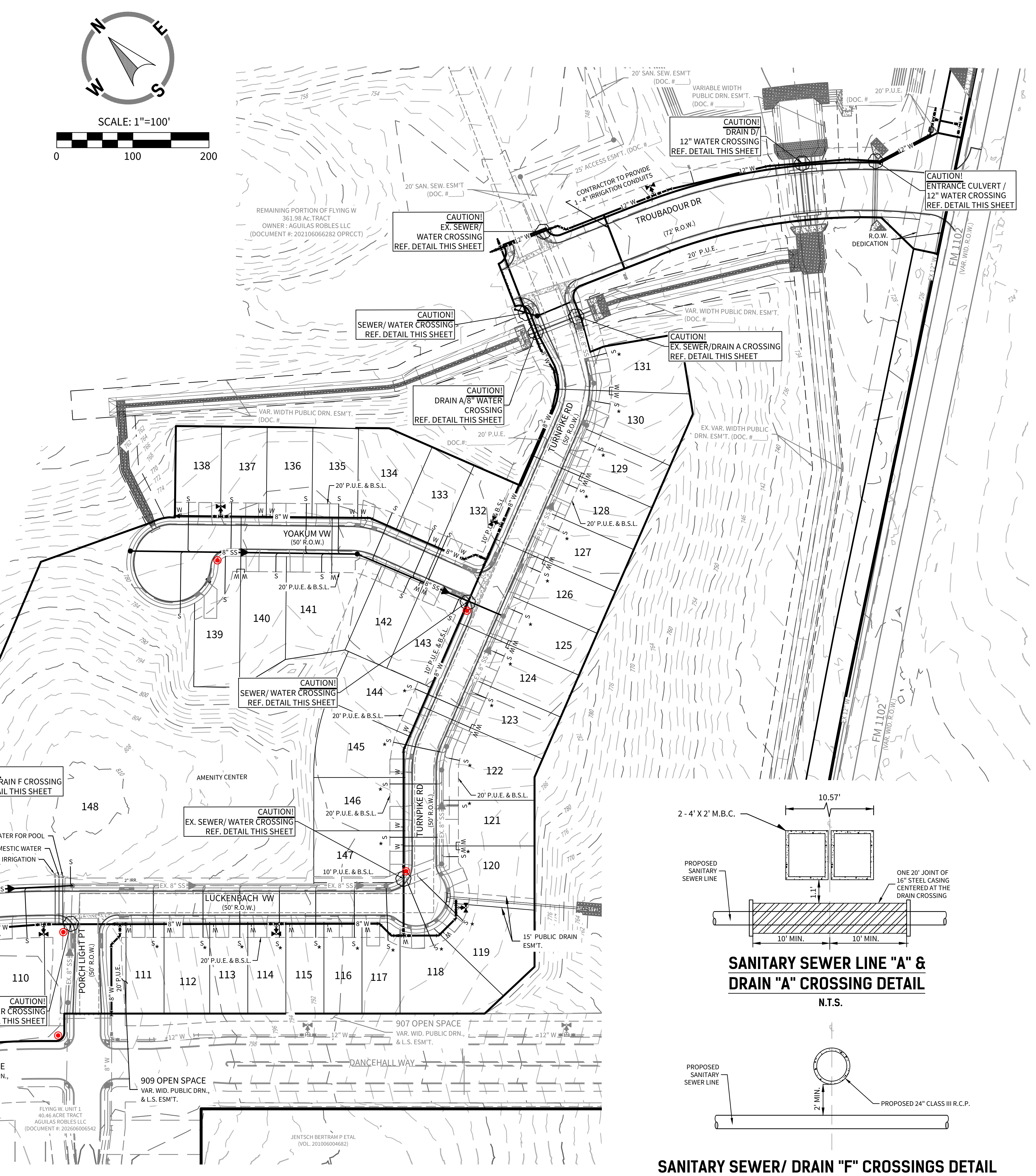
THE CONTRACTOR SHALL BE RESPONSIBLE FOR MEETING 98% COMPACTION ON ALL TRENCH BACKFILL AND PAYING FOR THE TESTS TO BE PERFORMED BY A THIRD PARTY. COMPACTION TEST WILL BE DONE AT ONE LOCATION POINT RANDOMLY SELECTED OR AS INDICATED BY THE CCSUD INSPECTOR/TEST ADMINISTER, PER EACH 12-INCH LOOSE LIFT PER 400 LINEAR FEET AT A MINIMUM. THIS PROJECT WILL NOT BE ACCEPTED AND FINALIZED BY CCSUD WITHOUT THIS REQUIREMENT BEING MET AND VERIFIED BY PROVIDING ALL NECESSARY DOCUMENTED TEST RESULTS.

TRENCH EXCAVATION PROTECTION

CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN/GEOTECHNICAL/SAFETY/EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITE(S) WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS AND/OR PROCEDURES FOR THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR'S IMPLEMENTATION OF THESE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.

CAUTION!

THE CONTRACTOR SHALL BE AWARE THAT UNDERGROUND UTILITY LINES EXIST ALONG FM 1102. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE THESE UTILITIES LOCATED PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING IN THIS AREA. ANY DAMAGE DONE TO THESE EXISTING FACILITIES WILL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO REPAIR.


N
E
S
W
SCALE: 1"=100'
0
100
200
TROUBADOUR DR
TURNPIKE RD
YOAKUM VW
LUCKENBACH VW
DANCEHALL WAY
TIN STAR CT
PORCH LIGHT PT
FM 1102
AMENITY CENTER
910 OPEN SPACE VAR. WID. PUBLIC DRN., SEW., & L.S. ESM'T.
908 OPEN SPACE VAR. WID. PUBLIC DRN., & L.S. ESM'T.
909 OPEN SPACE VAR. WID. PUBLIC DRN., & L.S. ESM'T.
907 OPEN SPACE VAR. WID. PUBLIC DRN., & L.S. ESM'T.
REMAINING PORTION OF FLYING W 361.98 Ac TRACT OWNER : AGUILAS ROBLES LLC
FLYING W. UNIT 1 40.46 ACRE TRACT AGUILAS ROBLES LLC (DOCUMENT #: 202606006542
JENTSCH BERTRAM P ETAL (VOL. 201006004682)
CAUTION! ENTRANCE CULVERT / 12" WATER CROSSING REF. DETAIL THIS SHEET
CAUTION! DRAIN D 12" WATER CROSSING REF. DETAIL THIS SHEET
CAUTION! EX. SEWER/ WATER CROSSING REF. DETAIL THIS SHEET
CAUTION! SEWER/ WATER CROSSING REF. DETAIL THIS SHEET
CAUTION! EX. SEWER/DRAIN A CROSSING REF. DETAIL THIS SHEET
CAUTION! DRAIN A/8" WATER CROSSING REF. DETAIL THIS SHEET
CAUTION! SEWER/DRAIN F CROSSING REF. DETAIL THIS SHEET
CAUTION! EX. SEWER/ WATER CROSSING REF. DETAIL THIS SHEET
CONTRACTOR TO PROVIDE 4" IRRIGATION CONDUITS
R.O.W. DEDICATION
1" WATER FOR POOL
2" DOMESTIC WATER
1.5" IRRIGATION
20' P.U.E. & B.S.L.
20' P.U.E.
15' PUBLIC DRAIN ESM'T.
96
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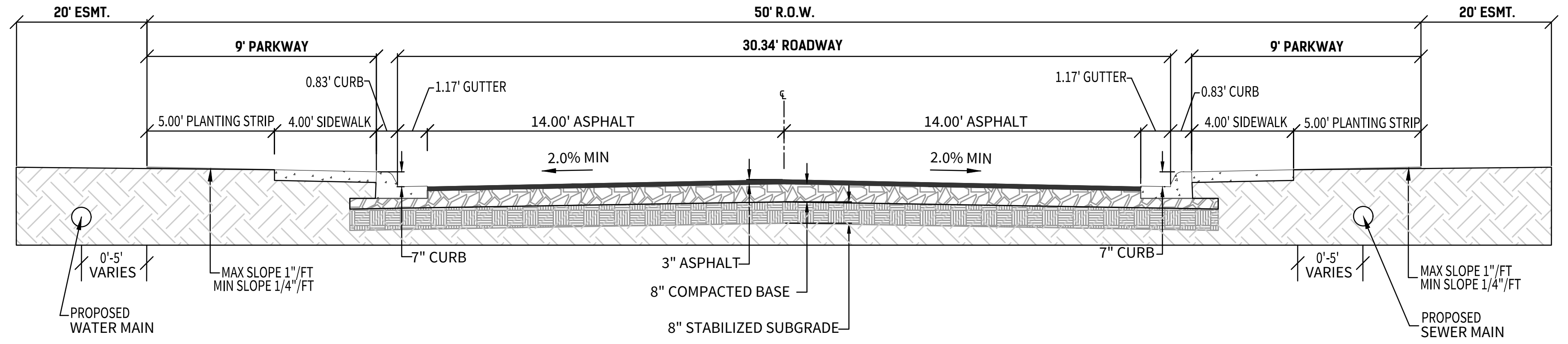
154
10.57'
2 - 4' X 2' M.B.C.
PROPOSED SANITARY SEWER LINE
ONE 20' JOINT OF 16" STEEL CASING CENTERED AT THE DRAIN CROSSING
1.1'
10' MIN.
10' MIN.
PROPOSED SANITARY SEWER LINE
2' MIN.
PROPOSED 24" CLASS III R.C.P.

SANITARY SEWER LINE "A" & DRAIN "A" CROSSING DETAIL

N.T.S.

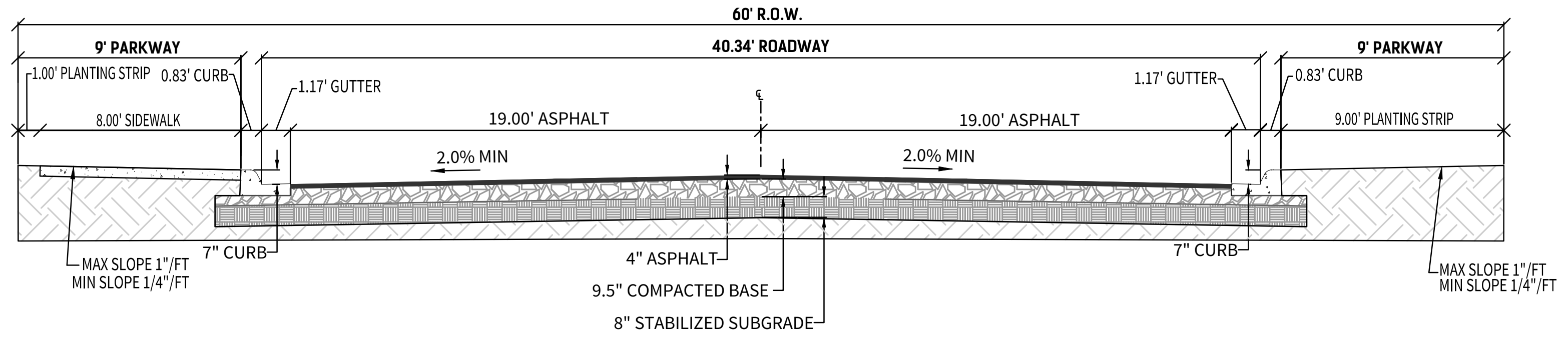
SANITARY SEWER/ DRAIN "F" CROSSINGS DETAIL

N.T.S.


20' ESMT.
50' R.O.W.
20' ESMT.
9' PARKWAY
30.34' ROADWAY
9' PARKWAY
0.83' CURB
1.17' GUTTER
1.17' GUTTER
0.83' CURB
5.00' PLANTING STRIP
4.00' SIDEWALK
14.00' ASPHALT
14.00' ASPHALT
4.00' SIDEWALK
5.00' PLANTING STRIP
2.0% MIN
2.0% MIN
0'-5' VARIES
MAX SLOPE 1"/FT MIN SLOPE 1/4"/FT
7" CURB
3" ASPHALT
8" COMPACTED BASE
8" STABILIZED SUBGRADE
7" CURB
0'-5' VARIES
MAX SLOPE 1"/FT MIN SLOPE 1/4"/FT
PROPOSED WATER MAIN
PROPOSED SEWER MAIN

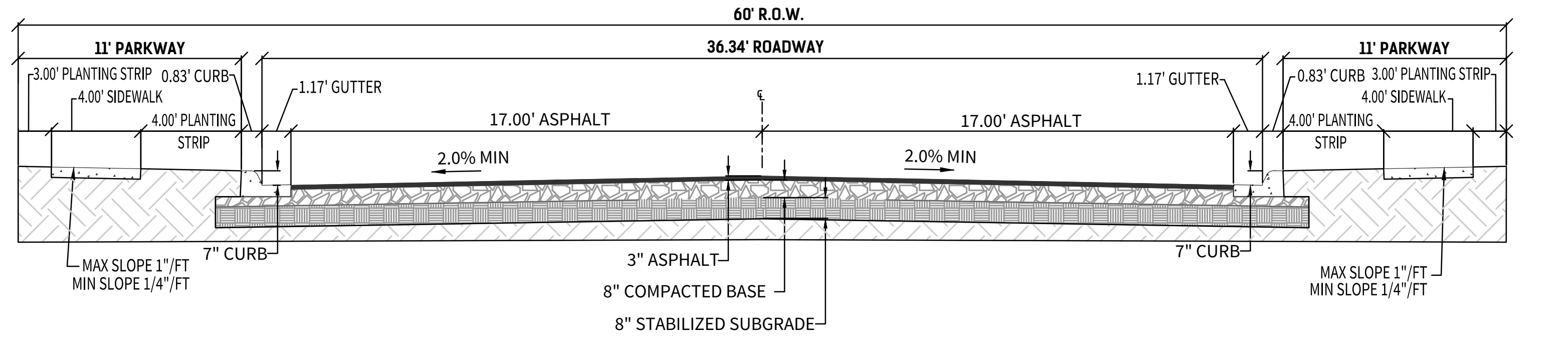
TYPICAL "RESIDENTIAL" STREET CROSS SECTION

N.T.S.


60' R.O.W.
9' PARKWAY
40.34' ROADWAY
9' PARKWAY
1.00' PLANTING STRIP
0.83' CURB
1.17' GUTTER
1.17' GUTTER
0.83' CURB
8.00' SIDEWALK
19.00' ASPHALT
19.00' ASPHALT
9.00' PLANTING STRIP
2.0% MIN
2.0% MIN
MAX SLOPE 1"/FT MIN SLOPE 1/4"/FT
7" CURB
4" ASPHALT
9.5" COMPACTED BASE
8" STABILIZED SUBGRADE
7" CURB
MAX SLOPE 1"/FT MIN SLOPE 1/4"/FT

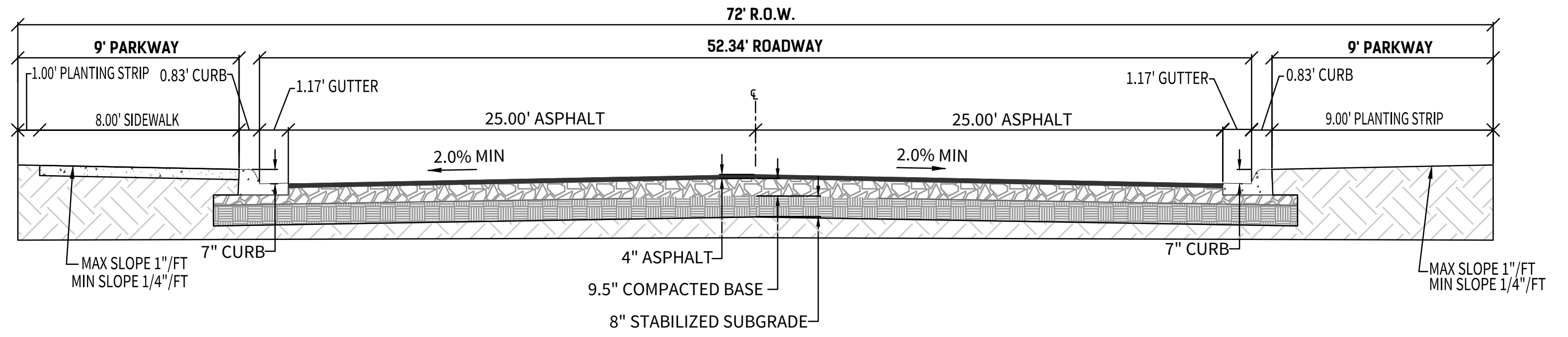
TYPICAL "MINOR COLLECTOR" STREET CROSS SECTION

N.T.S.


60' R.O.W.
11' PARKWAY
36.34' ROADWAY
11' PARKWAY
3.00' PLANTING STRIP
0.83' CURB
4.00' SIDEWALK
4.00' PLANTING STRIP
1.17' GUTTER
1.17' GUTTER
0.83' CURB
3.00' PLANTING STRIP
4.00' SIDEWALK
4.00' PLANTING STRIP
17.00' ASPHALT
17.00' ASPHALT
2.0% MIN
2.0% MIN
MAX SLOPE 1"/FT MIN SLOPE 1/4"/FT
7" CURB
3" ASPHALT
8" COMPACTED BASE
8" STABILIZED SUBGRADE
7" CURB
MAX SLOPE 1"/FT MIN SLOPE 1/4"/FT

TYPICAL "RESIDENTIAL COLLECTOR" STREET CROSS SECTION

N.T.S.


72' R.O.W.
9' PARKWAY
52.34' ROADWAY
9' PARKWAY
1.00' PLANTING STRIP
0.83' CURB
1.17' GUTTER
1.17' GUTTER
0.83' CURB
8.00' SIDEWALK
25.00' ASPHALT
25.00' ASPHALT
9.00' PLANTING STRIP
2.0% MIN
2.0% MIN
MAX SLOPE 1"/FT MIN SLOPE 1/4"/FT
7" CURB
4" ASPHALT
9.5" COMPACTED BASE
8" STABILIZED SUBGRADE
7" CURB
MAX SLOPE 1"/FT MIN SLOPE 1/4"/FT

TYPICAL 72' "MINOR COLLECTOR" STREET CROSS SECTION

N.T.S.

CUDEENGINEERS.COM

CUDE ENGINEERS EST. 1980

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

UTILITY LAYOUT PLAN

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
1.
2.
3.
4.
5.
6.
7.
8.

4/16/26
TORY DUANE MILLER
135598

CUDE ENGINEERS
TBPELS No. 10048500

C3.01

R:\04024\018\2-DWG\4-Plans\C3.01 UTILITY LAYOUT PLAN.dwg 2026/04/16 8:39am sgonzales

LEGEND

UNIT BOUNDARY	━━━
PROPOSED SANITARY SEWER	━ 8" SS ━
PROPOSED SANITARY SEWER MANHOLE	●
EXISTING SANITARY SEWER	– – 8" SS – –
EXISTING SANITARY SEWER MANHOLE	●
PROPOSED WATER MAIN	— 8" W —
PROPOSED STANDARD FIRE HYDRANT	
PUBLIC UTILITY EASEMENT	P.U.E
LATERALS TYING INTO EXISTING WYES	S*

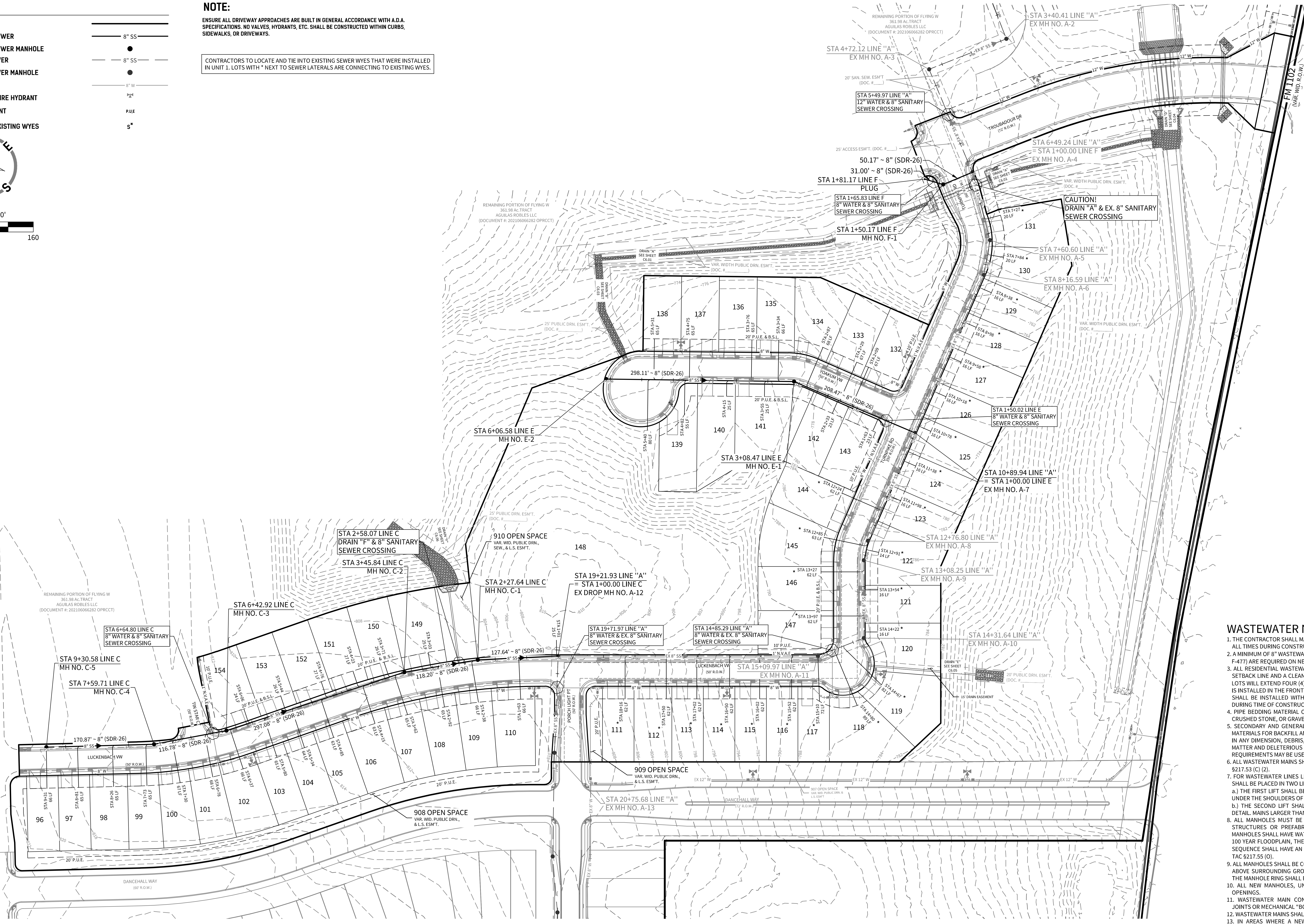
SCALE: 1"=80'

0 80 160

NOTE:

ENSURE ALL DRIVEWAY APPROACHES ARE BUILT IN GENERAL ACCORDANCE WITH A.D.A. SPECIFICATIONS. NO VALVES, HYDRANTS, ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.

CONTRACTORS TO LOCATE AND TIE INTO EXISTING SEWER WYES THAT WERE INSTALLED IN UNIT 1. LOTS WITH * NEXT TO SEWER LATERALS ARE CONNECTING TO EXISTING WYES.


N
E
S
W
REMAINING PORTION OF FLYING W
361.98 Ac.TRACT
AGUILAS ROBLES LLC
(DOCUMENT #: 202106066282 OPRCCT)
STA 3+40.41 LINE "A"
EX MH NO. A-2
STA 4+72.12 LINE "A"
EX MH NO. A-3
20' SAN. SEW. ESM'T (DOC. #____)
STA 5+49.97 LINE "A"
12" WATER & 8" SANITARY SEWER CROSSING
TROUBADOUR DR (72' R.O.W.)
12" W
EX 8" SS
FM 1102 (VAR. WID. R.O.W.)
DRAIN "D" SEE SHEET C6.04
25' ACCESS ESM'T. (DOC. #____)
STA 6+49.24 LINE "A"
= STA 1+00.00 LINE F
EX MH NO. A-4
50.17' ~ 8" (SDR-26)
31.00' ~ 8" (SDR-26)
STA 1+81.17 LINE F
PLUG
STA 1+65.83 LINE F
8" WATER & 8" SANITARY SEWER CROSSING
STA 1+50.17 LINE F
MH NO. F-1
DRAIN "A" SEE SHEET C6.01
VAR. WIDTH PUBLIC DRN. ESM'T. (DOC. #____)
TURNPIKE RD (60' R.O.W.)
CAUTION!
DRAIN "A" & EX. 8" SANITARY SEWER CROSSING
STA 7+60.60 LINE "A"
EX MH NO. A-5
STA 8+16.59 LINE "A"
EX MH NO. A-6
DRAIN "B" SEE SHEET C6.03
25' PUBLIC DRN. ESM'T. (DOC. #____)
298.11' ~ 8" (SDR-26)
20' P.U.E. & B.S.L.
YOAKUM VW (50' R.O.W.)
208.47' ~ 8" (SDR-26)
STA 6+06.58 LINE E
MH NO. E-2
STA 3+08.47 LINE E
MH NO. E-1
STA 1+50.02 LINE E
8" WATER & 8" SANITARY SEWER CROSSING
STA 10+89.94 LINE "A"
= STA 1+00.00 LINE E
EX MH NO. A-7
STA 12+76.80 LINE "A"
EX MH NO. A-8
STA 13+08.25 LINE "A"
EX MH NO. A-9
STA 14+31.64 LINE "A"
EX MH NO. A-10
STA 15+09.97 LINE "A"
EX MH NO. A-11
STA 14+85.29 LINE "A"
8" WATER & EX. 8" SANITARY SEWER CROSSING
STA 19+71.97 LINE "A"
8" WATER & EX. 8" SANITARY SEWER CROSSING
STA 19+21.93 LINE "A"
= STA 1+00.00 LINE C
EX DROP MH NO. A-12
STA 2+27.64 LINE C
MH NO. C-1
STA 2+58.07 LINE C
DRAIN "F" & 8" SANITARY SEWER CROSSING
STA 3+45.84 LINE C
MH NO. C-2
DRAIN "F" SEE SHEET C6.06
910 OPEN SPACE
VAR. WID. PUBLIC DRN., SEW., & L.S. ESM'T.
STA 6+42.92 LINE C
MH NO. C-3
STA 6+64.80 LINE C
8" WATER & 8" SANITARY SEWER CROSSING
STA 9+30.58 LINE C
MH NO. C-5
STA 7+59.71 LINE C
MH NO. C-4
170.87' ~ 8" (SDR-26)
116.78' ~ 8" (SDR-26)
297.08' ~ 8" (SDR-26)
118.20' ~ 8" (SDR-26)
127.64' ~ 8" (SDR-26)
LUCKENBACH VW (50' R.O.W.)
TIN STAR CT (50' R.O.W.)
PORCH LIGHT PT (50' R.O.W.)
908 OPEN SPACE
VAR. WID. PUBLIC DRN., & L.S. ESM'T.
909 OPEN SPACE
VAR. WID. PUBLIC DRN., & L.S. ESM'T.
907 OPEN SPACE
VAR. WID. PUBLIC DRN. & L.S. ESM'T
DRAIN "E" SEE SHEET C6.05
20' PUBLIC DRN. ESM'T. (DOC. #____)
15' DRAIN EASEMENT
STA 20+75.68 LINE "A"
EX MH NO. A-13
DANCEHALL WAY (72' R.O.W.)
DANCEHALL WAY (60' R.O.W.)
EX 12" W
20' P.U.E.
10' P.U.E.
1' N.V.A.E.
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152
153
154
STA 7+27 * 20 LF
STA 7+84 * 20 LF
STA 8+38 * 16 LF
STA 8+98 * 16 LF
STA 9+58 * 16 LF
STA 10+18 * 16 LF
STA 10+78 * 16 LF
STA 11+38 * 16 LF
STA 11+98 * 16 LF
STA 12+91 * 14 LF
STA 13+54 * 16 LF
STA 14+22 * 16 LF
STA 14+67 * 82 LF
STA 14+80 * 89 LF
STA 12+24 * 62 LF
STA 12+85 * 63 LF
STA 13+27 * 62 LF
STA 13+97 * 62 LF
STA 5+31 65 LF
STA 4+75 65 LF
STA 3+76 65 LF
STA 3+34 66 LF
STA 2+87 68 LF
STA 2+29 67 LF
STA 2+09 67 LF
STA 5+40 80 LF
STA 4+82 55 LF
STA 4+15 25 LF
STA 3+55 25 LF
STA 2+33 23 LF
STA 1+63 23 LF
STA 1+01 25 LF
STA 3+03 25 LF
STA 3+71 26 LF
STA 4+23 27 LF
STA 4+76 27 LF
STA 5+44 26 LF
STA 6+06 24 LF
STA 9+31 66 LF
STA 8+81 65 LF
STA 8+26 65 LF
STA 7+73 65 LF
STA 7+30 67 LF
STA 6+78 68 LF
STA 6+37 66 LF
STA 5+80 65 LF
STA 5+34 64 LF
STA 4+85 63 LF
STA 4+15 63 LF
STA 3+62 65 LF
STA 2+92 65 LF
STA 2+38 66 LF
STA 1+63 66 LF
STA 18+16 * 62 LF
STA 17+50 * 62 LF
STA 17+02 * 62 LF
STA 16+50 * 62 LF
STA 16+02 * 62 LF
STA 15+52 * 62 LF
STA 15+10 * 72 LF

WASTEWATER NOTES:

1. THE CONTRACTOR SHALL MAINTAIN SERVICE TO EXISTING WASTEWATER SYSTEM AT ALL TIMES DURING CONSTRUCTION.
2. A MINIMUM OF 8" WASTEWATER PIPE AND FITTINGS (P.V.C. SDR-26, ASTM, D3034, D-3212, F-477) ARE REQUIRED ON NEW INSTALLATION.
3. ALL RESIDENTIAL WASTEWATER SERVICE LATERALS SHALL BE EXTENDED TO THE BUILDING SETBACK LINE AND A CLEANOUT SHALL BE INSTALLED AT THE PROPERTY LINE. SERVICES TO LOTS WILL EXTEND FOUR (4) FEET PAST THE UNDERGROUND ELECTRIC CONDUIT IF ELECTRIC IS INSTALLED IN THE FRONT EASEMENT. ALL SEWER CLEANOUTS THAT LEAD TO CCSUD MAINS SHALL BE INSTALLED WITH A PROTECTIVE UTILITY SHROUD AND PIVOTING MARKER POLE DURING TIME OF CONSTRUCTION.
4. PIPE BEDDING MATERIAL OF WASTEWATER MAINS SHALL BE COMPOSED OF WELLGRADED, CRUSHED STONE, OR GRAVEL PER SECTION 01230 OF CCSUD'S SPECIFICATIONS.
5. SECONDARY AND GENERAL BACKFILL OF WASTEWATER MAINS SHALL BE APPROVED SOIL MATERIALS FOR BACKFILL AND FILL, FREE OF CLAY, ROCK, OR GRAVEL LARGER THAN 2-INCHES IN ANY DIMENSION, DEBRIS, WASTE, FROZEN MATERIALS, VEGETABLE, AND OTHER ORGANIC MATTER AND DELETERIOUS MATERIALS. PREVIOUSLY EXCAVATED MATERIALS MEETING THESE REQUIREMENTS MAY BE USED FOR BACKFILL.
6. ALL WASTEWATER MAINS SHALL HAVE COMPRESSION OR MECHANICAL JOINTS AS PER 30 TAC §217.53 (C) (2).
7. FOR WASTEWATER LINES LESS THAN 24" IN DIAMETER, SELECT INITIAL BACKFILL MATERIAL SHALL BE PLACED IN TWO LIFTS.
   a.) THE FIRST LIFT SHALL BE SPREAD UNIFORMLY AND SIMULTANEOUSLY ON EACH SIDE AND UNDER THE SHOULDERS OF THE PIPE TO THE MID POINT OR SPRING LINE OF THE PIPE.
   b.) THE SECOND LIFT SHALL BE PLACED TO A DEPTH AS SHOWN ON THE PIPE BACKFILL DETAIL. MAINS LARGER THAN 24", 12" MAXIMUM LIFTS SHALL BE USED.
8. ALL MANHOLES MUST BE WATERTIGHT, EITHER MONOLITHIC, CAST-IN-PLACE CONCRETE STRUCTURES OR PREFABRICATED MANHOLES SPECIFICALLY APPROVED BY CCSUD. THE MANHOLES SHALL HAVE WATER-TIGHT RINGS AND COVERS. WHEREVER THEY ARE WITHIN THE 100 YEAR FLOODPLAIN, THE MANHOLE COVERS SHALL BE CCSUD. EVERY THIRD MANHOLE IN SEQUENCE SHALL HAVE AN ALTERNATE MEANS OF VENTING. 30 TAC §213.5 (C) (3) (A) AND 30 TAC §217.55 (O).
9. ALL MANHOLES SHALL BE CONSTRUCTED SO THAT THE TOP OF THE RING IS TWO INCHES (2") ABOVE SURROUNDING GROUND EXCEPT WHEN LOCATED IN PAVED AREA. IN PAVED AREAS, THE MANHOLE RING SHALL BE FLUSH WITH PAVEMENT.
10. ALL NEW MANHOLES, UNLESS APPROVED BY CCSUD, ARE TO HAVE COVERS WITH 32" OPENINGS.
11. WASTEWATER MAIN CONNECTIONS TO PRE-CAST MANHOLES WILL BE COMPRESSION JOINTS OR MECHANICAL "BOOT TYPE" JOINT AS APPROVED BY CCSUD.
12. WASTEWATER MAINS SHALL BE TESTED FROM MANHOLE TO MANHOLE. CCSUD. 03/2022
13. IN AREAS WHERE A NEW WASTEWATER MANHOLE IS TO BE CONSTRUCTED OVER AN EXISTING WASTEWATER SYSTEM, IT SHALL BE THE CONTACTOR'S RESPONSIBILITY TO TEST THE EXISTING MANHOLES BEFORE CONSTRUCTION. AFTER THE PROPOSED MANHOLE(S) HAS BEEN BUILT, THE CONTRACTOR SHALL RE-TEST THE EXISTING SYSTEM TO THE SATISFACTION OF THE CONSTRUCTION INSPECTOR. (NO SEPARATE PAY ITEM).
14. WHERE THE MINIMUM 9 FOOT SEPARATION DISTANCE BETWEEN WASTEWATER LINES AND WATER LINES CANNOT BE MAINTAINED, THE INSTALLATION OF WASTEWATER LINES SHALL BE IN STRICT ACCORDANCE WITH TCEQ. THE WASTEWATER LINE SHALL BE CONSTRUCTED OF CAST IRON, DUCTILE IRON OR PVC MEETING THE ASTM SPECIFICATION FOR BOTH PIPES AND JOINTS OF 160 PSI AND SHALL BE IN ACCORDANCE WITH 30 TAC § 217.53 (D) AND 30 TAC § 290.44 (E).
16. NO TESTING WILL BE PERFORMED PRIOR TO 30 DAYS FROM COMPLETE INSTALLATION OF THE WASTEWATER LINES. THE FOLLOWING SEQUENCE WILL BE STRICTLY ADHERED TO:
   a. PULL MANDREL
   b. PERFORM AIR TEST
   c. CLEANING OF ANY DEBRIS
   d. FLUSHING OF SYSTEM
   e. TV INSPECTION (WITHIN 72 HOURS OF FLUSHING)
17. A MINIMUM OF 3 FEET OF COVER IS TO BE MAINTAINED OVER THE WASTEWATER MAIN AND LATERALS AT SUBGRADE, OTHERWISE CONCRETE ENCASEMENT WILL BE REQUIRED.
18. TCEQ AND EPA REQUIRE EROSION AND SEDIMENTATION CONTROL FOR CONSTRUCTION OF WASTEWATER COLLECTION SYSTEMS. DEVELOPER OR AUTHORIZED REPRESENTATIVE SHALL PROVIDE EROSION AND SEDIMENTATION CONTROL AS NOTES ON THE PROJECT'S PLAN AND PROFILE SHEETS. ALL TEMPORARY EROSION AND SEDIMENTATION CONTROLS SHALL BE REMOVED BY THE CONTRACTOR AT FINAL ACCEPTANCE OF THE PROJECT BY CCSUD.
19. ALL MANHOLES NOT WITHIN PAVED STREETS SHALL HAVE LOCKING CONCRETE COLLAR TO SECURE RING AND COVER TO MANHOLE CONE PER CCSUD DETAIL DRAWING #329.
20. ALL MANHOLES OVER THE EDWARDS AQUIFER RECHARGE ZONE SHALL HAVE LOCKING CONCRETE COLLAR TO SECURE RING AND COVER TO MANHOLE CONE PER CCSUD DETAIL DRAWING #329.

NOTE:

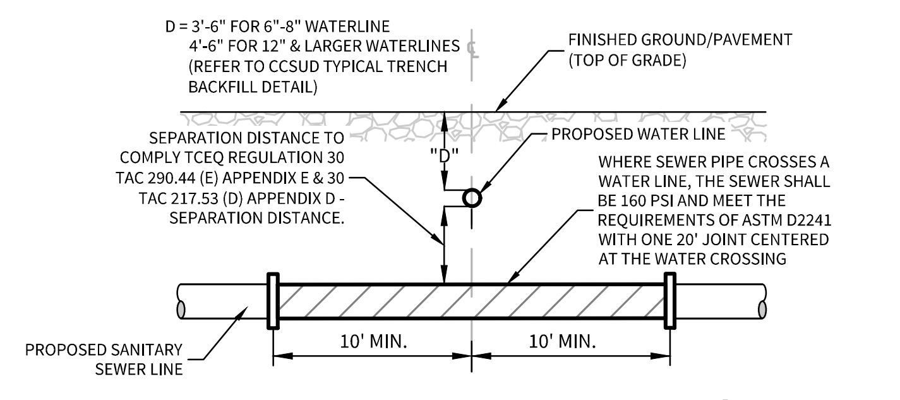
THE CONTRACTOR SHALL BE RESPONSIBLE FOR MEETING 98% COMPACTION ON ALL TRENCH BACKFILL AND PAYING FOR THE TESTS TO BE PERFORMED BY A THIRD PARTY. COMPACTION TEST WILL BE DONE AT ONE LOCATION POINT RANDOMLY SELECTED OR AS INDICATED BY THE CCUSD INSPECTOR/TEST ADMINISTER, PER EACH 12-INCH LOOSE LIFT PER 400 LINEAR FEET AT A MINIMUM. THIS PROJECT WILL NOT BE ACCEPTED AND FINALIZED BY CCUSD WITHOUT THIS REQUIREMENT BEING MET AND VERIFIED BY PROVIDING ALL NECESSARY DOCUMENTED TEST RESULTS.

TRENCH EXCAVATION PROTECTION

CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN/GEOTECHNICAL/SAFETY/EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITE(S) WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS AND/OR PROCEDURES FOR THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR'S IMPLEMENTATION OF THESE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.

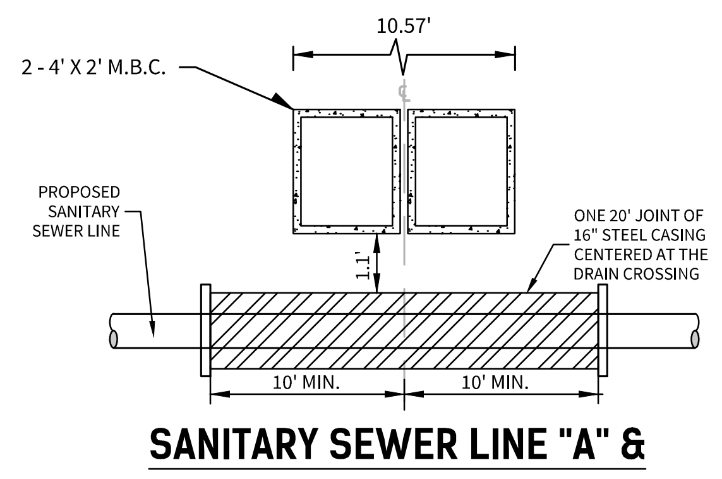
NOTES:

1. ALL EXCAVATED MATERIAL SHALL BE PLACED ON THE UPGRADIENT SIDE OF THE SEWER TRENCH THUS ALLOWING THE TRENCH TO INTERCEPT ANY SILT CONTAMINATED RUNOFF.
2. ALL SANITARY SEWER PIPE SHALL BE P.V.C. THAT MEETS ASTM SPECIFICATION D-3034, SDR-26 UNLESS OTHERWISE NOTED.
3. ALL LATERALS TO BE INSTALLED @ MIN. 2.0% SLOPE. UNLESS OTHERWISE NOTED.
4. LATERALS TO BE BUILT TO FRONT UTILITY EASEMENT LINE OR SANITARY SEWER EASEMENT LINE.
5. ENSURE ALL DRIVEWAY APPROACHES ARE BUILT IN GENERAL ACCORDANCE WITH A.D.A. SPECIFICATIONS. NO VALVES, HYDRANTS, ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.
6. THE LOCATIONS AND DEPTHS OF ALL EXISTING UTILITIES, INCLUDING SERVICE LATERALS AND DRAINAGE STRUCTURES SHOWN ON THE PLANS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION AND DEPTHS OF UNDERGROUND UTILITIES AT LEAST 48 HOURS PRIOR TO CONSTRUCTION WHETHER SHOWN ON PLANS OR NOT, AND TO PROTECT THE SAME DURING CONSTRUCTION.
7. ALL UTILITIES TO BE CONSTRUCTED PRIOR TO STREETS
8. NO VALVES, HYDRANTS, CLEANOUTS ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.
9. THE UTILITY TRENCH COMPACTION NOTE FROM THE STANDARD COUNTY CONSTRUCTION PLAN NOTES.
10. THIS PROJECT INCLUDES UTILITY INSTALLATIONS GREATER THAN 5-FEET IN DEPTH LOCATED IN PUBLIC RIGHT-OF-WAY OR EASEMENTS. DEEP TRENCHES POSE COMPACTION TESTING AND CONSTRUCTION CHALLENGES AND COUNTY METHODS FOR TESTING AND COMPACTION MAY NOT BE ACHIEVABLE. A UTILITY COMPACTION PLAN WILL BE REQUIRED AND MUST BE SUBMITTED FOR APPROVAL TO COUNTY PRIOR TO UTILITY INSTALLATION.


D = 3'-6" FOR 6"-8" WATERLINE
4'-6" FOR 12" & LARGER WATERLINES
(REFER TO CCSUD TYPICAL TRENCH BACKFILL DETAIL)
FINISHED GROUND/PAVEMENT (TOP OF GRADE)
SEPARATION DISTANCE TO COMPLY TCEQ REGULATION 30 TAC 290.44 (E) APPENDIX E & 30 TAC 217.53 (D) APPENDIX D - SEPARATION DISTANCE.
"D"
PROPOSED WATER LINE
WHERE SEWER PIPE CROSSES A WATER LINE, THE SEWER SHALL BE 160 PSI AND MEET THE REQUIREMENTS OF ASTM D2241 WITH ONE 20' JOINT CENTERED AT THE WATER CROSSING
PROPOSED SANITARY SEWER LINE
10' MIN.
10' MIN.

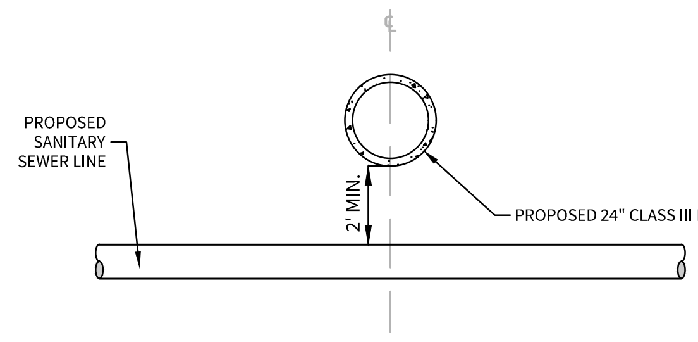
TYPICAL SANITARY SEWER/ WATER CROSSING DETAIL

N.T.S.


10.57'
2 - 4' X 2' M.B.C.
PROPOSED SANITARY SEWER LINE
ONE 20' JOINT OF 16" STEEL CASING CENTERED AT THE DRAIN CROSSING
1.1'
10' MIN.
10' MIN.

SANITARY SEWER LINE "A" & DRAIN "A" CROSSING DETAIL

N.T.S.


PROPOSED SANITARY SEWER LINE
2' MIN.
PROPOSED 24" CLASS III R.C.P.

SANITARY SEWER/ DRAIN "F" CROSSINGS DETAIL

N.T.S.

CUDEENGINEERS.COM

CUDE
EST. 1980
ENGINEERS

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

OVERALL SANITARY SEWER PLAN

DATE	04/16/2026
PROJECT NO.	04024-018
DRAWN BY	C7
CHECKED BY	JL/TM

REVISIONS
1.
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3.
4.
5.
6.
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8.

4/16/26

TORY DUANE MILLER
135598

Tory Miller

CUDE ENGINEERS
TBPELS No. 10048500

C4.00

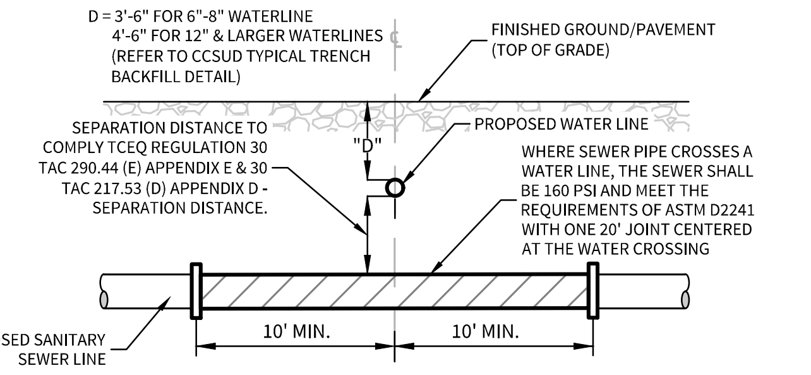
R:\04024\018\2-DWG\4-Plans\C4.00 OVERALL SANITARY SEWER PLAN.dwg 2026/04/16 8:47am sgonzales

LEGEND

UNIT BOUNDARY	▬
PROPOSED SANITARY SEWER	8" SS
PROPOSED SANITARY SEWER MANHOLE	●
EXISTING SANITARY SEWER	8" SS
EXISTING SANITARY SEWER MANHOLE	●
PROPOSED WATER MAIN	8" W
PROPOSED STANDARD FIRE HYDRANT	⧓
PUBLIC UTILITY EASEMENT	P.U.E.

NOTE:

ENSURE ALL DRIVEWAY APPROACHES ARE BUILT IN GENERAL ACCORDANCE WITH A.D.A. SPECIFICATIONS. NO VALVES, HYDRANTS, ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.


D = 3'-6" FOR 6"-8" WATERLINE
4'-6" FOR 12" & LARGER WATERLINES
(REFER TO CCSUD TYPICAL TRENCH BACKFILL DETAIL)
FINISHED GROUND/PAVEMENT (TOP OF GRADE)
SEPARATION DISTANCE TO COMPLY TCEQ REGULATION 30 TAC 290.44 (E) APPENDIX E & 30 TAC 217.53 (D) APPENDIX D - SEPARATION DISTANCE.
"D"
PROPOSED WATER LINE
WHERE SEWER PIPE CROSSES A WATER LINE, THE SEWER SHALL BE 160 PSI AND MEET THE REQUIREMENTS OF ASTM D2241 WITH ONE 20' JOINT CENTERED AT THE WATER CROSSING
PROPOSED SANITARY SEWER LINE
10' MIN.
10' MIN.

TYPICAL SANITARY SEWER/ WATER CROSSING DETAIL

N.T.S.

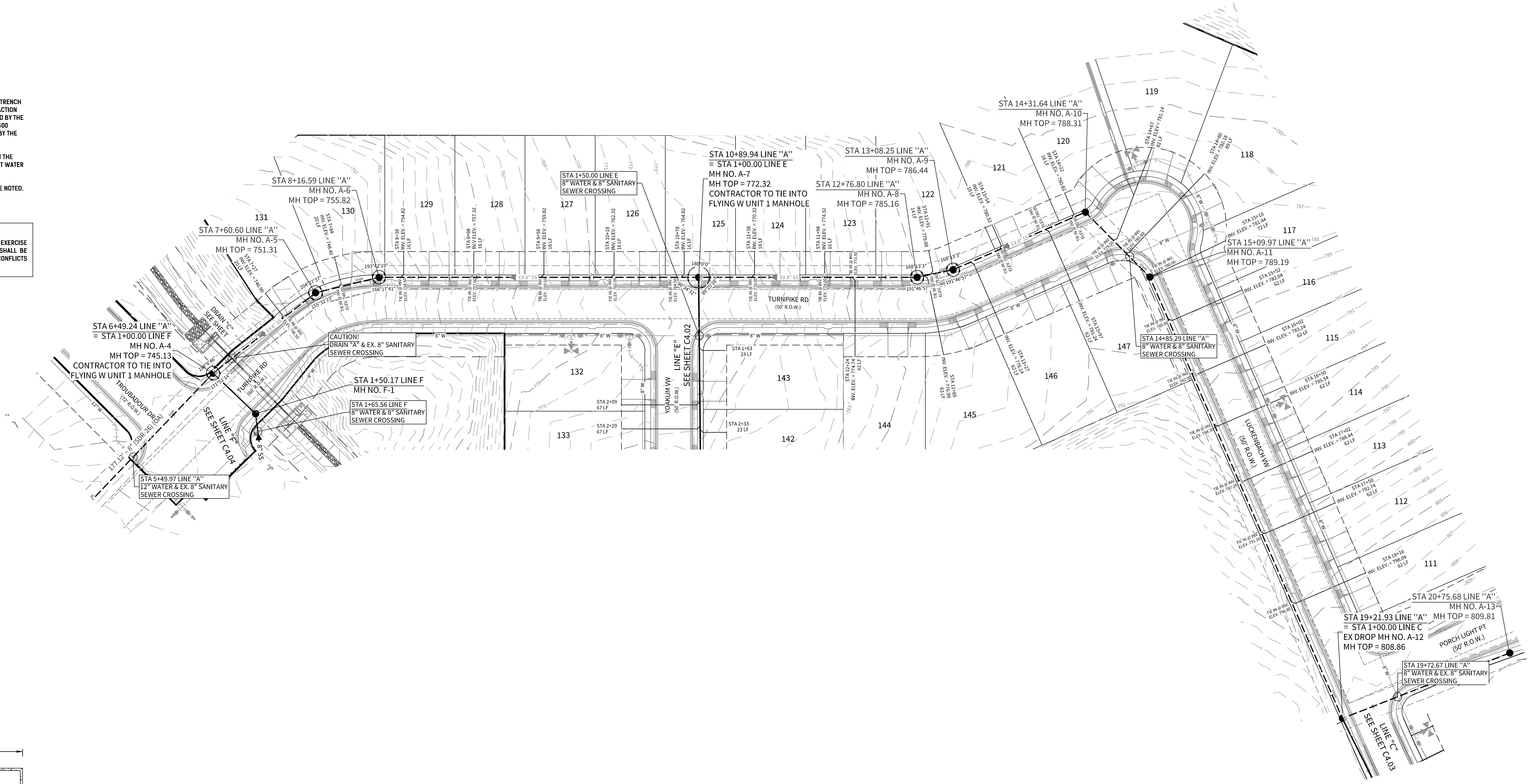
NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MEETING 98% COMPACTION ON ALL TRENCH BACKFILL AND PAYING FOR THE TESTS TO BE PERFORMED BY A THIRD PARTY. COMPACTION TEST WILL BE DONE AT ONE LOCATION POINT RANDOMLY SELECTED OR AS INDICATED BY THE COMAL COUNTY INSPECTOR/TEST ADMINISTER, PER EACH 12-INCH LOOSE LIFT PER 400 LINEAR FEET AT A MINIMUM. THIS PROJECT WILL NOT BE ACCEPTED AND FINALIZED BY THE COUNTY WITHOUT THIS REQUIREMENT BEING MET AND VERIFIED BY PROVIDING ALL NECESSARY DOCUMENTED TEST RESULTS.
2. CONTRACTOR TO MAINTAIN A MINIMUM 2' VERTICAL SEPARATION DISTANCE BETWEEN THE BOTTOM OF EXISTING WATER MAIN AND TOP OF PROPOSED SANITARY SEWER MAIN AT WATER AND SANITARY SEWER CROSSINGS.
3. ALL 8" SANITARY SEWER PIPE SHALL BE SDR-26 PS115 ASTM F679.
4. ALL LATERALS SHALL BE INSTALLED AT A MINIMUM 2.0% SLOPE UNLESS OTHERWISE NOTED.

CAUTION!!

EXISTING UTILITIES ARE WITHIN THE LIMITS OF CONSTRUCTION. CONTRACTORS SHALL EXERCISE EXTRA CARE IN DIGGING ANY TRENCH FOR PROPOSED UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE, VERIFY THE EXACT LOCATION & IDENTIFY AREA OF CONFLICTS WITH EXISTING UTILITIES AND SHALL NOTIFY THE ENGINEER IF CONFLICT IS FOUND.

N
S
E
W
SCALE: 1"=50'
0
50
100


STA 6+49.24 LINE ''A''
= STA 1+00.00 LINE F
MH NO. A-4
MH TOP = 745.13
CONTRACTOR TO TIE INTO FLYING W UNIT 1 MANHOLE
STA 7+60.60 LINE ''A''
MH NO. A-5
MH TOP = 751.31
STA 8+16.59 LINE ''A''
MH NO. A-6
MH TOP = 755.82
STA 1+50.00 LINE E
8" WATER & 8" SANITARY SEWER CROSSING
STA 10+89.94 LINE ''A''
= STA 1+00.00 LINE E
MH NO. A-7
MH TOP = 772.32
CONTRACTOR TO TIE INTO FLYING W UNIT 1 MANHOLE
STA 12+76.80 LINE ''A''
MH NO. A-8
MH TOP = 785.16
STA 13+08.25 LINE ''A''
MH NO. A-9
MH TOP = 786.44
STA 14+31.64 LINE ''A''
MH NO. A-10
MH TOP = 788.31
STA 15+09.97 LINE ''A''
MH NO. A-11
MH TOP = 789.19
STA 14+85.29 LINE ''A''
8" WATER & 8" SANITARY SEWER CROSSING
CAUTION!
DRAIN "A" & EX. 8" SANITARY SEWER CROSSING
STA 1+50.17 LINE F
MH NO. F-1
STA 1+65.56 LINE F
8" WATER & 8" SANITARY SEWER CROSSING
STA 5+49.97 LINE ''A''
12" WATER & EX. 8" SANITARY SEWER CROSSING
STA 19+21.93 LINE ''A''
= STA 1+00.00 LINE C
EX DROP MH NO. A-12
MH TOP = 808.86
STA 20+75.68 LINE ''A''
MH NO. A-13
MH TOP = 809.81
STA 19+72.67 LINE ''A''
8" WATER & EX. 8" SANITARY SEWER CROSSING
DRAIN "C" SEE SHEET
TURNPIKE RD (60' R.O.W.)
TURNPIKE RD (50' R.O.W.)
TROUBADOUR DR (72' R.O.W.)
LUCKENBACH WW (50' R.O.W.)
PORCH LIGHT PT (50' R.O.W.)
YOAKUM WW
LINE "F" SEE SHEET C4.04
LINE "E" SEE SHEET C4.02
LINE "C" SEE SHEET C4.03
177.12' ~ 8" (SDR-26) (OA)
EX 8" SS
8" SS
8" W
12" W
111
112
113
114
115
116
117
118
119
120
121
122
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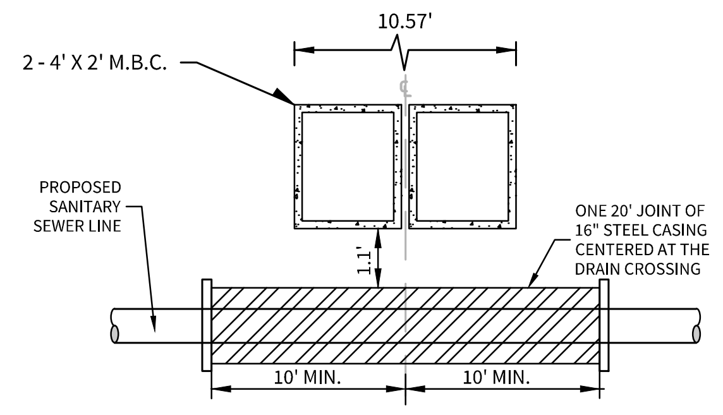
10.57'
2 - 4' X 2' M.B.C.
PROPOSED SANITARY SEWER LINE
1.1'
ONE 20' JOINT OF 16" STEEL CASING CENTERED AT THE DRAIN CROSSING
10' MIN.
10' MIN.

SANITARY SEWER LINE "A" & DRAIN "A" CROSSING DETAIL

N.T.S.

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EST. 1980
ENGINEERS

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W UNIT 2

EXISTING SANITARY SEWER PLAN LINE 'A'

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
1.
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8.

4/16/26

TORY DUANE MILLER
135598

CUDE ENGINEERS
TBPELS No. 10048500

C4.01

R:\04024\018\2-DWG\4-Plans\C4.01 SANITARY SEWER PLAN & PROFILE LINE 'A'.dwg 2026/04/16 8:48am sgonzales

REPRODUCTION OF THE ORIGINAL SIGNED AND SEALED PLAN AND/OR ELECTRONIC MEDIA MAY HAVE BEEN INADVERTENTLY ALTERED. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE SCALE OF THE DOCUMENT AND CONTACTING CUDE ENGINEERS TO VERIFY DISCREPANCIES PRIOR TO CONSTRUCTION.

LEGEND

UNIT BOUNDARY	▬
PROPOSED SANITARY SEWER	8" SS
PROPOSED SANITARY SEWER MANHOLE	●
EXISTING SANITARY SEWER	8" SS
EXISTING SANITARY SEWER MANHOLE	●
PROPOSED WATER MAIN	8" W
PROPOSED STANDARD FIRE HYDRANT	
PUBLIC UTILITY EASEMENT	P.U.E

NOTE:

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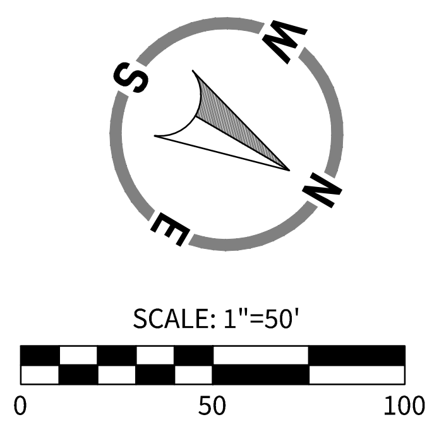
S
W
N
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SCALE: 1"=50'
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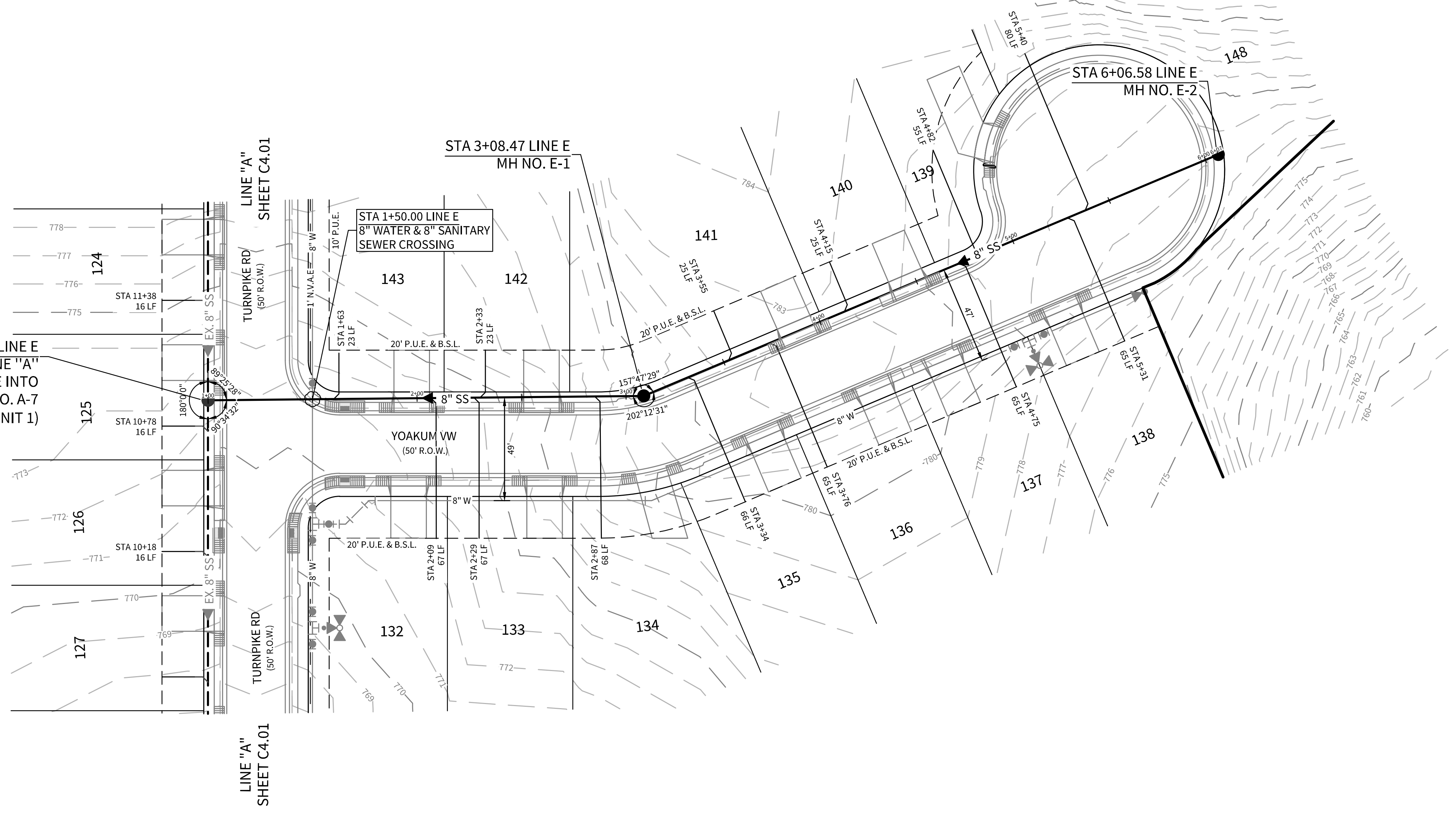
STA 6+06.58 LINE E
MH NO. E-2
STA 3+08.47 LINE E
MH NO. E-1
STA 1+50.00 LINE E
8" WATER & 8" SANITARY
SEWER CROSSING
STA 1+00.00 LINE E
= STA 10+89.94 LINE "A"
CONTRACTOR TO TIE INTO
EX MH NO. A-7
(FLYING W UNIT 1)
LINE "A"
SHEET C4.01
TURNPIKE RD
(50' R.O.W.)
YOAKUM VW
(50' R.O.W.)
8" SS
8" W
20' P.U.E. & B.S.L.
10' P.U.E.
STA 11+38
16 LF
STA 10+78
16 LF
STA 10+18
16 LF
124
125
126
127
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134
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138
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140
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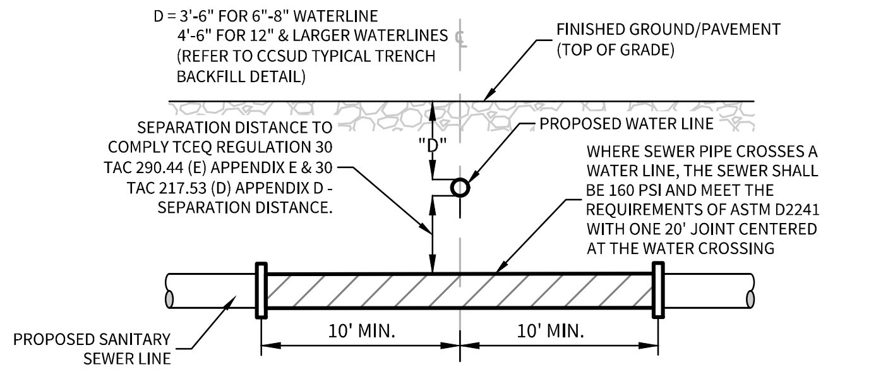
148


D = 3'-6" FOR 6"-8" WATERLINE
4'-6" FOR 12" & LARGER WATERLINES
(REFER TO CCSUD TYPICAL TRENCH
BACKFILL DETAIL)
FINISHED GROUND/PAVEMENT
(TOP OF GRADE)
SEPARATION DISTANCE TO
COMPLY TCEQ REGULATION 30
TAC 290.44 (E) APPENDIX E & 30
TAC 217.53 (D) APPENDIX D -
SEPARATION DISTANCE.
"D"
PROPOSED WATER LINE
WHERE SEWER PIPE CROSSES A
WATER LINE, THE SEWER SHALL
BE 160 PSI AND MEET THE
REQUIREMENTS OF ASTM D2241
WITH ONE 20' JOINT CENTERED
AT THE WATER CROSSING
PROPOSED SANITARY
SEWER LINE
10' MIN.
10' MIN.

TYPICAL SANITARY SEWER/ WATER CROSSING DETAIL

N.T.S.

NOTES:

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3. ALL 8" SANITARY SEWER PIPE SHALL BE SDR-26 PS115 ASTM F679.
4. ALL LATERALS SHALL BE INSTALLED AT A MINIMUM 2.0% SLOPE UNLESS OTHERWISE NOTED.

CAUTION!!

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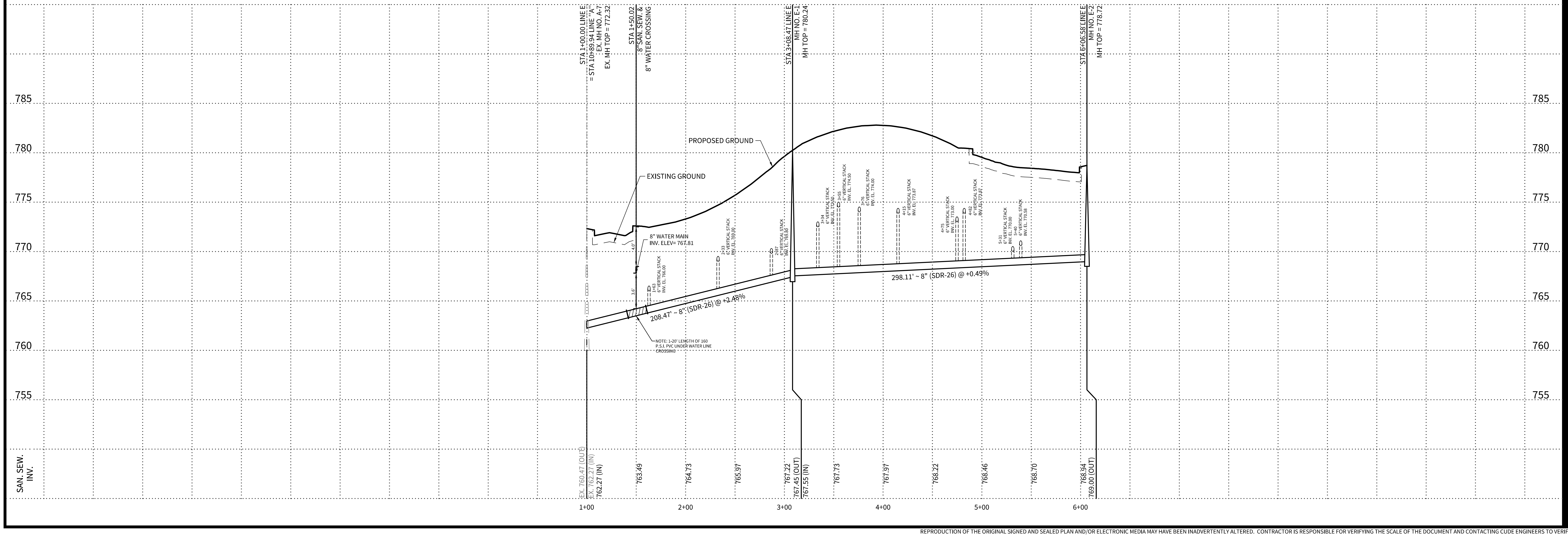
LINE E

STA. 1+00.00 TO STA. 6+06.58

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'


STA 1+00.00 LINE E
= STA 10+89.94 LINE "A"
EX. MH NO. A-7
EX. MH TOP = 772.32
STA 1+50.02
8"SAN. SEW. &
8" WATER CROSSING
STA 3+08.47 LINE E
MH NO. E-1
MH TOP = 780.24
STA 6+06.58 LINE E
MH NO. E-2
MH TOP = 778.72
785
780
775
770
765
760
755
PROPOSED GROUND
EXISTING GROUND
8" WATER MAIN
INV. ELEV= 767.81
4.0'
3.6'
1+63
6" VERTICAL STACK
INV. EL. 766.00
2+33
6" VERTICAL STACK
INV. EL. 769.00
2+87
6" VERTICAL STACK
INV. EL. 769.80
3+34
6" VERTICAL STACK
INV. EL. 772.50
3+55
6" VERTICAL STACK
INV. EL. 774.50
3+76
6" VERTICAL STACK
INV. EL. 774.00
4+15
6" VERTICAL STACK
INV. EL. 773.87
4+75
6" VERTICAL STACK
INV. EL. 773.00
4+82
6" VERTICAL STACK
INV. EL. 773.87
5+31
6" VERTICAL STACK
INV. EL. 770.00
5+40
6" VERTICAL STACK
INV. EL. 770.58
208.47' ~ 8" (SDR-26) @ +2.48%
298.11' ~ 8" (SDR-26) @ +0.49%
NOTE: 1-20' LENGTH OF 160
P.S.I. PVC UNDER WATER LINE
CROSSING
SAN. SEW.
INV.
EX. 760.47 (OUT)
EX. 762.27 (IN)
762.27 (IN)
763.49
764.73
765.97
767.22
767.45 (OUT)
767.55 (IN)
767.73
767.97
768.22
768.46
768.70
768.94
769.00 (OUT)
1+00
2+00
3+00
4+00
5+00
6+00

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CUDE ENGINEERS EST. 1980

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San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

SANITARY SEWER PLAN & PROFILE LINE 'E'

DATE	04/16/2026
PROJECT NO.	04024-018
DRAWN BY	C7
CHECKED BY	JL/TM

REVISIONS
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2.
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6.
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8.

4/16/26
TORY DUANE MILLER
135598

CUDE ENGINEERS
TBPELS No. 10048500

C4.02

LEGEND

UNIT BOUNDARY	▬▬▬
PROPOSED SANITARY SEWER	—— 8" SS ——
PROPOSED SANITARY SEWER MANHOLE	●
EXISTING SANITARY SEWER	— — 8" SS — —
EXISTING SANITARY SEWER MANHOLE	●
PROPOSED WATER MAIN	—— 8" W ——
PROPOSED STANDARD FIRE HYDRANT	⧓
PUBLIC UTILITY EASEMENT	P.U.E
PROPOSED VERTICAL STACK	0

NOTE:

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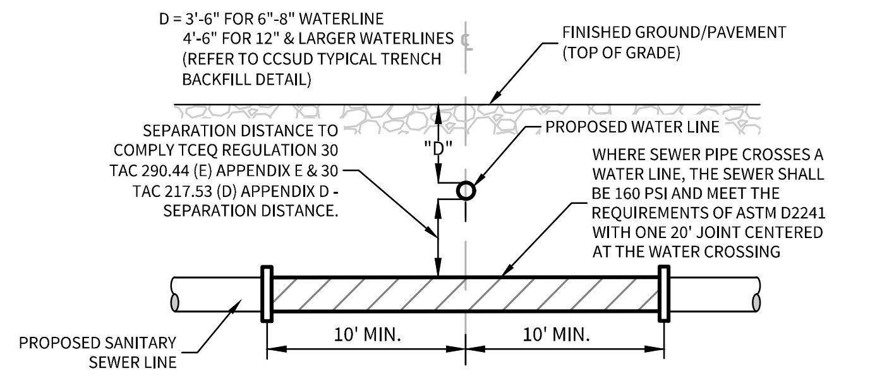
D = 3'-6" FOR 6"-8" WATERLINE
4'-6" FOR 12" & LARGER WATERLINES
(REFER TO CCSUD TYPICAL TRENCH BACKFILL DETAIL)
FINISHED GROUND/PAVEMENT (TOP OF GRADE)
SEPARATION DISTANCE TO COMPLY TCEQ REGULATION 30 TAC 290.44 (E) APPENDIX E & 30 TAC 217.53 (D) APPENDIX D - SEPARATION DISTANCE.
"D"
PROPOSED WATER LINE
WHERE SEWER PIPE CROSSES A WATER LINE, THE SEWER SHALL BE 160 PSI AND MEET THE REQUIREMENTS OF ASTM D2241 WITH ONE 20' JOINT CENTERED AT THE WATER CROSSING
PROPOSED SANITARY SEWER LINE
10' MIN.
10' MIN.

TYPICAL SANITARY SEWER/ WATER CROSSING DETAIL

N.T.S.

NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MEETING 98% COMPACTION ON ALL TRENCH BACKFILL AND PAYING FOR THE TESTS TO BE PERFORMED BY A THIRD PARTY. COMPACTION TEST WILL BE DONE AT ONE LOCATION POINT RANDOMLY SELECTED OR AS INDICATED BY THE COMAL COUNTY INSPECTOR/TEST ADMINISTER, PER EACH 12-INCH LOOSE LIFT PER 400 LINEAR FEET AT A MINIMUM. THIS PROJECT WILL NOT BE ACCEPTED AND FINALIZED THE COUNTY WITHOUT THIS REQUIREMENT BEING MET AND VERIFIED BY PROVIDING ALL NECESSARY DOCUMENTED TEST RESULTS.
2. CONTRACTOR TO MAINTAIN A MINIMUM 2' VERTICAL SEPARATION DISTANCE BETWEEN THE BOTTOM OF EXISTING WATER MAIN AND TOP OF PROPOSED SANITARY SEWER MAIN AT WATER AND SANITARY SEWER CROSSINGS.
3. ALL 8" SANITARY SEWER PIPE SHALL BE SDR-26 PS115 ASTM F679.
4. ALL LATERALS SHALL BE INSTALLED AT A MINIMUM 2.0% SLOPE UNLESS OTHERWISE NOTED.

CAUTION!!

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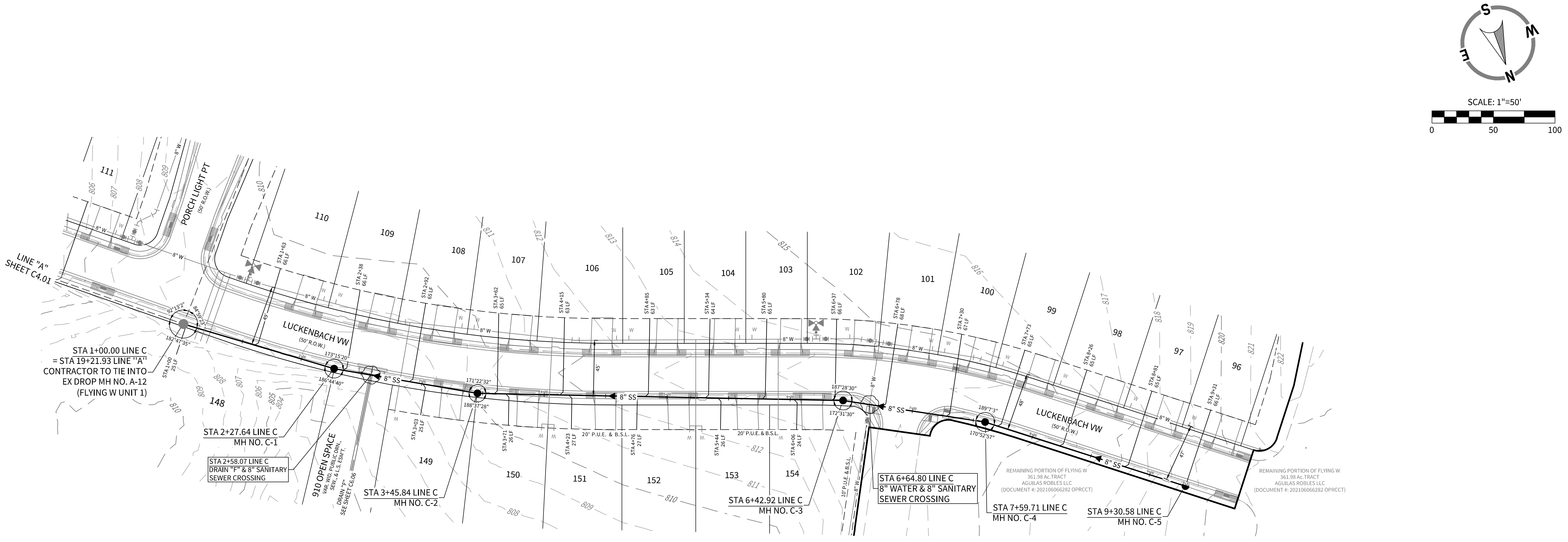
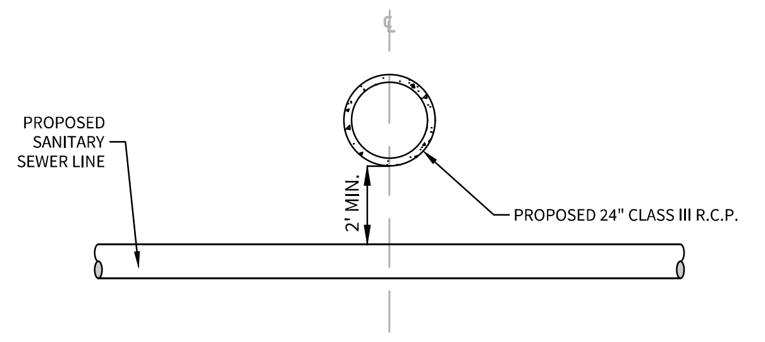

S
W
E
N
SCALE: 1"=50'
0
50
100
LINE "A"
SHEET C4.01
PORCH LIGHT PT
(50' R.O.W.)
LUCKENBACH VW
(50' R.O.W.)
111
110
109
108
107
106
105
104
103
102
101
100
99
98
97
96
148
149
150
151
152
153
154
8" W
8" SS
STA 1+63 66 LF
STA 2+38 66 LF
STA 2+92 65 LF
STA 3+62 65 LF
STA 4+15 63 LF
STA 4+85 63 LF
STA 5+34 64 LF
STA 5+80 65 LF
STA 6+37 66 LF
STA 6+78 68 LF
STA 7+30 67 LF
STA 7+73 65 LF
STA 8+26 65 LF
STA 8+81 65 LF
STA 9+31 66 LF
STA 1+00 25 LF
STA 3+03 25 LF
STA 3+71 26 LF
STA 4+23 27 LF
STA 4+76 27 LF
STA 5+44 26 LF
STA 6+06 24 LF
92°13'2"
84°59'23"
182°47'35"
173°15'20"
186°44'40"
171°22'32"
188°37'28"
187°28'30"
172°31'30"
189°7'3"
170°52'57"
49'
48'
47'
20' P.U.E. & B.S.L.
10' P.U.E. & B.S.L.
STA 1+00.00 LINE C
= STA 19+21.93 LINE "A"
CONTRACTOR TO TIE INTO
EX DROP MH NO. A-12
(FLYING W UNIT 1)
STA 2+27.64 LINE C
MH NO. C-1
STA 2+58.07 LINE C
DRAIN "F" & 8" SANITARY
SEWER CROSSING
910 OPEN SPACE
VAR. WID. PUBLIC DRN., SEW., & L.S. ESM'T.
DRAIN "F"
SEE SHEET C6.06
STA 3+45.84 LINE C
MH NO. C-2
STA 6+42.92 LINE C
MH NO. C-3
STA 6+64.80 LINE C
8" WATER & 8" SANITARY
SEWER CROSSING
STA 7+59.71 LINE C
MH NO. C-4
STA 9+30.58 LINE C
MH NO. C-5
REMAINING PORTION OF FLYING W
361.98 Ac.TRACT
AGUILAS ROBLES LLC
(DOCUMENT #: 202106066282 OPRCCT)
REMAINING PORTION OF FLYING W
361.98 Ac.TRACT
AGUILAS ROBLES LLC
(DOCUMENT #: 202106066282 OPRCCT)


PROPOSED SANITARY SEWER LINE
2' MIN.
PROPOSED 24" CLASS III R.C.P.

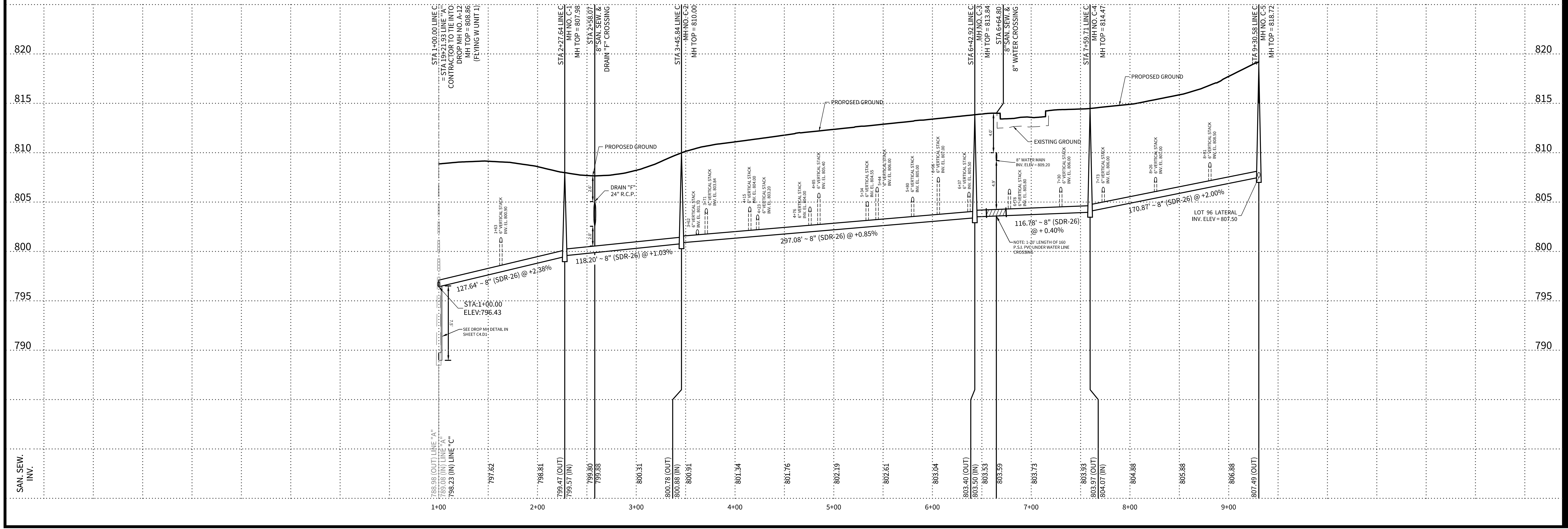
LINE C

STA. 1+00.00 TO STA. 9+30.58

SANITARY SEWER/ DRAIN "F" CROSSINGS DETAIL

N.T.S.

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'



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4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

SANITARY SEWER PLAN & PROFILE LINE 'C'

DATE	04/16/2026
PROJECT NO.	04024-018
DRAWN BY	C7
CHECKED BY	JL/TM

REVISIONS
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4/16/26
TORY DUANE MILLER
135598

CUDE ENGINEERS
TBPELS No. 10048500

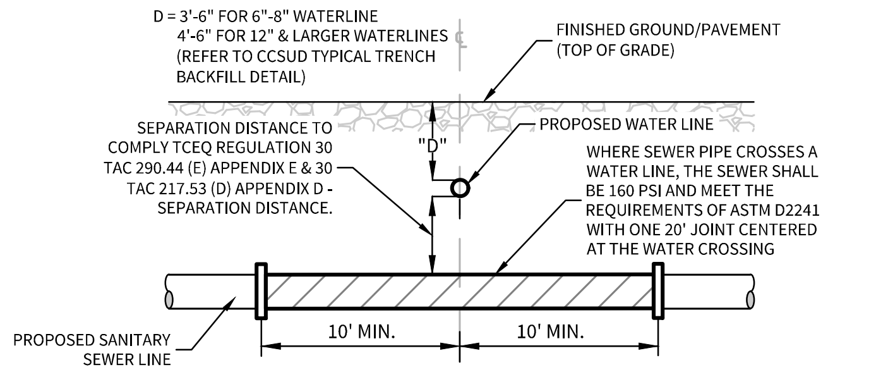
C4.03

LEGEND

UNIT BOUNDARY	―
PROPOSED SANITARY SEWER	― 8" SS ―
PROPOSED SANITARY SEWER MANHOLE	●
EXISTING SANITARY SEWER	– – 8" SS – –
EXISTING SANITARY SEWER MANHOLE	●
PROPOSED WATER MAIN	― 8" W ―
PROPOSED STANDARD FIRE HYDRANT	
PUBLIC UTILITY EASEMENT	P.U,E
PROPOSED VERTICAL STACK	

NOTE:

ENSURE ALL DRIVEWAY APPROACHES ARE BUILT IN GENERAL ACCORDANCE WITH A.D.A. SPECIFICATIONS. NO VALVES, HYDRANTS, ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.


D = 3'-6" FOR 6"-8" WATERLINE
4'-6" FOR 12" & LARGER WATERLINES
(REFER TO CCSUD TYPICAL TRENCH BACKFILL DETAIL)
FINISHED GROUND/PAVEMENT (TOP OF GRADE)
SEPARATION DISTANCE TO COMPLY TCEQ REGULATION 30 TAC 290.44 (E) APPENDIX E & 30 TAC 217.53 (D) APPENDIX D - SEPARATION DISTANCE.
"D"
PROPOSED WATER LINE
WHERE SEWER PIPE CROSSES A WATER LINE, THE SEWER SHALL BE 160 PSI AND MEET THE REQUIREMENTS OF ASTM D2241 WITH ONE 20' JOINT CENTERED AT THE WATER CROSSING
PROPOSED SANITARY SEWER LINE
10' MIN.
10' MIN.

TYPICAL SANITARY SEWER/ WATER CROSSING DETAIL

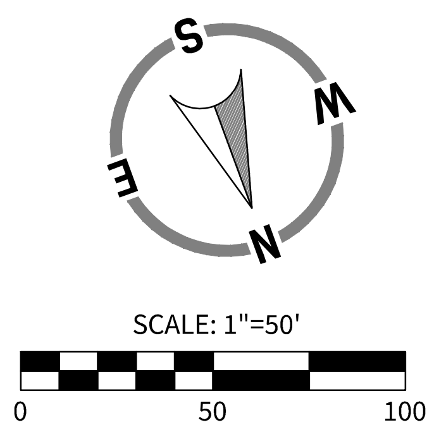
N.T.S.

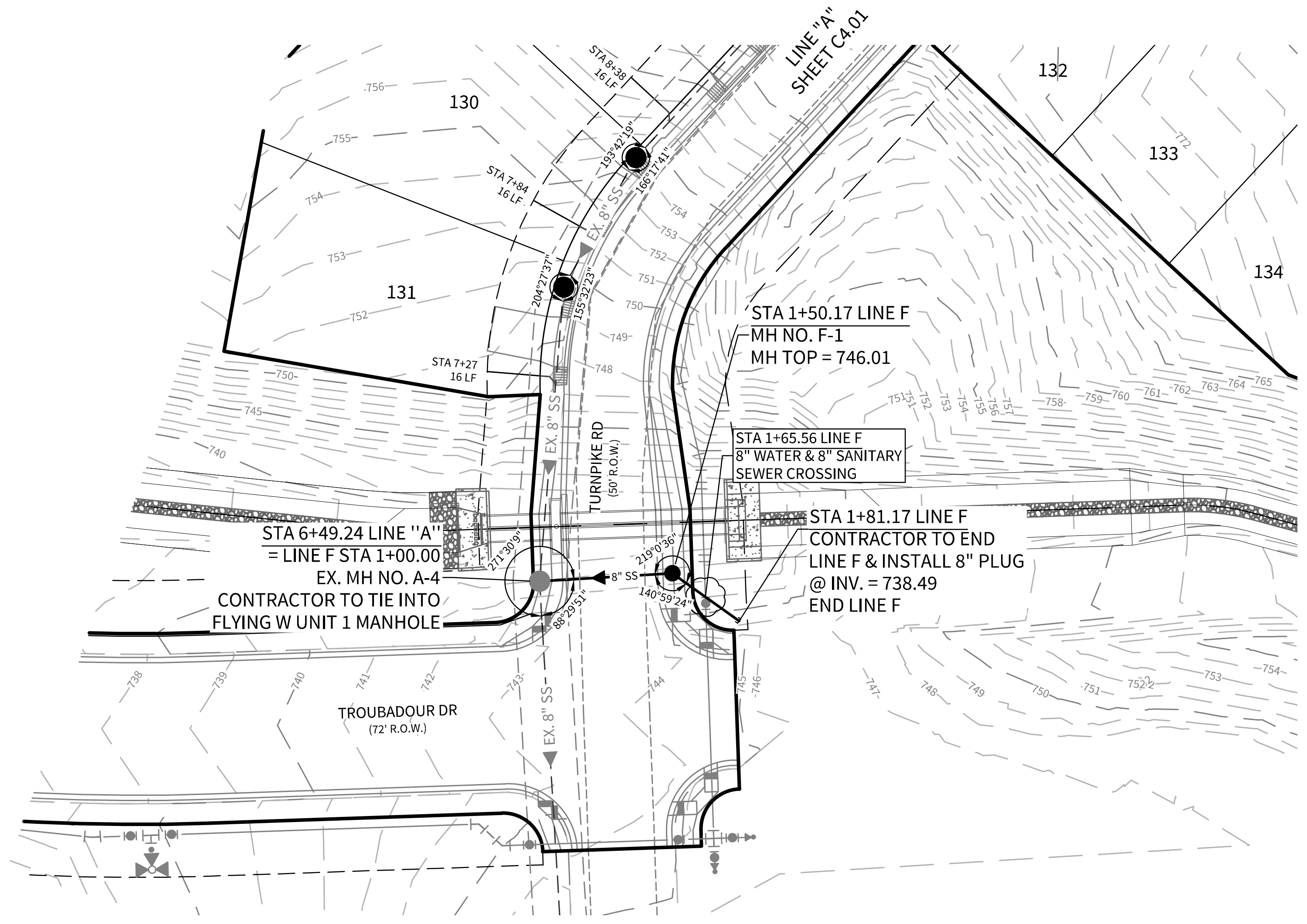
NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MEETING 98% COMPACTION ON ALL TRENCH BACKFILL AND PAYING FOR THE TESTS TO BE PERFORMED BY A THIRD PARTY. COMPACTION TEST WILL BE DONE AT ONE LOCATION POINT RANDOMLY SELECTED OR AS INDICATED BY THE COMAL COUNTY INSPECTOR/TEST ADMINISTER, PER EACH 12-INCH LOOSE LIFT PER 400 LINEAR FEET AT A MINIMUM. THIS PROJECT WILL NOT BE ACCEPTED AND FINALIZED THE COUNTY WITHOUT THIS REQUIREMENT BEING MET AND VERIFIED BY PROVIDING ALL NECESSARY DOCUMENTED TEST RESULTS.
2. CONTRACTOR TO MAINTAIN A MINIMUM 2' VERTICAL SEPARATION DISTANCE BETWEEN THE BOTTOM OF EXISTING WATER MAIN AND TOP OF PROPOSED SANITARY SEWER MAIN AT WATER AND SANITARY SEWER CROSSINGS.
3. ALL 8" SANITARY SEWER PIPE SHALL BE SDR-26 PS115 ASTM F679.
4. ALL LATERALS SHALL BE INSTALLED AT A MINIMUM 2.0% SLOPE UNLESS OTHERWISE NOTED.

CAUTION!!

EXISTING UTILITIES ARE WITHIN THE LIMITS OF CONSTRUCTION. CONTRACTORS SHALL EXERCISE EXTRA CARE IN DIGGING ANY TRENCH FOR PROPOSED UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE, VERIFY THE EXACT LOCATION & IDENTIFY AREA OF CONFLICTS WITH EXISTING UTILITIES AND SHALL NOTIFY THE ENGINEER IF CONFLICT IS FOUND.

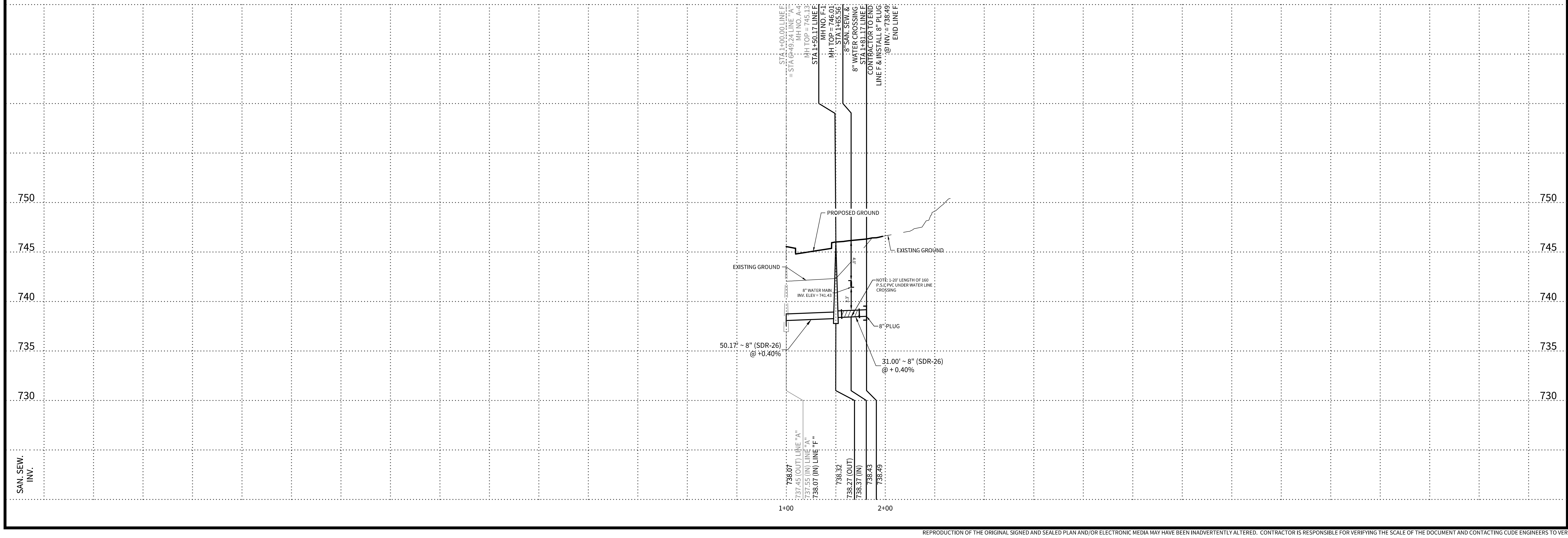

S
W
N
E
SCALE: 1"=50'
0
50
100


LINE "A"
SHEET C4.01
130
131
132
133
134
STA 8+38
16 LF
STA 7+84
16 LF
STA 7+27
16 LF
193°42'19"
166°17'41"
204°27'37"
155°32'23"
EX. 8" SS
TURNPIKE RD
(50' R.O.W.)
STA 1+50.17 LINE F
MH NO. F-1
MH TOP = 746.01
STA 1+65.56 LINE F
8" WATER & 8" SANITARY
SEWER CROSSING
STA 6+49.24 LINE "A"
= LINE F STA 1+00.00
EX. MH NO. A-4
CONTRACTOR TO TIE INTO
FLYING W UNIT 1 MANHOLE
271°30'9"
88°29'51"
8" SS
219°0'36"
140°59'24"
STA 1+81.17 LINE F
CONTRACTOR TO END
LINE F & INSTALL 8" PLUG
@ INV. = 738.49
END LINE F
TROUBADOUR DR
(72' R.O.W.)
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
772

LINE F

STA. 1+00.00 TO STA. 1+81.17

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'


STA 1+00.00 LINE F
= STA 6+49.24 LINE "A"
MH NO. A-4
MH TOP = 745.13
STA 1+50.17 LINE F
MH NO. F-1
MH TOP = 746.01
STA 1+65.56
8"SAN. SEW. &
8" WATER CROSSING
STA 1+81.17 LINE F
CONTRACTOR TO END
LINE F & INSTALL 8" PLUG
@ INV. = 738.49
END LINE F
750
745
740
735
730
PROPOSED GROUND
EXISTING GROUND
EXISTING GROUND
4.0'
2.3'
8" WATER MAIN
INV. ELEV = 741.43
NOTE: 1-20' LENGTH OF 160 P.S.I. PVC UNDER WATER LINE CROSSING
8" PLUG
50.17' ~ 8" (SDR-26)
@ +0.40%
31.00' ~ 8" (SDR-26)
@ + 0.40%
SAN. SEW. INV.
738.07
737.45 (OUT) LINE "A"
737.55 (IN) LINE "A"
738.07 (IN) LINE "F"
738.32
738.27 (OUT)
738.37 (IN)
738.43
738.49
1+00
2+00

CUDEENGINEERS.COM

EST. 1980
CUDE
ENGINEERS

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FLYING W
UNIT 2

SANITARY SEWER PLAN & PROFILE LINE 'F'

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
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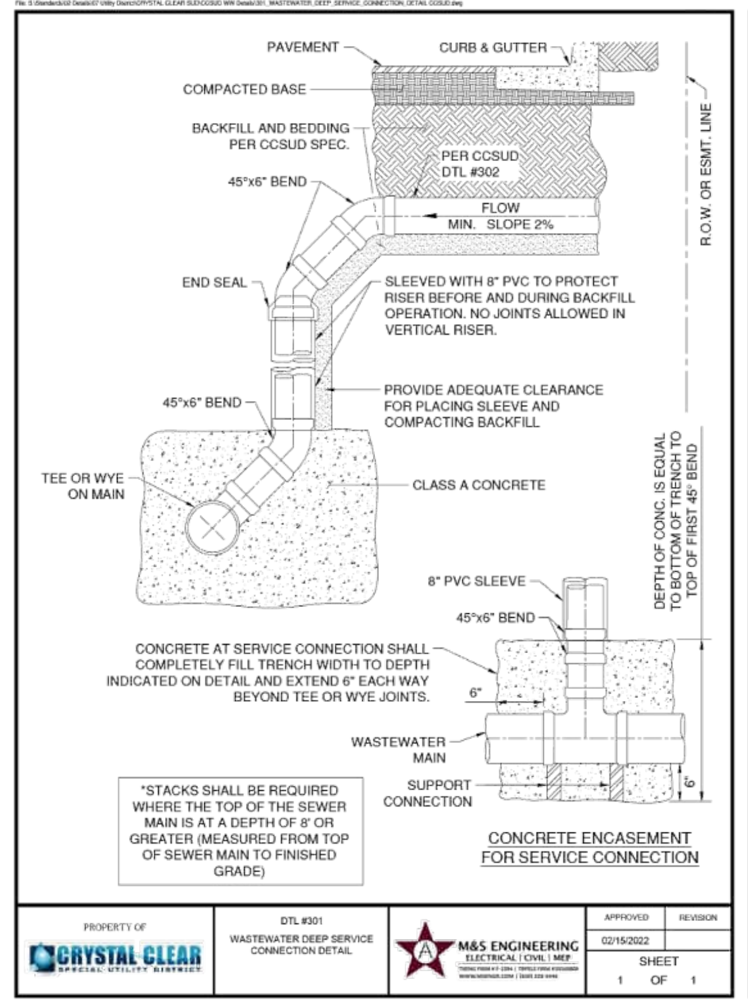
4/16/26
TORY DUANE MILLER
135598

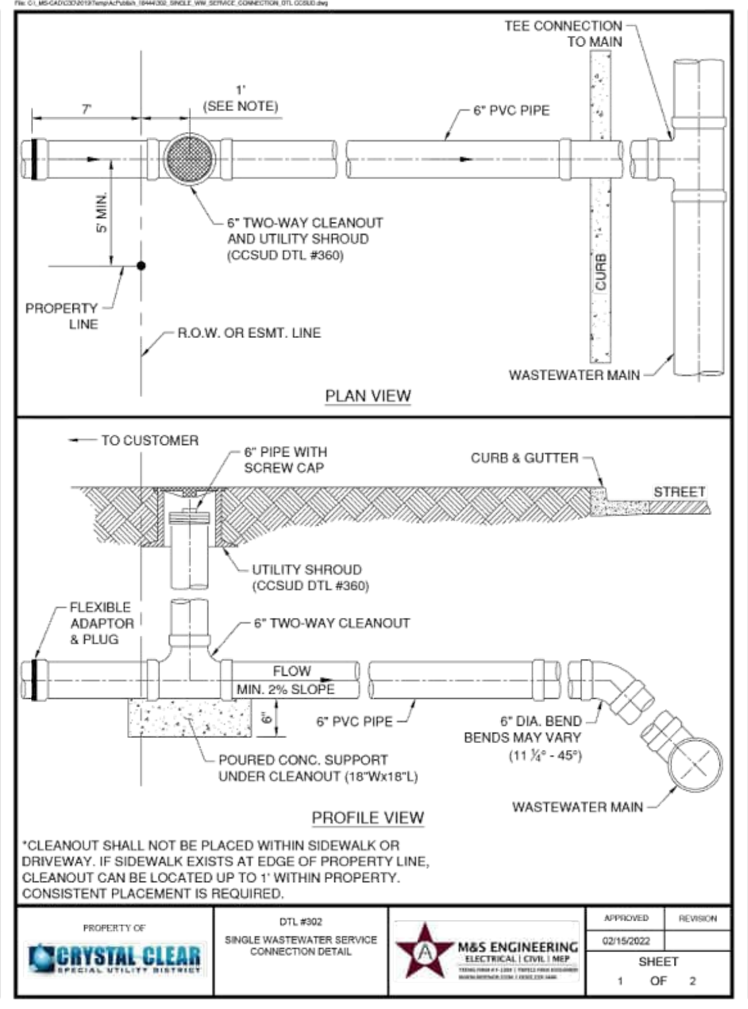
CUDE ENGINEERS
TBPELS No. 10048500

C4.04

REPRODUCTION OF THE ORIGINAL SIGNED AND SEALED PLAN AND/OR ELECTRONIC MEDIA MAY HAVE BEEN INADVERTENTLY ALTERED. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE SCALE OF THE DOCUMENT AND CONTACTING CUDE ENGINEERS TO VERIFY DISCREPANCIES PRIOR TO CONSTRUCTION.

R:\04024\018\2-DWG\4-Plans\C4.04 SANITARY SEWER PLAN & PROFILE LINE 'F'.dwg 2026/04/16 8:49am sgonzales

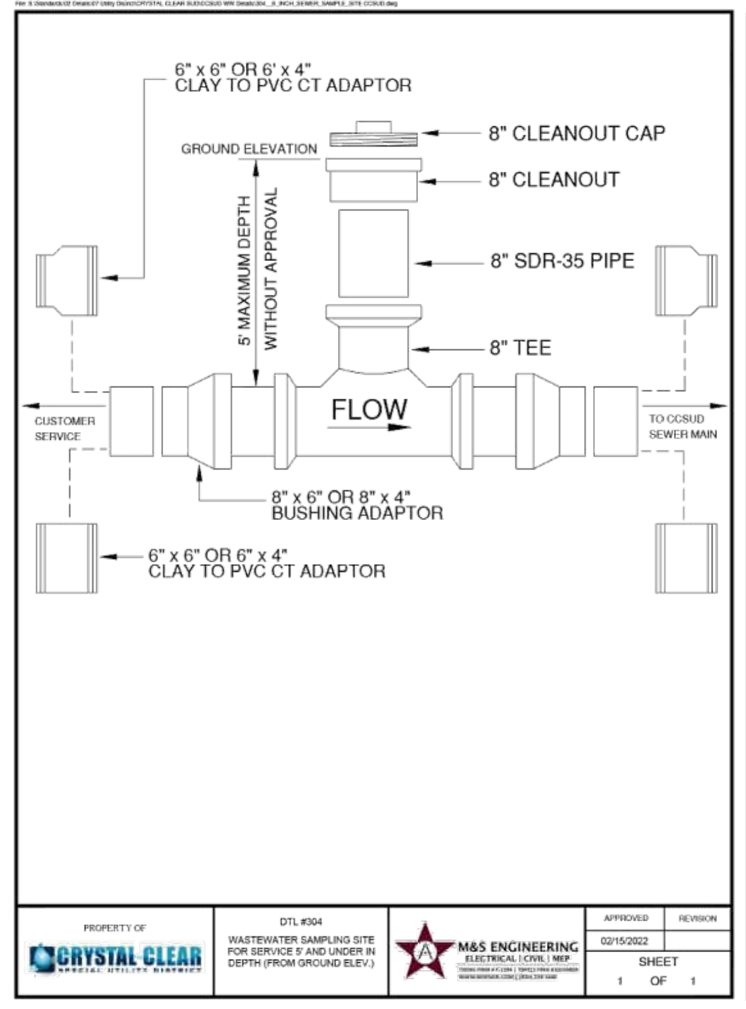

PAVEMENT
CURB & GUTTER
COMPACTED BASE
BACKFILL AND BEDDING PER CCSUD SPEC.
PER CCSUD DTL #302
45°x6" BEND
FLOW
MIN. SLOPE 2%
R.O.W. OR ESMT. LINE
END SEAL
SLEEVED WITH 8" PVC TO PROTECT RISER BEFORE AND DURING BACKFILL OPERATION. NO JOINTS ALLOWED IN VERTICAL RISER.
PROVIDE ADEQUATE CLEARANCE FOR PLACING SLEEVE AND COMPACTING BACKFILL
TEE OR WYE ON MAIN
CLASS A CONCRETE
DEPTH OF CONC. IS EQUAL TO BOTTOM OF TRENCH TO TOP OF FIRST 45° BEND
8" PVC SLEEVE
CONCRETE AT SERVICE CONNECTION SHALL COMPLETELY FILL TRENCH WIDTH TO DEPTH INDICATED ON DETAIL AND EXTEND 6" EACH WAY BEYOND TEE OR WYE JOINTS.
6"
WASTEWATER MAIN
SUPPORT CONNECTION
*STACKS SHALL BE REQUIRED WHERE THE TOP OF THE SEWER MAIN IS AT A DEPTH OF 8' OR GREATER (MEASURED FROM TOP OF SEWER MAIN TO FINISHED GRADE)
CONCRETE ENCASEMENT FOR SERVICE CONNECTION
PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT
DTL #301
WASTEWATER DEEP SERVICE CONNECTION DETAIL
M&S ENGINEERING ELECTRICAL | CIVIL | MEP
APPROVED 02/15/2022
REVISION
SHEET 1 OF 1

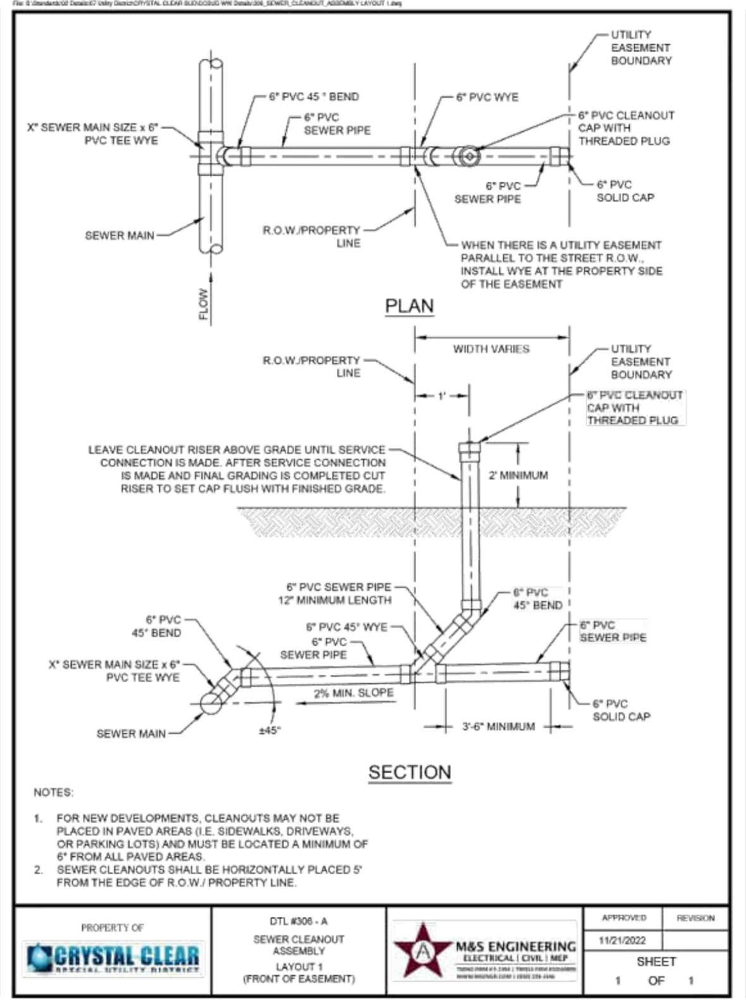

TEE CONNECTION TO MAIN
7'
1' (SEE NOTE)
6" PVC PIPE
5' MIN.
6" TWO-WAY CLEANOUT AND UTILITY SHROUD (CCSUD DTL #360)
PROPERTY LINE
R.O.W. OR ESMT. LINE
CURB
WASTEWATER MAIN
PLAN VIEW
TO CUSTOMER
6" PIPE WITH SCREW CAP
CURB & GUTTER
STREET
UTILITY SHROUD (CCSUD DTL #360)
FLEXIBLE ADAPTOR & PLUG
6" TWO-WAY CLEANOUT
FLOW
MIN. 2% SLOPE
6" PVC PIPE
POURED CONC. SUPPORT UNDER CLEANOUT (18"Wx18"L)
6" DIA. BEND BENDS MAY VARY (11 ¼° - 45°)
WASTEWATER MAIN
PROFILE VIEW
*CLEANOUT SHALL NOT BE PLACED WITHIN SIDEWALK OR DRIVEWAY. IF SIDEWALK EXISTS AT EDGE OF PROPERTY LINE, CLEANOUT CAN BE LOCATED UP TO 1' WITHIN PROPERTY. CONSISTENT PLACEMENT IS REQUIRED.
PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT
DTL #302
SINGLE WASTEWATER SERVICE CONNECTION DETAIL
M&S ENGINEERING ELECTRICAL | CIVIL | MEP
APPROVED 02/15/2022
REVISION
SHEET 1 OF 2

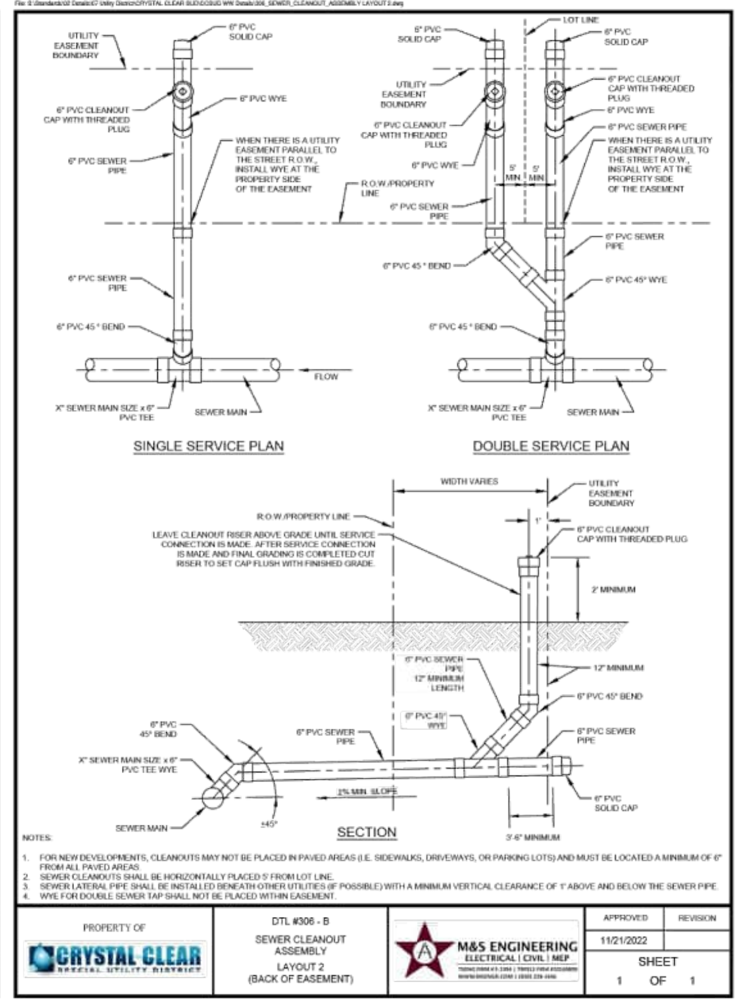
NOTES:

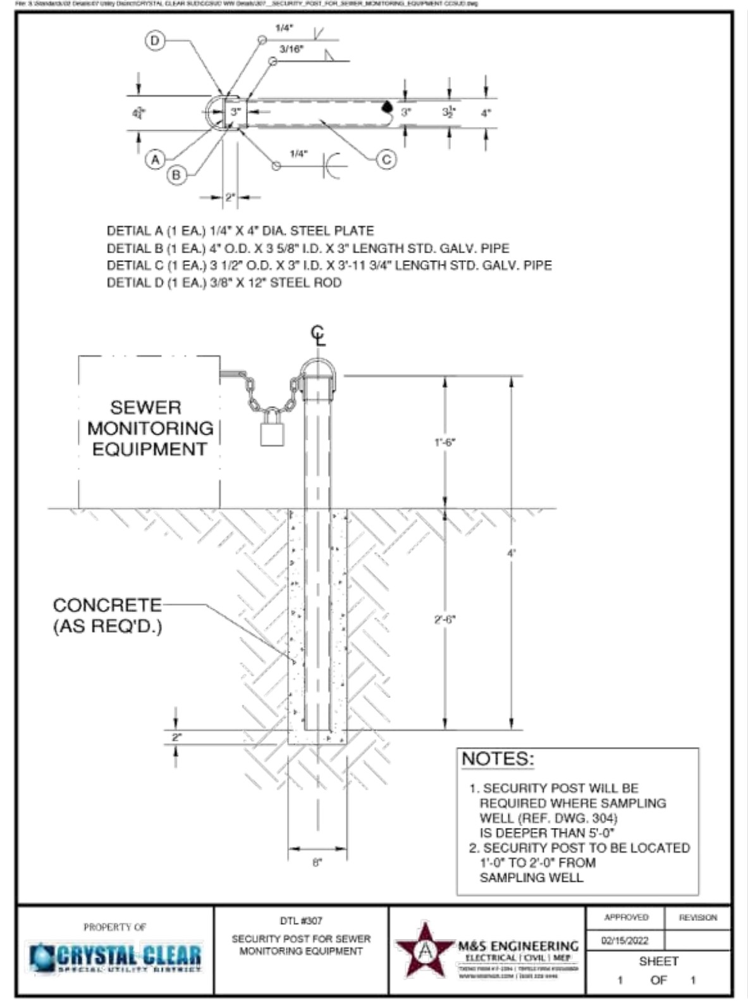
1. CONTRACTOR, DURING SUBDIVISION CONSTRUCTION, SHALL INSTALL WASTEWATER CONNECTION TO MAIN, 6" STUB WITH 6" SERVICE BRANCH WITH 2-WAY CLEANOUT, CONCRETE SUPPORT (MIN. 18"Wx18"Lx6"H), RISER FOR CLEAN OUT (CAPPED), UTILITY SHROUD, 7' EXTENSION, AND PLUG. ALL WASTEWATER PIPING SHALL HAVE ELASTOMERIC GASKET TYPE JOINTS AND SHALL SLOPE DOWNWARD TO MAIN 2%, 1/4" PER FOOT, MINIMUM TO 45° MAXIMUM. DEPTH OF SERVICE STUB AT PROPERTY LINE WILL BE SHOWN ON PLANS BY ENGINEER OR DESIGNATED REPRESENTATIVE IF GREATER THAN 4', OTHERWISE, THE INSTALLED DEPTH WILL TYPICALLY BE 4' TO 6'. IF WASTEWATER SERVICE LINE TO MAIN REQUIRES DEFLECTION EXCEEDING 45°, REFER TO DETAIL DRAWING 301. ALL INSTALLATIONS SHALL BE MADE IN ACCORDANCE WITH INFORMATION SHOWN ON APPLICABLE STANDARD DRAWINGS AND WILL BE INSPECTED BY CCSUD CONSTRUCTION INSPECTION PERSONNEL.
2. CUSTOMER SHALL REMOVE PLUG, INSTALL 4" WASTEWATER LINE [EXTEND 4" PIPE 6" MINIMUM INTO 6" PIPE AND JOINT WITH FLEXIBLE ADAPTOR]. IF WASTEWATER WILL NOT SATISFACTORILY FLOW BY GRAVITY TO SEWER MAIN ADJACENT TO PROPERTY, PUMP EQUIPMENT MUST BE PROVIDED BY THE CUSTOMER AS PART OF CUSTOMER'S WASTEWATER SYSTEM.
3. CUSTOMER IS RESPONSIBLE FOR PIPING SYSTEM UNTIL WASTEWATER IS CONNECTED. ANY MISSING OR DAMAGED PARTS SHALL BE REINSTALLED BY CUSTOMER WHO SHALL GUARANTEE, FOR A PERIOD OF TWO (2) YEARS FROM DATE OF FINAL ACCEPTANCE, THAT CONNECTIONS TO CCSUD SYSTEMS ARE FREE FROM DEFECTS IN WORKMANSHIP OR MATERIALS. CUSTOMER ALSO HAS THE RESPONSIBILITY TO ASSURE THAT 2-WAY CLEANOUTS REMAIN CLEAR OF SIDEWALKS AND OTHER OBSTRUCTIONS.
4. CCSUD'S ACTIVITY IS LIMITED TO INSPECTION OF CONNECTIONS TO THE WASTEWATER SYSTEM. FOR MAINTENANCE PURPOSES, CCSUD'S RESPONSIBILITY ENDS AT THE CUSTOMER'S WASTEWATER CONNECTION TO THE 2-WAY CLEANOUT OR THE PROPERTY LINE, WHICHEVER IS CLOSER TO WASTEWATER MAIN.
5. PIPING IN STREET RIGHT-OF-WAY AND IN EASEMENT AREA SHALL BE BEDDED IN GRANULAR MATERIALS AS REQUIRED BY CCSUD STANDARD SPECIFICATION; MATERIALS SHALL BE AS SPECIFIED; BACKFILL ABOVE THE GRANULAR BEDDING. SERVICE LINES IN THESE AREAS SHALL HAVE A MINIMUM COVER BELOW FINAL STREET GRADE OF 42"; ANY EXCEPTION MUST BE SPECIFICALLY APPROVED BY THE ENGINEER.

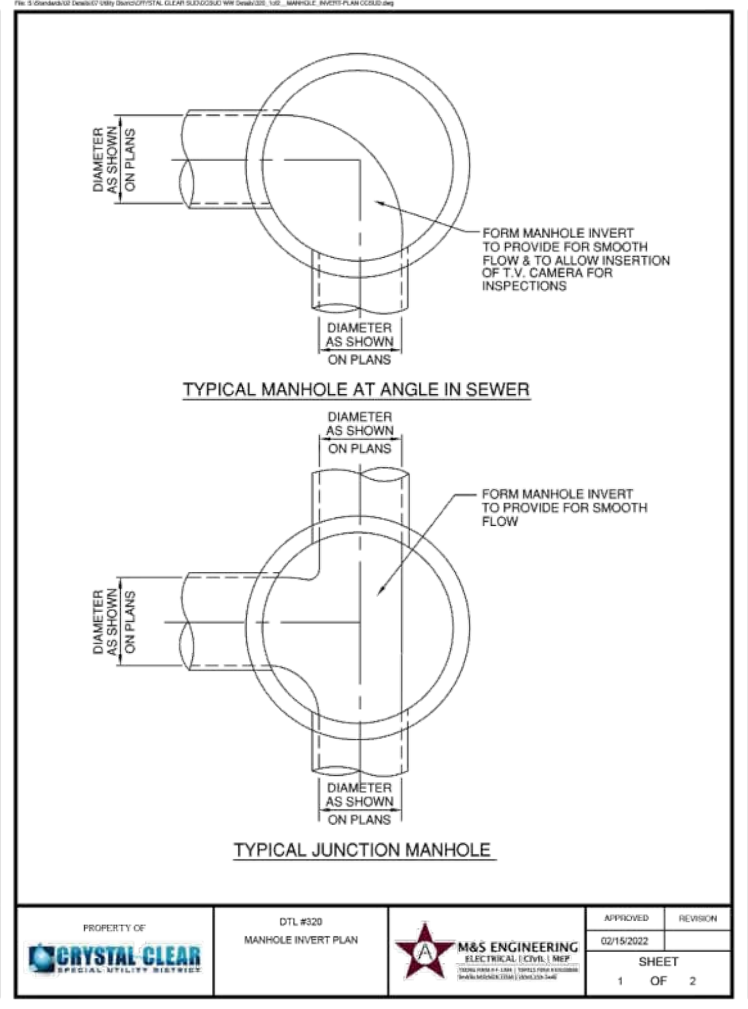
PROPERTY OF	DTL #302		APPROVED	REVISION
CRYSTAL CLEAR SPECIAL UTILITY DISTRICT	SINGLE WASTEWATER SERVICE CONNECTION DETAIL	M&S ENGINEERING ELECTRICAL | CIVIL | MEP	02/15/2022	
			SHEET 2 OF 2	

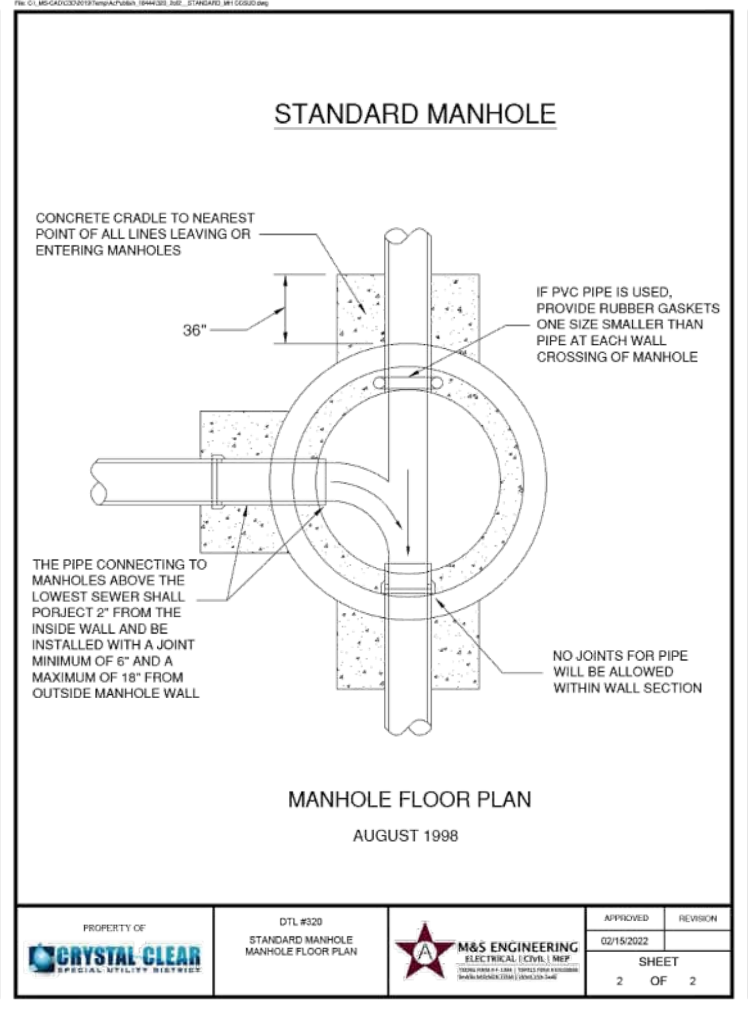

6" x 6" OR 6' x 4" CLAY TO PVC CT ADAPTOR
GROUND ELEVATION
8" CLEANOUT CAP
8" CLEANOUT
5' MAXIMUM DEPTH WITHOUT APPROVAL
8" SDR-35 PIPE
8" TEE
FLOW
CUSTOMER SERVICE
TO CCSUD SEWER MAIN
8" x 6" OR 8" x 4" BUSHING ADAPTOR
6" x 6" OR 6" x 4" CLAY TO PVC CT ADAPTOR
PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT
DTL #304
WASTEWATER SAMPLING SITE FOR SERVICE 5' AND UNDER IN DEPTH (FROM GROUND ELEV.)
M&S ENGINEERING ELECTRICAL | CIVIL | MEP
APPROVED 02/15/2022
REVISION
SHEET 1 OF 1

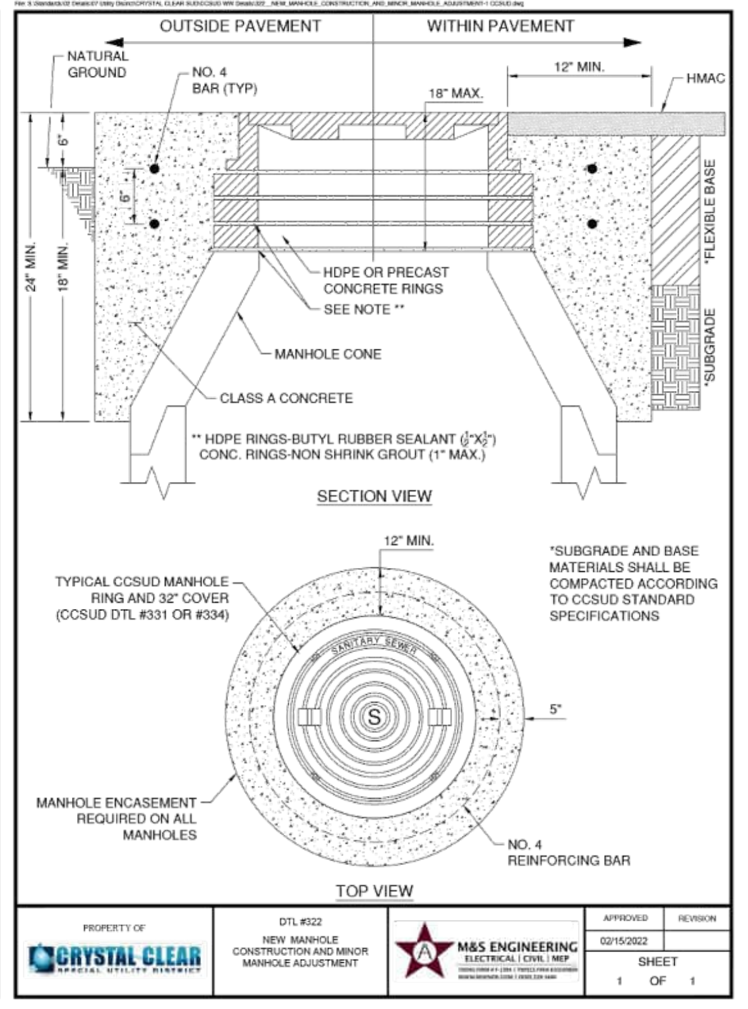

UTILITY EASEMENT BOUNDARY
6" PVC 45° BEND
6" PVC WYE
X" SEWER MAIN SIZE x 6" PVC TEE WYE
6" PVC SEWER PIPE
6" PVC CLEANOUT CAP WITH THREADED PLUG
6" PVC SOLID CAP
SEWER MAIN
R.O.W./PROPERTY LINE
WHEN THERE IS A UTILITY EASEMENT PARALLEL TO THE STREET R.O.W., INSTALL WYE AT THE PROPERTY SIDE OF THE EASEMENT
FLOW
PLAN
WIDTH VARIES
1'
LEAVE CLEANOUT RISER ABOVE GRADE UNTIL SERVICE CONNECTION IS MADE. AFTER SERVICE CONNECTION IS MADE AND FINAL GRADING IS COMPLETED CUT RISER TO SET CAP FLUSH WITH FINISHED GRADE.
2' MINIMUM
6" PVC SEWER PIPE 12" MINIMUM LENGTH
6" PVC 45° WYE
2% MIN. SLOPE
±45°
3'-6" MINIMUM
SECTION
NOTES:
1. FOR NEW DEVELOPMENTS, CLEANOUTS MAY NOT BE PLACED IN PAVED AREAS (I.E. SIDEWALKS, DRIVEWAYS, OR PARKING LOTS) AND MUST BE LOCATED A MINIMUM OF 6" FROM ALL PAVED AREAS.
2. SEWER CLEANOUTS SHALL BE HORIZONTALLY PLACED 5' FROM THE EDGE OF R.O.W./ PROPERTY LINE.
PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT
DTL #306 - A
SEWER CLEANOUT ASSEMBLY LAYOUT 1 (FRONT OF EASEMENT)
M&S ENGINEERING ELECTRICAL | CIVIL | MEP
APPROVED 11/21/2022
REVISION
SHEET 1 OF 1

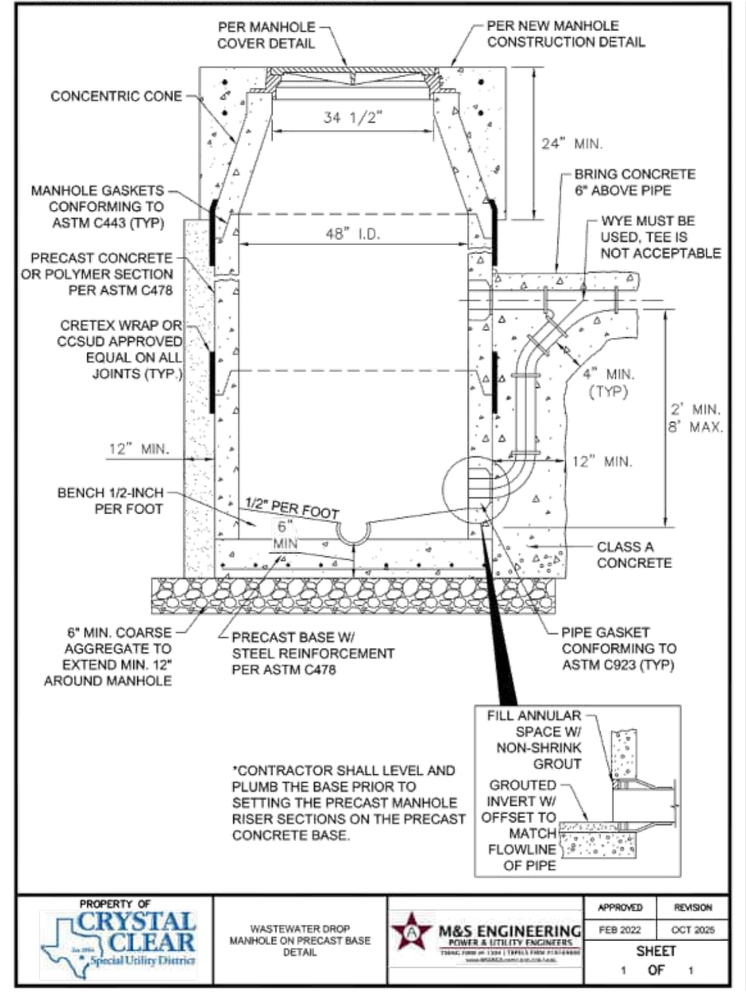

UTILITY EASEMENT BOUNDARY
6" PVC SOLID CAP
LOT LINE
6" PVC CLEANOUT CAP WITH THREADED PLUG
6" PVC WYE
WHEN THERE IS A UTILITY EASEMENT PARALLEL TO THE STREET R.O.W., INSTALL WYE AT THE PROPERTY SIDE OF THE EASEMENT
R.O.W./PROPERTY LINE
6" PVC SEWER PIPE
6" PVC 45° BEND
6" PVC 45° WYE
5' MIN
FLOW
X" SEWER MAIN SIZE x 6" PVC TEE
SEWER MAIN
SINGLE SERVICE PLAN
DOUBLE SERVICE PLAN
WIDTH VARIES
LEAVE CLEANOUT RISER ABOVE GRADE UNTIL SERVICE CONNECTION IS MADE. AFTER SERVICE CONNECTION IS MADE AND FINAL GRADING IS COMPLETED CUT RISER TO SET CAP FLUSH WITH FINISHED GRADE.
2' MINIMUM
12" MINIMUM
2% MIN. SLOPE
±45°
3'-6" MINIMUM
SECTION
NOTES:
1. FOR NEW DEVELOPMENTS, CLEANOUTS MAY NOT BE PLACED IN PAVED AREAS (I.E. SIDEWALKS, DRIVEWAYS, OR PARKING LOTS) AND MUST BE LOCATED A MINIMUM OF 6" FROM ALL PAVED AREAS.
2. SEWER CLEANOUTS SHALL BE HORIZONTALLY PLACED 5' FROM LOT LINE.
3. SEWER LATERAL PIPE SHALL BE INSTALLED BENEATH OTHER UTILITIES (IF POSSIBLE) WITH A MINIMUM VERTICAL CLEARANCE OF 1' ABOVE AND BELOW THE SEWER PIPE.
4. WYE FOR DOUBLE SEWER TAP SHALL NOT BE PLACED WITHIN EASEMENT.
PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT
DTL #306 - B
SEWER CLEANOUT ASSEMBLY LAYOUT 2 (BACK OF EASEMENT)
M&S ENGINEERING ELECTRICAL | CIVIL | MEP
APPROVED 11/21/2022
REVISION
SHEET 1 OF 1

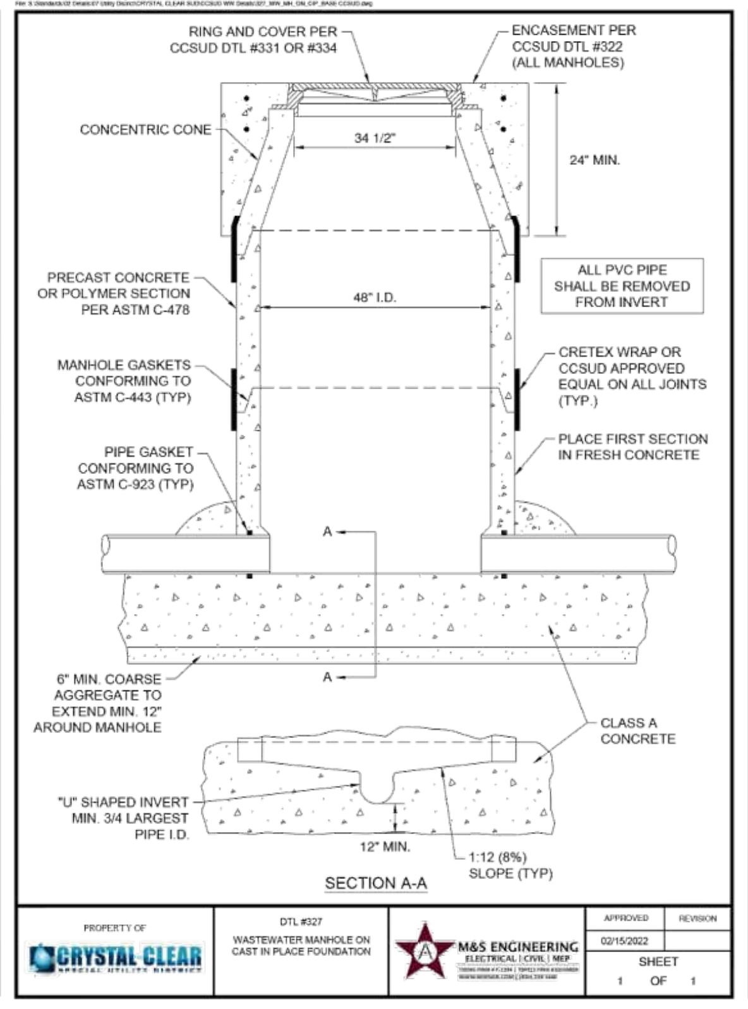

DETIAL A (1 EA.) 1/4" X 4" DIA. STEEL PLATE
DETIAL B (1 EA.) 4" O.D. X 3 5/8" I.D. X 3" LENGTH STD. GALV. PIPE
DETIAL C (1 EA.) 3 1/2" O.D. X 3" I.D. X 3'-11 3/4" LENGTH STD. GALV. PIPE
DETIAL D (1 EA.) 3/8" X 12" STEEL ROD
SEWER MONITORING EQUIPMENT
CONCRETE (AS REQ'D.)
1'-6"
4'
2'-6"
8"
NOTES:
1. SECURITY POST WILL BE REQUIRED WHERE SAMPLING WELL (REF. DWG. 304) IS DEEPER THAN 5'-0"
2. SECURITY POST TO BE LOCATED 1'-0" TO 2'-0" FROM SAMPLING WELL
PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT
DTL #307
SECURITY POST FOR SEWER MONITORING EQUIPMENT
M&S ENGINEERING ELECTRICAL | CIVIL | MEP
APPROVED 02/15/2022
REVISION
SHEET 1 OF 1

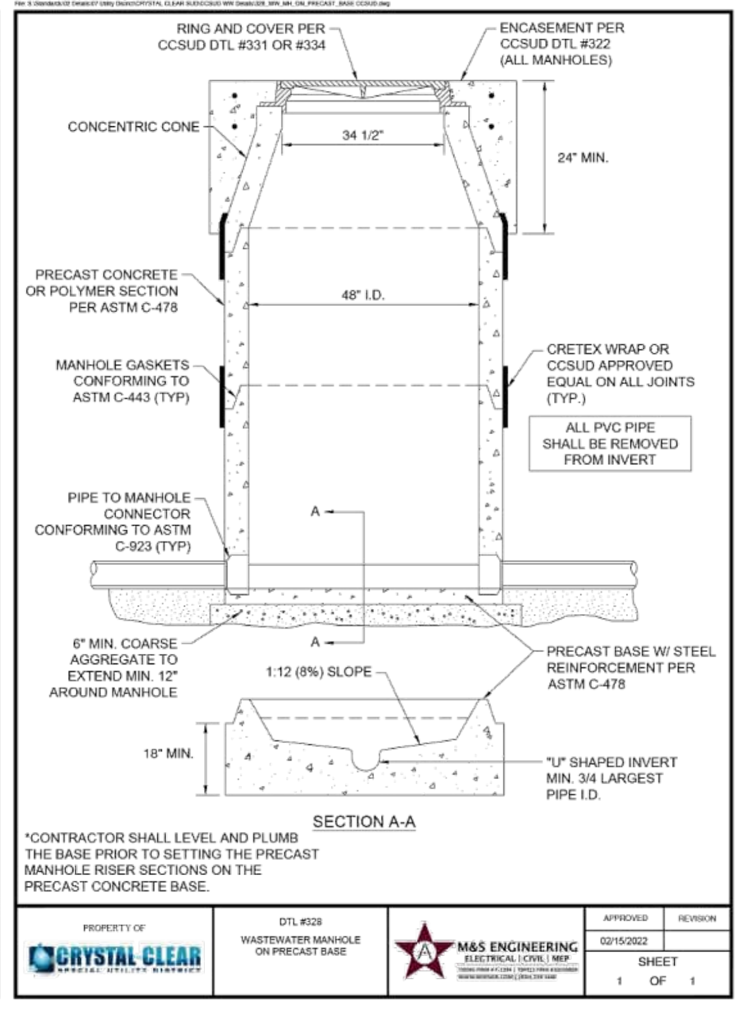

DIAMETER AS SHOWN ON PLANS
FORM MANHOLE INVERT TO PROVIDE FOR SMOOTH FLOW & TO ALLOW INSERTION OF T.V. CAMERA FOR INSPECTIONS
TYPICAL MANHOLE AT ANGLE IN SEWER
FORM MANHOLE INVERT TO PROVIDE FOR SMOOTH FLOW
TYPICAL JUNCTION MANHOLE
PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT
DTL #320
MANHOLE INVERT PLAN
M&S ENGINEERING ELECTRICAL | CIVIL | MEP
APPROVED 02/15/2022
REVISION
SHEET 1 OF 2

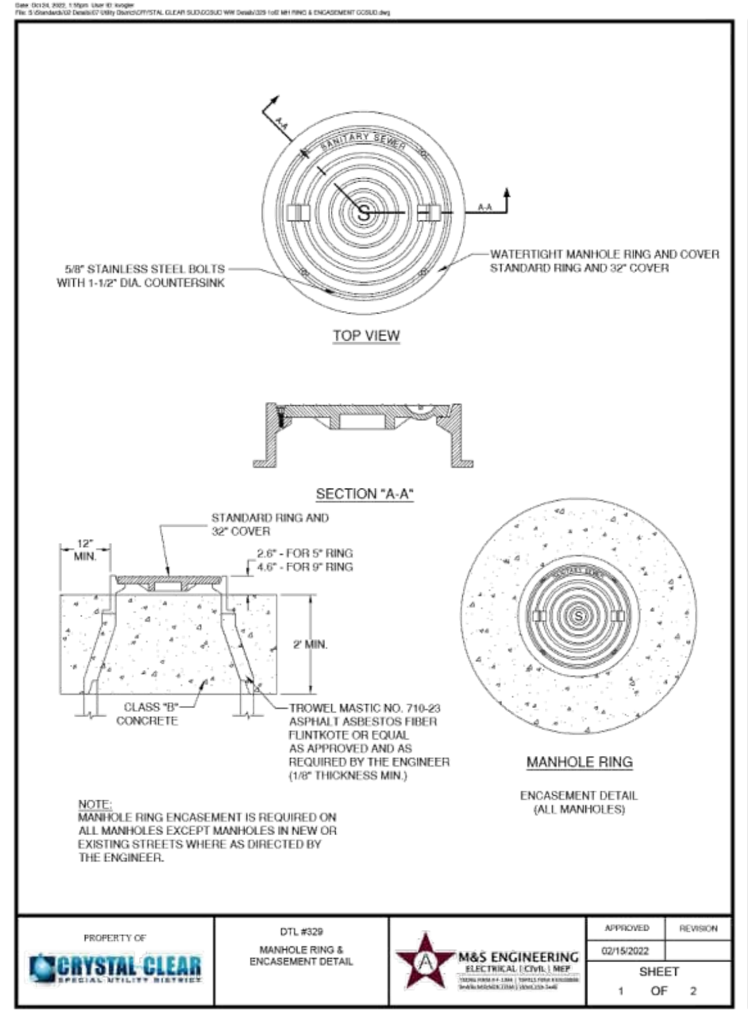

STANDARD MANHOLE
CONCRETE CRADLE TO NEAREST POINT OF ALL LINES LEAVING OR ENTERING MANHOLES
36"
IF PVC PIPE IS USED, PROVIDE RUBBER GASKETS ONE SIZE SMALLER THAN PIPE AT EACH WALL CROSSING OF MANHOLE
THE PIPE CONNECTING TO MANHOLES ABOVE THE LOWEST SEWER SHALL PORJECT 2" FROM THE INSIDE WALL AND BE INSTALLED WITH A JOINT MINIMUM OF 6" AND A MAXIMUM OF 18" FROM OUTSIDE MANHOLE WALL
NO JOINTS FOR PIPE WILL BE ALLOWED WITHIN WALL SECTION
MANHOLE FLOOR PLAN
AUGUST 1998
PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT
DTL #320
STANDARD MANHOLE MANHOLE FLOOR PLAN
M&S ENGINEERING ELECTRICAL | CIVIL | MEP
APPROVED 02/15/2022
REVISION
SHEET 2 OF 2

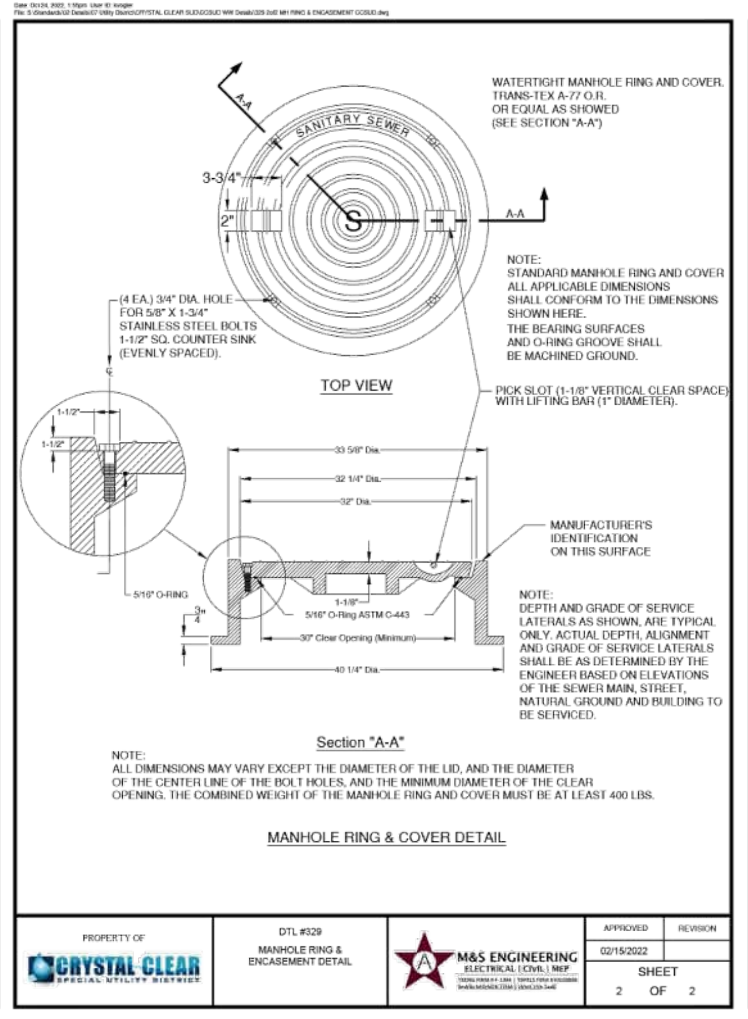

OUTSIDE PAVEMENT
WITHIN PAVEMENT
NATURAL GROUND
NO. 4 BAR (TYP)
18" MAX.
12" MIN.
HMAC
6"
24" MIN.
18" MIN.
*FLEXIBLE BASE
*SUBGRADE
HDPE OR PRECAST CONCRETE RINGS
SEE NOTE **
MANHOLE CONE
CLASS A CONCRETE
** HDPE RINGS-BUTYL RUBBER SEALANT (½"X½") CONC. RINGS-NON SHRINK GROUT (1" MAX.)
SECTION VIEW
12" MIN.
TYPICAL CCSUD MANHOLE RING AND 32" COVER (CCSUD DTL #331 OR #334)
*SUBGRADE AND BASE MATERIALS SHALL BE COMPACTED ACCORDING TO CCSUD STANDARD SPECIFICATIONS
SANITARY SEWER
S
5"
MANHOLE ENCASEMENT REQUIRED ON ALL MANHOLES
NO. 4 REINFORCING BAR
TOP VIEW
PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT
DTL #322
NEW MANHOLE CONSTRUCTION AND MINOR MANHOLE ADJUSTMENT
M&S ENGINEERING ELECTRICAL | CIVIL | MEP
APPROVED 02/15/2022
REVISION
SHEET 1 OF 1

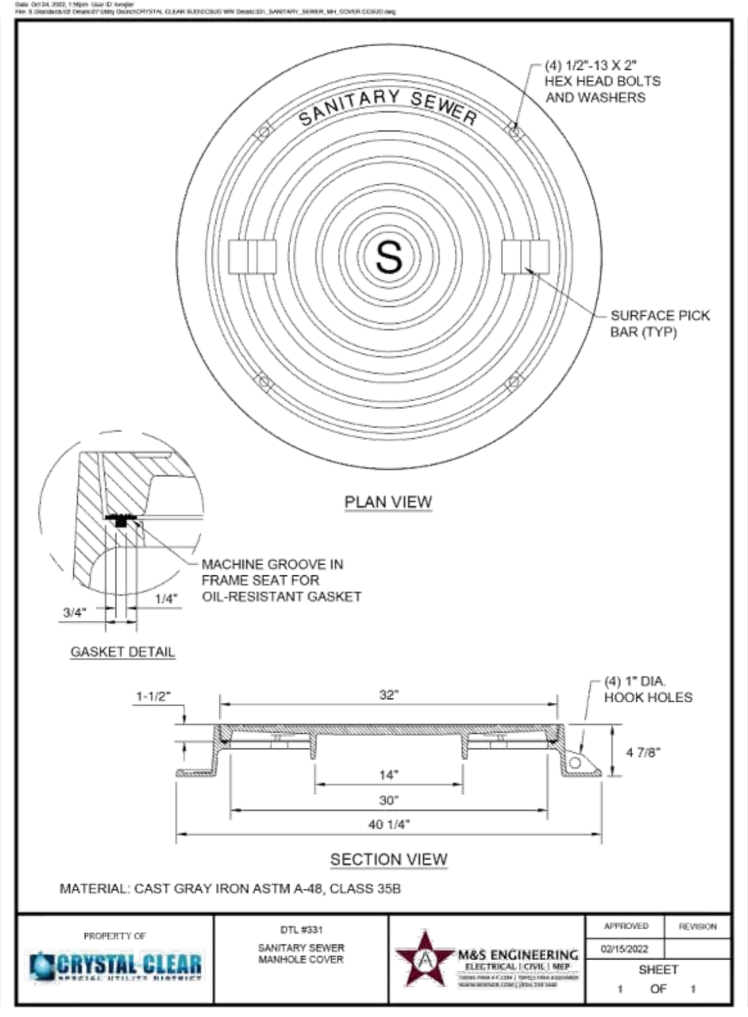

PER MANHOLE COVER DETAIL
PER NEW MANHOLE CONSTRUCTION DETAIL
CONCENTRIC CONE
34 1/2"
24" MIN.
BRING CONCRETE 6" ABOVE PIPE
WYE MUST BE USED, TEE IS NOT ACCEPTABLE
MANHOLE GASKETS CONFORMING TO ASTM C443 (TYP)
48" I.D.
PRECAST CONCRETE OR POLYMER SECTION PER ASTM C478
CRETEX WRAP OR CCSUD APPROVED EQUAL ON ALL JOINTS (TYP.)
4" MIN. (TYP)
2' MIN. 8' MAX.
12" MIN.
BENCH 1/2-INCH PER FOOT
1/2" PER FOOT
6" MIN
CLASS A CONCRETE
6" MIN. COARSE AGGREGATE TO EXTEND MIN. 12" AROUND MANHOLE
PRECAST BASE W/ STEEL REINFORCEMENT PER ASTM C478
PIPE GASKET CONFORMING TO ASTM C923 (TYP)
FILL ANNULAR SPACE W/ NON-SHRINK GROUT
GROUTED INVERT W/ OFFSET TO MATCH FLOWLINE OF PIPE
*CONTRACTOR SHALL LEVEL AND PLUMB THE BASE PRIOR TO SETTING THE PRECAST MANHOLE RISER SECTIONS ON THE PRECAST CONCRETE BASE.
PROPERTY OF CRYSTAL CLEAR Special Utility District
WASTEWATER DROP MANHOLE ON PRECAST BASE DETAIL
M&S ENGINEERING POWER & UTILITY ENGINEERS
APPROVED FEB 2022
REVISION OCT 2025
SHEET 1 OF 1

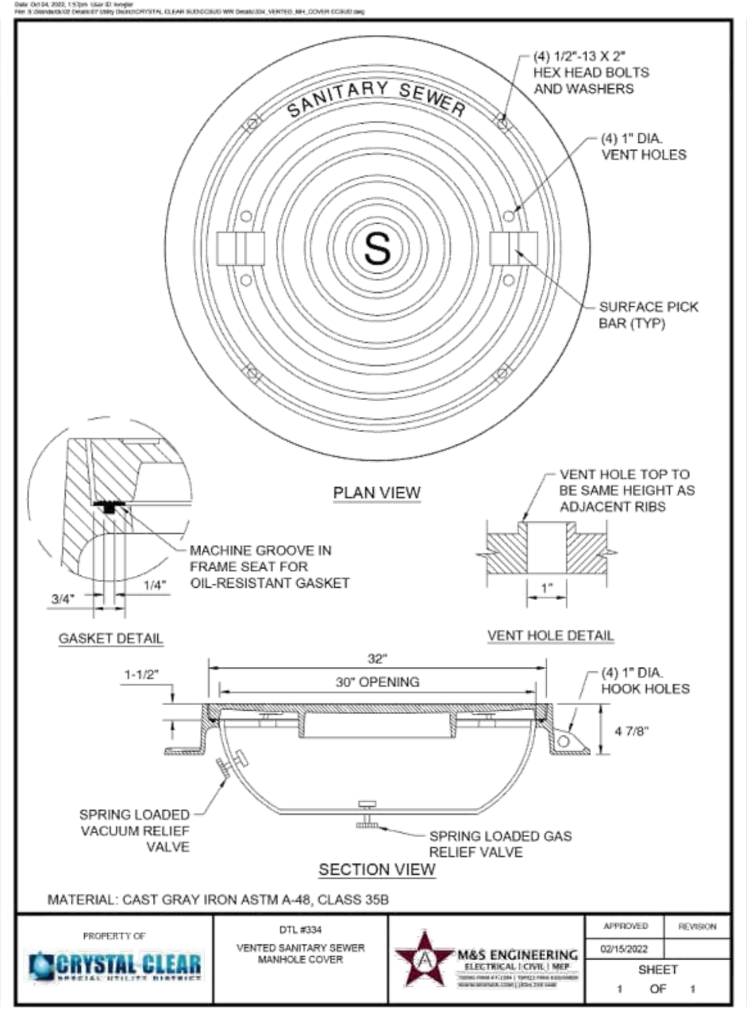

RING AND COVER PER CCSUD DTL #331 OR #334
ENCASEMENT PER CCSUD DTL #322 (ALL MANHOLES)
CONCENTRIC CONE
34 1/2"
24" MIN.
ALL PVC PIPE SHALL BE REMOVED FROM INVERT
PRECAST CONCRETE OR POLYMER SECTION PER ASTM C-478
48" I.D.
MANHOLE GASKETS CONFORMING TO ASTM C-443 (TYP)
CRETEX WRAP OR CCSUD APPROVED EQUAL ON ALL JOINTS (TYP.)
PIPE GASKET CONFORMING TO ASTM C-923 (TYP)
PLACE FIRST SECTION IN FRESH CONCRETE
A
6" MIN. COARSE AGGREGATE TO EXTEND MIN. 12" AROUND MANHOLE
CLASS A CONCRETE
"U" SHAPED INVERT MIN. 3/4 LARGEST PIPE I.D.
12" MIN.
1:12 (8%) SLOPE (TYP)
SECTION A-A
PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT
DTL #327
WASTEWATER MANHOLE ON CAST IN PLACE FOUNDATION
M&S ENGINEERING ELECTRICAL | CIVIL | MEP
APPROVED 02/15/2022
REVISION
SHEET 1 OF 1

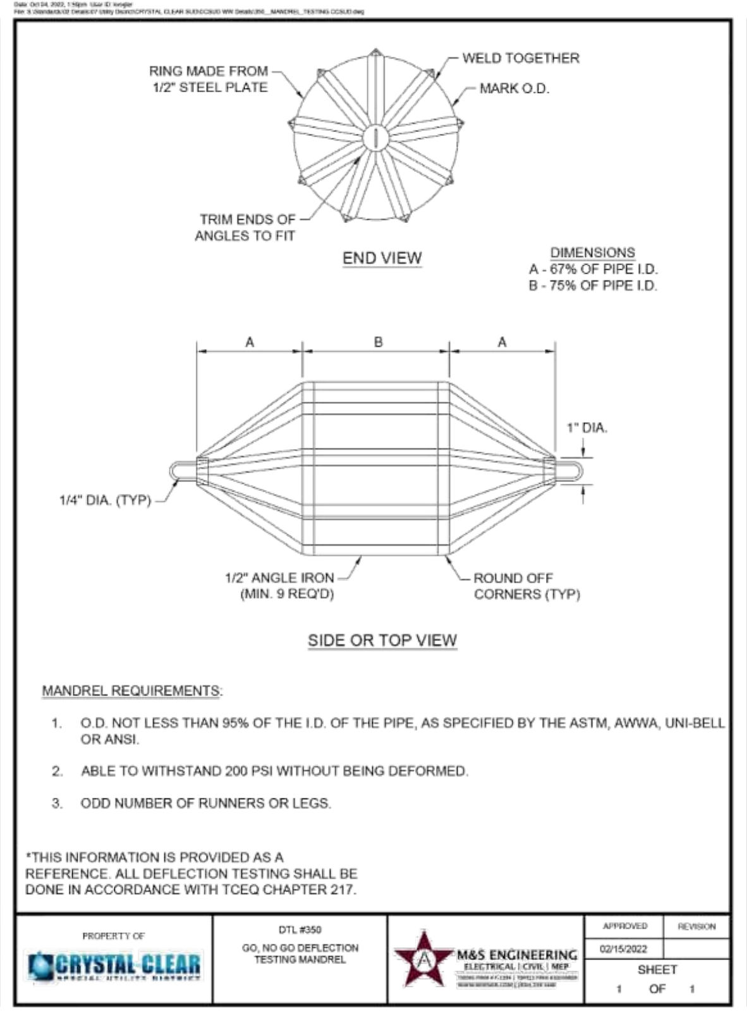

RING AND COVER PER CCSUD DTL #331 OR #334
ENCASEMENT PER CCSUD DTL #322 (ALL MANHOLES)
CONCENTRIC CONE
34 1/2"
24" MIN.
PRECAST CONCRETE OR POLYMER SECTION PER ASTM C-478
48" I.D.
CRETEX WRAP OR CCSUD APPROVED EQUAL ON ALL JOINTS (TYP.)
MANHOLE GASKETS CONFORMING TO ASTM C-443 (TYP)
ALL PVC PIPE SHALL BE REMOVED FROM INVERT
PIPE TO MANHOLE CONNECTOR CONFORMING TO ASTM C-923 (TYP)
A
6" MIN. COARSE AGGREGATE TO EXTEND MIN. 12" AROUND MANHOLE
1:12 (8%) SLOPE
PRECAST BASE W/ STEEL REINFORCEMENT PER ASTM C-478
18" MIN.
"U" SHAPED INVERT MIN. 3/4 LARGEST PIPE I.D.
SECTION A-A
*CONTRACTOR SHALL LEVEL AND PLUMB THE BASE PRIOR TO SETTING THE PRECAST MANHOLE RISER SECTIONS ON THE PRECAST CONCRETE BASE.
PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT
DTL #328
WASTEWATER MANHOLE ON PRECAST BASE
M&S ENGINEERING ELECTRICAL | CIVIL | MEP
APPROVED 02/15/2022
REVISION
SHEET 1 OF 1


A-A
SANITARY SEWER
S
5/8" STAINLESS STEEL BOLTS WITH 1-1/2" DIA. COUNTERSINK
WATERTIGHT MANHOLE RING AND COVER STANDARD RING AND 32" COVER
TOP VIEW
SECTION "A-A"
STANDARD RING AND 32" COVER
12" MIN.
2.6" - FOR 5" RING
4.6" - FOR 9" RING
2' MIN.
CLASS "B" CONCRETE
TROWEL MASTIC NO. 710-23 ASPHALT ASBESTOS FIBER FLINTKOTE OR EQUAL AS APPROVED AND AS REQUIRED BY THE ENGINEER (1/8" THICKNESS MIN.)
MANHOLE RING
ENCASEMENT DETAIL (ALL MANHOLES)
NOTE:
MANHOLE RING ENCASEMENT IS REQUIRED ON ALL MANHOLES EXCEPT MANHOLES IN NEW OR EXISTING STREETS WHERE AS DIRECTED BY THE ENGINEER.
PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT
DTL #329
MANHOLE RING & ENCASEMENT DETAIL
M&S ENGINEERING ELECTRICAL | CIVIL | MEP
APPROVED 02/15/2022
REVISION
SHEET 1 OF 2


A-A
SANITARY SEWER
S
3-3/4"
2"
WATERTIGHT MANHOLE RING AND COVER. TRANS-TEX A-77 O.R. OR EQUAL AS SHOWED (SEE SECTION "A-A")
NOTE:
STANDARD MANHOLE RING AND COVER ALL APPLICABLE DIMENSIONS SHALL CONFORM TO THE DIMENSIONS SHOWN HERE. THE BEARING SURFACES AND O-RING GROOVE SHALL BE MACHINED GROUND.
(4 EA.) 3/4" DIA. HOLE FOR 5/8" X 1-3/4" STAINLESS STEEL BOLTS 1-1/2" SQ. COUNTER SINK (EVENLY SPACED).
TOP VIEW
PICK SLOT (1-1/8" VERTICAL CLEAR SPACE) WITH LIFTING BAR (1" DIAMETER).
1-1/2"
33 5/8" Dia.
32 1/4" Dia.
32" Dia.
MANUFACTURER'S IDENTIFICATION ON THIS SURFACE
5/16" O-RING
1-1/8"
5/16" O-Ring ASTM C-443
30" Clear Opening (Minimum)
40 1/4" Dia.
NOTE:
DEPTH AND GRADE OF SERVICE LATERALS AS SHOWN, ARE TYPICAL ONLY. ACTUAL DEPTH, ALIGNMENT AND GRADE OF SERVICE LATERALS SHALL BE AS DETERMINED BY THE ENGINEER BASED ON ELEVATIONS OF THE SEWER MAIN, STREET, NATURAL GROUND AND BUILDING TO BE SERVICED.
Section "A-A"
NOTE:
ALL DIMENSIONS MAY VARY EXCEPT THE DIAMETER OF THE LID, AND THE DIAMETER OF THE CENTER LINE OF THE BOLT HOLES, AND THE MINIMUM DIAMETER OF THE CLEAR OPENING. THE COMBINED WEIGHT OF THE MANHOLE RING AND COVER MUST BE AT LEAST 400 LBS.
MANHOLE RING & COVER DETAIL
PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT
DTL #329
MANHOLE RING & ENCASEMENT DETAIL
M&S ENGINEERING ELECTRICAL | CIVIL | MEP
APPROVED 02/15/2022
REVISION
SHEET 2 OF 2


SANITARY SEWER
S
(4) 1/2"-13 X 2" HEX HEAD BOLTS AND WASHERS
SURFACE PICK BAR (TYP)
PLAN VIEW
MACHINE GROOVE IN FRAME SEAT FOR OIL-RESISTANT GASKET
3/4"
1/4"
GASKET DETAIL
1-1/2"
32"
(4) 1" DIA. HOOK HOLES
4 7/8"
14"
30"
40 1/4"
SECTION VIEW
MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT
DTL #331
SANITARY SEWER MANHOLE COVER
M&S ENGINEERING ELECTRICAL | CIVIL | MEP
APPROVED 02/15/2022
REVISION
SHEET 1 OF 1


SANITARY SEWER
S
(4) 1/2"-13 X 2" HEX HEAD BOLTS AND WASHERS
(4) 1" DIA. VENT HOLES
SURFACE PICK BAR (TYP)
PLAN VIEW
MACHINE GROOVE IN FRAME SEAT FOR OIL-RESISTANT GASKET
3/4"
1/4"
GASKET DETAIL
VENT HOLE TOP TO BE SAME HEIGHT AS ADJACENT RIBS
1"
VENT HOLE DETAIL
1-1/2"
32"
30" OPENING
(4) 1" DIA. HOOK HOLES
4 7/8"
SPRING LOADED VACUUM RELIEF VALVE
SPRING LOADED GAS RELIEF VALVE
SECTION VIEW
MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT
DTL #334
VENTED SANITARY SEWER MANHOLE COVER
M&S ENGINEERING ELECTRICAL | CIVIL | MEP
APPROVED 02/15/2022
REVISION
SHEET 1 OF 1


RING MADE FROM 1/2" STEEL PLATE
WELD TOGETHER
MARK O.D.
TRIM ENDS OF ANGLES TO FIT
END VIEW
DIMENSIONS
A - 67% OF PIPE I.D.
B - 75% OF PIPE I.D.
A
B
1" DIA.
1/4" DIA. (TYP)
1/2" ANGLE IRON (MIN. 9 REQ'D)
ROUND OFF CORNERS (TYP)
SIDE OR TOP VIEW
MANDREL REQUIREMENTS:
1. O.D. NOT LESS THAN 95% OF THE I.D. OF THE PIPE, AS SPECIFIED BY THE ASTM, AWWA, UNI-BELL OR ANSI.
2. ABLE TO WITHSTAND 200 PSI WITHOUT BEING DEFORMED.
3. ODD NUMBER OF RUNNERS OR LEGS.
*THIS INFORMATION IS PROVIDED AS A REFERENCE. ALL DEFLECTION TESTING SHALL BE DONE IN ACCORDANCE WITH TCEQ CHAPTER 217.
PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT
DTL #350
GO, NO GO DEFLECTION TESTING MANDREL
M&S ENGINEERING ELECTRICAL | CIVIL | MEP
APPROVED 02/15/2022
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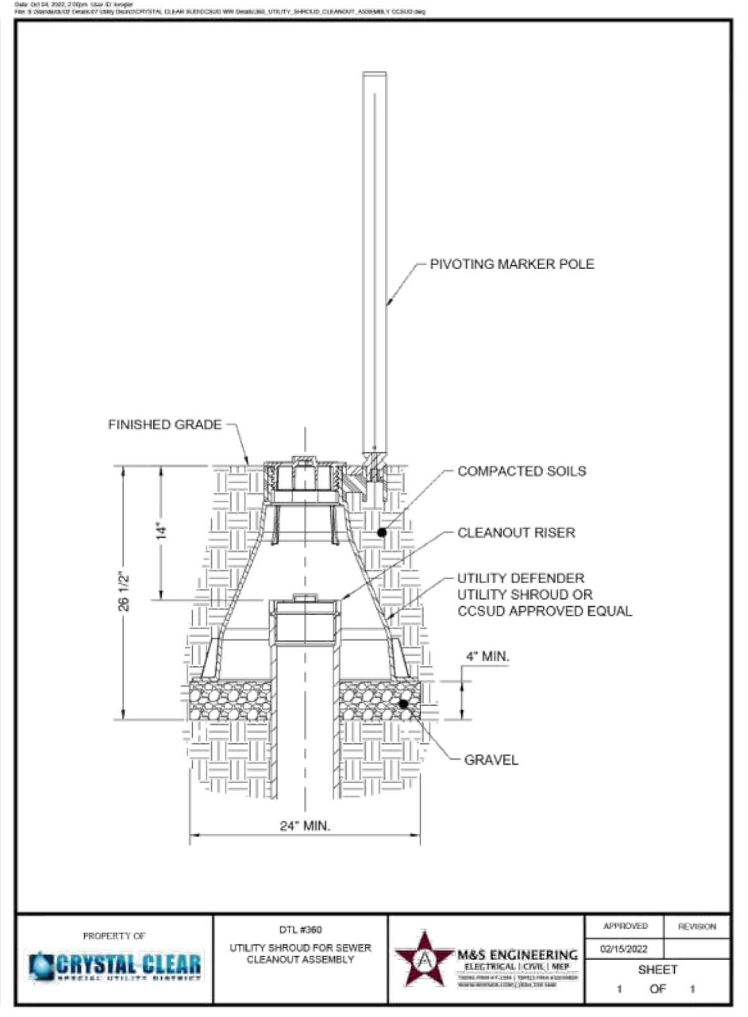
SHEET 1 OF 1


PIVOTING MARKER POLE
FINISHED GRADE
COMPACTED SOILS
CLEANOUT RISER
UTILITY DEFENDER UTILITY SHROUD OR CCSUD APPROVED EQUAL
14"
26 1/2"
4" MIN.
GRAVEL
24" MIN.
PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT
DTL #360
UTILITY SHROUD FOR SEWER CLEANOUT ASSEMBLY
M&S ENGINEERING ELECTRICAL | CIVIL | MEP
APPROVED 02/15/2022
REVISION
SHEET 1 OF 1

CUDEENGINEERS.COM

CUDE ENGINEERS EST. 1980

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

SANITARY SEWER DETAILS

DATE
04/16/2026
PROJECT NO.
04024-018
DRAWN BY
C7
CHECKED BY
JL/TM

REVISIONS
1.
2.
3.
4.
5.
6.
7.
8.

CUDE ENGINEERS
TBPELS No. 10048500

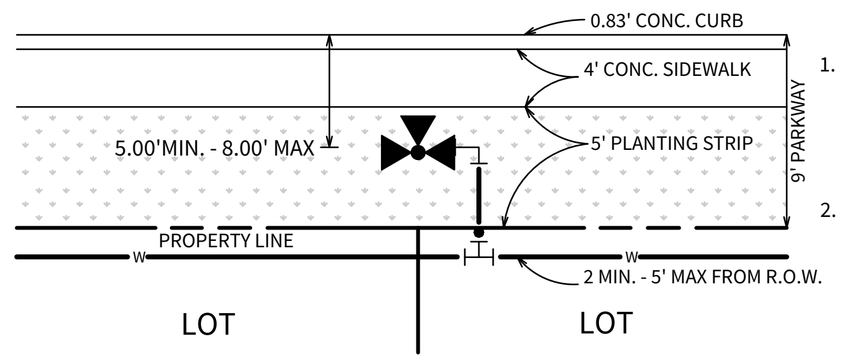
C4.D1

R:\04024\018\2-DWG\4-Plans\C4.D1 SSD.dwg 2026/04/16 8:49am sgonzales

REPRODUCTION OF THE ORIGINAL SIGNED AND SEALED PLAN AND/OR ELECTRONIC MEDIA MAY HAVE BEEN INADVERTENTLY ALTERED. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE SCALE OF THE DOCUMENT AND CONTACTING CUDE ENGINEERS TO VERIFY DISCREPANCIES PRIOR TO CONSTRUCTION.

LEGEND

PROPOSED 3/4" SINGLE WATER SERVICE	W
PROPOSED 3/4" DUAL WATER SERVICE	W W
PROPOSED 1" IRRIGATION WITH 5/8" METER	IRR
PROPOSED SANITARY SEWER	8"SS
PROPOSED SANITARY SEWER MANHOLE	●
PROPOSED WATER MAIN	XXX L.F. – XX" PVC C–900
PROPOSED STANDARD FIRE HYDRANT	
PROPOSED STANDARD GATE VALVE	●
PUBLIC UTILITY EASEMENT	P.U.E.
ENTIRE LENGTH TO BE RESTRAINED	⊗

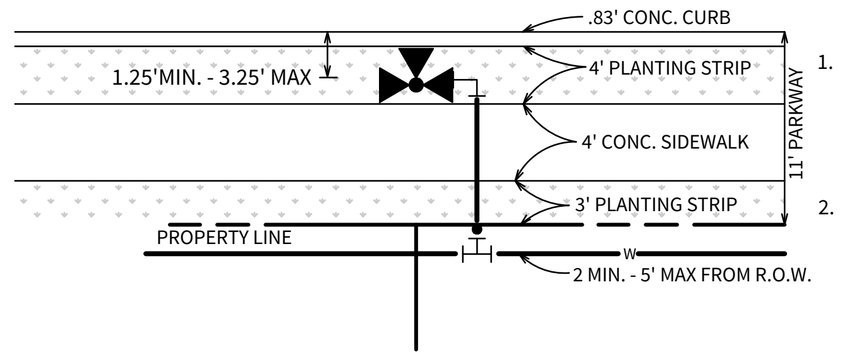

0.83' CONC. CURB
4' CONC. SIDEWALK
5' PLANTING STRIP
5.00'MIN. - 8.00' MAX
9' PARKWAY
PROPERTY LINE
W
2 MIN. - 5' MAX FROM R.O.W.
LOT
LOT

NOTE:

1. EXCLUSIVE OF THE TEE, PAYMENT FOR THE FIRE HYDRANT SHALL INCLUDE ALL FITTINGS, 6" D.I. PIPE AND 6" GATE VALVE & BOX.
2. FIRE HYDRANT TO BE INSTALLED OUTSIDE OF THE LIMITS OF ALL PROPOSED SIDEWALKS.

RESIDENTIAL FIRE HYDRANT DETAIL (4' SIDEWALK / 50' R.O.W.)

N.T.S.

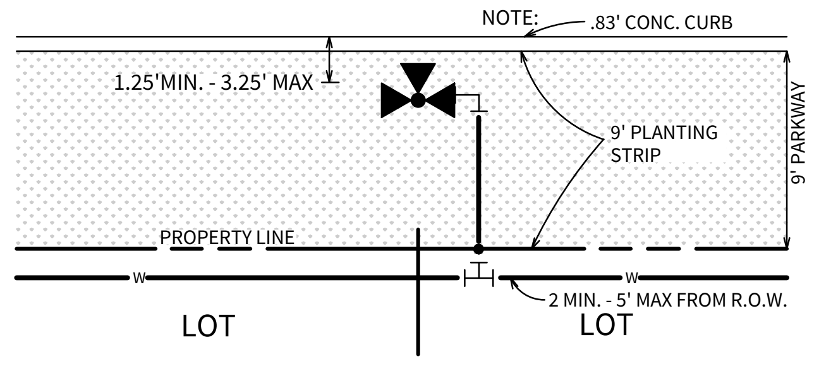

.83' CONC. CURB
1.25'MIN. - 3.25' MAX
4' PLANTING STRIP
4' CONC. SIDEWALK
3' PLANTING STRIP
11' PARKWAY
PROPERTY LINE
W
2 MIN. - 5' MAX FROM R.O.W.

NOTE:

1. EXCLUSIVE OF THE TEE, PAYMENT FOR THE FIRE HYDRANT SHALL INCLUDE ALL FITTINGS, 6" D.I. PIPE AND 6" GATE VALVE & BOX.
2. FIRE HYDRANT TO BE INSTALLED OUTSIDE OF THE LIMITS OF ALL PROPOSED SIDEWALKS.

RESIDENTIAL COLLECTOR FIRE HYDRANT DETAIL (4' SIDEWALK / 60' R.O.W.)

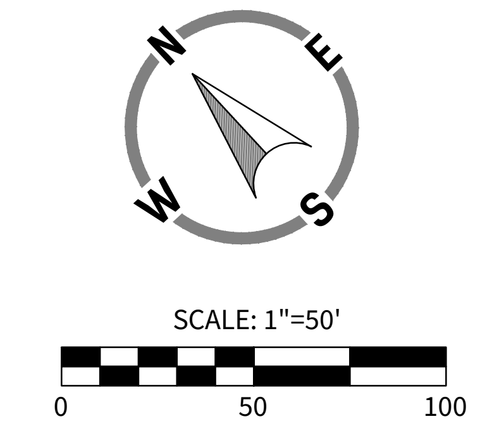
N.T.S.

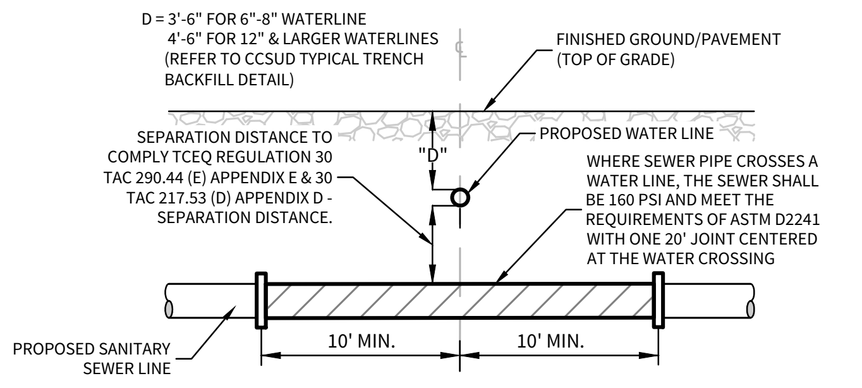

NOTE:
.83' CONC. CURB
1.25'MIN. - 3.25' MAX
9' PLANTING STRIP
9' PARKWAY
PROPERTY LINE
W
2 MIN. - 5' MAX FROM R.O.W.
LOT
LOT

1. EXCLUSIVE OF THE TEE, PAYMENT FOR THE FIRE HYDRANT SHALL INCLUDE ALL FITTINGS, 6" D.I. PIPE AND 6" GATE VALVE & BOX.
2. FIRE HYDRANT TO BE INSTALLED OUTSIDE OF THE LIMITS OF ALL PROPOSED SIDEWALKS.

MINOR COLLECTOR FIRE HYDRANT DETAIL (72' R.O.W.)

N.T.S.


N
E
S
W
SCALE: 1"=50'
0
50
100


D = 3'-6" FOR 6"-8" WATERLINE
4'-6" FOR 12" & LARGER WATERLINES
(REFER TO CCSUD TYPICAL TRENCH BACKFILL DETAIL)
FINISHED GROUND/PAVEMENT (TOP OF GRADE)
PROPOSED WATER LINE
SEPARATION DISTANCE TO COMPLY TCEQ REGULATION 30 TAC 290.44 (E) APPENDIX E & 30 TAC 217.53 (D) APPENDIX D - SEPARATION DISTANCE.
"D"
WHERE SEWER PIPE CROSSES A WATER LINE, THE SEWER SHALL BE 160 PSI AND MEET THE REQUIREMENTS OF ASTM D2241 WITH ONE 20' JOINT CENTERED AT THE WATER CROSSING
PROPOSED SANITARY SEWER LINE
10' MIN.
10' MIN.

TYPICAL SANITARY SEWER/ WATER CROSSING DETAIL

N.T.S.

SHEET NOTES:

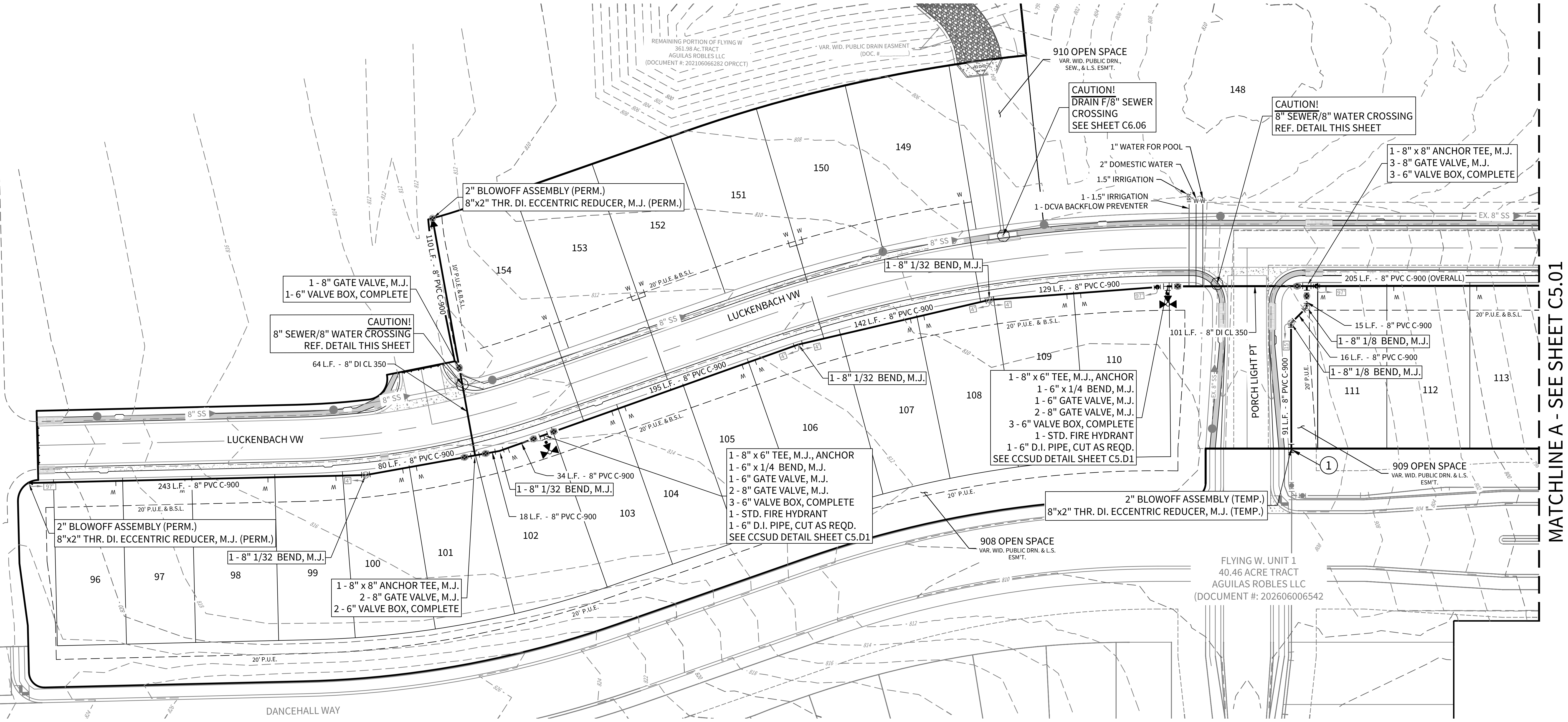
1. ALL 8" & 12" PVC SHALL BE C–900 CLASS 235 DR 18, UNLESS OTHERWISE STATED.
2. DISINFECTANT
   - A. BEFORE DISINFECTION FOR USE WITH POTABLE WATER, THE WATER MAIN PIPELINE SHALL BE FILLED TO ELIMINATE AIR POCKETS AND FLUSHED TO REMOVE PARTICULATES. THE FLUSHING VELOCITY IN THE MAIN SHALL NOT BE LESS THAN 2.50 FEET/SECOND UNLESS THE OWNER DETERMINES THAT CONDITIONS DO NOT PERMIT THE REQUIRED FLOW RATE.
   - B. THE CONTRACTOR SHALL DISINFECT ALL INSTALLED WATER MAINS IN ACCORDANCE WITH THE REQUIREMENTS OF AWWA C651 AND CCSUD TECHNICAL SPECIFICATION SECTION 01350, HYDROTESTING AND DISINFECTION.
   - C. LIQUID CHLORINE, SODIUM HYPOCHLORITE OR CALCIUM HYPOCHLORITE SHALL BE USED IN ACCORDANCE WITH AWWA C652 AND AWWA C653
   - D. LIQUID CHLORINE SHALL BE USED ONLY WHERE GAS–FLOW CHLORINATORS AND INJECTORS ARE INSTALLED FOR TREATMENT APPLICATIONS. PORTABLE OR MAKESHIFT GAS CHLORINATION EQUIPMENT IS NOT ACCEPTABLE.
   - E. DISINFECTANT CHEMICALS AND MATERIALS SHALL BE FURNISHED BY THE CONTRACTOR.
   - F. ALL DISINFECTION OF WATER MAINS AND PIPING SHALL BE DONE UNDER GENERAL SUPERVISION OF THE INSPECTOR.
3. CONTRACTOR SHALL MAINTAIN A MINIMUM DEPTH OF 3.5 FEET ON ALL 8" AND 4.5 FEET ON ALL 12" MAINS

CAUTION!

THE CONTRACTOR SHALL BE AWARE THAT UNDERGROUND UTILITY LINES EXIST ALONG FM 1102. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE THESE UTILITIES LOCATED PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING IN THIS AREA. ANY DAMAGE DONE TO THESE EXISTING FACILITIES WILL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO REPAIR.

TRENCH EXCAVATION PROTECTION

CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN/GEOTECHNICAL/SAFETY/EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITE(S) WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS AND/OR PROCEDURES FOR THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR'S IMPLEMENTATION OF THESE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.


REMAINING PORTION OF FLYING W
361.98 Ac.TRACT
AGUILAS ROBLES LLC
(DOCUMENT #: 202106066282 OPRCCT)
VAR. WID. PUBLIC DRAIN EASEMENT
910 OPEN SPACE
VAR. WID. PUBLIC DRN., SEW., & L.S. ESMT.
CAUTION!
DRAIN F/8" SEWER CROSSING
SEE SHEET C6.06
CAUTION!
8" SEWER/8" WATER CROSSING
REF. DETAIL THIS SHEET
1" WATER FOR POOL
2" DOMESTIC WATER
1.5" IRRIGATION
1 - 1.5" IRRIGATION
1 - DCVA BACKFLOW PREVENTER
1 - 8" x 8" ANCHOR TEE, M.J.
3 - 8" GATE VALVE, M.J.
3 - 6" VALVE BOX, COMPLETE
EX. 8" SS
2" BLOWOFF ASSEMBLY (PERM.)
8"x2" THR. DI. ECCENTRIC REDUCER, M.J. (PERM.)
110 L.F. - 8" PVC C-900
10' P.U.E. & B.S.L.
1 - 8" GATE VALVE, M.J.
1- 6" VALVE BOX, COMPLETE
CAUTION!
8" SEWER/8" WATER CROSSING
REF. DETAIL THIS SHEET
64 L.F. - 8" DI CL 350
8" SS
LUCKENBACH VW
LUCKENBACH VW
20' P.U.E. & B.S.L.
1 - 8" 1/32 BEND, M.J.
195 L.F. - 8" PVC C-900
142 L.F. - 8" PVC C-900
129 L.F. - 8" PVC C-900
205 L.F. - 8" PVC C-900 (OVERALL)
101 L.F. - 8" DI CL 350
15 L.F. - 8" PVC C-900
1 - 8" 1/8 BEND, M.J.
16 L.F. - 8" PVC C-900
1 - 8" 1/8 BEND, M.J.
91 L.F. - 8" PVC C-900
PORCH LIGHT PT
1 - 8" 1/32 BEND, M.J.
1 - 8" x 6" TEE, M.J., ANCHOR
1 - 6" x 1/4 BEND, M.J.
1 - 6" GATE VALVE, M.J.
2 - 8" GATE VALVE, M.J.
3 - 6" VALVE BOX, COMPLETE
1 - STD. FIRE HYDRANT
1 - 6" D.I. PIPE, CUT AS REQD.
SEE CCSUD DETAIL SHEET C5.D1
80 L.F. - 8" PVC C-900
243 L.F. - 8" PVC C-900
34 L.F. - 8" PVC C-900
1 - 8" 1/32 BEND, M.J.
18 L.F. - 8" PVC C-900
2" BLOWOFF ASSEMBLY (PERM.)
8"x2" THR. DI. ECCENTRIC REDUCER, M.J. (PERM.)
1 - 8" 1/32 BEND, M.J.
1 - 8" x 8" ANCHOR TEE, M.J.
2 - 8" GATE VALVE, M.J.
2 - 6" VALVE BOX, COMPLETE
2" BLOWOFF ASSEMBLY (TEMP.)
8"x2" THR. DI. ECCENTRIC REDUCER, M.J. (TEMP.)
908 OPEN SPACE
VAR. WID. PUBLIC DRN. & L.S. ESMT.
909 OPEN SPACE
VAR. WID. PUBLIC DRN. & L.S. ESMT.
①
20' P.U.E.
FLYING W. UNIT 1
40.46 ACRE TRACT
AGUILAS ROBLES LLC
(DOCUMENT #: 202606006542)
DANCEHALL WAY
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
148
149
150
151
152
153
154
MATCHLINE A - SEE SHEET C5.01

KEYNOTES:

① AFTER RELEASE FOR SERVICE, CONTRACTOR TO TIE NEW 8" MAIN INTO EXST. 8" WATER MAIN WITH ±5 L.F. OF 8" WATER MAIN, CUT AS REQUIRED.

8" VALVES TO REMAIN CLOSED UNTIL AFTER DISINFECTION & ACCEPTANCE BY CCSUD.

CONTRACTOR SHALL FIELD LOCATE & VERIFY DEPTH OF EXISTING 2" LINE AND 8" MAIN & FITTINGS PRIOR TO COMMENCING CONSTRUCTION.

CONTRACTOR TO ENSURE EXISTING PIPES (2" & 12") WILL MEET TxDOT COVER REQUIREMENTS POST CONSTRUCTION. EXISTING PIPE NOT MEETING MINIMUM COVER STANDARDS WILL BE LOWERED AS NEEDED.

PORTIONS OF EXISTING CCSUD 8" MAIN IS CLASSIFIED AS CLASS PIPE AND WILL NOT BE TIED TO. CONTRACTOR TO FIELD VERIFY CONNECTION LOCATIONS ARE NOT CLASS PIPE PRIOR TO INSTALLATION. CONTRACTOR TO CONNECT TO PORTIONS OF EXISTING 8" MAIN NOT CLASSIFIED AS CLASS PIPE.

FOR CHLORINATION INJECTION
2–1" CORPORATION STOP C.C. X I.P.
2–1" COPPER TUBING, CUT AS REQ'D
2–1 1/4" THD. SOLID CAPS, THR.
2–1" COMP. X 1 1/4" COUPLING, CURB STOP
CONTRACTOR SHALL PROVIDE A 4" JUMPER CONNECTION TO LOAD NEW MAIN

1–8" SOLID SLEEVE
SEE CCSUD DETAIL SHEET C5.D1

1 – 8" TRANSITION COUPLING, M.J.

RESTRAINT LENGTH TABLE

	12"x1/8" V-BEND	12"x1/8" BEND	12"x1/16" BEND	12"x1/32" BEND	8"x1/8" BEND	8"x1/16" BEND	8"x1/32" BEND
PIPE MATERIAL	PVC	PVC	PVC	PVC	PVC	PVC	PVC
SOIL TYPE	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL
SAFETY FACTOR	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1
TRENCH TYPE	5	5	5	5	5	5	5
DEPTH OF BURY (FT)	4	4	4	4	4	4	4
TEST PRESSURE (PSI)	250	250	250	250	250	250	250
UPPER RESTRAINT LENGTH (FT)	57	N/A	N/A	N/A	N/A	N/A	N/A
LOWER RESTRAINT LENGTH (FT)	15	21	10	5	15	7	4
THRUST (LBS)	26,186	26,186	13,350	6,707	12,310	6,276	3,153

RESTRAINT LENGTH TABLE

	12"x12" TEE	8"x8" TEE	12" DEAD END/IN-LINE VALVE	8" DEAD END/IN-LINE VALVE	12"x8" REDUCER	12"x8" CROSS
PIPE MATERIAL	PVC	PVC	PVC	PVC	PVC	PVC
SOIL TYPE	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL
SAFETY FACTOR	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1
TRENCH TYPE	5	5	5	5	5	5
DEPTH OF BURY (FT)	4	4	4	4	4	4
TEST PRESSURE (PSI)	250	250	250	250	250	250
LENGTH ALONG RUN (FT)	0	0	N/A	N/A	N/A	0
RESTRAINT LENGTH (FT)	137	97	137	97	73	137
THRUST (LBS)	34,213	16,083	34,213	16,083	18,130	34,213

NOTE: ALL JOINTS WITHIN THE CALCULATED LENGTH MUST BE RESTRAINED. IF YOUR DISTANCE BETWEEN FITTINGS IS LESS THAN OR EQUAL TO THE CALCULATED RESTRAIN LENGTH, RESTRAIN ALL JOINTS BETWEEN THOSE FITTINGS. CALCULATIONS ARE PROVIDED FOR REFERENCE. THE RESTRAINT LENGTH SHALL BE DESIGNED BASED UPON THE CONDITIONS ENCOUNTERED DURING INSTALLATION.

CRYSTAL CLEAR SPECIAL UTILITY DISTRICT (CCSUD) WATER MAIN NOTES:

1. CONSTRUCTION OF ALL CCSUD WATER UTILITY INFRASTRUCTURE MUST ADHERE TO CCSUD'S TECHNICAL SPECIFICATIONS, DETAILS AND APPROVED EQUIPMENT LIST.
2. REMOVE ONLY VEGETATION, TREES, STUMPS, RUBBISH, AND OTHER MATERIAL NECESSARY FOR CONSTRUCTION AND DISPOSE OF OFF SITE.
3. THE CONNECTION LOCATIONS LISTED IN THE PLANS ARE BASED ON BEST AVAILABLE INFORMATION. THE CONTRACTOR SHALL FIELD LOCATE EXISTING WATER MAIN LOCATIONS AT ALL TIE-IN LOCATIONS TO VERIFY SIZE, ELEVATION, AND MATERIAL PRIOR TO ORDERING MATERIALS FOR CONNECTION.
4. THE CONTRACTOR SHALL MAINTAIN MINIMUM SEPARATION BETWEEN UTILITIES PER TCEQ STANDARDS.
5. UNLESS OTHERWISE SPECIFIED, ALL PVC WATER MAINS SHALL BE C900 DR 18, COLORED BLUE IN ACCORDANCE WITH SPECIFICATION SECTION 02650 – PVC PIPE FOR WATER MAINS.
6. ALL DUCTILE IRON WATER MAINS SHALL BE PRESSURE CLASS CONFORMING TO AWWA C151 AND CEMENT LINED.
7. WATER MAINS SHALL BE RESTRAINED WITH RESTRAINT LENGTHS OF FITTINGS SHOWN IN PLANS. THRUST BLOCKING IS REQUIRED AT ALL FITTINGS AND BENDS IN ACCORDANCE WITH THE THRUST BLOCKING DETAIL PROVIDED AND SPECIFICATION SECTION 02680 - JOINT RESTRAINTS AND THRUST BLOCKING.
8. LOCATIONS OF COMBINATION AIR VALVES SHOWN ARE APPROXIMATE. INSTALL AIR RELEASE VALVES AT THE HIGH POINT IN THE WATER MAIN FOR THE LOCATIONS GIVEN.
9. THE CONTRACTOR SHALL COORDINATE PRESSURE TESTING OF NEW WATER MAINS WITH OWNER AND ENGINEER AT LEAST TWO BUSINESS DAYS PRIOR. PRESSURE TESTING REQUIREMENTS ARE INCLUDED IN THE SPECIFICATIONS.
10. ALL WATER MAINS SHALL BE DISINFECTED PER AWWA AND TCEQ STANDARDS.
11. THE OWNER SHALL SUPPLY ALL WATER NEEDED FOR CONSTRUCTION TESTING AND DISINFECTION. THE CONTRACTOR SHALL NOT BE REQUIRED TO PAY FOR THIS WATER.
12. UNLESS NOTED OTHERWISE, ALL WATER MAIN P.I.'S SHALL BE ACHIEVED USING THE WATER MAIN MANUFACTURER'S ALLOWABLE JOINT DEFLECTION.
13. WATER MAINS, FIRE HYDRANTS, APPURTENANCES, AND VALVES THAT ARE ABANDONED SHALL BE CUT AND PLUGGED PER SPECIFICATION SECTION 02500 – ABANDONMENT OF WATER INFRASTRUCTURE.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MEETING 98% COMPACTION ON ALL TRENCH BACKFILL AND PAYING FOR THE TESTS TO BE PERFORMED BY A THIRD PARTY. COMPACTION TESTS WILL BE DONE AT ONE LOCATION POINT RANDOMLY SELECTED OR AS INDICATED BY CCSUD INSPECTOR/TEST ADMINISTRATOR, PER EACH 12-INCH LOOSE LIFT 400 LINEAR FEET AT A MINIMUM. PERMITS WILL NOT BE ACCEPTED AND FINALIZED BY CCSUD WITHOUT THIS REQUIREMENT BEING MET AND VERIFIED BY PROVIDING ALL NECESSARY DOCUMENTED TEST RESULTS.

NOTES:

1. ALL EXCAVATED MATERIAL SHALL BE PLACED ON THE UPGRADIENT SIDE OF THE SEWER TRENCH THUS ALLOWING THE TRENCH TO INTERCEPT ANY SILT CONTAMINATED RUNOFF.
2. ALL SANITARY SEWER PIPE SHALL BE P.V.C. THAT MEETS ASTM SPECIFICATION D-3034, SDR-26 UNLESS OTHERWISE NOTED.
3. ALL LATERALS TO BE INSTALLED @ MIN. 2.0% SLOPE. UNLESS OTHERWISE NOTED.
4. LATERALS TO BE BUILT TO FRONT UTILITY EASEMENT LINE OR SANITARY SEWER EASEMENT LINE.
5. ENSURE ALL DRIVEWAY APPROACHES ARE BUILT IN GENERAL ACCORDANCE WITH A.D.A. SPECIFICATIONS. NO VALVES, HYDRANTS, ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.
6. THE LOCATIONS AND DEPTHS OF ALL EXISTING UTILITIES, INCLUDING SERVICE LATERALS AND DRAINAGE STRUCTURES SHOWN ON THE PLANS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION AND DEPTHS OF UNDERGROUND UTILITIES AT LEAST 48 HOURS PRIOR TO CONSTRUCTION WHETHER SHOWN ON PLANS OR NOT, AND TO PROTECT THE SAME DURING CONSTRUCTION.
7. ALL UTILITIES TO BE CONSTRUCTED PRIOR TO STREETS
8. NO VALVES, HYDRANTS, CLEANOUTS ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.
9. THIS PROJECT INCLUDES UTILITY INSTALLATIONS GREATER THAN 5-FEET IN DEPTH LOCATED IN PUBLIC RIGHT-OF-WAY OR EASEMENTS. DEEP TRENCHES POSE COMPACTION TESTING AND CONSTRUCTION CHALLENGES AND CITY METHODS FOR TESTING AND COMPACTION MAY NOT BE ACHIEVABLE. A UTILITY COMPACTION PLAN WILL BE REQUIRED AND MUST BE SUBMITTED FOR APPROVAL TO CITY PRIOR TO UTILITY INSTALLATION.
10. UTILITY TRENCH COMPACTION (ADDED TO THE CONSTRUCTION PLANS ON ALL UTILITY PLAN SHEETS): ALL UTILITY TRENCH COMPACTION TESTS WITHIN THE STREET PAVEMENT/SIDEWALK SECTION SHALL BE THE RESPONSIBILITY OF THE DEVELOPER'S GEOTECHNICAL ENGINEER. FILL MATERIAL SHALL BE PLACED IN UNIFORM LAYERS NOT TO EXCEED TWELVE INCHES (12") LOOSE. DETERMINE THE MAXIMUM LIFT THICKNESS BASED ON THE ABILITY OF THE COMPACTING OPERATION AND EQUIPMENT USED TO MEET THE REQUIRED DENSITY. EACH LAYER OF MATERIAL SHALL BE COMPACTED TO A MINIMUM 95% DENSITY AND TESTED FOR DENSITY AND MOISTURE IN ACCORDANCE WITH TEST METHODS TEX-113-E, TEX-114-E, TEX-115-E. THE NUMBER AND LOCATION OF REQUIRED TESTS SHALL BE DETERMINED BY THE GEOTECHNICAL ENGINEER AND APPROVED BY THE CITY OF NEW BRAUNFELS STREET INSPECTOR. AT A MINIMUM, TESTS SHALL BE TAKEN EVERY 200 LF FOR EACH LIFT AND EVERY OTHER SERVICE LINE. UPON COMPLETION OF TESTING THE GEOTECHNICAL ENGINEER SHALL PROVIDE THE CITY OF NEW BRAUNFELS STREET INSPECTOR WITH ALL TESTING DOCUMENTATION AND A CERTIFICATION STATING THAT THE PLACEMENT OF FILL MATERIAL HAS BEEN COMPLETED IN ACCORDANCE WITH THE PLANS. ADDITIONAL DENSITY TESTS MAY BE REQUESTED BY THE CITY OF NEW BRAUNFELS INSPECTOR.
11. FOR WATER METER BOX INSTALLATION, SEE C5.D1 - SERVICE CONNECTION DETAILS.
12. CONTRACTOR TO EXTEND WATER SERVICE TRENCH PAST WATER SERVICE METER THROUGH PUBLIC UTILITY EASEMENT AT MINIMUM DEPTH OF 1'. WATER SERVICE PAST METER TO BE INSTALLED WITH HOMEBUILDING.

CUDEENGINEERS.COM
EST. 1980
CUDE
ENGINEERS
4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

WATER DISTRIBUTION

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
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4/16/26
TORY DUANE MILLER
135598

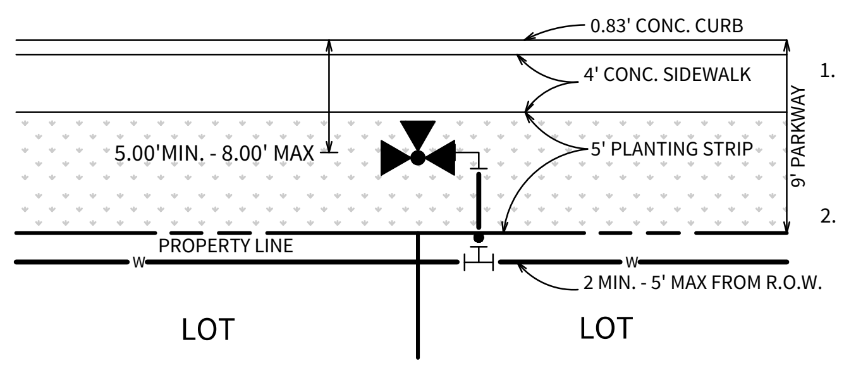
CUDE ENGINEERS
TBPELS No. 10048500

C5.00

R:\04024\018\2-DWG\4-Plans\C5.00 WATER DISTRIBUTION.dwg 2026/04/16 8:39am sgonzales

LEGEND

PROPOSED 3/4" SINGLE WATER SERVICE	W
PROPOSED 3/4" DUAL WATER SERVICE	W W
PROPOSED 1" IRRIGATION WITH 5/8" METER	IRR
PROPOSED SANITARY SEWER	8"SS
PROPOSED SANITARY SEWER MANHOLE	●
PROPOSED WATER MAIN	XXX L.F. - XX" PVC C-900
PROPOSED STANDARD FIRE HYDRANT	⧓
PROPOSED STANDARD GATE VALVE	●
PUBLIC UTILITY EASEMENT	P.U.E.
ENTIRE LENGTH TO BE RESTRAINED	⊗



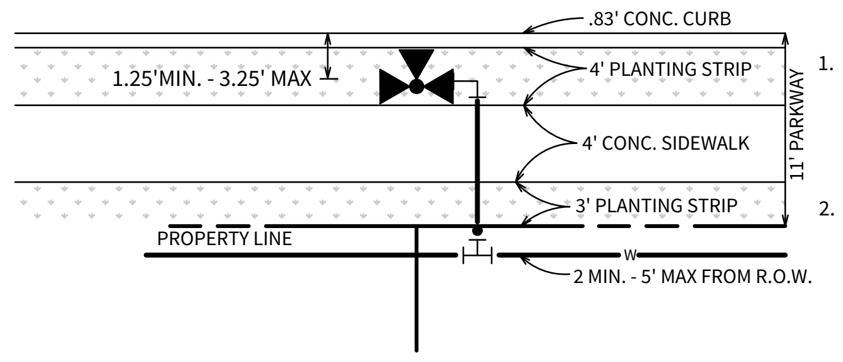
0.83' CONC. CURB
4' CONC. SIDEWALK
5.00'MIN. - 8.00' MAX
5' PLANTING STRIP
9' PARKWAY
PROPERTY LINE
2 MIN. - 5' MAX FROM R.O.W.
LOT
LOT

NOTE:

1. EXCLUSIVE OF THE TEE, PAYMENT FOR THE FIRE HYDRANT SHALL INCLUDE ALL FITTINGS, 6" D.I. PIPE AND 6" GATE VALVE & BOX.
2. FIRE HYDRANT TO BE INSTALLED OUTSIDE OF THE LIMITS OF ALL PROPOSED SIDEWALKS.

RESIDENTIAL FIRE HYDRANT DETAIL (4' SIDEWALK / 50' R.O.W.)

N.T.S.



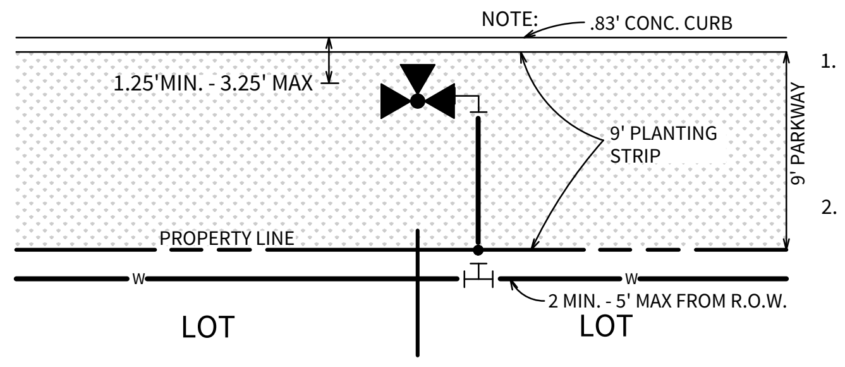
.83' CONC. CURB
1.25'MIN. - 3.25' MAX
4' PLANTING STRIP
4' CONC. SIDEWALK
3' PLANTING STRIP
11' PARKWAY
PROPERTY LINE
2 MIN. - 5' MAX FROM R.O.W.

NOTE:

1. EXCLUSIVE OF THE TEE, PAYMENT FOR THE FIRE HYDRANT SHALL INCLUDE ALL FITTINGS, 6" D.I. PIPE AND 6" GATE VALVE & BOX.
2. FIRE HYDRANT TO BE INSTALLED OUTSIDE OF THE LIMITS OF ALL PROPOSED SIDEWALKS.

RESIDENTIAL COLLECTOR FIRE HYDRANT DETAIL (4' SIDEWALK / 60' R.O.W.)

N.T.S.

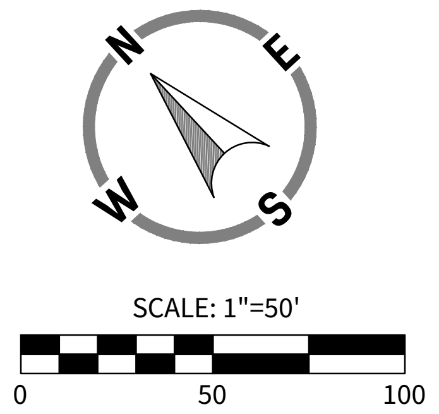


NOTE:
.83' CONC. CURB
1.25'MIN. - 3.25' MAX
9' PLANTING STRIP
9' PARKWAY
PROPERTY LINE
2 MIN. - 5' MAX FROM R.O.W.
LOT
LOT

1. EXCLUSIVE OF THE TEE, PAYMENT FOR THE FIRE HYDRANT SHALL INCLUDE ALL FITTINGS, 6" D.I. PIPE AND 6" GATE VALVE & BOX.
2. FIRE HYDRANT TO BE INSTALLED OUTSIDE OF THE LIMITS OF ALL PROPOSED SIDEWALKS.

MINOR COLLECTOR FIRE HYDRANT DETAIL (72' R.O.W.)

N.T.S.



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SCALE: 1"=50'
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50
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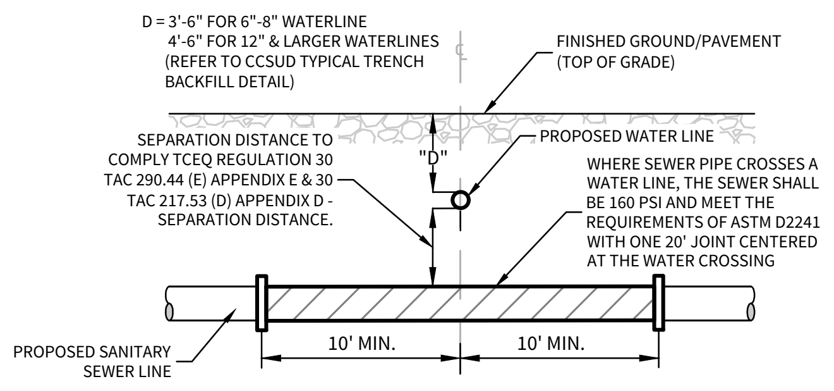
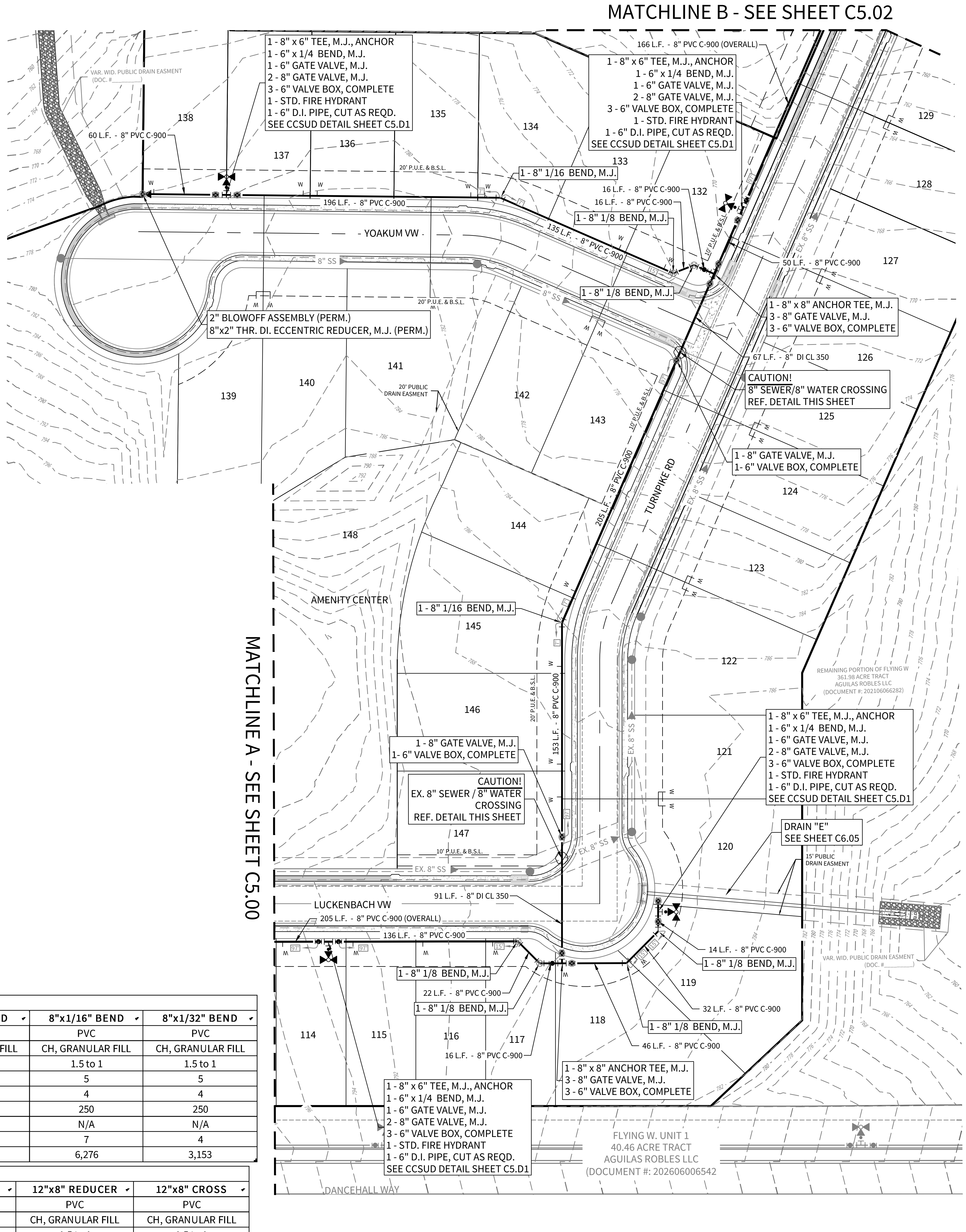


D = 3'-6" FOR 6"-8" WATERLINE
4'-6" FOR 12" & LARGER WATERLINES
(REFER TO CCSUD TYPICAL TRENCH BACKFILL DETAIL)
FINISHED GROUND/PAVEMENT (TOP OF GRADE)
SEPARATION DISTANCE TO COMPLY TCEQ REGULATION 30 TAC 290.44 (E) APPENDIX E & 30 TAC 217.53 (D) APPENDIX D - SEPARATION DISTANCE.
"D"
PROPOSED WATER LINE
WHERE SEWER PIPE CROSSES A WATER LINE, THE SEWER SHALL BE 160 PSI AND MEET THE REQUIREMENTS OF ASTM D2241 WITH ONE 20' JOINT CENTERED AT THE WATER CROSSING
PROPOSED SANITARY SEWER LINE
10' MIN.
10' MIN.

TYPICAL SANITARY SEWER/ WATER CROSSING DETAIL

N.T.S.



MATCHLINE B - SEE SHEET C5.02
MATCHLINE A - SEE SHEET C5.00
VAR. WID. PUBLIC DRAIN EASMENT (DOC. #______)
1 - 8" x 6" TEE, M.J., ANCHOR
1 - 6" x 1/4 BEND, M.J.
1 - 6" GATE VALVE, M.J.
2 - 8" GATE VALVE, M.J.
3 - 6" VALVE BOX, COMPLETE
1 - STD. FIRE HYDRANT
1 - 6" D.I. PIPE, CUT AS REQD.
SEE CCSUD DETAIL SHEET C5.D1
60 L.F. - 8" PVC C-900
196 L.F. - 8" PVC C-900
135 L.F. - 8" PVC C-900
166 L.F. - 8" PVC C-900 (OVERALL)
1 - 8" 1/16 BEND, M.J.
16 L.F. - 8" PVC C-900
16 L.F. - 8" PVC C-900
1 - 8" 1/8 BEND, M.J.
1 - 8" 1/8 BEND, M.J.
50 L.F. - 8" PVC C-900
1 - 8" x 8" ANCHOR TEE, M.J.
3 - 8" GATE VALVE, M.J.
3 - 6" VALVE BOX, COMPLETE
67 L.F. - 8" DI CL 350
CAUTION!
8" SEWER/8" WATER CROSSING
REF. DETAIL THIS SHEET
1 - 8" GATE VALVE, M.J.
1- 6" VALVE BOX, COMPLETE
2" BLOWOFF ASSEMBLY (PERM.)
8"x2" THR. DI. ECCENTRIC REDUCER, M.J. (PERM.)
- YOAKUM VW -
8" SS
20' P.U.E. & B.S.L.
20' PUBLIC DRAIN EASMENT
10' P.U.E. & B.S.L.
TURNPIKE RD
EX. 8" SS
205 L.F. - 8" PVC C-900
153 L.F. - 8" PVC C-900
AMENITY CENTER
1 - 8" 1/16 BEND, M.J.
REMAINING PORTION OF FLYING W
361.98 ACRE TRACT
AGUILAS ROBLES LLC
(DOCUMENT #: 202106066282)
1 - 8" GATE VALVE, M.J.
1- 6" VALVE BOX, COMPLETE
CAUTION!
EX. 8" SEWER / 8" WATER CROSSING
REF. DETAIL THIS SHEET
1 - 8" x 6" TEE, M.J., ANCHOR
1 - 6" x 1/4 BEND, M.J.
1 - 6" GATE VALVE, M.J.
2 - 8" GATE VALVE, M.J.
3 - 6" VALVE BOX, COMPLETE
1 - STD. FIRE HYDRANT
1 - 6" D.I. PIPE, CUT AS REQD.
SEE CCSUD DETAIL SHEET C5.D1
DRAIN "E"
SEE SHEET C6.05
15' PUBLIC DRAIN EASMENT
91 L.F. - 8" DI CL 350
LUCKENBACH VW
205 L.F. - 8" PVC C-900 (OVERALL)
136 L.F. - 8" PVC C-900
14 L.F. - 8" PVC C-900
1 - 8" 1/8 BEND, M.J.
1 - 8" 1/8 BEND, M.J.
22 L.F. - 8" PVC C-900
1 - 8" 1/8 BEND, M.J.
32 L.F. - 8" PVC C-900
1 - 8" 1/8 BEND, M.J.
46 L.F. - 8" PVC C-900
16 L.F. - 8" PVC C-900
1 - 8" x 8" ANCHOR TEE, M.J.
3 - 8" GATE VALVE, M.J.
3 - 6" VALVE BOX, COMPLETE
1 - 8" x 6" TEE, M.J., ANCHOR
1 - 6" x 1/4 BEND, M.J.
1 - 6" GATE VALVE, M.J.
2 - 8" GATE VALVE, M.J.
3 - 6" VALVE BOX, COMPLETE
1 - STD. FIRE HYDRANT
1 - 6" D.I. PIPE, CUT AS REQD.
SEE CCSUD DETAIL SHEET C5.D1
VAR. WID. PUBLIC DRAIN EASMENT (DOC. #______)
FLYING W. UNIT 1
40.46 ACRE TRACT
AGUILAS ROBLES LLC
(DOCUMENT #: 202606006542
DANCEHALL WAY
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CAUTION!

THE CONTRACTOR SHALL BE AWARE THAT UNDERGROUND UTILITY LINES EXIST ALONG FM 1102. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE THESE UTILITIES LOCATED PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING IN THIS AREA. ANY DAMAGE DONE TO THESE EXISTING FACILITIES WILL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO REPAIR.

TRENCH EXCAVATION PROTECTION

CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN/GEOTECHNICAL/SAFETY/EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITE(S) WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS AND/OR PROCEDURES FOR THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR'S IMPLEMENTATION OF THESE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.

CRYSTAL CLEAR SPECIAL UTILITY DISTRICT (CCSUD) WATER MAIN NOTES:

1. CONSTRUCTION OF ALL CCSUD WATER UTILITY INFRASTRUCTURE MUST ADHERE TO CCSUD'S TECHNICAL SPECIFICATIONS, DETAILS AND APPROVED EQUIPMENT LIST.
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6. ALL DUCTILE IRON WATER MAINS SHALL BE PRESSURE CLASS CONFORMING TO AWWA C151 AND CEMENT LINED.
7. WATER MAINS SHALL BE RESTRAINED WITH RESTRAINT LENGTHS OF FITTINGS SHOWN IN PLANS. THRUST BLOCKING IS REQUIRED AT ALL FITTINGS AND BENDS IN ACCORDANCE WITH THE THRUST BLOCKING DETAIL PROVIDED AND SPECIFICATION SECTION 02680 - JOINT RESTRAINTS AND THRUST BLOCKING.
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13. WATER MAINS, FIRE HYDRANTS, APPURTENANCES, AND VALVES THAT ARE ABANDONED SHALL BE CUT AND PLUGGED PER SPECIFICATION SECTION 02500 – ABANDONMENT OF WATER INFRASTRUCTURE.
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NOTES:

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2. ALL SANITARY SEWER PIPE SHALL BE P.V.C. THAT MEETS ASTM SPECIFICATION D-3034, SDR-26 UNLESS OTHERWISE NOTED.
3. ALL LATERALS TO BE INSTALLED @ MIN. 2.0% SLOPE. UNLESS OTHERWISE NOTED.
4. LATERALS TO BE BUILT TO FRONT UTILITY EASEMENT LINE OR SANITARY SEWER EASEMENT LINE.
5. ENSURE ALL DRIVEWAY APPROACHES ARE BUILT IN GENERAL ACCORDANCE WITH A.D.A. SPECIFICATIONS. NO VALVES, HYDRANTS, ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.
6. THE LOCATIONS AND DEPTHS OF ALL EXISTING UTILITIES, INCLUDING SERVICE LATERALS AND DRAINAGE STRUCTURES SHOWN ON THE PLANS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION AND DEPTHS OF UNDERGROUND UTILITIES AT LEAST 48 HOURS PRIOR TO CONSTRUCTION WHETHER SHOWN ON PLANS OR NOT, AND TO PROTECT THE SAME DURING CONSTRUCTION.
7. ALL UTILITIES TO BE CONSTRUCTED PRIOR TO STREETS
8. NO VALVES, HYDRANTS, CLEANOUTS ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.
9. THIS PROJECT INCLUDES UTILITY INSTALLATIONS GREATER THAN 5-FEET IN DEPTH LOCATED IN PUBLIC RIGHT-OF-WAY OR EASEMENTS. DEEP TRENCHES POSE COMPACTION TESTING AND CONSTRUCTION CHALLENGES AND CITY METHODS FOR TESTING AND COMPACTION MAY NOT BE ACHIEVABLE. A UTILITY COMPACTION PLAN WILL BE REQUIRED AND MUST BE SUBMITTED FOR APPROVAL TO CITY PRIOR TO UTILITY INSTALLATION.
10. UTILITY TRENCH COMPACTION (ADDED TO THE CONSTRUCTION PLANS ON ALL UTILITY PLAN SHEETS): ALL UTILITY TRENCH COMPACTION TESTS WITHIN THE STREET PAVEMENT/SIDEWALK SECTION SHALL BE THE RESPONSIBILITY OF THE DEVELOPER'S GEOTECHNICAL ENGINEER. FILL MATERIAL SHALL BE PLACED IN UNIFORM LAYERS NOT TO EXCEED TWELVE INCHES (12") LOOSE. DETERMINE THE MAXIMUM LIFT THICKNESS BASED ON THE ABILITY OF THE COMPACTING OPERATION AND EQUIPMENT USED TO MEET THE REQUIRED DENSITY. EACH LAYER OF MATERIAL SHALL BE COMPACTED TO A MINIMUM 95% DENSITY AND TESTED FOR DENSITY AND MOISTURE IN ACCORDANCE WITH TEST METHODS TEX-113-E, TEX-114-E, TEX-115-E. THE NUMBER AND LOCATION OF REQUIRED TESTS SHALL BE DETERMINED BY THE GEOTECHNICAL ENGINEER AND APPROVED BY THE CITY OF NEW BRAUNFELS STREET INSPECTOR. AT A MINIMUM, TESTS SHALL BE TAKEN EVERY 200 LF FOR EACH LIFT AND EVERY OTHER SERVICE LINE. UPON COMPLETION OF TESTING THE GEOTECHNICAL ENGINEER SHALL PROVIDE THE CITY OF NEW BRAUNFELS STREET INSPECTOR WITH ALL TESTING DOCUMENTATION AND A CERTIFICATION STATING THAT THE PLACEMENT OF FILL MATERIAL HAS BEEN COMPLETED IN ACCORDANCE WITH THE PLANS. ADDITIONAL DENSITY TESTS MAY BE REQUESTED BY THE CITY OF NEW BRAUNFELS INSPECTOR.
11. FOR WATER METER BOX INSTALLATION, SEE 5.D1 - SERVICE CONNECTION DETAILS.
12. CONTRACTOR TO EXTEND WATER SERVICE TRENCH PAST WATER SERVICE METER THROUGH PUBLIC UTILITY EASEMENT AT MINIMUM DEPTH OF 1'. WATER SERVICE PAST METER TO BE INSTALLED WITH HOMEBUILDING.

SHEET NOTES:

1. ALL 8" & 12" PVC SHALL BE C-900 CLASS 235 DR 18, UNLESS OTHERWISE STATED.
2. DISINFECTANT
   - A. BEFORE DISINFECTION FOR USE WITH POTABLE WATER, THE WATER MAIN PIPELINE SHALL BE FILLED TO ELIMINATE AIR POCKETS AND FLUSHED TO REMOVE PARTICULATES. THE FLUSHING VELOCITY IN THE MAIN SHALL NOT BE LESS THAN 2.50 FEET/SECOND UNLESS THE OWNER DETERMINES THAT CONDITIONS DO NOT PERMIT THE REQUIRED FLOW RATE.
   - B. THE CONTRACTOR SHALL DISINFECT ALL INSTALLED WATER MAINS IN ACCORDANCE WITH THE REQUIREMENTS OF AWWA C651 AND CCSUD TECHNICAL SPECIFICATION SECTION 01350, HYDROTESTING AND DISINFECTION.
   - C. LIQUID CHLORINE, SODIUM HYPOCHLORITE OR CALCIUM HYPOCHLORITE SHALL BE USED IN ACCORDANCE WITH AWWA C652 AND AWWA C653
   - D. LIQUID CHLORINE SHALL BE USED ONLY WHERE GAS-FLOW CHLORINATORS AND INJECTORS ARE INSTALLED FOR TREATMENT APPLICATIONS. PORTABLE OR MAKESHIFT GAS CHLORINATION EQUIPMENT IS NOT ACCEPTABLE.
   - E. DISINFECTANT CHEMICALS AND MATERIALS SHALL BE FURNISHED BY THE CONTRACTOR.
   - F. ALL DISINFECTION OF WATER MAINS AND PIPING SHALL BE DONE UNDER GENERAL SUPERVISION OF THE INSPECTOR.
3. CONTRACTOR SHALL MAINTAIN A MINIMUM DEPTH OF 3.5 FEET ON ALL 8" AND 4.5 FEET ON ALL 12" MAINS

RESTRAINT LENGTH TABLE

	12"x1/8" V-BEND	12"x1/8" BEND	12"x1/16" BEND	12"x1/32" BEND	8"x1/8" BEND	8"x1/16" BEND	8"x1/32" BEND
PIPE MATERIAL	PVC	PVC	PVC	PVC	PVC	PVC	PVC
SOIL TYPE	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL
SAFETY FACTOR	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1
TRENCH TYPE	5	5	5	5	5	5	5
DEPTH OF BURY (FT)	4	4	4	4	4	4	4
TEST PRESSURE (PSI)	250	250	250	250	250	250	250
UPPER RESTRAINT LENGTH (FT)	57	N/A	N/A	N/A	N/A	N/A	N/A
LOWER RESTRAINT LENGTH (FT)	15	21	10	5	15	7	4
THRUST (LBS)	26,186	26,186	13,350	6,707	12,310	6,276	3,153

RESTRAINT LENGTH TABLE

	12"x12" TEE	8"x8" TEE	12" DEAD END/IN-LINE VALVE	8" DEAD END/IN-LINE VALVE	12"x8" REDUCER	12"x8" CROSS
PIPE MATERIAL	PVC	PVC	PVC	PVC	PVC	PVC
SOIL TYPE	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL
SAFETY FACTOR	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1
TRENCH TYPE	5	5	5	5	5	5
DEPTH OF BURY (FT)	4	4	4	4	4	4
TEST PRESSURE (PSI)	250	250	250	250	250	250
LENGTH ALONG RUN (FT)	0	0	N/A	N/A	N/A	0
RESTRAINT LENGTH (FT)	137	97	137	97	73	137
THRUST (LBS)	34,213	16,083	34,213	16,083	18,130	34,213

NOTE: ALL JOINTS WITHIN THE CALCULATED LENGTH MUST BE RESTRAINED. IF YOUR DISTANCE BETWEEN FITTINGS IS LESS THAN OR EQUAL TO THE CALCULATED RESTRAIN LENGTH, RESTRAIN ALL JOINTS BETWEEN THOSE FITTINGS. CALCULATIONS ARE PROVIDED FOR REFERENCE. THE RESTRAINT LENGTH SHALL BE DESIGNED BASED UPON THE CONDITIONS ENCOUNTERED DURING INSTALLATION.

CUDEENGINEERS.COM

CUDE
EST. 1980
ENGINEERS

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W UNIT 2

WATER DISTRIBUTION

DATE	04/16/2026
PROJECT NO.	04024-018
DRAWN BY	C7
CHECKED BY	JL/TM

REVISIONS
1.
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4/16/26

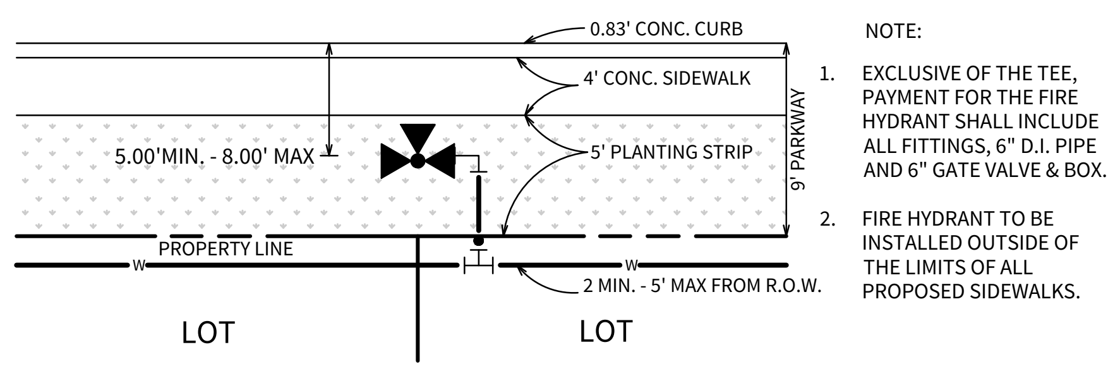
TORY DUANE MILLER
135598

CUDE ENGINEERS
TBPELS No. 10048500

C5.01

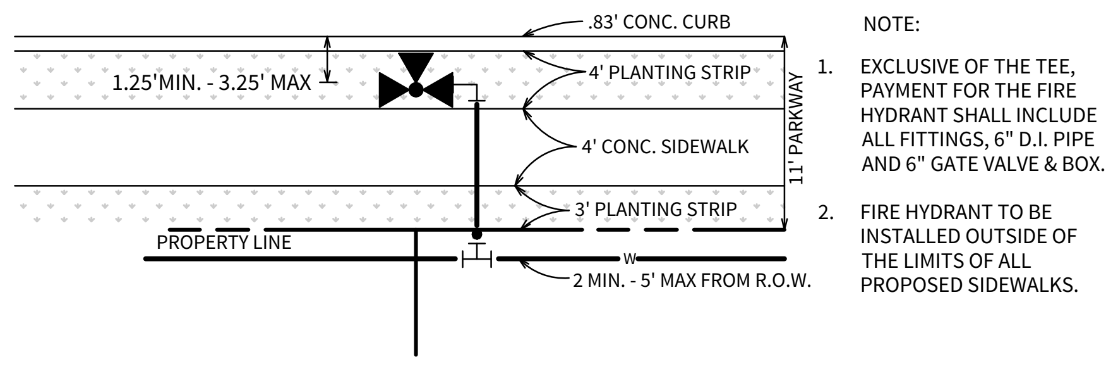
LEGEND

PROPOSED 3/4" SINGLE WATER SERVICE	—W
PROPOSED 3/4" DUAL WATER SERVICE	—⊏ W W
PROPOSED 1" IRRIGATION WITH 5/8" METER	— IRR
PROPOSED SANITARY SEWER	— 8"SS —
PROPOSED SANITARY SEWER MANHOLE	—●—
PROPOSED WATER MAIN	XXX L.F. - XX" PVC C-900
PROPOSED STANDARD FIRE HYDRANT	⧓
PROPOSED STANDARD GATE VALVE	—●—
PUBLIC UTILITY EASEMENT	P.U.E.
ENTIRE LENGTH TO BE RESTRAINED	⊗


0.83' CONC. CURB
4' CONC. SIDEWALK
5' PLANTING STRIP
9' PARKWAY
5.00'MIN. - 8.00' MAX
PROPERTY LINE
2 MIN. - 5' MAX FROM R.O.W.
LOT
LOT
NOTE:
1. EXCLUSIVE OF THE TEE, PAYMENT FOR THE FIRE HYDRANT SHALL INCLUDE ALL FITTINGS, 6" D.I. PIPE AND 6" GATE VALVE & BOX.
2. FIRE HYDRANT TO BE INSTALLED OUTSIDE OF THE LIMITS OF ALL PROPOSED SIDEWALKS.

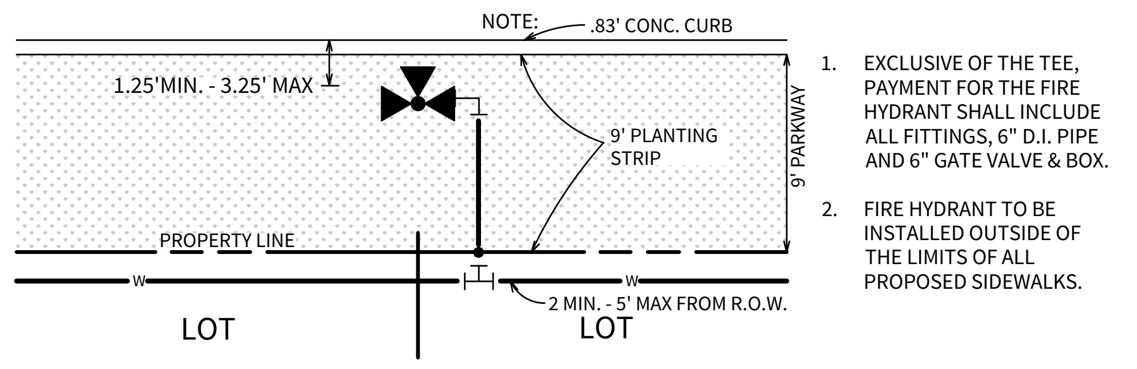
RESIDENTIAL FIRE HYDRANT DETAIL (4' SIDEWALK / 50' R.O.W.)

N.T.S.


.83' CONC. CURB
4' PLANTING STRIP
4' CONC. SIDEWALK
3' PLANTING STRIP
11' PARKWAY
1.25'MIN. - 3.25' MAX
PROPERTY LINE
2 MIN. - 5' MAX FROM R.O.W.
NOTE:
1. EXCLUSIVE OF THE TEE, PAYMENT FOR THE FIRE HYDRANT SHALL INCLUDE ALL FITTINGS, 6" D.I. PIPE AND 6" GATE VALVE & BOX.
2. FIRE HYDRANT TO BE INSTALLED OUTSIDE OF THE LIMITS OF ALL PROPOSED SIDEWALKS.

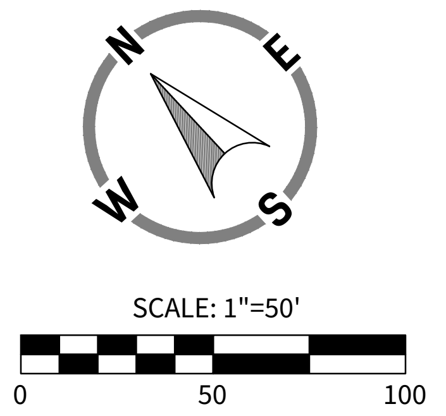
RESIDENTIAL COLLECTOR FIRE HYDRANT DETAIL (4' SIDEWALK / 60' R.O.W.)

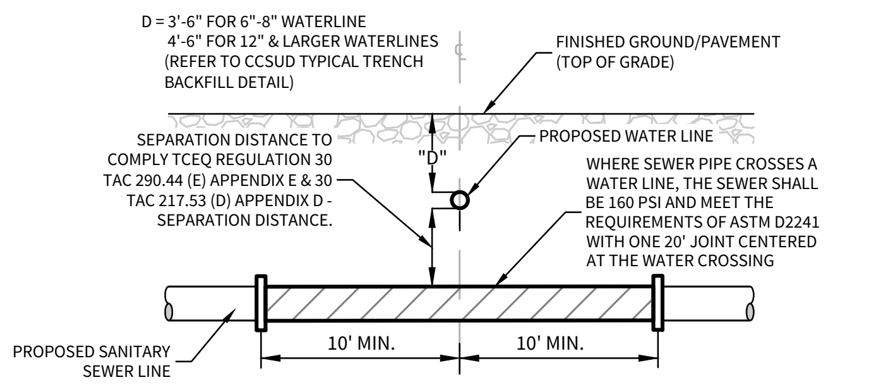
N.T.S.


NOTE:
.83' CONC. CURB
1.25'MIN. - 3.25' MAX
9' PLANTING STRIP
9' PARKWAY
PROPERTY LINE
2 MIN. - 5' MAX FROM R.O.W.
LOT
LOT
1. EXCLUSIVE OF THE TEE, PAYMENT FOR THE FIRE HYDRANT SHALL INCLUDE ALL FITTINGS, 6" D.I. PIPE AND 6" GATE VALVE & BOX.
2. FIRE HYDRANT TO BE INSTALLED OUTSIDE OF THE LIMITS OF ALL PROPOSED SIDEWALKS.

MINOR COLLECTOR FIRE HYDRANT DETAIL (72' R.O.W.)

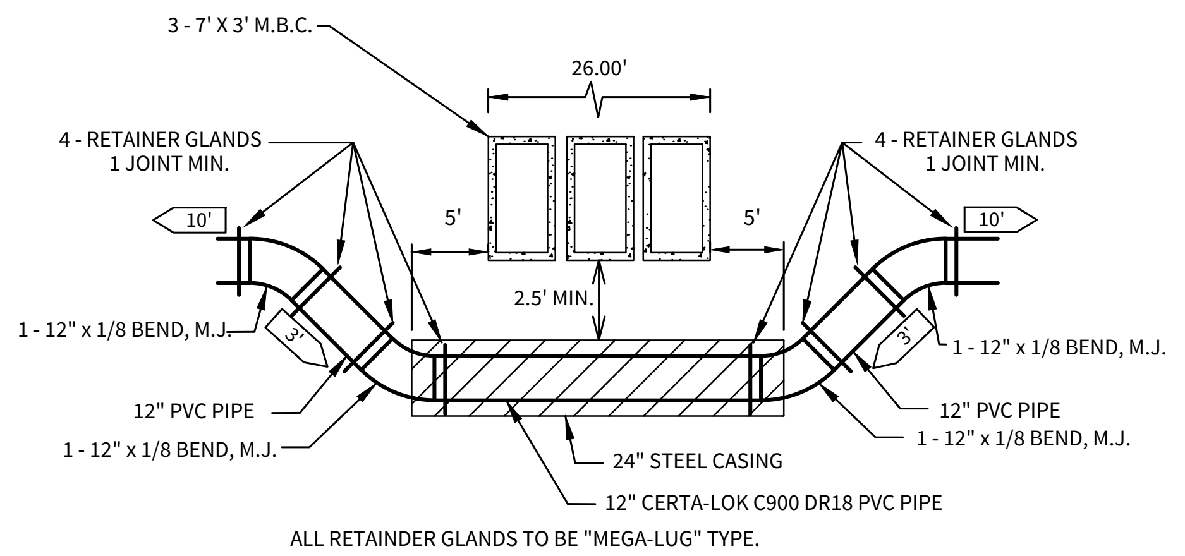
N.T.S.


N
E
S
W
SCALE: 1"=50'
0
50
100


D = 3'-6" FOR 6"-8" WATERLINE
4'-6" FOR 12" & LARGER WATERLINES
(REFER TO CCSUD TYPICAL TRENCH BACKFILL DETAIL)
FINISHED GROUND/PAVEMENT (TOP OF GRADE)
SEPARATION DISTANCE TO COMPLY TCEQ REGULATION 30 TAC 290.44 (E) APPENDIX E & 30 TAC 217.53 (D) APPENDIX D - SEPARATION DISTANCE.
PROPOSED WATER LINE
"D"
WHERE SEWER PIPE CROSSES A WATER LINE, THE SEWER SHALL BE 160 PSI AND MEET THE REQUIREMENTS OF ASTM D2241 WITH ONE 20' JOINT CENTERED AT THE WATER CROSSING
PROPOSED SANITARY SEWER LINE
10' MIN.
10' MIN.

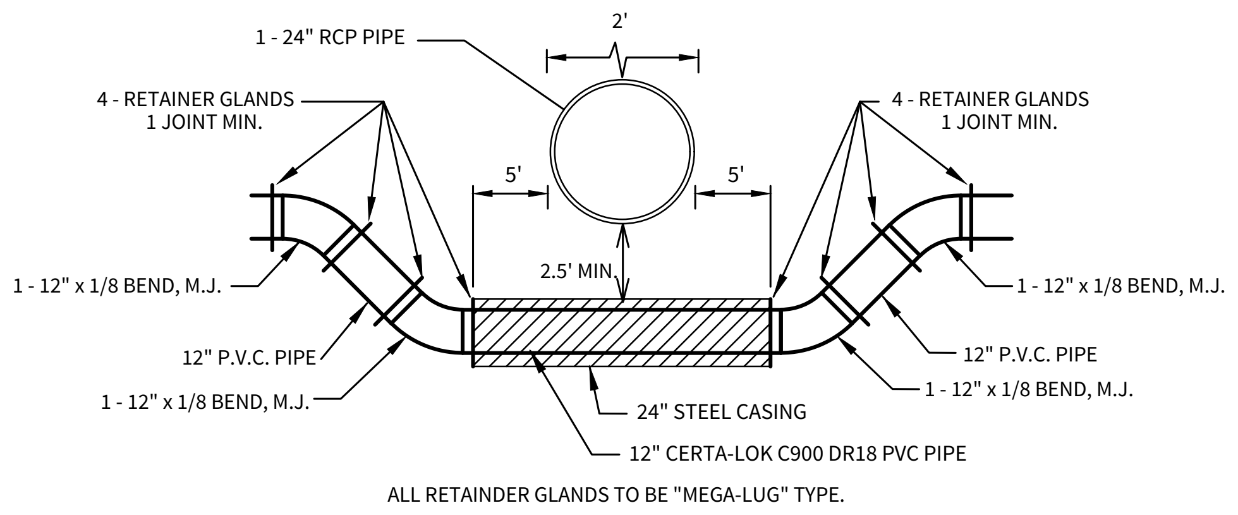
TYPICAL SANITARY SEWER/ WATER CROSSING DETAIL

N.T.S.


3 - 7' X 3' M.B.C.
26.00'
4 - RETAINER GLANDS 1 JOINT MIN.
4 - RETAINER GLANDS 1 JOINT MIN.
10'
10'
5'
5'
2.5' MIN.
1 - 12" x 1/8 BEND, M.J.
1 - 12" x 1/8 BEND, M.J.
12" PVC PIPE
12" PVC PIPE
1 - 12" x 1/8 BEND, M.J.
1 - 12" x 1/8 BEND, M.J.
24" STEEL CASING
12" CERTA-LOK C900 DR18 PVC PIPE
ALL RETAINDER GLANDS TO BE "MEGA-LUG" TYPE.

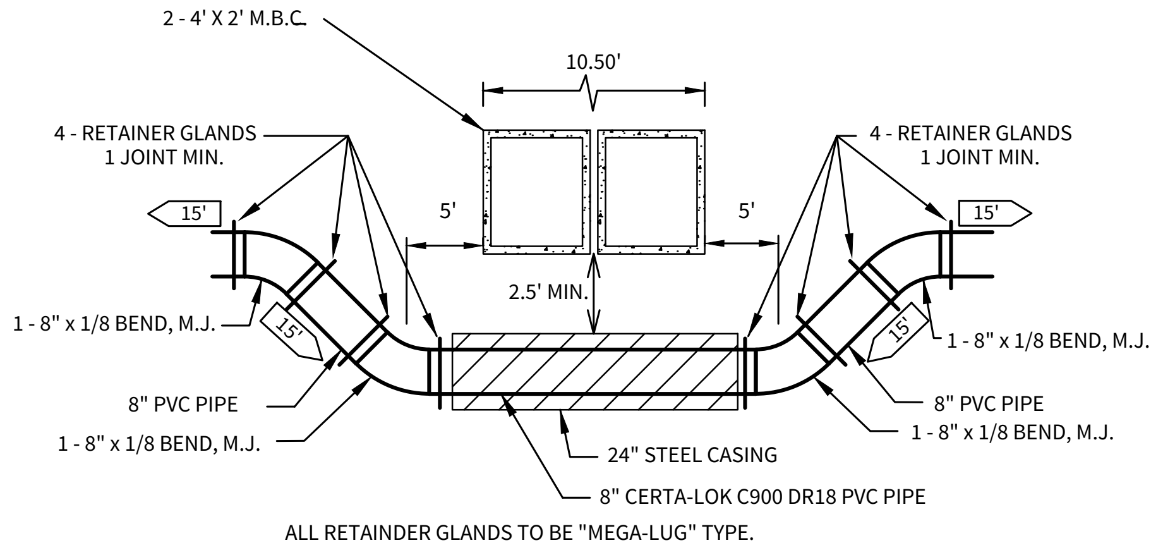
WATER / DRAIN "D" CROSSING

SIDE VIEW (THIS DETAIL IS VERTICAL ONLY, NOT HORIZONTAL.)


1 - 24" RCP PIPE
2'
4 - RETAINER GLANDS 1 JOINT MIN.
4 - RETAINER GLANDS 1 JOINT MIN.
5'
5'
2.5' MIN.
1 - 12" x 1/8 BEND, M.J.
1 - 12" x 1/8 BEND, M.J.
12" P.V.C. PIPE
12" P.V.C. PIPE
1 - 12" x 1/8 BEND, M.J.
1 - 12" x 1/8 BEND, M.J.
24" STEEL CASING
12" CERTA-LOK C900 DR18 PVC PIPE
ALL RETAINDER GLANDS TO BE "MEGA-LUG" TYPE.

WATER / ENTRANCE CULVERT CROSSING DETAIL

SIDE VIEW (THIS DETAIL IS VERTICAL ONLY, NOT HORIZONTAL.)
(N.T.S.)


2 - 4' X 2' M.B.C.
10.50'
4 - RETAINER GLANDS 1 JOINT MIN.
4 - RETAINER GLANDS 1 JOINT MIN.
15'
15'
5'
5'
2.5' MIN.
1 - 8" x 1/8 BEND, M.J.
1 - 8" x 1/8 BEND, M.J.
8" PVC PIPE
8" PVC PIPE
1 - 8" x 1/8 BEND, M.J.
1 - 8" x 1/8 BEND, M.J.
24" STEEL CASING
8" CERTA-LOK C900 DR18 PVC PIPE
ALL RETAINDER GLANDS TO BE "MEGA-LUG" TYPE.

WATER / DRAIN "A" CROSSING

SIDE VIEW (THIS DETAIL IS VERTICAL ONLY, NOT HORIZONTAL.)

CAUTION!

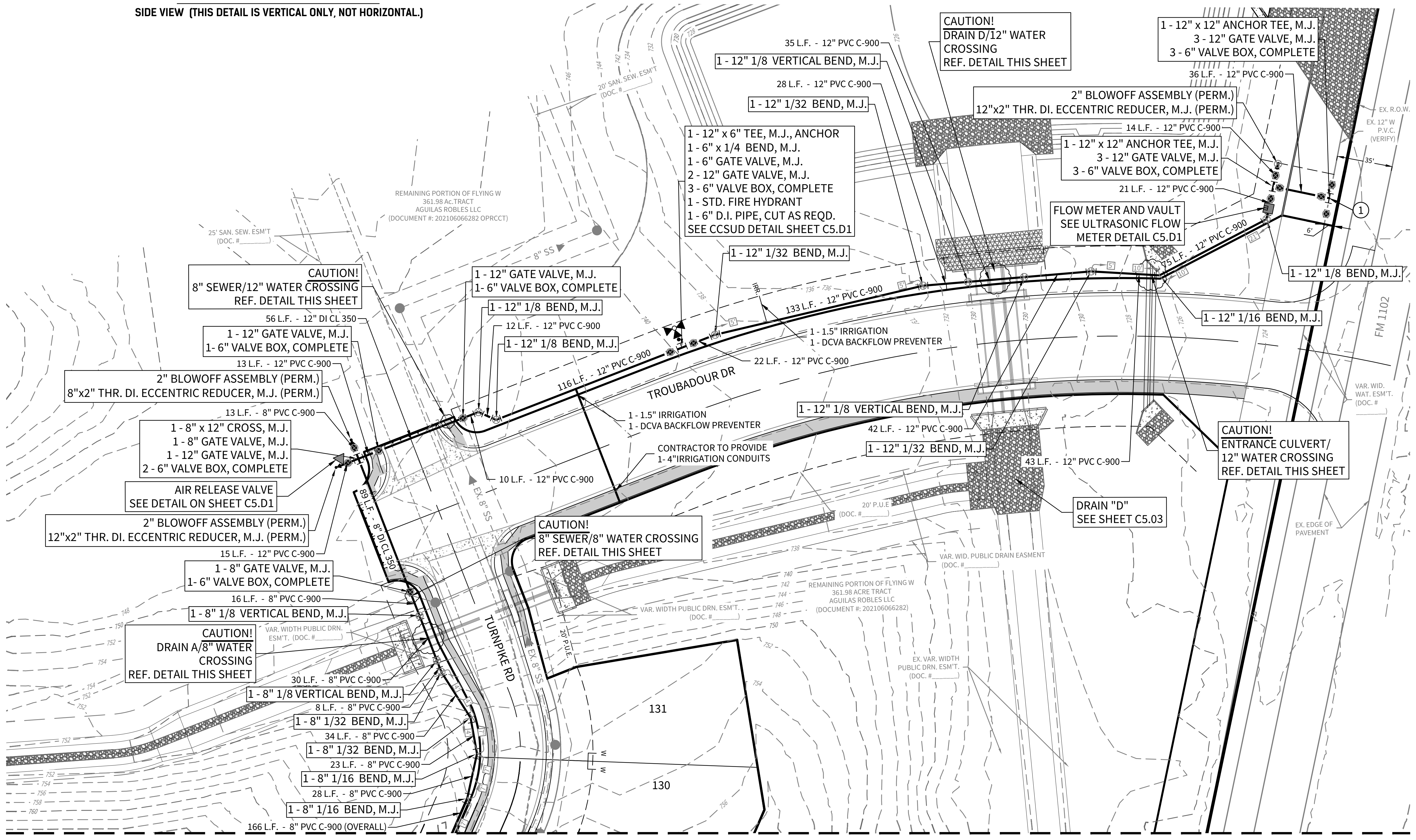
THE CONTRACTOR SHALL BE AWARE THAT UNDERGROUND UTILITY LINES EXIST ALONG FM 1102. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE THESE UTILITIES LOCATED PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING IN THIS AREA. ANY DAMAGE DONE TO THESE EXISTING FACILITIES WILL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO REPAIR.

TRENCH EXCAVATION PROTECTION

CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN/GEOTECHNICAL/SAFETY/EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITE(S) WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS AND/OR PROCEDURES FOR THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR'S IMPLEMENTATION OF THESE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.

CRYSTAL CLEAR SPECIAL UTILITY DISTRICT (CCSUD) WATER MAIN NOTES:

1. CONSTRUCTION OF ALL CCSUD WATER UTILITY INFRASTRUCTURE MUST ADHERE TO CCSUD'S TECHNICAL SPECIFICATIONS, DETAILS AND APPROVED EQUIPMENT LIST.
2. REMOVE ONLY VEGETATION, TREES, STUMPS, RUBBISH, AND OTHER MATERIAL NECESSARY FOR CONSTRUCTION AND DISPOSE OF OFF SITE.
3. THE CONNECTION LOCATIONS LISTED IN THE PLANS ARE BASED ON BEST AVAILABLE INFORMATION. THE CONTRACTOR SHALL FIELD LOCATE EXISTING WATER MAIN LOCATIONS AT ALL TIE-IN LOCATIONS TO VERIFY SIZE, ELEVATION, AND MATERIAL PRIOR TO ORDERING MATERIALS FOR CONNECTION.
4. THE CONTRACTOR SHALL MAINTAIN MINIMUM SEPARATION BETWEEN UTILITIES PER TCEQ STANDARDS.
5. UNLESS OTHERWISE SPECIFIED, ALL PVC WATER MAINS SHALL BE C900 DR 18, COLORED BLUE IN ACCORDANCE WITH SPECIFICATION SECTION 02650 – PVC PIPE FOR WATER MAINS.
6. ALL DUCTILE IRON WATER MAINS SHALL BE PRESSURE CLASS CONFORMING TO AWWA C151 AND CEMENT LINED.
7. WATER MAINS SHALL BE RESTRAINED WITH RESTRAINT LENGTHS OF FITTINGS SHOWN IN PLANS. THRUST BLOCKING IS REQUIRED AT ALL FITTINGS AND BENDS IN ACCORDANCE WITH THE THRUST BLOCKING DETAIL PROVIDED AND SPECIFICATION SECTION 02680 - JOINT RESTRAINTS AND THRUST BLOCKING.
8. LOCATIONS OF COMBINATION AIR VALVES SHOWN ARE APPROXIMATE. INSTALL AIR RELEASE VALVES AT THE HIGH POINT IN THE WATER MAIN FOR THE LOCATIONS GIVEN.
9. THE CONTRACTOR SHALL COORDINATE PRESSURE TESTING OF NEW WATER MAINS WITH OWNER AND ENGINEER AT LEAST TWO BUSINESS DAYS PRIOR. PRESSURE TESTING REQUIREMENTS ARE INCLUDED IN THE SPECIFICATIONS.
10. ALL WATER MAINS SHALL BE DISINFECTED PER AWWA AND TCEQ STANDARDS.
11. THE OWNER SHALL SUPPLY ALL WATER NEEDED FOR CONSTRUCTION TESTING AND DISINFECTION. THE CONTRACTOR SHALL NOT BE REQUIRED TO PAY FOR THIS WATER.
12. UNLESS NOTED OTHERWISE, ALL WATER MAIN P.I.'S SHALL BE ACHIEVED USING THE WATER MAIN MANUFACTURER'S ALLOWABLE JOINT DEFLECTION.
13. WATER MAINS, FIRE HYDRANTS, APPURTENANCES, AND VALVES THAT ARE ABANDONED SHALL BE CUT AND PLUGGED PER SPECIFICATION SECTION 02500 – ABANDONMENT OF WATER INFRASTRUCTURE.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MEETING 98% COMPACTION ON ALL TRENCH BACKFILL AND PAYING FOR THE TESTS TO BE PERFORMED BY A THIRD PARTY. COMPACTION TESTS WILL BE DONE AT ONE LOCATION POINT RANDOMLY SELECTED OR AS INDICATED BY CCSUD INSPECTOR/TEST ADMINISTRATOR, PER EACH 12-INCH LOOSE LIFT 400 LINEAR FEET AT A MINIMUM. PERMITS WILL NOT BE ACCEPTED AND FINALIZED BY CCSUD WITHOUT THIS REQUIREMENT BEING MET AND VERIFIED BY PROVIDING ALL NECESSARY DOCUMENTED TEST RESULTS.


35 L.F. - 12" PVC C-900
1 - 12" 1/8 VERTICAL BEND, M.J.
28 L.F. - 12" PVC C-900
1 - 12" 1/32 BEND, M.J.
CAUTION! DRAIN D/12" WATER CROSSING REF. DETAIL THIS SHEET
1 - 12" x 12" ANCHOR TEE, M.J. 3 - 12" GATE VALVE, M.J. 3 - 6" VALVE BOX, COMPLETE
36 L.F. - 12" PVC C-900
2" BLOWOFF ASSEMBLY (PERM.) 12"x2" THR. DI. ECCENTRIC REDUCER, M.J. (PERM.)
14 L.F. - 12" PVC C-900
1 - 12" x 12" ANCHOR TEE, M.J. 3 - 12" GATE VALVE, M.J. 3 - 6" VALVE BOX, COMPLETE
21 L.F. - 12" PVC C-900
1 - 12" x 6" TEE, M.J., ANCHOR 1 - 6" x 1/4 BEND, M.J. 1 - 6" GATE VALVE, M.J. 2 - 12" GATE VALVE, M.J. 3 - 6" VALVE BOX, COMPLETE 1 - STD. FIRE HYDRANT 1 - 6" D.I. PIPE, CUT AS REQD. SEE CCSUD DETAIL SHEET C5.D1
FLOW METER AND VAULT SEE ULTRASONIC FLOW METER DETAIL C5.D1
25 L.F. - 12" PVC C-900
1 - 12" 1/32 BEND, M.J.
1 - 12" 1/8 BEND, M.J.
1 - 12" 1/16 BEND, M.J.
CAUTION! 8" SEWER/12" WATER CROSSING REF. DETAIL THIS SHEET
1 - 12" GATE VALVE, M.J. 1 - 6" VALVE BOX, COMPLETE
56 L.F. - 12" DI CL 350
1 - 12" 1/8 BEND, M.J.
12 L.F. - 12" PVC C-900
1 - 12" GATE VALVE, M.J. 1- 6" VALVE BOX, COMPLETE
1 - 12" 1/8 BEND, M.J.
13 L.F. - 12" PVC C-900
133 L.F. - 12" PVC C-900
1 - 1.5" IRRIGATION 1 - DCVA BACKFLOW PREVENTER
22 L.F. - 12" PVC C-900
2" BLOWOFF ASSEMBLY (PERM.) 8"x2" THR. DI. ECCENTRIC REDUCER, M.J. (PERM.)
116 L.F. - 12" PVC C-900
TROUBADOUR DR
13 L.F. - 8" PVC C-900
1 - 8" x 12" CROSS, M.J. 1 - 8" GATE VALVE, M.J. 1 - 12" GATE VALVE, M.J. 2 - 6" VALVE BOX, COMPLETE
1 - 1.5" IRRIGATION 1 - DCVA BACKFLOW PREVENTER
CONTRACTOR TO PROVIDE 1 - 4" IRRIGATION CONDUITS
1 - 12" 1/8 VERTICAL BEND, M.J.
42 L.F. - 12" PVC C-900
1 - 12" 1/32 BEND, M.J.
43 L.F. - 12" PVC C-900
CAUTION! ENTRANCE CULVERT/ 12" WATER CROSSING REF. DETAIL THIS SHEET
DRAIN "D" SEE SHEET C5.03
AIR RELEASE VALVE SEE DETAIL ON SHEET C5.D1
10 L.F. - 12" PVC C-900
2" BLOWOFF ASSEMBLY (PERM.) 12"x2" THR. DI. ECCENTRIC REDUCER, M.J. (PERM.)
CAUTION! 8" SEWER/8" WATER CROSSING REF. DETAIL THIS SHEET
15 L.F. - 12" PVC C-900
1 - 8" GATE VALVE, M.J. 1 - 6" VALVE BOX, COMPLETE
16 L.F. - 8" PVC C-900
1 - 8" 1/8 VERTICAL BEND, M.J.
CAUTION! DRAIN A/8" WATER CROSSING REF. DETAIL THIS SHEET
30 L.F. - 8" PVC C-900
1 - 8" 1/8 VERTICAL BEND, M.J.
8 L.F. - 8" PVC C-900
1 - 8" 1/32 BEND, M.J.
34 L.F. - 8" PVC C-900
1 - 8" 1/32 BEND, M.J.
23 L.F. - 8" PVC C-900
1 - 8" 1/16 BEND, M.J.
28 L.F. - 8" PVC C-900
1 - 8" 1/16 BEND, M.J.
166 L.F. - 8" PVC C-900 (OVERALL)
TURNPIKE RD
FM 1102
131
130
①

MATCHLINE B - SEE SHEET C5.01

KEYNOTES:

① **AFTER RELEASE FOR SERVICE, CONTRACTOR TO TIE NEW 12" MAIN INTO EXST. 12" WATER MAIN WITH ±5 L.F. OF 12" WATER MAIN, CUT AS REQUIRED.**

12" VALVES TO REMAIN CLOSED UNTIL AFTER DISINFECTION & ACCEPTANCE BY CCSUD.

CONTRACTOR SHALL FIELD LOCATE & VERIFY DEPTH OF EXISTING 2" LINE AND 12" MAIN & FITTINGS PRIOR TO COMMENCING CONSTRUCTION.

CONTRACTOR TO ENSURE EXISTING PIPES (2" & 12") WILL MEET TxDOT COVER REQUIREMENTS POST CONSTRUCTION. EXISTING PIPE NOT MEETING MINIMUM COVER STANDARDS WILL BE LOWERED AS NEEDED.

PORTIONS OF EXISTING CCSUD 12" MAIN IS CLASSIFIED AS CLASS PIPE AND WILL NOT BE TIED TO. CONTRACTOR TO FIELD VERIFY CONNECTION LOCATIONS ARE NOT CLASS PIPE PRIOR TO INSTALLATION. CONTRACTOR TO CONNECT TO PORTIONS OF EXISTING 12" MAIN NOT CLASSIFIED AS CLASS PIPE.

FOR CHLORINATION INJECTION
2-1" CORPORATION STOP C.C. X I.P.
2-1" COPPER TUBING, CUT AS REQ'D
2-1 1/4" THD. SOLID CAPS, THR.
2-1" COMP. X 1 1/4" COUPLING, CURB STOP
CONTRACTOR SHALL PROVIDE A 4" JUMPER CONNECTION TO LOAD NEW MAIN

1-12" SOLID SLEEVE
1-2" BLOWOFF ASSEMBLY (TEMP.)
1-12" X 2" THR. DI. ECENTRICALLY TAPPED CAP, M.J. (TEMP.)
SEE CCSUD DETAIL SHEET C5.D1

RESTRAINT LENGTH TABLE

	12"x1/8" V-BEND	12"x1/8" BEND	12"x1/16" BEND	12"x1/32" BEND	8"x1/8" BEND	8"x1/16" BEND	8"x1/32" BEND
PIPE MATERIAL	PVC	PVC	PVC	PVC	PVC	PVC	PVC
SOIL TYPE	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL
SAFETY FACTOR	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1
TRENCH TYPE	5	5	5	5	5	5	5
DEPTH OF BURY (FT)	4	4	4	4	4	4	4
TEST PRESSURE (PSI)	250	250	250	250	250	250	250
UPPER RESTRAINT LENGTH (FT)	57	N/A	N/A	N/A	N/A	N/A	N/A
LOWER RESTRAINT LENGTH (FT)	15	21	10	5	15	7	4
THRUST (LBS)	26,186	26,186	13,350	6,707	12,310	6,276	3,153

RESTRAINT LENGTH TABLE

	12"x12" TEE	8"x8" TEE	12" DEAD END/IN-LINE VALVE	8" DEAD END/IN-LINE VALVE	12"x8" REDUCER	12"x8" CROSS
PIPE MATERIAL	PVC	PVC	PVC	PVC	PVC	PVC
SOIL TYPE	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL	CH, GRANULAR FILL
SAFETY FACTOR	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1	1.5 to 1
TRENCH TYPE	5	5	5	5	5	5
DEPTH OF BURY (FT)	4	4	4	4	4	4
TEST PRESSURE (PSI)	250	250	250	250	250	250
LENGTH ALONG RUN (FT)	0	0	N/A	N/A	N/A	0
RESTRAINT LENGTH (FT)	137	97	137	97	73	137
THRUST (LBS)	34,213	16,083	34,213	16,083	18,130	34,213

NOTE: ALL JOINTS WITHIN THE CALCULATED LENGTH MUST BE RESTRAINED. IF YOUR DISTANCE BETWEEN FITTINGS IS LESS THAN OR EQUAL TO THE CALCULATED RESTRAIN LENGTH, RESTRAIN ALL JOINTS BETWEEN THOSE FITTINGS. CALCULATIONS ARE PROVIDED FOR REFERENCE. THE RESTRAINT LENGTH SHALL BE DESIGNED BASED UPON THE CONDITIONS ENCOUNTERED DURING INSTALLATION.

SHEET NOTES:

1. ALL 8" & 12" PVC SHALL BE C-900 CLASS 235 DR 18, UNLESS OTHERWISE STATED.

2. DISINFECTANT
A. BEFORE DISINFECTION FOR USE WITH POTABLE WATER, THE WATER MAIN PIPELINE SHALL BE FILLED TO ELIMINATE AIR POCKETS AND FLUSHED TO REMOVE PARTICULATES. THE FLUSHING VELOCITY IN THE MAIN SHALL NOT BE LESS THAN 2.50 FEET/SECOND UNLESS THE OWNER DETERMINES THAT CONDITIONS DO NOT PERMIT THE REQUIRED FLOW RATE.
B. THE CONTRACTOR SHALL DISINFECT ALL INSTALLED WATER MAINS IN ACCORDANCE WITH THE REQUIREMENTS OF AWWA C651 AND CCSUD TECHNICAL SPECIFICATION SECTION 01350, HYDROTESTING AND DISINFECTION.
C. LIQUID CHLORINE, SODIUM HYPOCHLORITE OR CALCIUM HYPOCHLORITE SHALL BE USED IN ACCORDANCE WITH AWWA C652 AND AWWA C653
D. LIQUID CHLORINE SHALL BE USED ONLY WHERE GAS-FLOW CHLORINATORS AND INJECTORS ARE INSTALLED FOR TREATMENT APPLICATIONS. PORTABLE OR MAKESHIFT GAS CHLORINATION EQUIPMENT IS NOT ACCEPTABLE.
E. DISINFECTANT CHEMICALS AND MATERIALS SHALL BE FURNISHED BY THE CONTRACTOR.
F. ALL DISINFECTION OF WATER MAINS AND PIPING SHALL BE DONE UNDER GENERAL SUPERVISION OF THE INSPECTOR.

3. CONTRACTOR SHALL MAINTAIN A MINIMUM DEPTH OF 3.5 FEET ON ALL 8" AND 4.5 FEET ON ALL 12" MAINS

NOTES:

1. ALL EXCAVATED MATERIAL SHALL BE PLACED ON THE UPGRADIENT SIDE OF THE SEWER TRENCH THUS ALLOWING THE TRENCH TO INTERCEPT ANY SILT CONTAMINATED RUNOFF.
2. ALL SANITARY SEWER PIPE SHALL BE P.V.C. THAT MEETS ASTM SPECIFICATION D-3034, SDR-26 UNLESS OTHERWISE NOTED.
3. ALL LATERALS TO BE INSTALLED @ MIN. 2.0% SLOPE. UNLESS OTHERWISE NOTED.
4. LATERALS TO BE BUILT TO FRONT UTILITY EASEMENT LINE OR SANITARY SEWER EASEMENT LINE.
5. ENSURE ALL DRIVEWAY APPROACHES ARE BUILT IN GENERAL ACCORDANCE WITH A.D.A. SPECIFICATIONS. NO VALVES, HYDRANTS, ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.
6. THE LOCATIONS AND DEPTHS OF ALL EXISTING UTILITIES, INCLUDING SERVICE LATERALS AND DRAINAGE STRUCTURES SHOWN ON THE PLANS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION AND DEPTHS OF UNDERGROUND UTILITIES AT LEAST 48 HOURS PRIOR TO CONSTRUCTION WHETHER SHOWN ON PLANS OR NOT, AND TO PROTECT THE SAME DURING CONSTRUCTION.
7. ALL UTILITIES TO BE CONSTRUCTED PRIOR TO STREETS
8. NO VALVES, HYDRANTS, CLEANOUTS ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.
9. THIS PROJECT INCLUDES UTILITY INSTALLATIONS GREATER THAN 5-FEET IN DEPTH LOCATED IN PUBLIC RIGHT-OF-WAY OR EASEMENTS. DEEP TRENCHES POSE COMPACTION TESTING AND CONSTRUCTION CHALLENGES AND CITY METHODS FOR TESTING AND COMPACTION MAY NOT BE ACHIEVABLE. A UTILITY COMPACTION PLAN WILL BE REQUIRED AND MUST BE SUBMITTED FOR APPROVAL TO CITY PRIOR TO UTILITY INSTALLATION.
10. UTILITY TRENCH COMPACTION (ADDED TO THE CONSTRUCTION PLANS ON ALL UTILITY PLAN SHEETS): ALL UTILITY TRENCH COMPACTION TESTS WITHIN THE STREET PAVEMENT/SIDEWALK SECTION SHALL BE THE RESPONSIBILITY OF THE DEVELOPER'S GEOTECHNICAL ENGINEER. FILL MATERIAL SHALL BE PLACED IN UNIFORM LAYERS NOT TO EXCEED TWELVE INCHES (12") LOOSE. DETERMINE THE MAXIMUM LIFT THICKNESS BASED ON THE ABILITY OF THE COMPACTING OPERATION AND EQUIPMENT USED TO MEET THE REQUIRED DENSITY. EACH LAYER OF MATERIAL SHALL BE COMPACTED TO A MINIMUM 95% DENSITY AND TESTED FOR DENSITY AND MOISTURE IN ACCORDANCE WITH TEST METHODS TEX-113-E, TEX-114-E, TEX-115-E. THE NUMBER AND LOCATION OF REQUIRED TESTS SHALL BE DETERMINED BY THE GEOTECHNICAL ENGINEER AND APPROVED BY THE CITY OF NEW BRAUNFELS STREET INSPECTOR. AT A MINIMUM, TESTS SHALL BE TAKEN EVERY 200 LF FOR EACH LIFT AND EVERY OTHER SERVICE LINE. UPON COMPLETION OF TESTING THE GEOTECHNICAL ENGINEER SHALL PROVIDE THE CITY OF NEW BRAUNFELS STREET INSPECTOR WITH ALL TESTING DOCUMENTATION AND A CERTIFICATION STATING THAT THE PLACEMENT OF FILL MATERIAL HAS BEEN COMPLETED IN ACCORDANCE WITH THE PLANS. ADDITIONAL DENSITY TESTS MAY BE REQUESTED BY THE CITY OF NEW BRAUNFELS INSPECTOR.
11. FOR WATER METER BOX INSTALLATION, SEE 5.D1 - SERVICE CONNECTION DETAILS.
12. CONTRACTOR TO EXTEND WATER SERVICE TRENCH PAST WATER SERVICE METER THROUGH PUBLIC UTILITY EASEMENT AT MINIMUM DEPTH OF 1'. WATER SERVICE PAST METER TO BE INSTALLED WITH HOMEBUILDING.

CUDEENGINEERS.COM

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

WATER DISTRIBUTION

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
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8.

4/16/26
TORY DUANE MILLER
135598

CUDE ENGINEERS
TBPELS No. 10048500

C5.02

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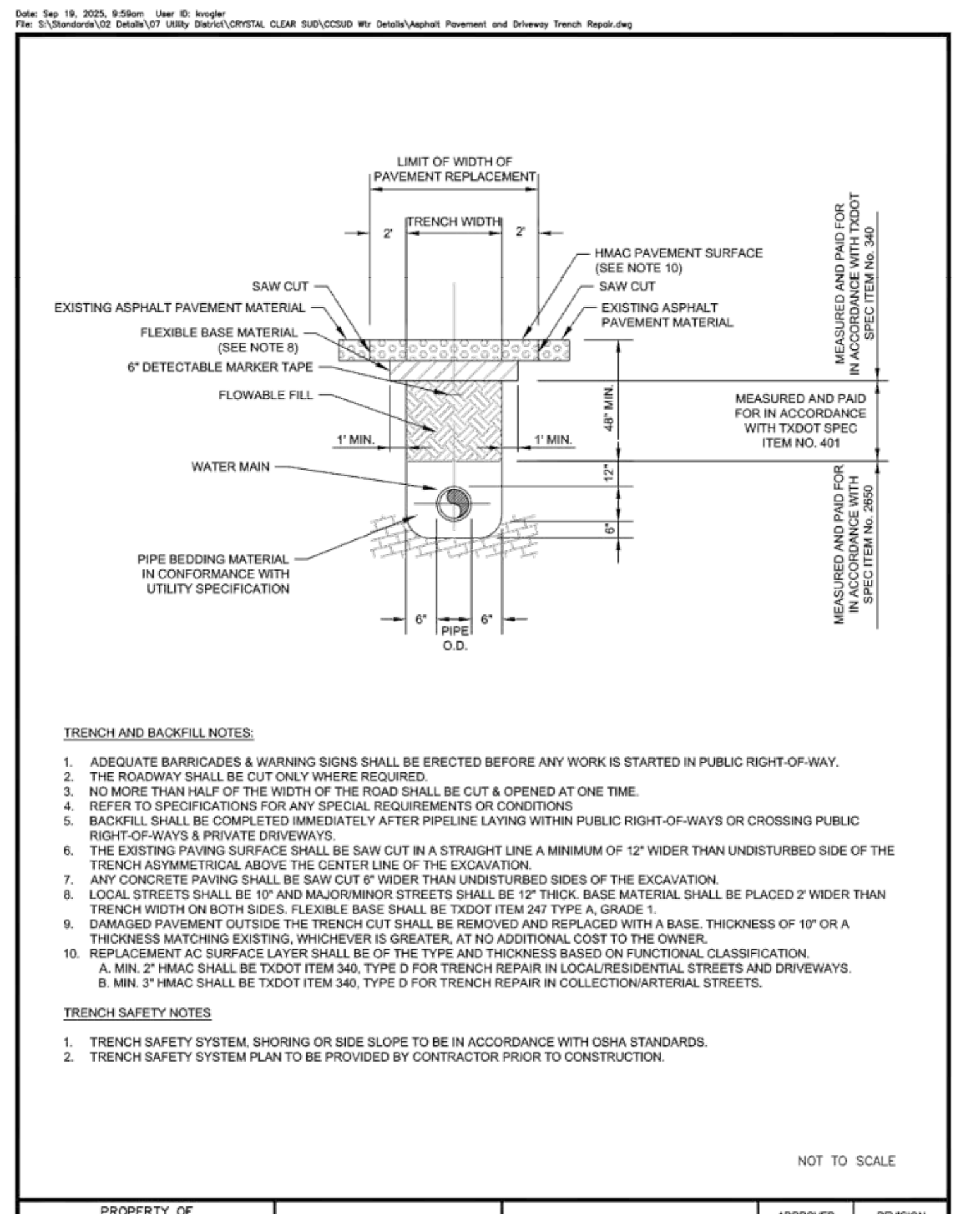
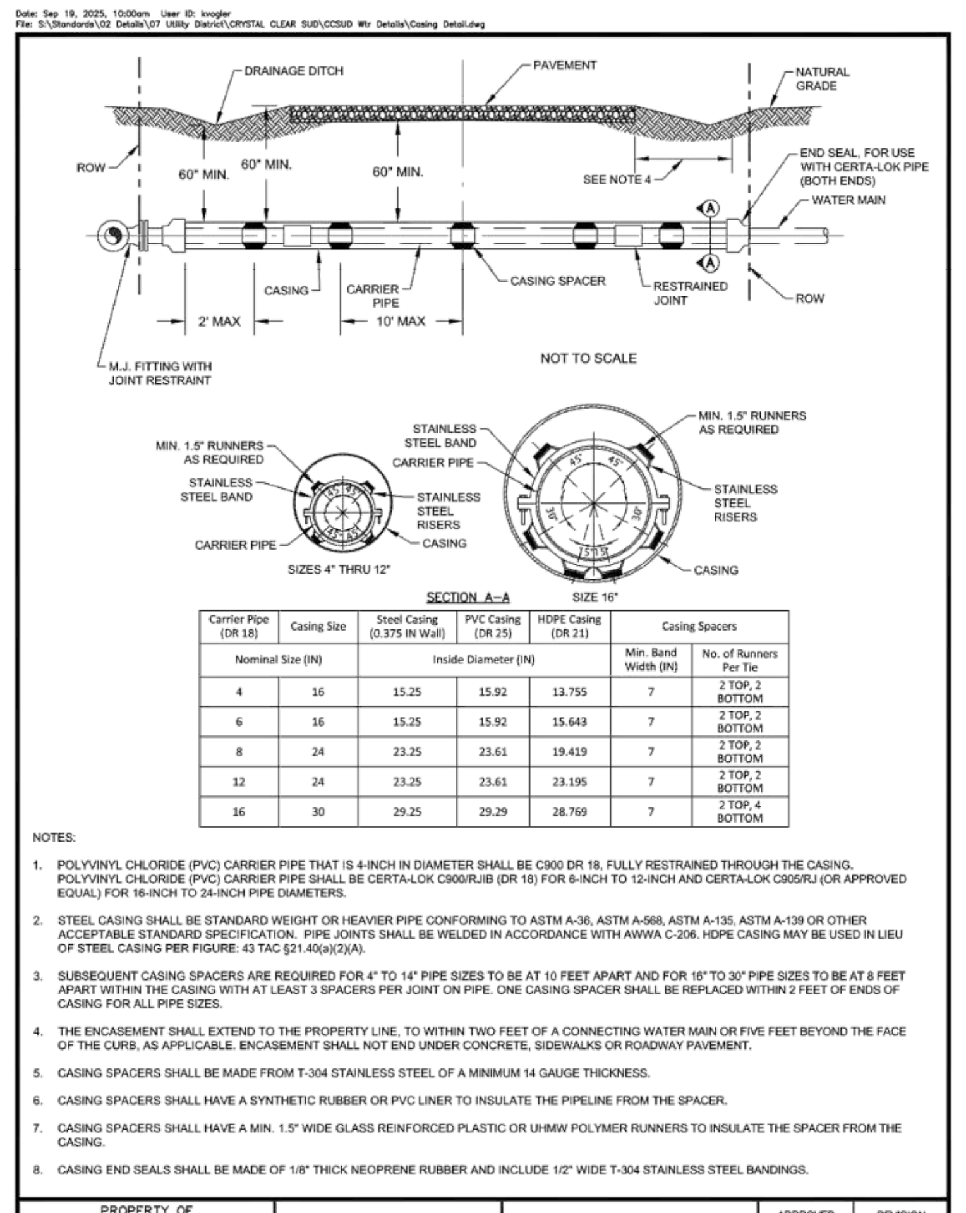
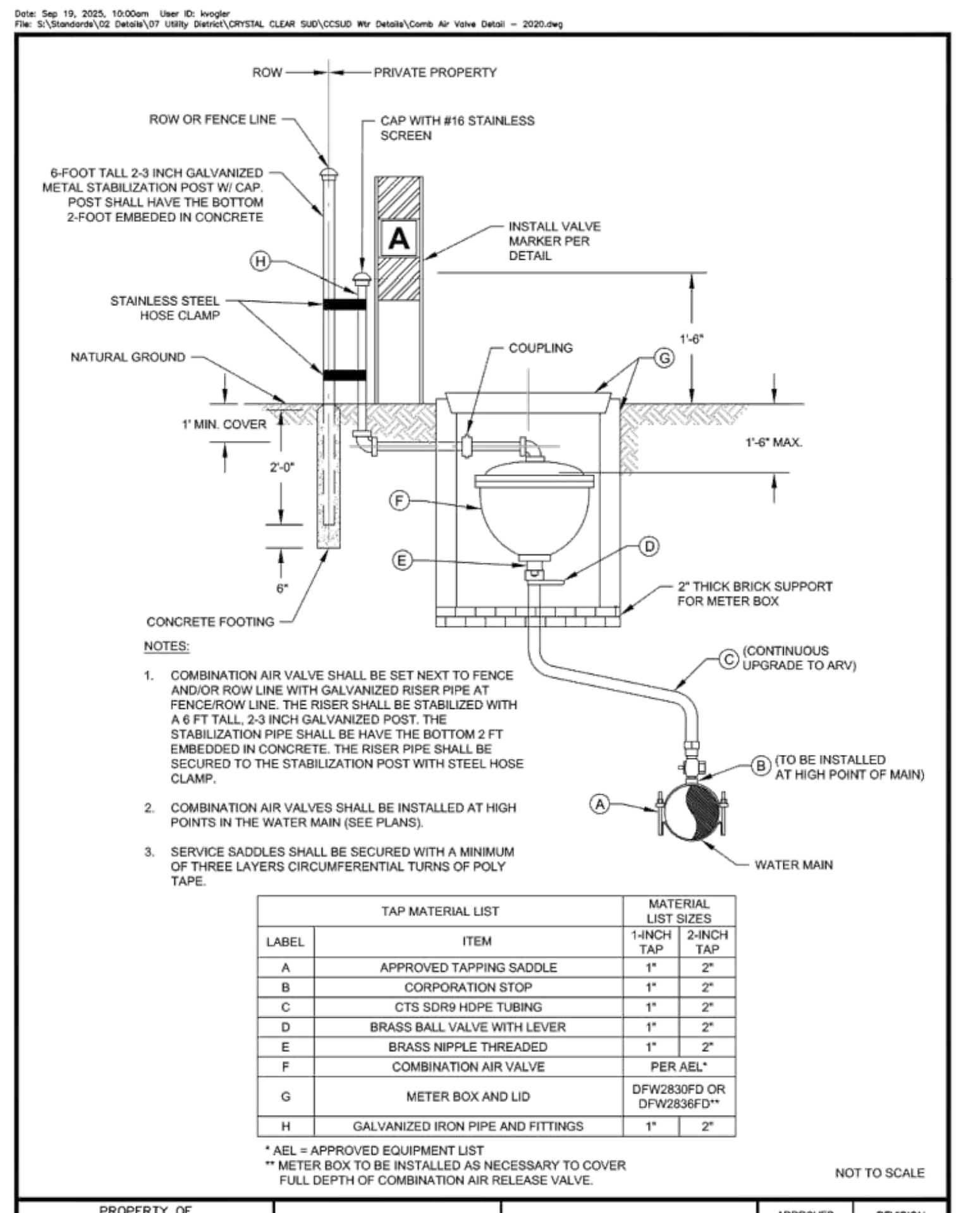
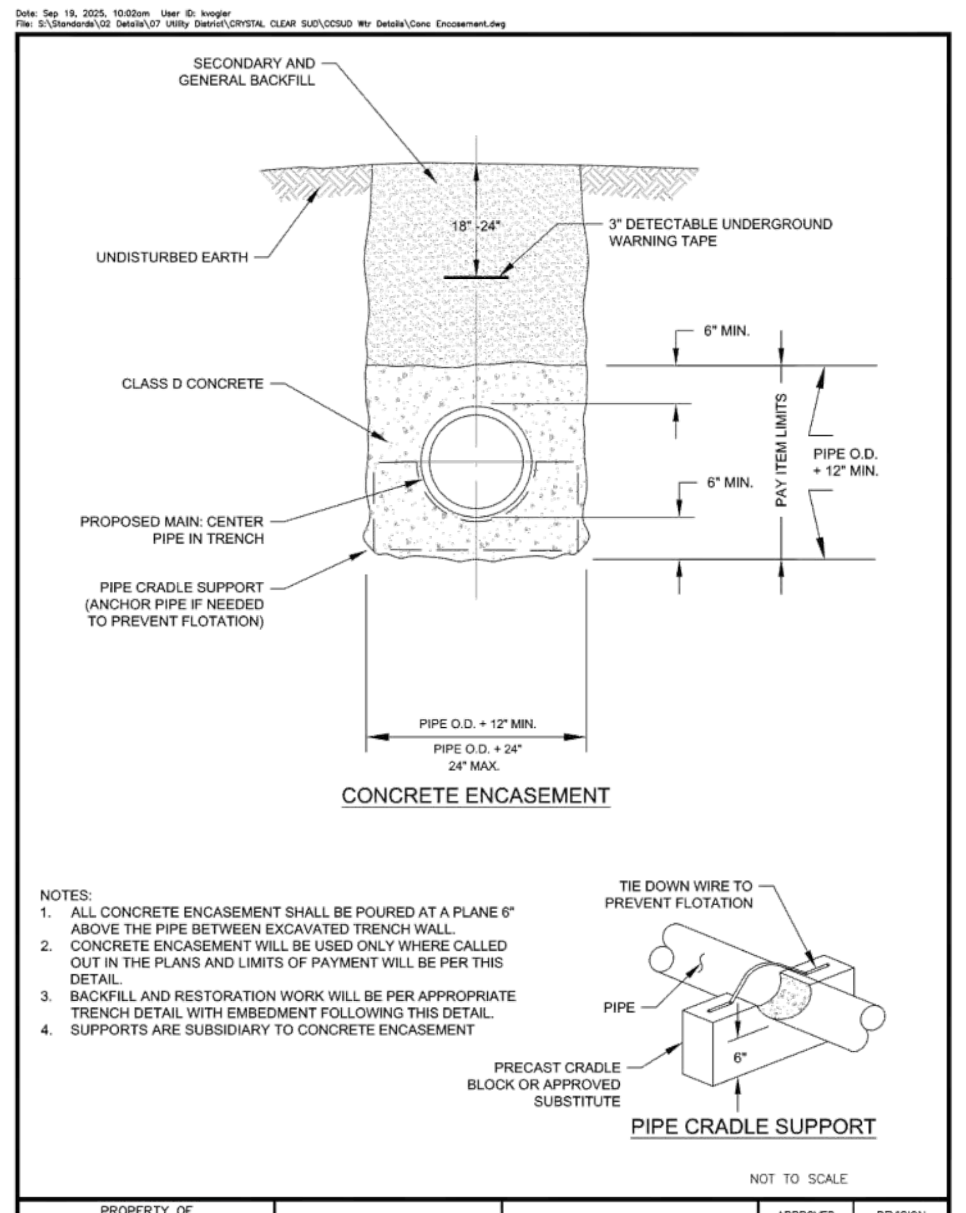
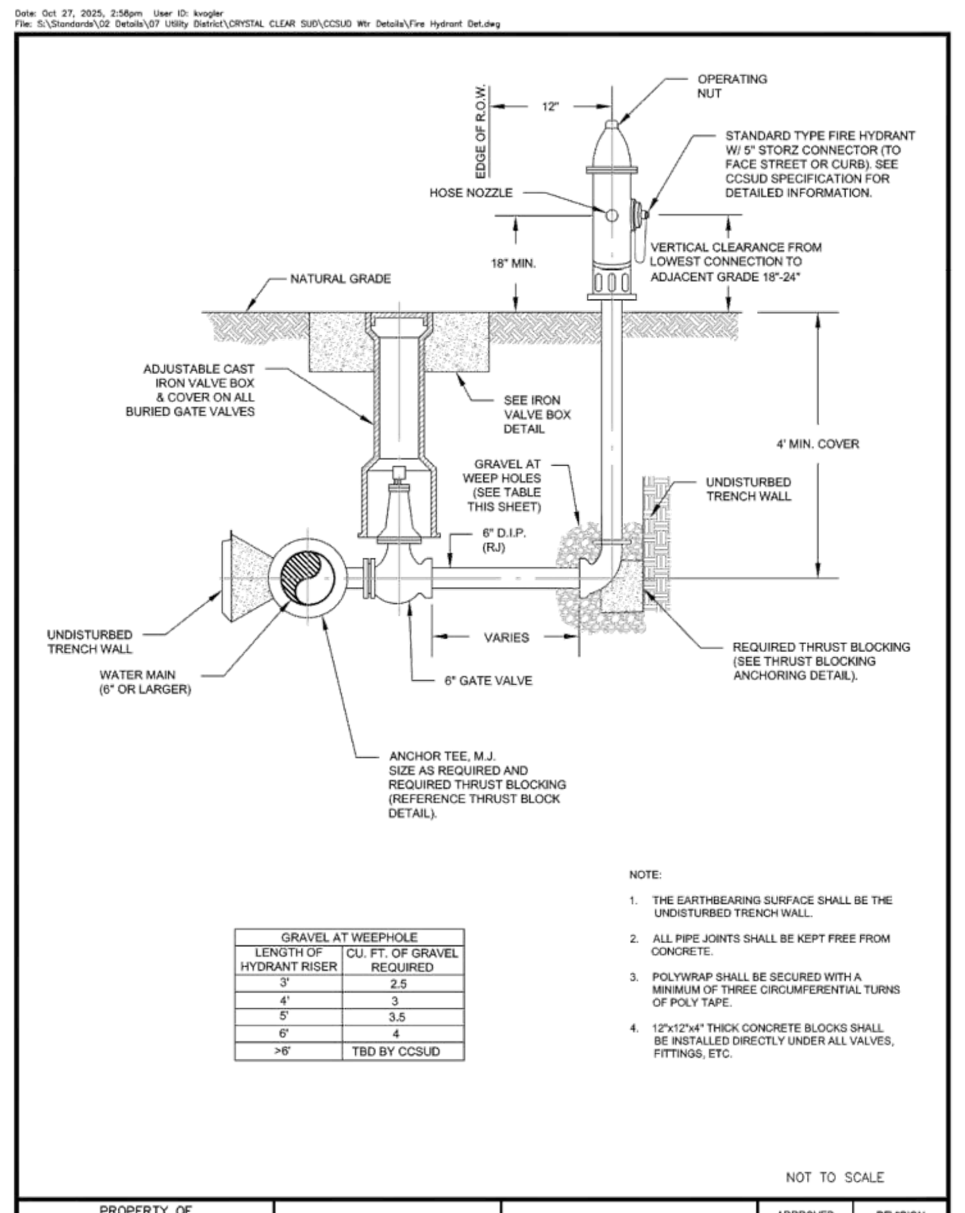
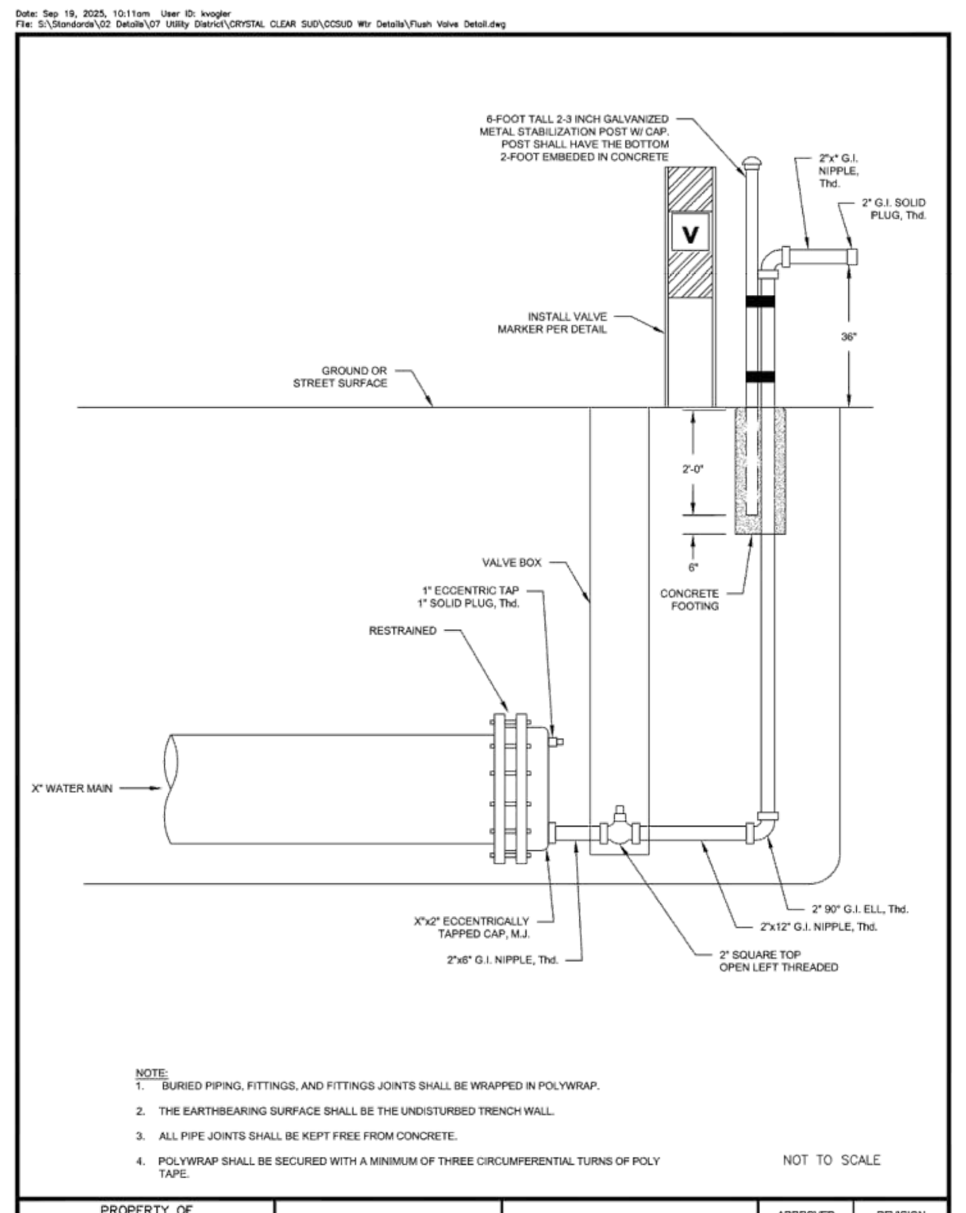

ASPHALT PAVEMENT AND DRIVEWAY (TRENCH REPAIR)

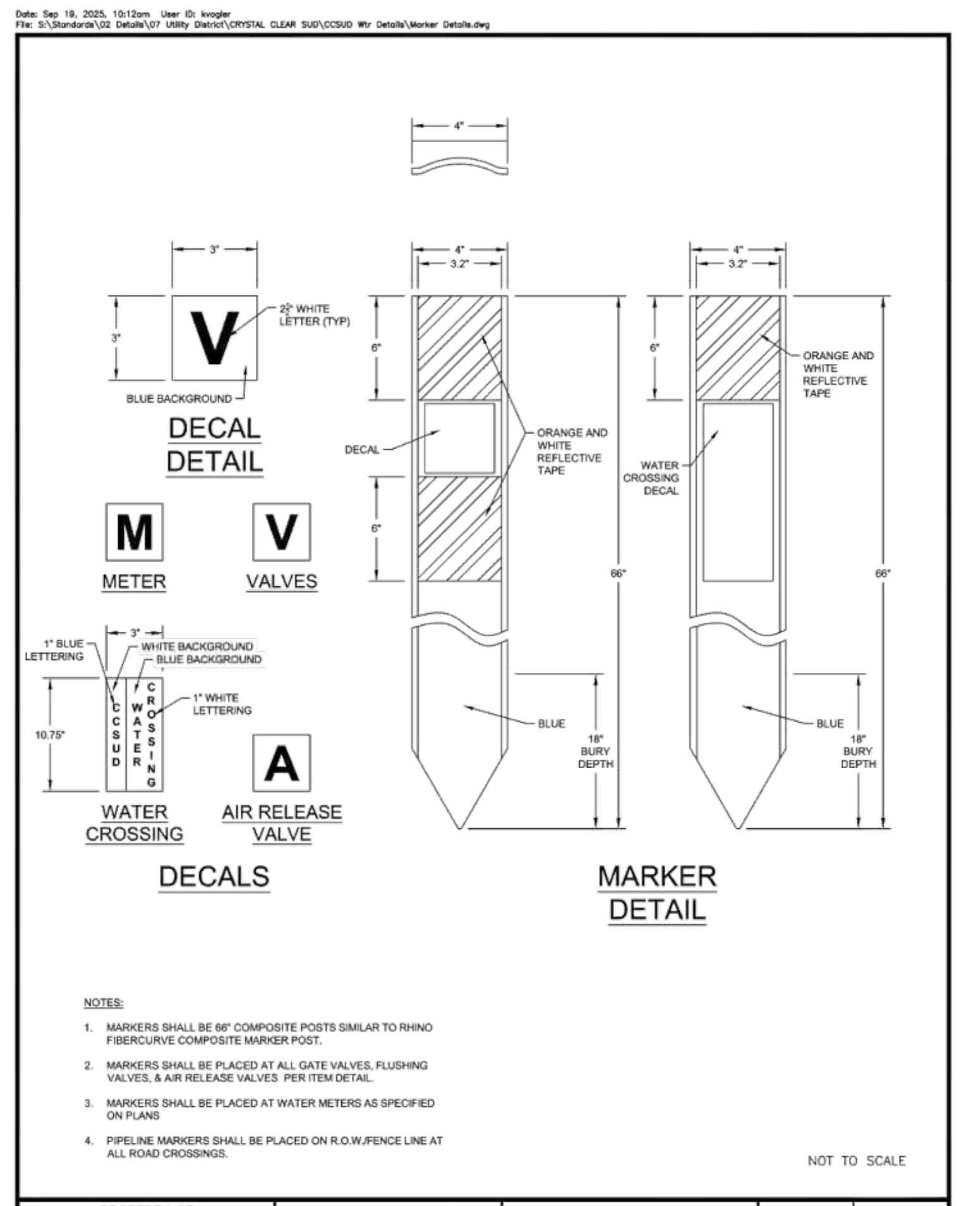

ROADWAY CASING DETAIL

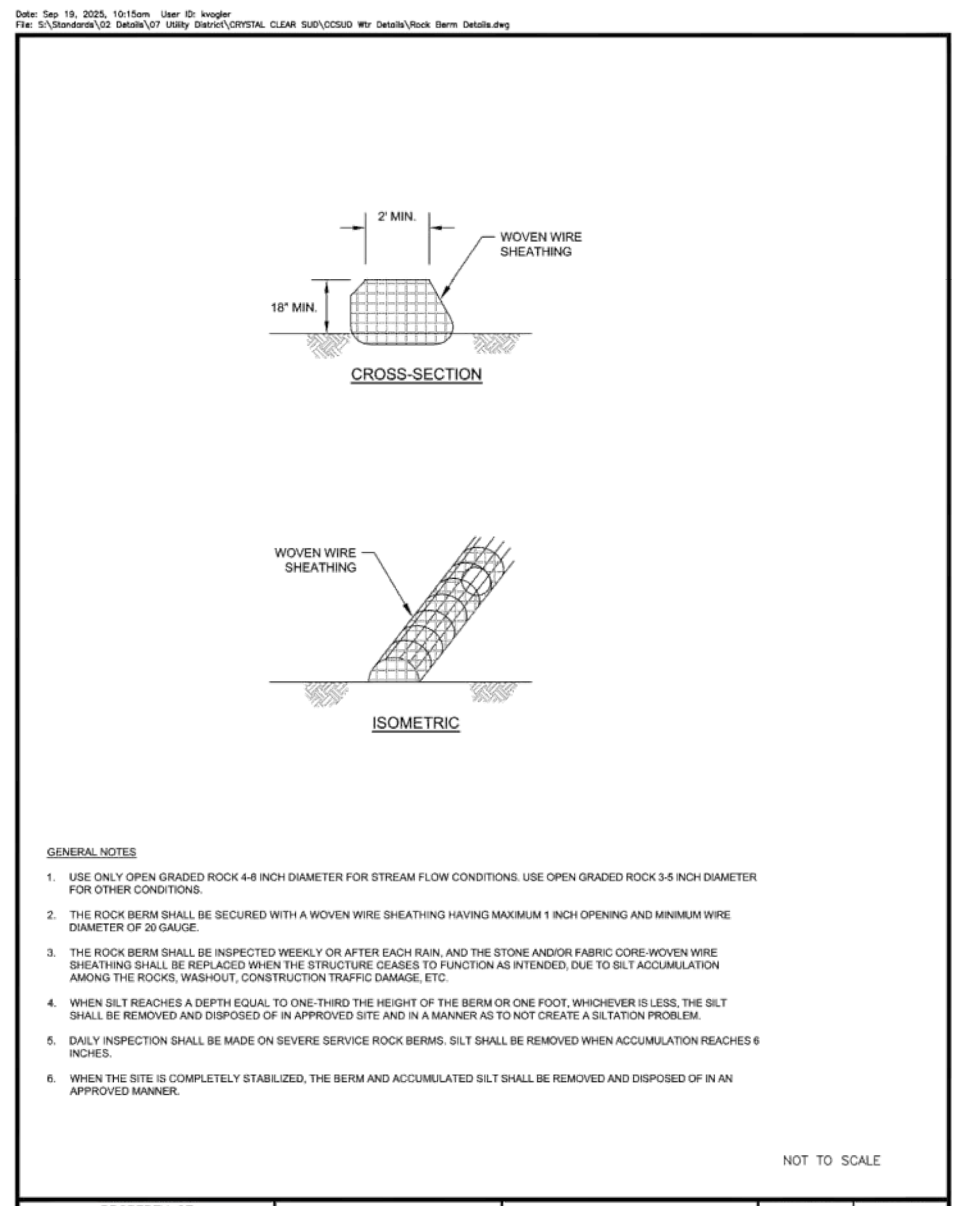

COMBINATION AIR VALVE DETAIL

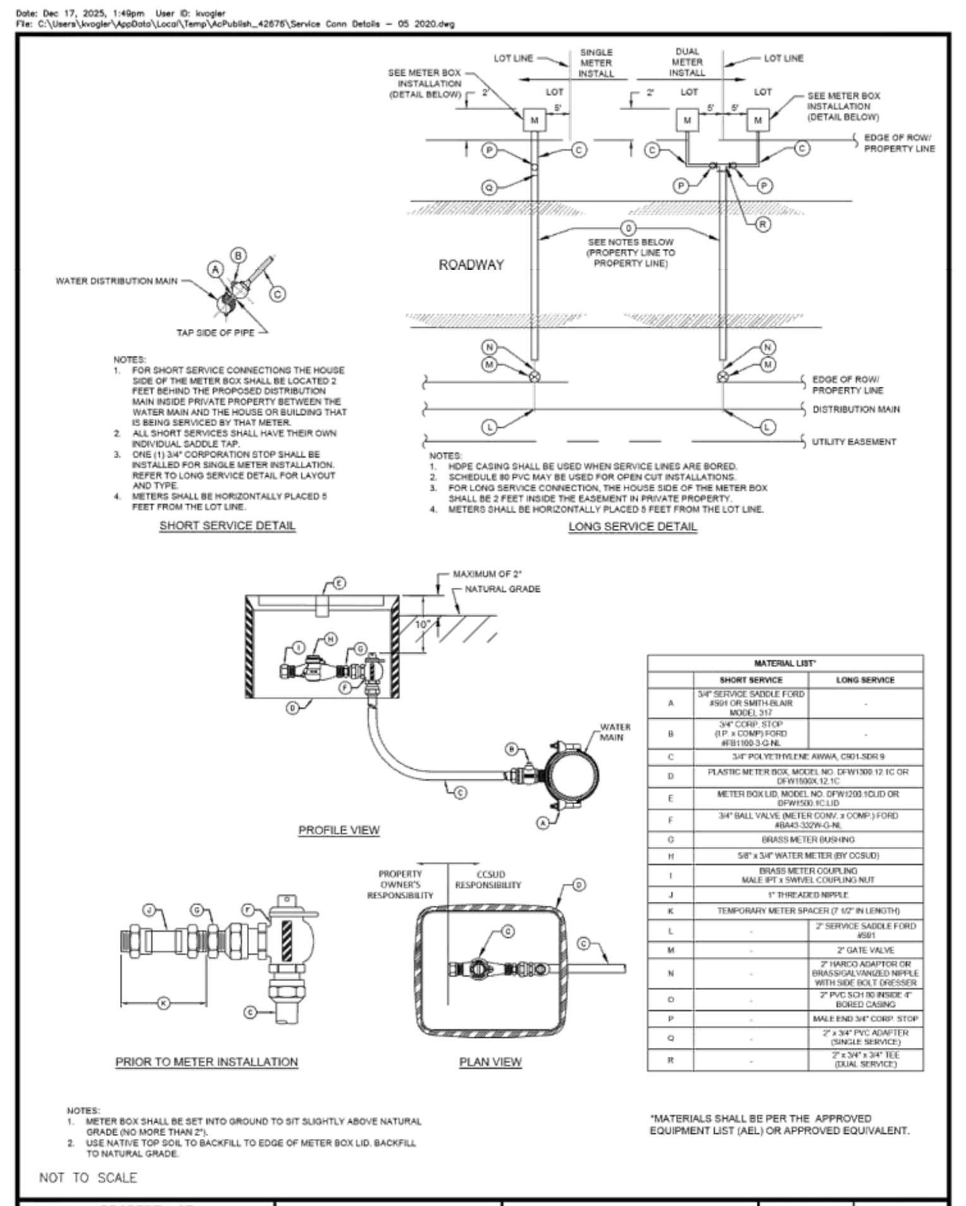

CONCRETE ENCASEMENT DETAIL

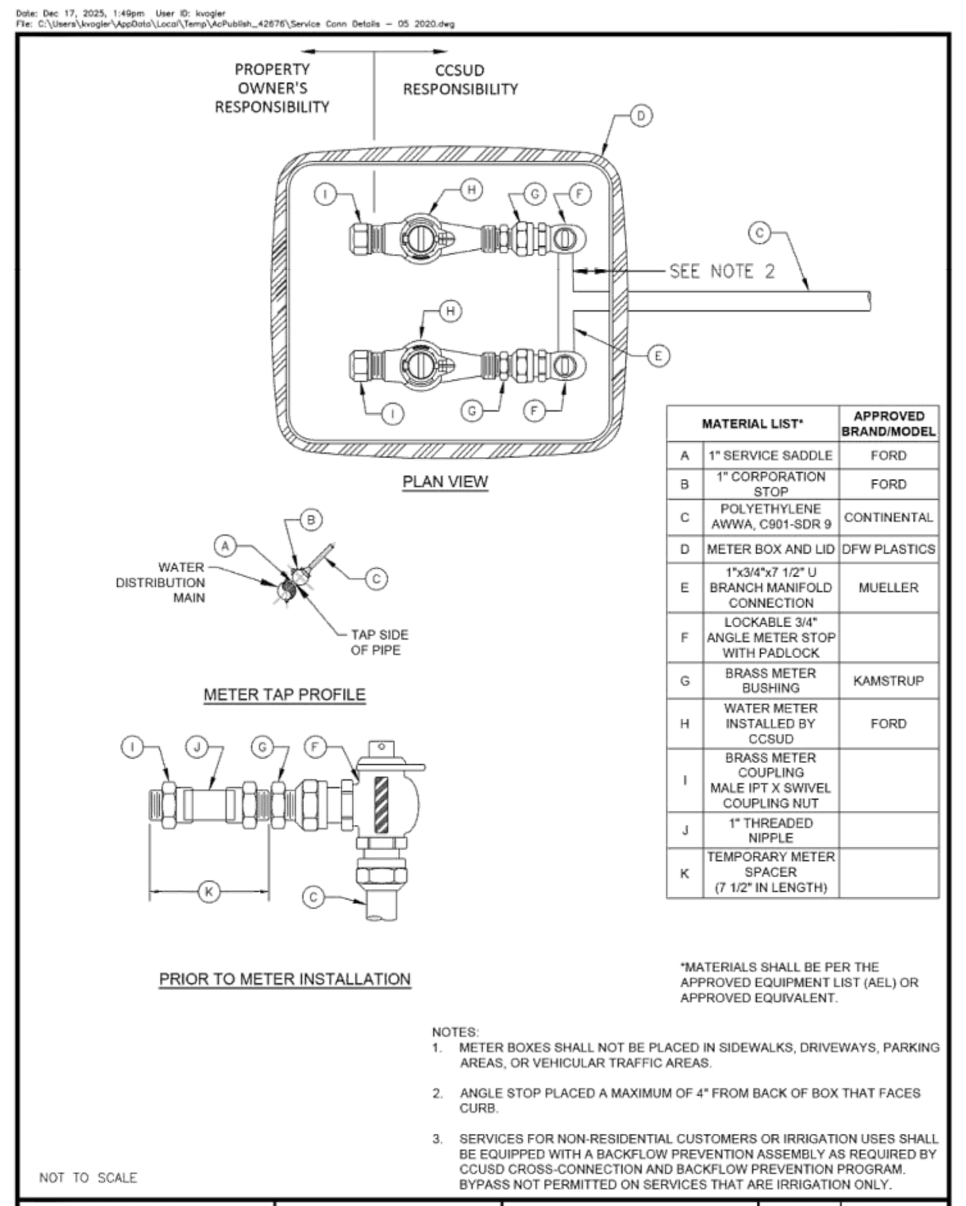

FIRE HYDRANT ASSEMBLY DETAIL (NEW BRAUNFELS)

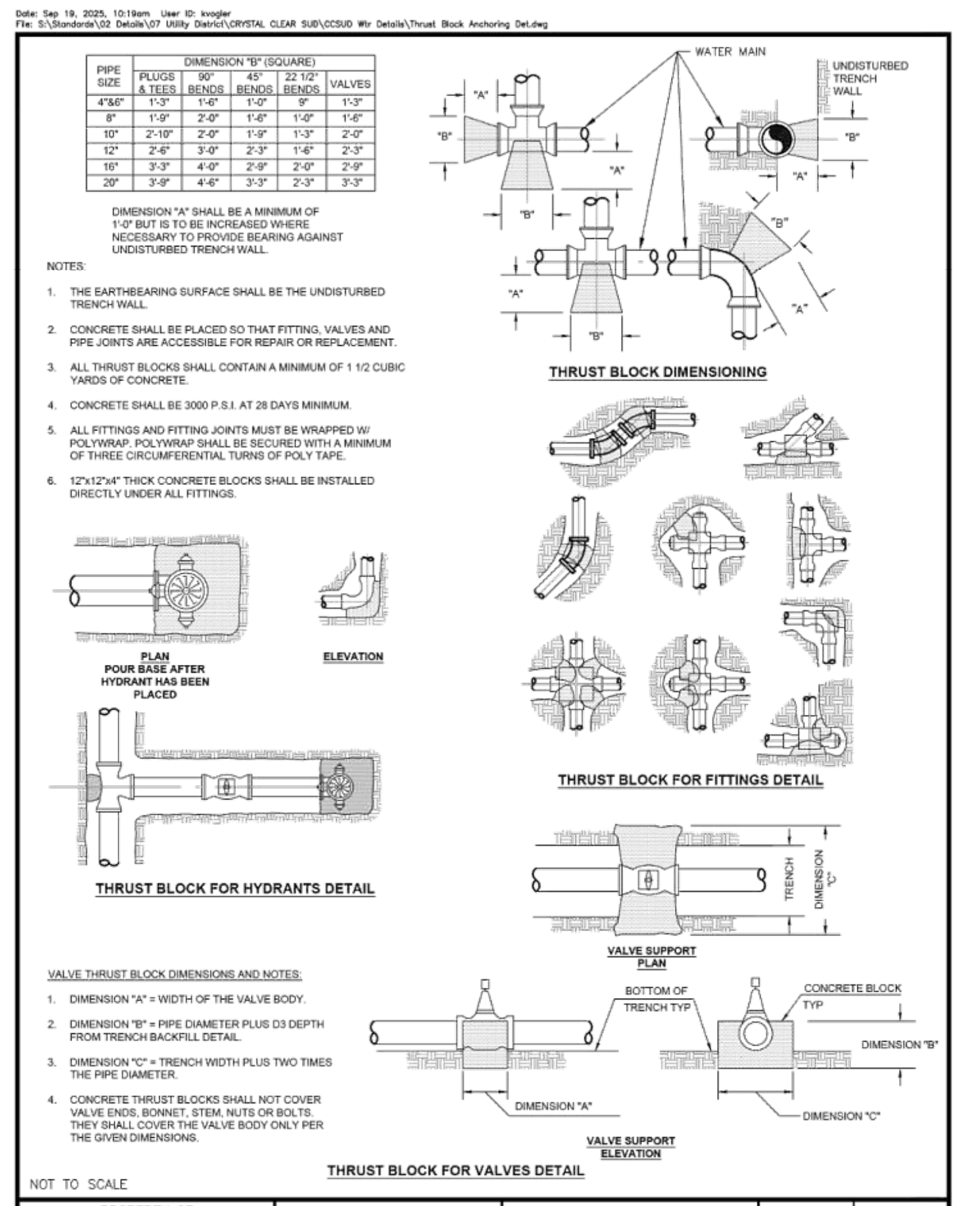

FLUSH VALVE DETAIL

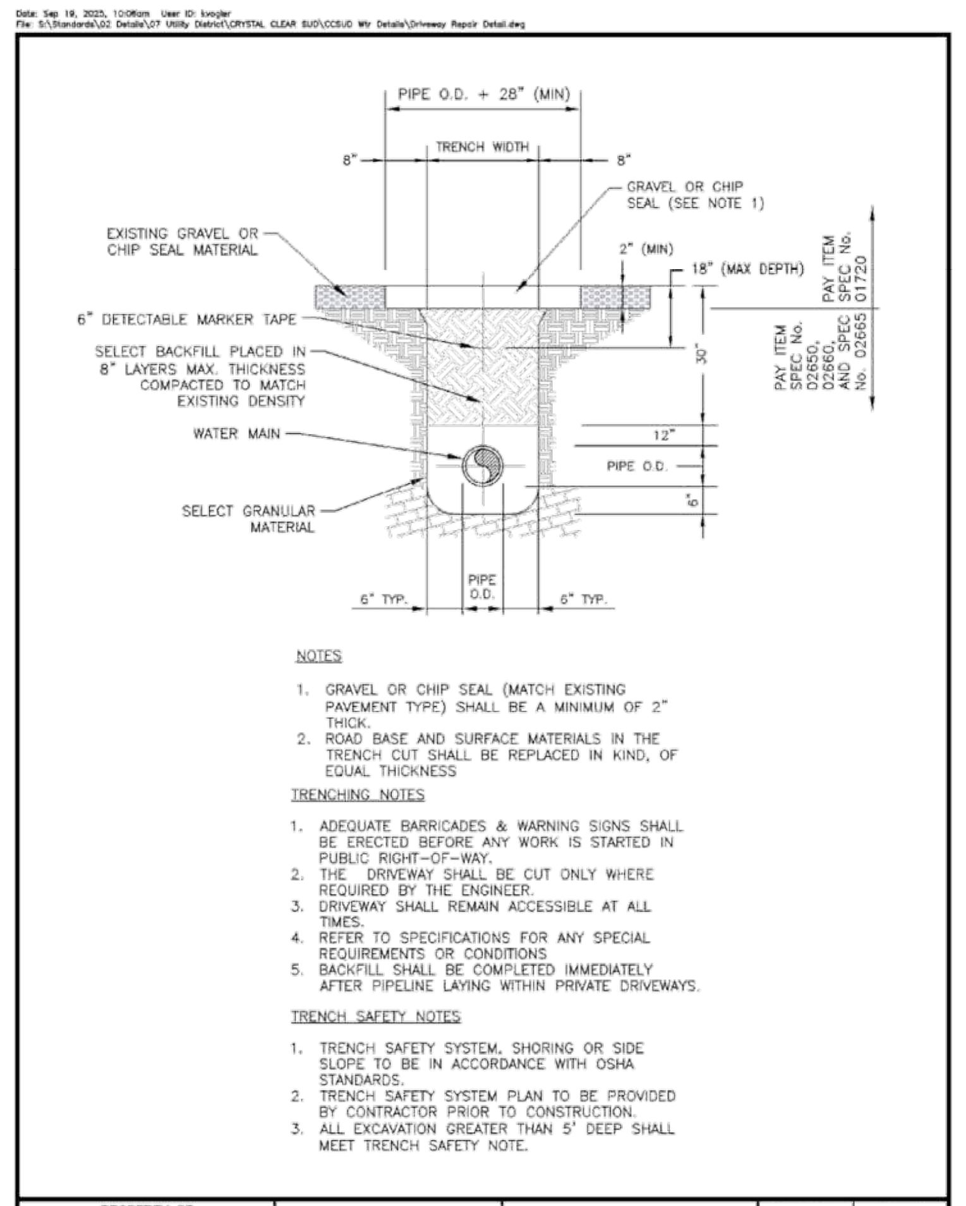

MARKER DETAILS

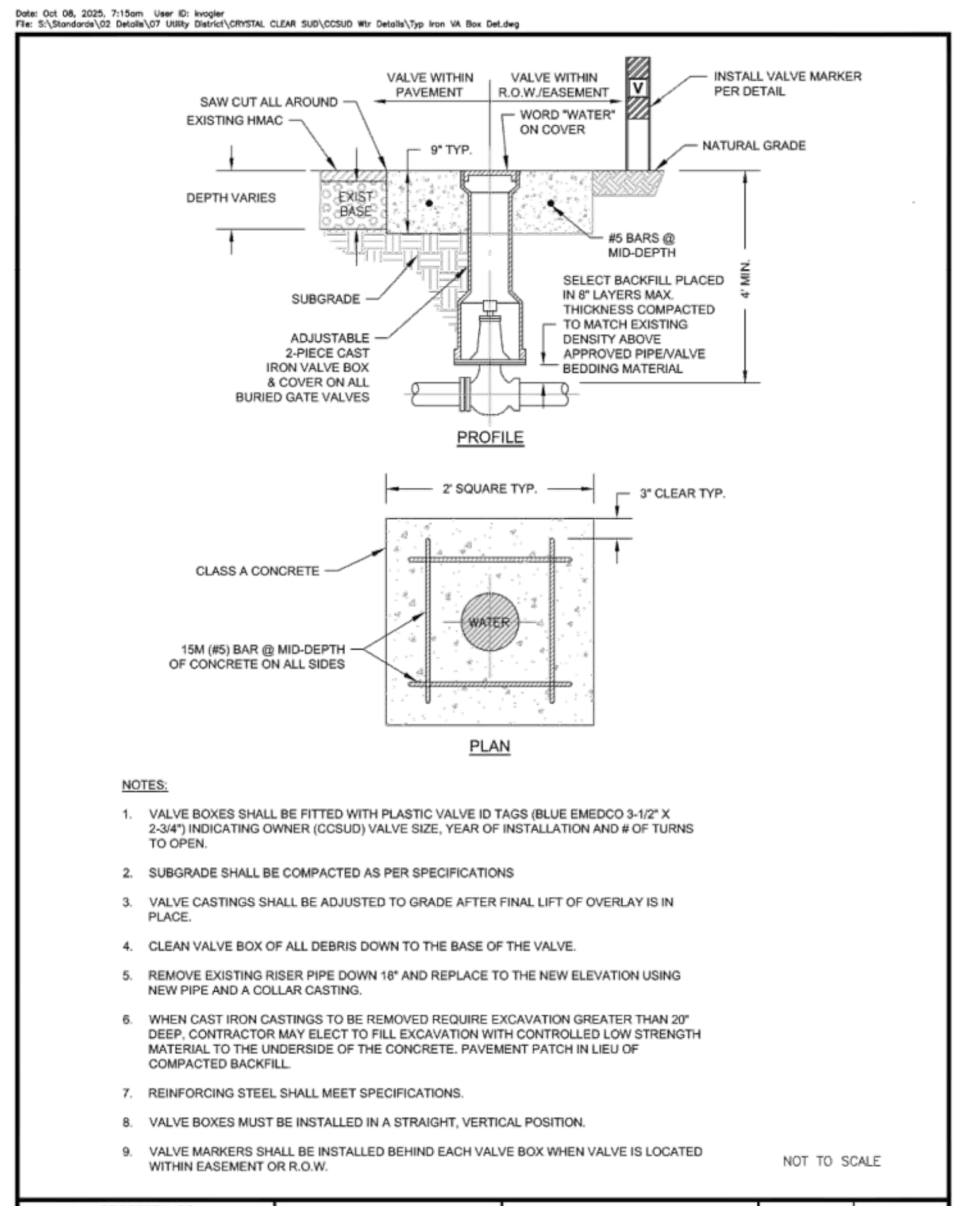

ROCK BERM DETAILS

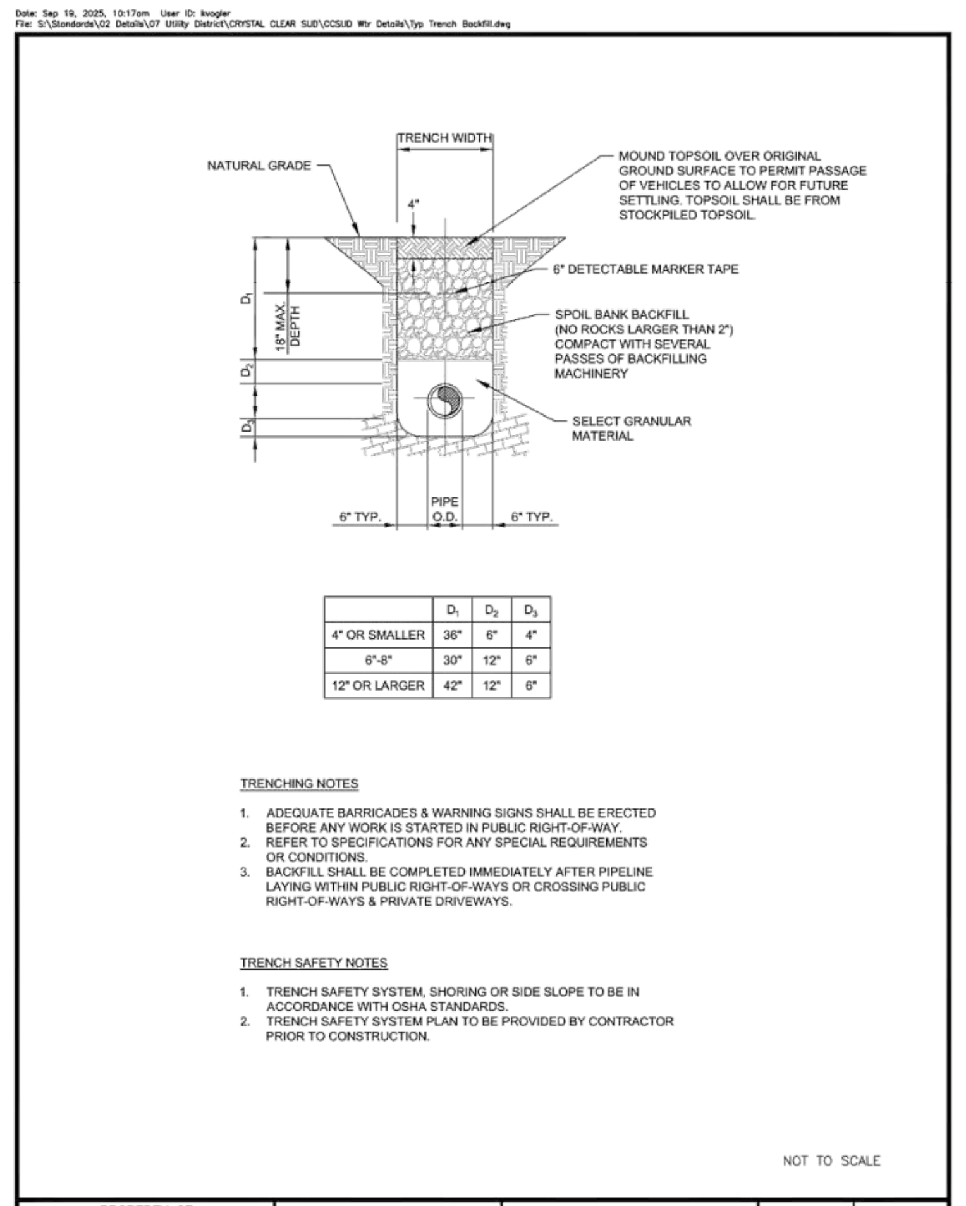

STANDARD SERVICE CONNECTION DETAILS

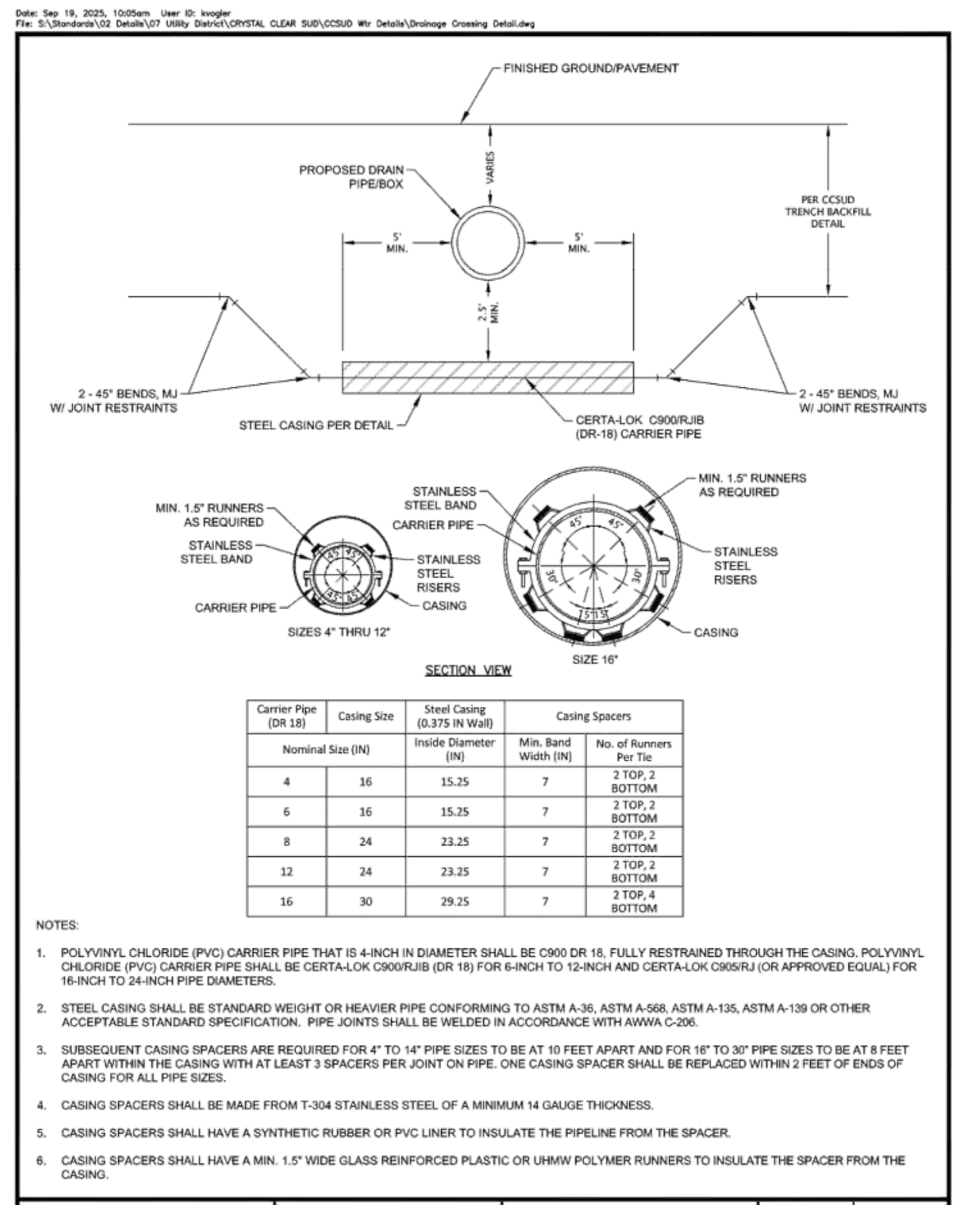

STANDARD SERVICE CONNECTION WITH IRRIGATION METER DETAILS

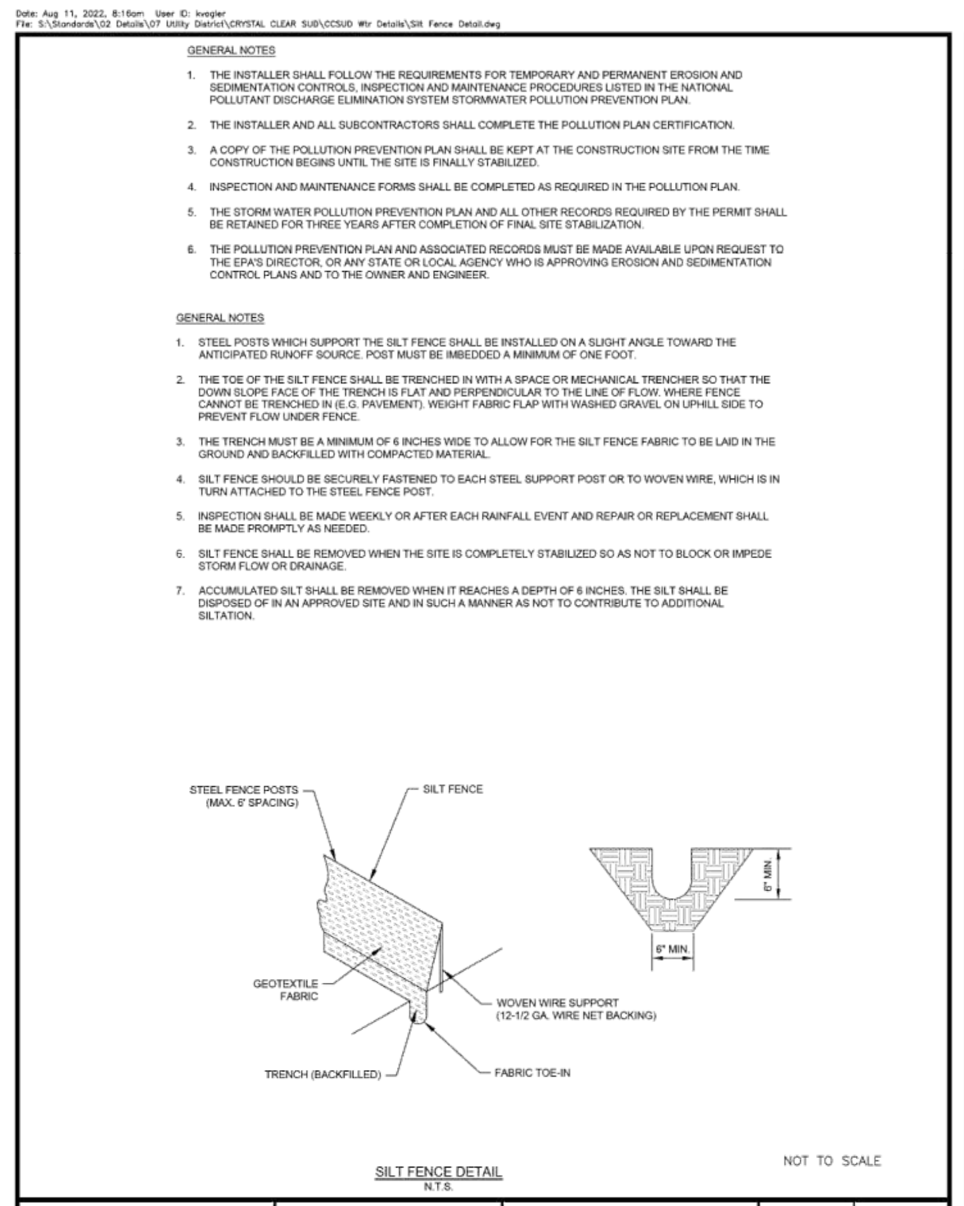

THRUST BLOCKING DETAILS

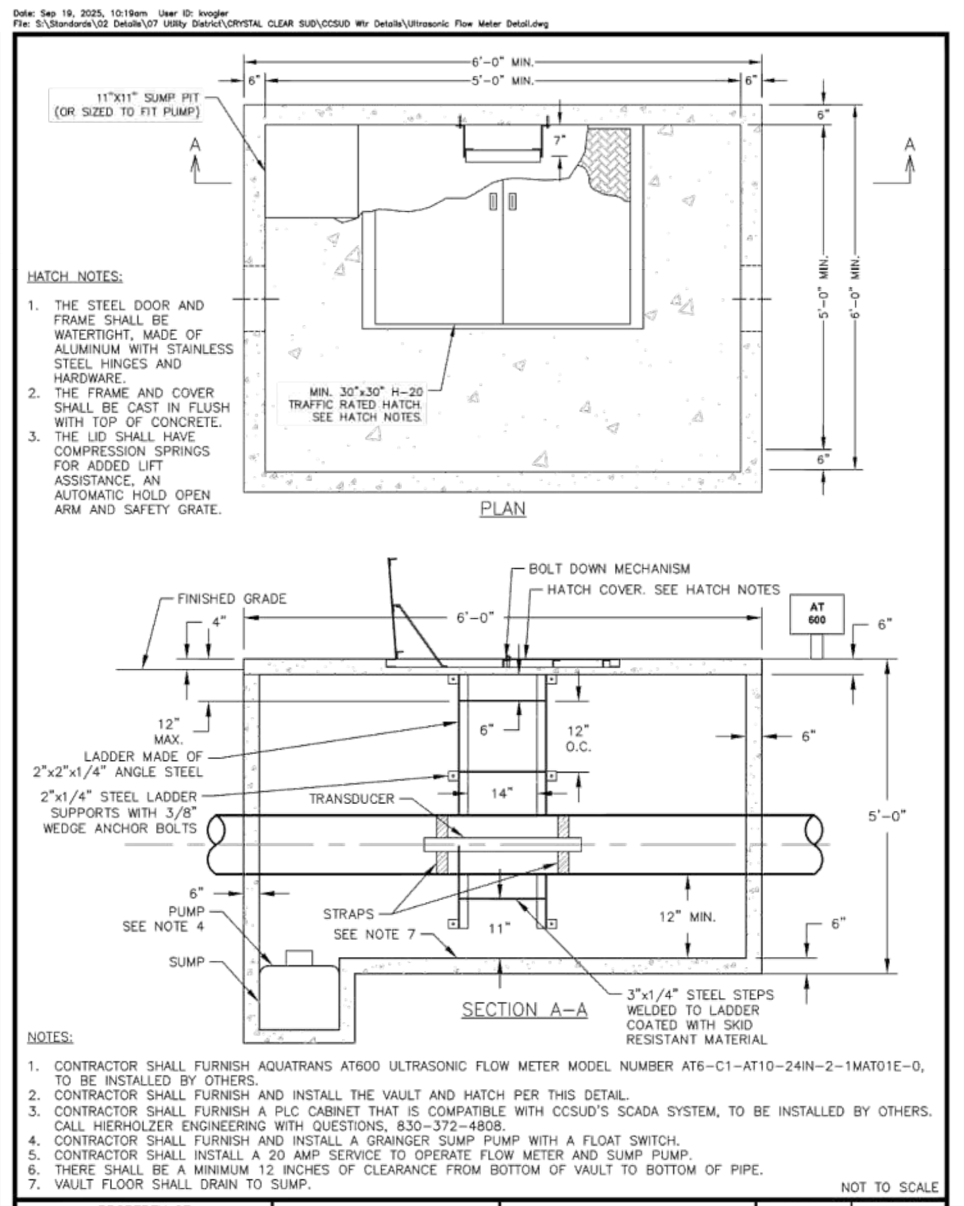

TYPICAL GRAVEL/CHIP SEAL DRIVEWAY REPAIR DETAIL


TYPICAL IRON VALVE BOX DETAILS


TYPICAL TRENCH BACKFILL DETAIL


DRAINAGE CROSSING DETAIL


SILT FENCE DETAILS


ULTRASONIC FLOW METER DETAIL

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FLYING W
UNIT 2

WATER DISTRIBUTION STANDARD DETAILS

DATE
04/16/2026

PROJECT NO.
04024-018

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JL/TM

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CUDE ENGINEERS
TBPELS No. 10048500

C5.D1

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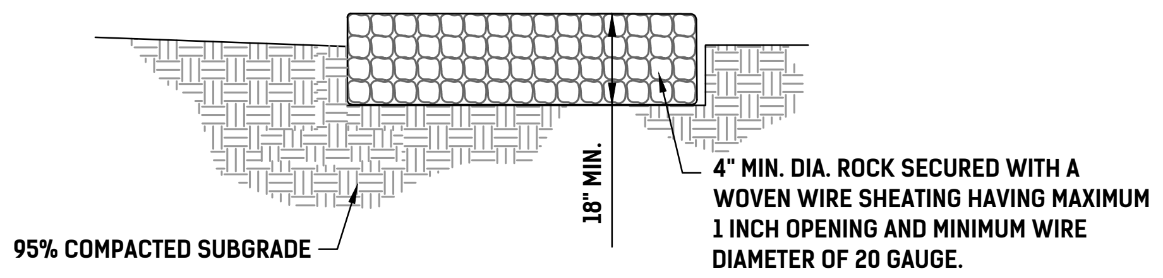
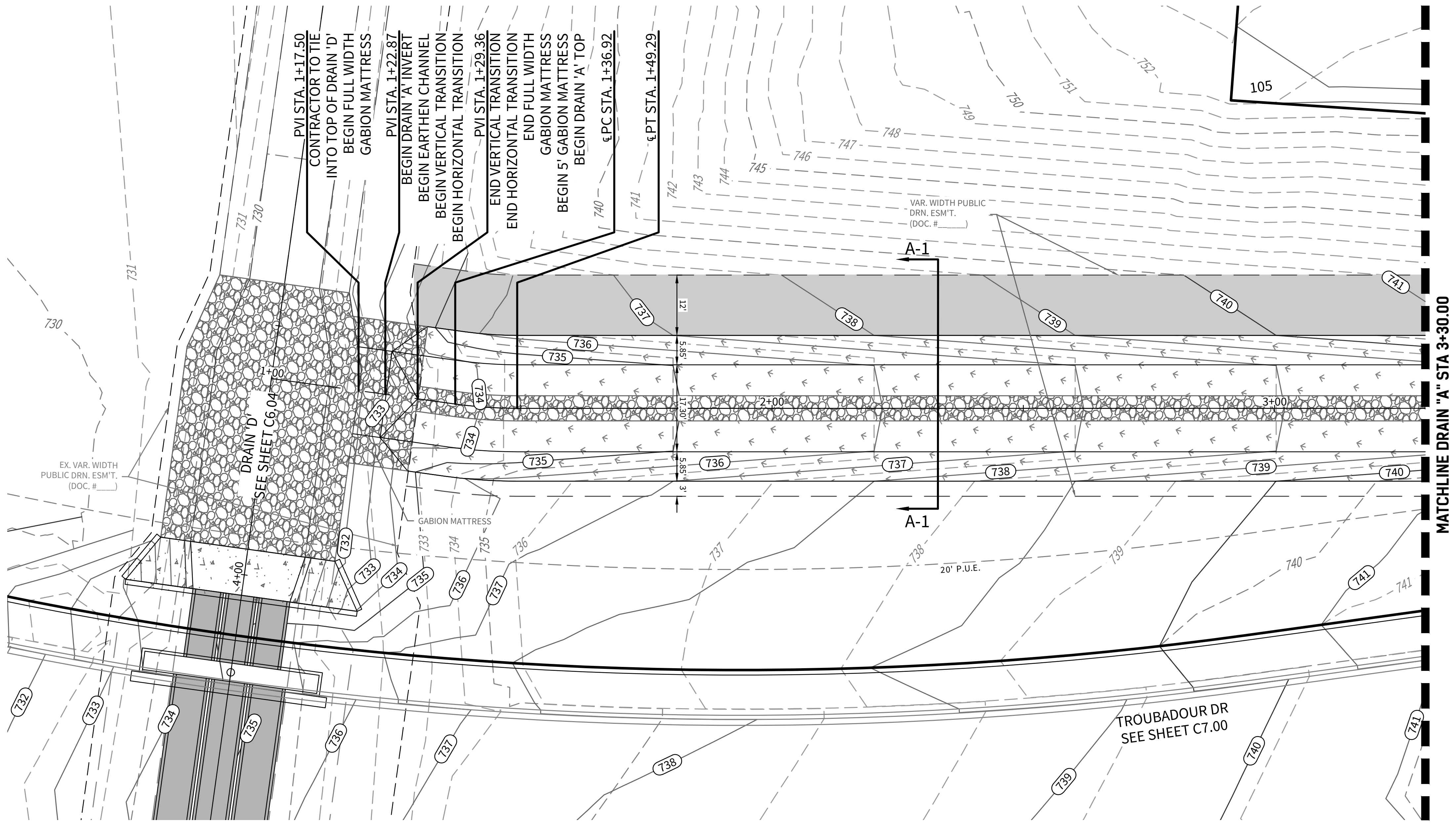
REPRODUCTION OF THE ORIGINAL SIGNED AND SEALED PLAN AND/OR ELECTRONIC MEDIA MAY HAVE BEEN INADVERTENTLY ALTERED. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE SCALE OF THE DOCUMENT AND CONTACTING CUDE ENGINEERS TO VERIFY DISCREPANCIES PRIOR TO CONSTRUCTION.


95% COMPACTED SUBGRADE
18" MIN.
4" MIN. DIA. ROCK SECURED WITH A WOVEN WIRE SHEATING HAVING MAXIMUM 1 INCH OPENING AND MINIMUM WIRE DIAMETER OF 20 GAUGE.

NOTE: GABION MATTRESS TO BE FREE OF GEO-TEXTILE FABRIC LINING.

GABION MATTRESS DETAIL (N.T.S.)


PVI STA. 1+17.50
CONTRACTOR TO TIE INTO TOP OF DRAIN 'D'
BEGIN FULL WIDTH GABION MATTRESS
PVI STA. 1+22.87
BEGIN DRAIN 'A' INVERT
BEGIN EARTHEN CHANNEL
BEGIN VERTICAL TRANSITION
BEGIN HORIZONTAL TRANSITION
PVI STA. 1+29.36
END VERTICAL TRANSITION
END HORIZONTAL TRANSITION
END FULL WIDTH GABION MATTRESS
BEGIN 5' GABION MATTRESS
BEGIN DRAIN 'A' TOP
℄ PC STA. 1+36.92
℄ PT STA. 1+49.29
105
VAR. WIDTH PUBLIC DRN. ESM'T. (DOC. #___)
A-1
A-1
12'
5.85'
1+00
4+00
DRAIN 'D' SEE SHEET C6.04
EX. VAR. WIDTH PUBLIC DRN. ESM'T. (DOC. #____)
GABION MATTRESS
20' P.U.E.
TROUBADOUR DR SEE SHEET C7.00
MATCHLINE DRAIN "A" STA 3+30.00
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
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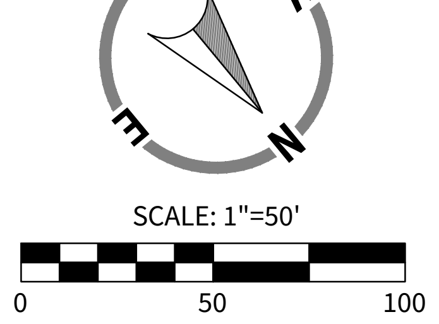
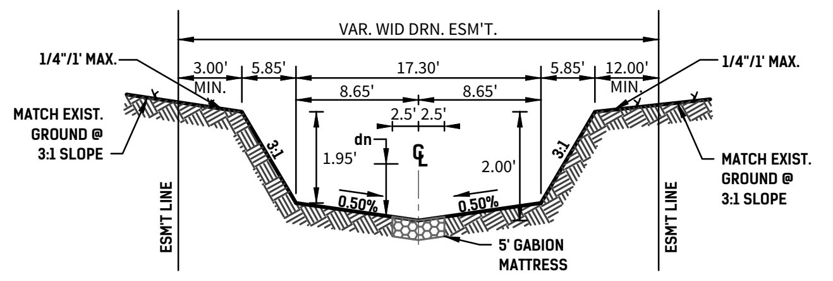
750
751
752


S
W
N
E
SCALE: 1"=50'
0
50
100


VAR. WID DRN. ESM'T.
1/4"/1' MAX.
1/4"/1' MAX.
3.00' MIN.
5.85'
17.30'
5.85'
12.00' MIN.
8.65'
8.65'
2.5'
2.5'
dn
℄
1.95'
2.00'
3:1
3:1
0.50%
0.50%
MATCH EXIST. GROUND @ 3:1 SLOPE
MATCH EXIST. GROUND @ 3:1 SLOPE
ESM'T LINE
ESM'T LINE
5' GABION MATTRESS

DRAIN "A-1" SECTION

(N.T.S.)

Name	A-1
BEGIN STA	1+29.36
END STA	3+55.97
Q25 (cfs)	107.63
h (ft)	2.00'
b_w (ft)	17.30'
z (_):1 left	3
z (_):1 right	3
t_w (ft)	29
n	0.035
Slope (%)	2.50%
d_n (ft)	0.92'
V (fps)	5.81

LEGEND:

▨	REVEGATATION
▨	PROPOSED M.B.C.
▨	PROPOSED CONCRETE RIP-RAP
▨	GABION MATTRESS
▨	MAINTENANCE PATH

KEYNOTES:

1. CONCRETE COLLARS SHALL BE INSTALLED FOR CAST-IN-PLACE & PRECAST CURB INLETS FOR EVERY PIPE CONNECTION

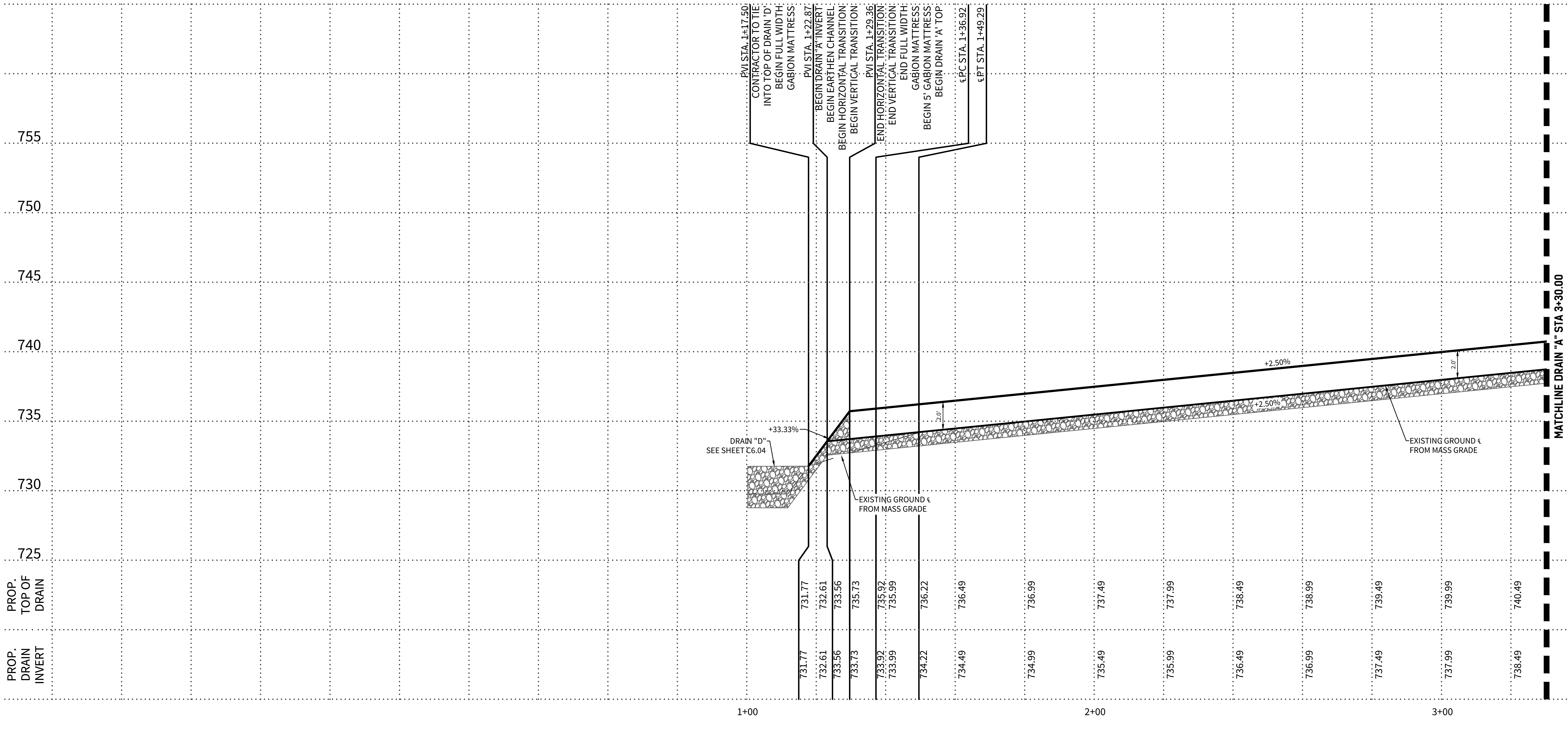
GENERAL NOTES

1. ALL CONCRETE LINING SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF NOT LESS THAN 3000 PSI IN 28 DAYS.
2. REFERENCE CITY OF SAN ANTONIO TYPICAL CONCRETE CHANNEL RIP-RAP STANDARDS FOUND ON SHEET C6.D1

DRAIN "A"

STA. 1+00.00 TO STA. 3+30.00

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 5'


PVI STA. 1+17.50
CONTRACTOR TO TIE INTO TOP OF DRAIN 'D'
BEGIN FULL WIDTH GABION MATTRESS
PVI STA. 1+22.87
BEGIN DRAIN 'A' INVERT
BEGIN EARTHEN CHANNEL
BEGIN HORIZONTAL TRANSITION
BEGIN VERTICAL TRANSITION
PVI STA. 1+29.36
END HORIZONTAL TRANSITION
END VERTICAL TRANSITION
END FULL WIDTH GABION MATTRESS
BEGIN 5' GABION MATTRESS
BEGIN DRAIN 'A' TOP
℄ PC STA. 1+36.92
℄ PT STA. 1+49.29
755
750
745
740
735
730
725
+33.33%
DRAIN "D" SEE SHEET C6.04
+2.50%
+2.50%
2.0'
2.0'
EXISTING GROUND ℄ FROM MASS GRADE
EXISTING GROUND ℄ FROM MASS GRADE
MATCHLINE DRAIN "A" STA 3+30.00
1+00
2+00
3+00

PROP. TOP OF DRAIN	731.77	732.61	733.56	735.73	735.92	735.99	736.22	736.49	736.99	737.49	737.99	738.49	738.99	739.49	739.99	740.49
PROP. DRAIN INVERT	731.77	732.61	733.56	733.73	733.92	733.99	734.22	734.49	734.99	735.49	735.99	736.49	736.99	737.49	737.99	738.49

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UNIT 2

DRAINAGE PLAN & PROFILE - DRAIN 'A'

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
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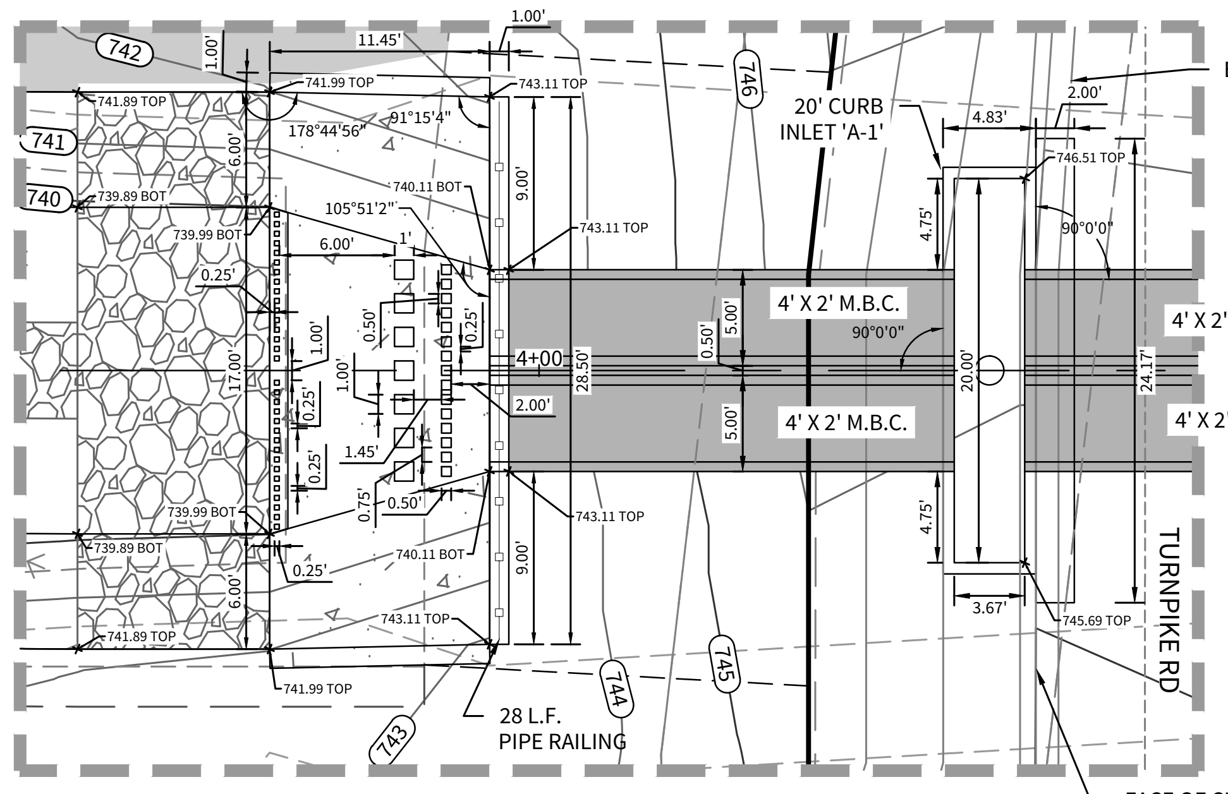
4/16/26
TORY DUANE MILLER
135598
Tory Miller

CUDE ENGINEERS
TBPELS No. 10048500

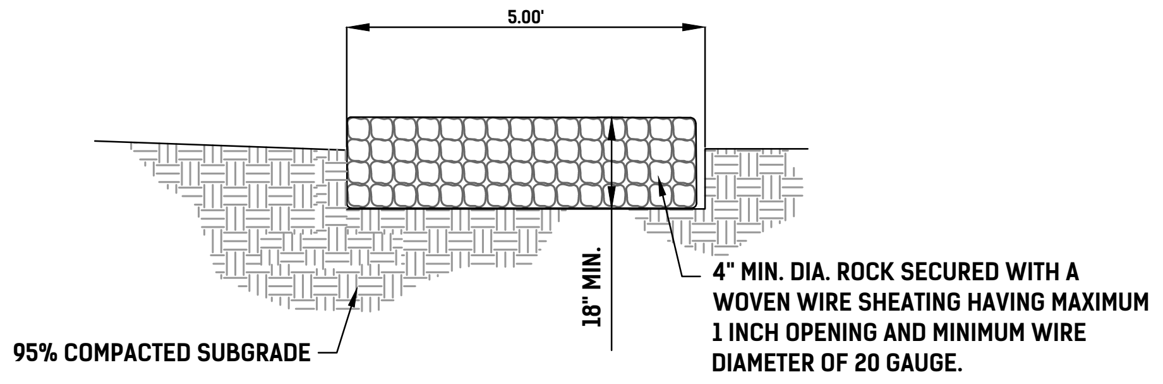
C6.00

R:\04024\018\2-DWG\4-Plans\C6.00 DRAINAGE PLAN & PROFILE - DRAIN A SG.dwg 2026/04/16 8:39am sgonzales


EDGE OF PVM'T
20' CURB INLET 'A-1'
4' X 2' M.B.C.
28 L.F. PIPE RAILING
FACE OF CURB
TURNPIKE RD
743.11 TOP
741.99 TOP

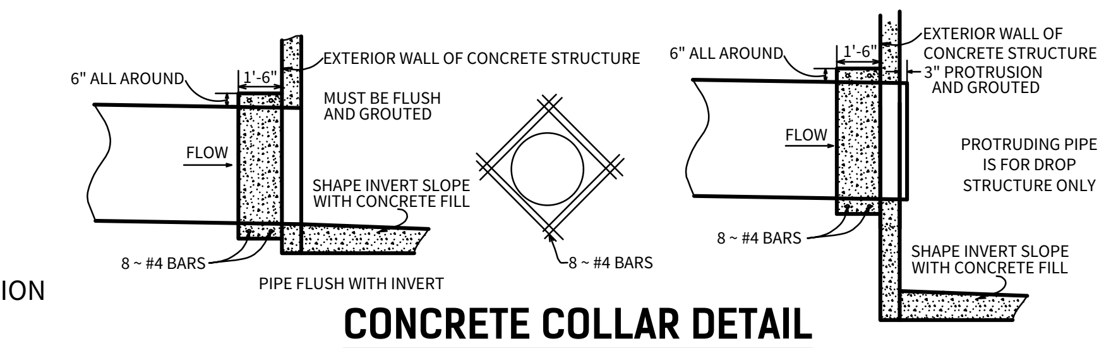
DRAIN "A" OUTFALL & CURB INLET 'A-1' DETAIL

(SCALE 1" = 10')


5.00'
18" MIN.
95% COMPACTED SUBGRADE
4" MIN. DIA. ROCK SECURED WITH A WOVEN WIRE SHEATING HAVING MAXIMUM 1 INCH OPENING AND MINIMUM WIRE DIAMETER OF 20 GAUGE.

NOTE: GABION MATTRESS TO BE FREE OF GEO-TEXTILE FABRIC LINING.

GABION MATTRESS DETAIL (N.T.S.)


6" ALL AROUND
EXTERIOR WALL OF CONCRETE STRUCTURE
MUST BE FLUSH AND GROUTED
FLOW
SHAPE INVERT SLOPE WITH CONCRETE FILL
8 - #4 BARS
PIPE FLUSH WITH INVERT
3" PROTRUSION AND GROUTED
PROTRUDING PIPE IS FOR DROP STRUCTURE ONLY

CONCRETE COLLAR DETAIL

(N.T.S.)

LEGEND:

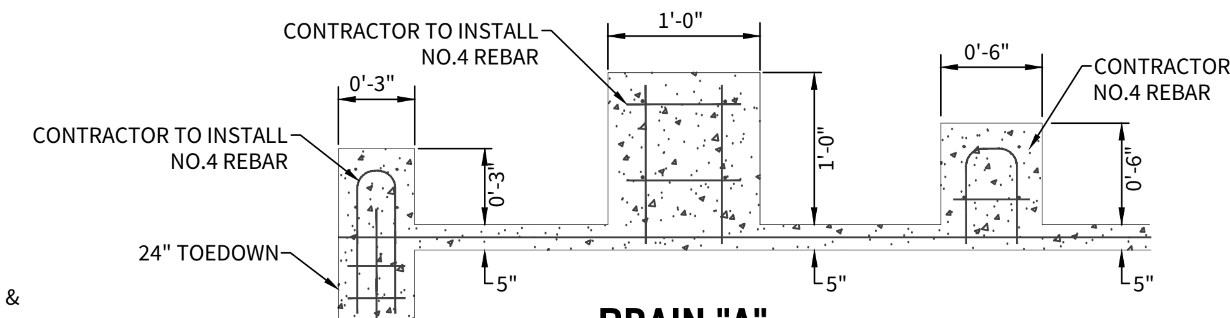
▨	REVEGETATION
▨	PROPOSED M.B.C.
▨	PROPOSED CONCRETE RIP-RAP
▨	GABION MATTRESS
▨	MAINTENANCE PATH

KEYNOTES:

1. CONCRETE COLLARS SHALL BE INSTALLED FOR CAST-IN-PLACE & PRECAST CURB INLETS FOR EVERY PIPE CONNECTION

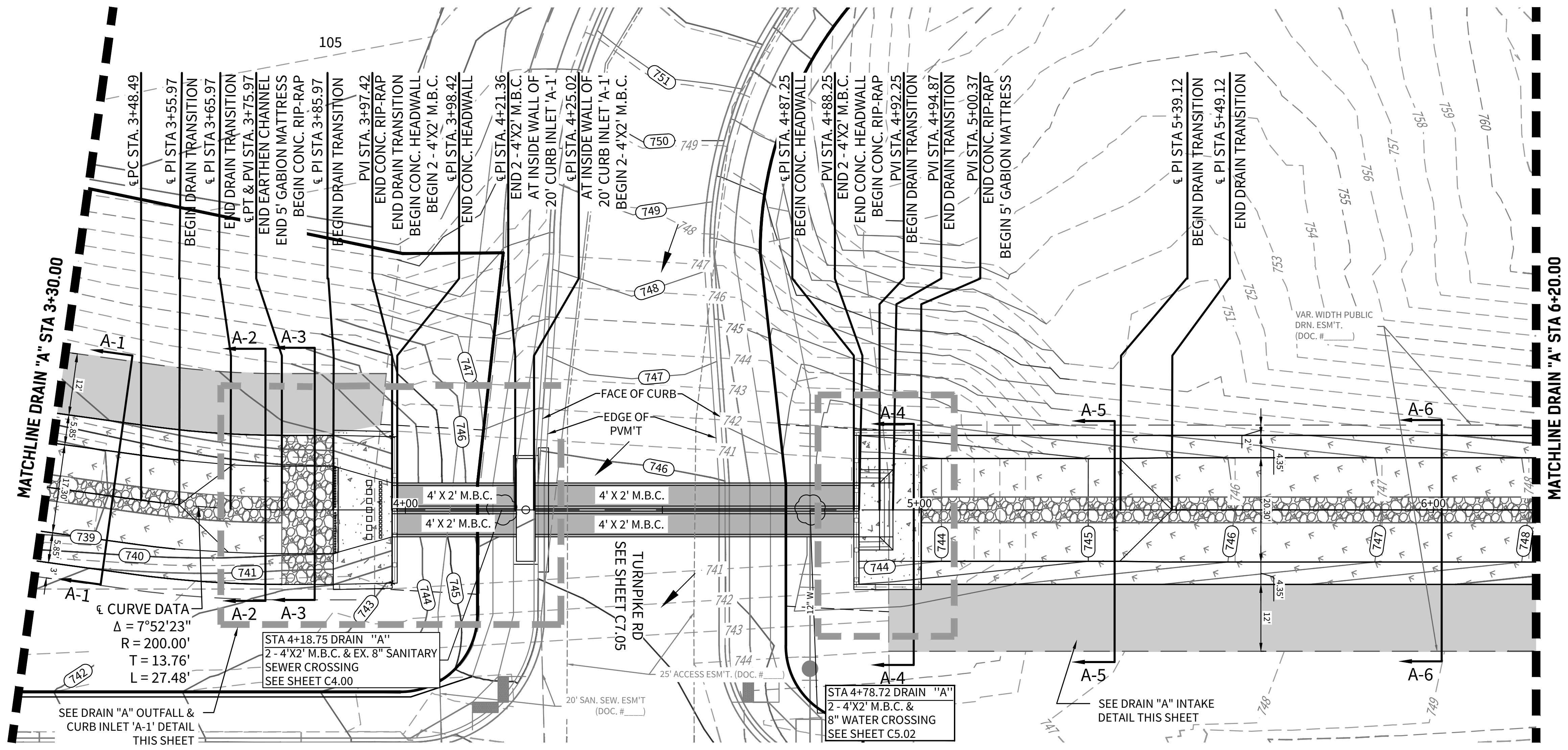
GENERAL NOTES

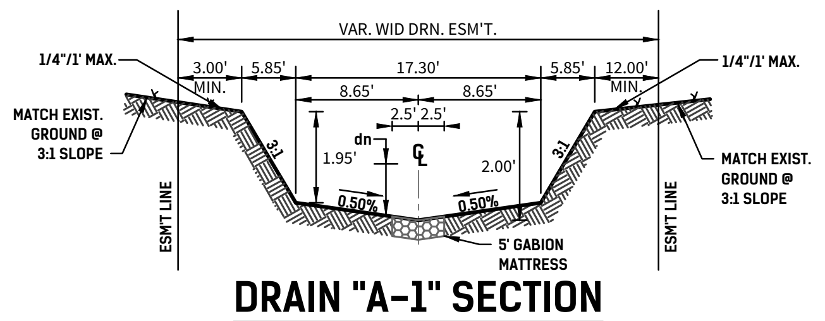
1. ALL CONCRETE LINING SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF NOT LESS THAN 3000 PSI IN 28 DAYS.
2. REFERENCE CITY OF SAN ANTONIO TYPICAL CONCRETE CHANNEL RIP-RAP STANDARDS FOUND ON SHEET C6.D1


CONTRACTOR TO INSTALL NO.4 REBAR
CONTRACTOR TO INSTALL NO.4 REBAR
CONTRACTOR TO INSTALL NO.4 REBAR
24" TOEDOWN
1'-0"
0'-6"
0'-3"

DRAIN "A" BAFFLE BLOCK REINFORCEMENT DETAIL

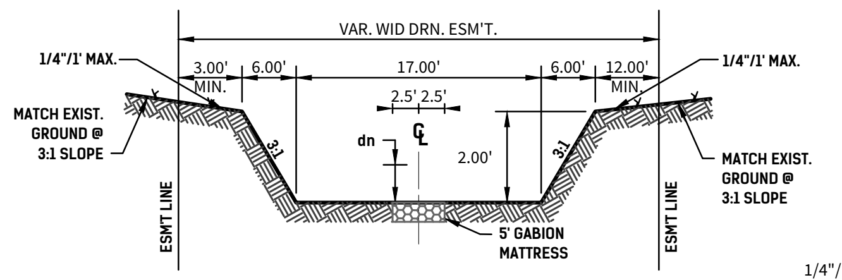
(N.T.S.)


MATCHLINE DRAIN "A" STA 3+30.00
MATCHLINE DRAIN "A" STA 6+20.00
PC STA 3+48.49
PVI STA 3+55.97
BEGIN DRAIN TRANSITION
PVI STA 3+65.97
END DRAIN TRANSITION
PT & PVI STA 3+75.97
END EARTHEN CHANNEL
END 5' GABION MATTRESS
BEGIN CONC. RIP-RAP
PI STA 3+85.97
BEGIN DRAIN TRANSITION
PVI STA 3+97.42
END CONC. RIP-RAP
END DRAIN TRANSITION
BEGIN 2 - 4'X2' M.B.C.
PI STA 3+98.42
END CONC. HEADWALL
PI STA 4+21.36
END 2 - 4'X2' M.B.C.
AT INSIDE WALL OF 20' CURB INLET 'A-1'
PI STA 4+25.02
BEGIN 2 - 4'X2' M.B.C.
PI STA 4+87.25
BEGIN CONC. HEADWALL
PVI STA 4+88.25
END 2 - 4'X2' M.B.C.
BEGIN CONC. RIP-RAP
PVI STA 4+92.25
BEGIN DRAIN TRANSITION
PVI STA 4+94.87
END DRAIN TRANSITION
PVI STA 5+00.37
END CONC. RIP-RAP
BEGIN 5' GABION MATTRESS
PVI STA 5+39.12
BEGIN DRAIN TRANSITION
PVI STA 5+49.12
END DRAIN TRANSITION
A-1 A-2 A-3 A-4 A-5 A-6
FACE OF CURB
EDGE OF PVM'T
4' X 2' M.B.C.
TURNPIKE RD SEE SHEET C7.05
CURVE DATA
Δ = 7°52'23"
R = 200.00'
T = 13.76'
L = 27.48'
STA 4+18.75 DRAIN "A" 2 - 4'X2' M.B.C. & EX. 8" SANITARY SEWER CROSSING SEE SHEET C4.00
STA 4+78.72 DRAIN "A" 2 - 4'X2' M.B.C. & 8" WATER CROSSING SEE SHEET C5.02
SEE DRAIN "A" OUTFALL & CURB INLET 'A-1' DETAIL THIS SHEET
SEE DRAIN "A" INTAKE DETAIL THIS SHEET
VAR. WIDTH PUBLIC DRN. ESM'T.
4+00
5+00
6+00


VAR. WID DRN. ESM'T.
1/4"/1' MAX.
MATCH EXIST. GROUND @ 3:1 SLOPE
ESM'T LINE
5' GABION MATTRESS

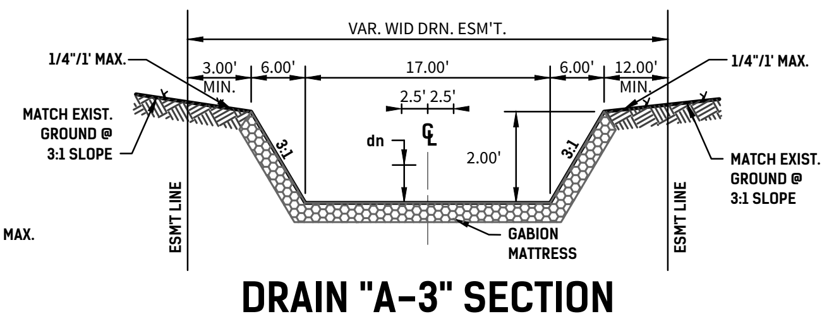
DRAIN "A-1" SECTION

(N.T.S.)


VAR. WID DRN. ESM'T.
1/4"/1' MAX.
MATCH EXIST. GROUND @ 3:1 SLOPE
ESM'T LINE
5' GABION MATTRESS

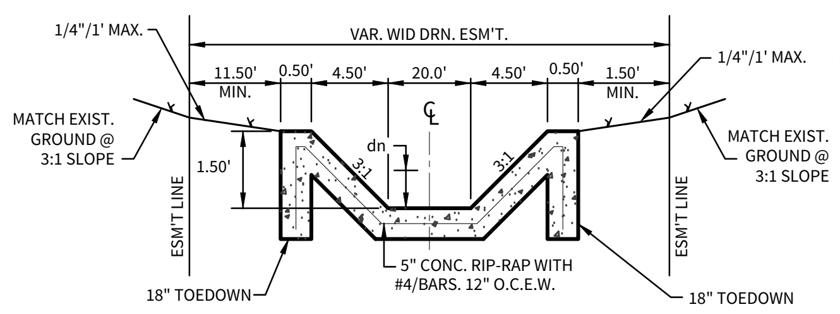
DRAIN "A-2" SECTION

(N.T.S.)


VAR. WID DRN. ESM'T.
1/4"/1' MAX.
MATCH EXIST. GROUND @ 3:1 SLOPE
ESM'T LINE
GABION MATTRESS

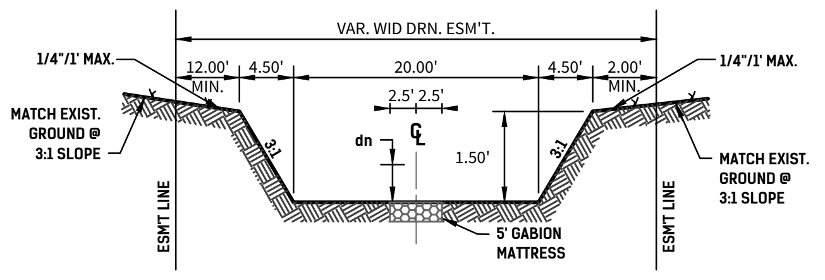
DRAIN "A-3" SECTION

(N.T.S.)


VAR. WID DRN. ESM'T.
1/4"/1' MAX.
MATCH EXIST. GROUND @ 3:1 SLOPE
ESM'T LINE
18" TOEDOWN
5" CONC. RIP-RAP WITH #4 BARS, 12" O.C.E.W.

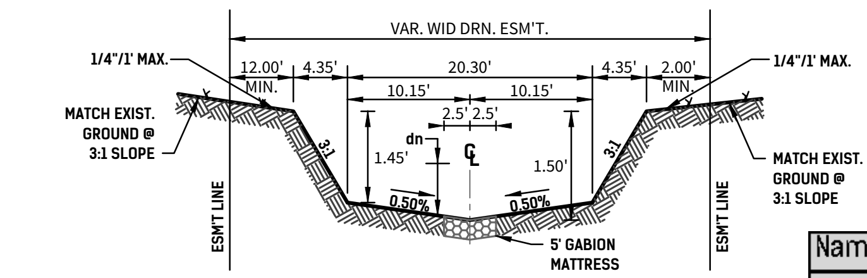
DRAIN "A-4" SECTION

(N.T.S.)


VAR. WID DRN. ESM'T.
1/4"/1' MAX.
MATCH EXIST. GROUND @ 3:1 SLOPE
ESM'T LINE
5' GABION MATTRESS

DRAIN "A-5" SECTION

(N.T.S.)


VAR. WID DRN. ESM'T.
1/4"/1' MAX.
MATCH EXIST. GROUND @ 3:1 SLOPE
ESM'T LINE
GABION MATTRESS

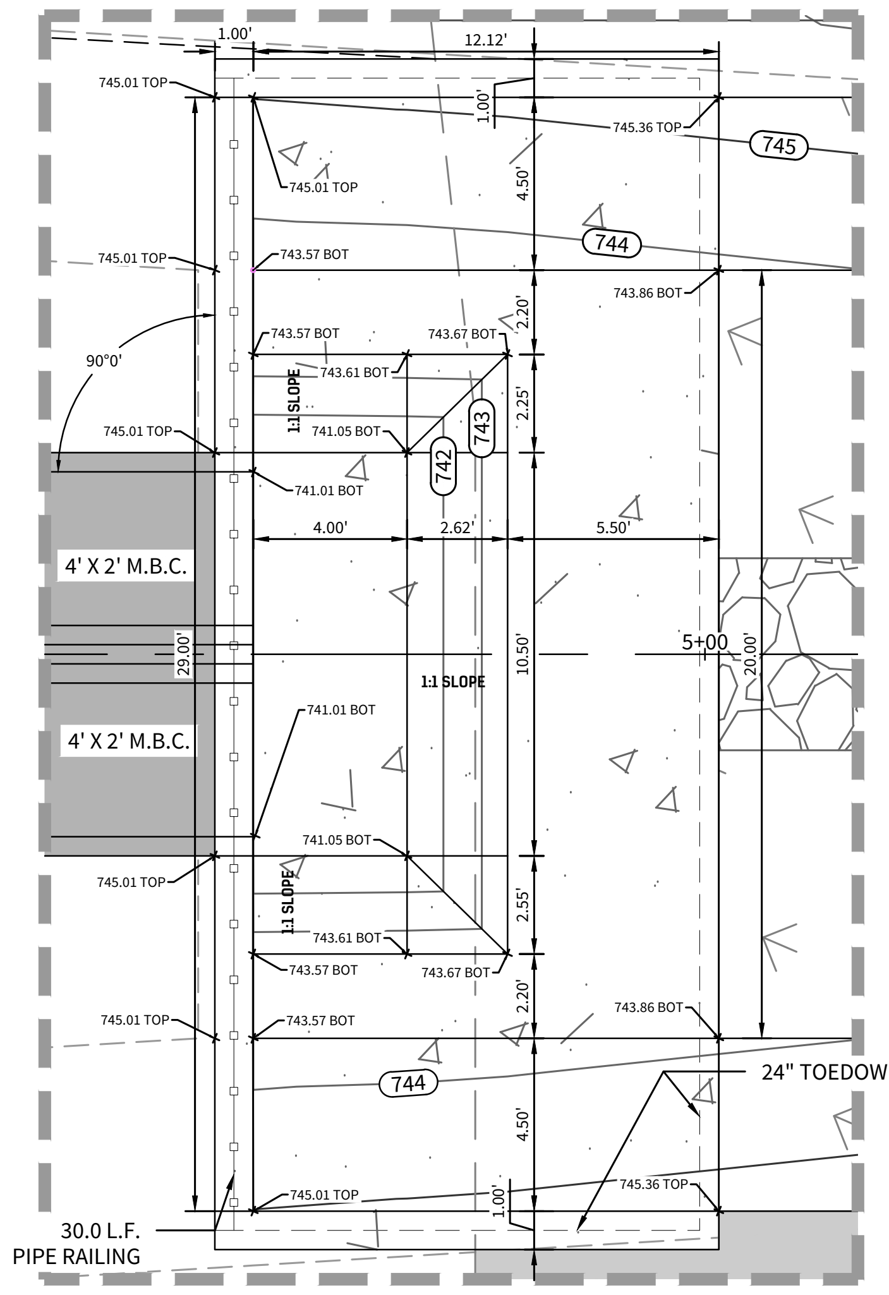
DRAIN "A-6" SECTION

(N.T.S.)

DRAIN "A"

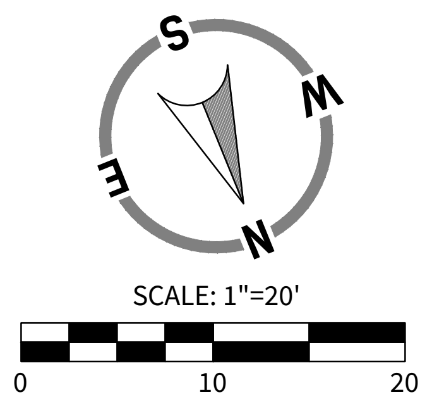
STA. 3+30.00 TO STA. 6+20.00

Name	A-1	A-2	A-3	A-4	A-5	A-6
BEGIN STA	1+29.36	3+65.97	3+75.97	4+94.87	5+00.37	5+49.12
END STA	3+55.97	3+75.97	3+85.97	5+00.37	5+39.12	6+40.35
Q25 (cfs)	107.63	107.63	107.63	93.79	93.79	93.79
h (ft)	2.00'	2.00'	2.00'	1.50'	1.50'	1.50'
b_w (ft)	17.30'	17.00'	17.00'	20.00'	20.00'	20.30'
z (_):1 left	3	3	3	3	3	3
z (_):1 right	3	3	3	3	3	3
t_w (ft)	29	29	29	29	29	29
n	0.035	0.035	0.035	0.015	0.035	0.035
Slope (%)	2.50%	2.50%	1.00%	3.50%	3.50%	3.50%
d_n (ft)	0.92'	0.93'	1.21'	0.43'	0.71'	0.71'
V (fps)	5.81	5.83	4.30	10.18	5.94	5.92


12.12'
745.01 TOP
4' X 2' M.B.C.
4' X 2' M.B.C.
3:1 SLOPE
5+00
30.0 L.F. PIPE RAILING
24" TOEDOWN
745.36 TOP
745.86 BOT

DRAIN "A" INTAKE DETAIL

(SCALE 1" = 5')


S
W
E
N
SCALE: 1"=20'
0
10
20

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 5'

DRAIN "A"

BAFFLE BLOCK CALCULATIONS

(CONTRA COSTA)

Y_0 = 1.89 FT　V_0 = 7.13 FPS

Q_{25} = 107.63 FT^3/S

$FROUDE_0$ = 0.91
SILL HEIGHT FACTOR = 0.09

Y_1 = 2.08 FT　V_1 = 5.66 FPS
$FROUDE_1$ = 0.69

CURB INLET "A-1" STA. 4+21.36 TO 4+25.02
CURB INLET ON GRADE – TxDOT METHOD

(TYPE C-1)

Q_{25} = 25.82 c.f.s.
S_X = GUTTER CROSS SLOPE = 0.02
S_L = STREET SLOPE = 0.04
$S_E = S_X + (\frac{A}{W})E_O$
S_E = EQUIVALENT CROSS SLOPE = 0.06

$L_R = ZQ^{0.42}S^{0.3}(\frac{1}{NSE})^{0.6}$

L_R = 57.61' INLET REQ'D
L_A = 20' CURB INLET USED
CO_T = CARRY OVER FLOW = $Q_{25}[(1-\frac{LA}{LR})^{1.8}]$

CO_T = 11.98 C.F.S.
Q_I = ACTUAL INLET INTERCEPTION = 13.84 C.F.S.

2- 4' X 2' M.B.C. DRAIN "A" STA. 3+97.42 TO 4+21.36

PIPE SLOPE = 1.00 %

Q_{25} = 107.63 c.f.s.

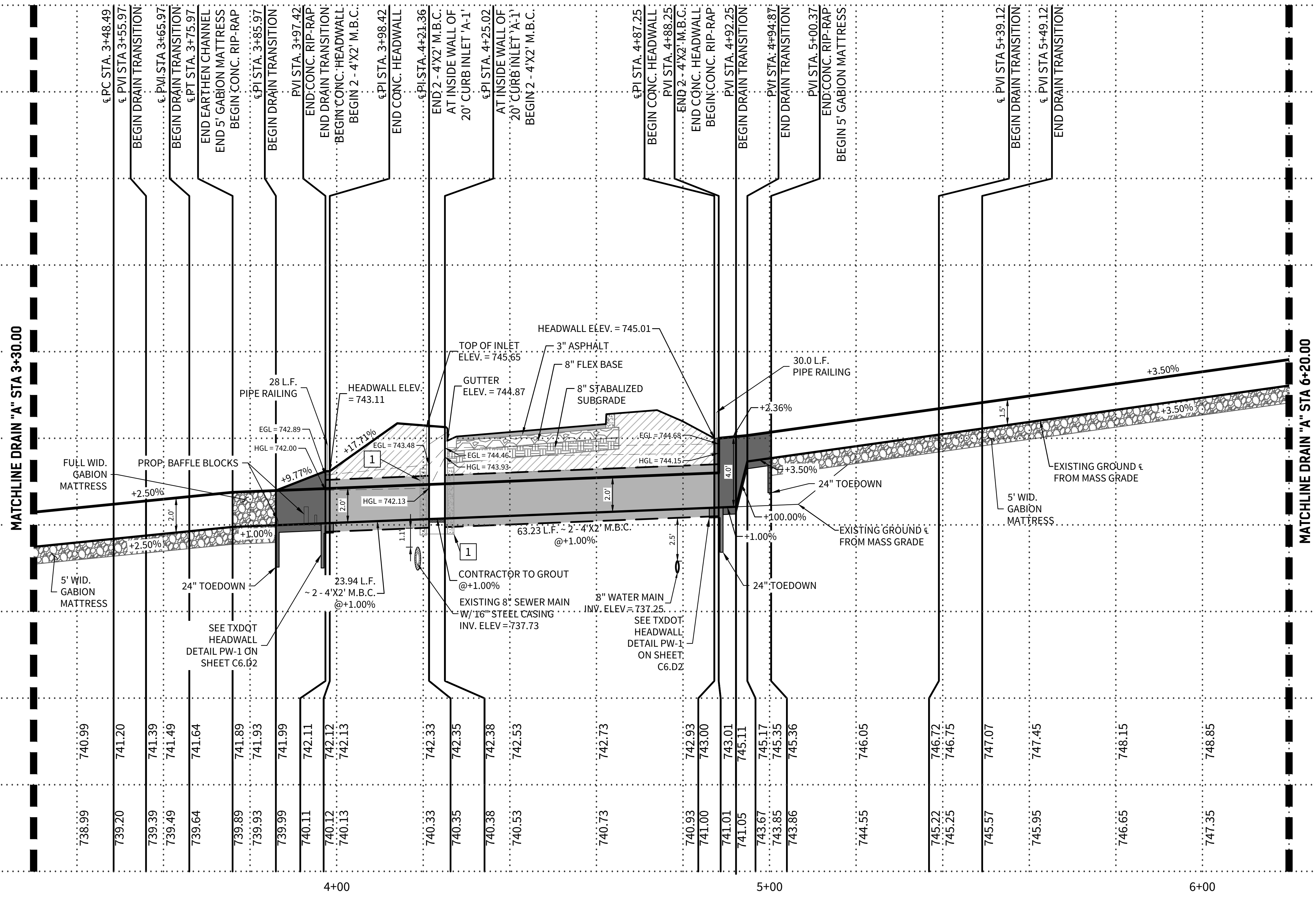
DEPTH OF FLOW = 1.89 ft

FLOW AREA = 15.10 ft^2

% FULL = 94.38%

$VELOCITY_{25}$ = 7.13 ft/s

n = 0.013


760
755
750
745
740
735
730
MATCHLINE DRAIN "A" STA 3+30.00
MATCHLINE DRAIN "A" STA 6+20.00
PC STA 3+48.49
PVI STA 3+55.97
BEGIN DRAIN TRANSITION
PVI STA 3+65.97
END DRAIN TRANSITION
PT STA 3+75.97
END EARTHEN CHANNEL
END 5' GABION MATTRESS
BEGIN CONC. RIP-RAP
PI STA 3+85.97
BEGIN DRAIN TRANSITION
PVI STA 3+97.42
END CONC. RIP-RAP
END DRAIN TRANSITION
BEGIN 2 - 4'X2' M.B.C.
PI STA 3+98.42
END CONC. HEADWALL
PI STA 4+21.36
END 2 - 4'X2' M.B.C.
AT INSIDE WALL OF 20' CURB INLET 'A-1'
PI STA 4+25.02
BEGIN 2 - 4'X2' M.B.C.
PI STA 4+87.25
BEGIN CONC. HEADWALL
PI STA 4+88.25
END 2 - 4'X2' M.B.C.
BEGIN CONC. RIP-RAP
PVI STA 4+92.25
BEGIN DRAIN TRANSITION
PVI STA 4+94.87
END DRAIN TRANSITION
PVI STA 5+00.37
END CONC. RIP-RAP
BEGIN 5' GABION MATTRESS
PVI STA 5+39.12
BEGIN DRAIN TRANSITION
PVI STA 5+49.12
END DRAIN TRANSITION
FULL WID. GABION MATTRESS
PROP. BAFFLE BLOCKS
28 L.F. PIPE RAILING
HEADWALL ELEV. = 743.11
TOP OF INLET ELEV. = 745.55
GUTTER ELEV. = 744.87
HEADWALL ELEV. = 745.01
3" ASPHALT
8" FLEX BASE
8" STABALIZED SUBGRADE
30.0 L.F. PIPE RAILING
+2.50%
+2.50%
+1.00%
+9.77%
+17.79%
+2.36%
+3.50%
+3.50%
+100.00%
-1.00%
24" TOEDOWN
24" TOEDOWN
24" TOEDOWN
5' WID. GABION MATTRESS
5' WID. GABION MATTRESS
23.94 L.F. ~ 2 - 4'X2' M.B.C. @+1.00%
63.23 L.F. - 2 - 4'X2' M.B.C. @+1.00%
CONTRACTOR TO GROUT @+1.00%
EXISTING 8" SEWER MAIN W/16" STEEL CASING INV. ELEV = 737.73
8" WATER MAIN INV. ELEV = 737.25
SEE TXDOT HEADWALL DETAIL PW-1 ON SHEET C6.02
SEE TXDOT DETAIL PW-1 ON SHEET C6.02
EXISTING GROUND FROM MASS GRADE
EXISTING GROUND FROM MASS GRADE
PROP. TOP OF DRAIN
740.99 741.20 741.39 741.49 741.64 741.89 741.93 741.99 742.11 742.12 742.13 742.33 742.35 742.38 742.53 742.73 742.93 743.00 743.01 745.11 745.17 745.35 746.05 746.72 746.75 747.07 747.45 748.15 748.85
PROP. DRAIN INVERT
738.99 739.20 739.39 739.49 739.64 739.89 739.93 739.99 740.11 740.12 740.13 740.33 740.35 740.38 740.53 740.73 740.93 741.00 741.01 741.05 743.67 743.85 743.86 744.55 745.22 745.25 745.57 745.95 746.65 747.35
4+00
5+00
6+00

2- 4' X 2' M.B.C. DRAIN "A" STA. 4+25.02 TO 4+88.25

PIPE SLOPE = 1.00 %

Q_{25} = 93.79 c.f.s.

DEPTH OF FLOW = 2.00 ft

FLOW AREA = 16.00 ft^2

% FULL = 100%

$VELOCITY_{25}$ = 5.86 ft/s

n = 0.013

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4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
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FLYING W
UNIT 2

DRAINAGE PLAN & PROFILE - DRAIN 'A'

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
CT

CHECKED BY
JL/TM

REVISIONS
1.
2.
3.
4.
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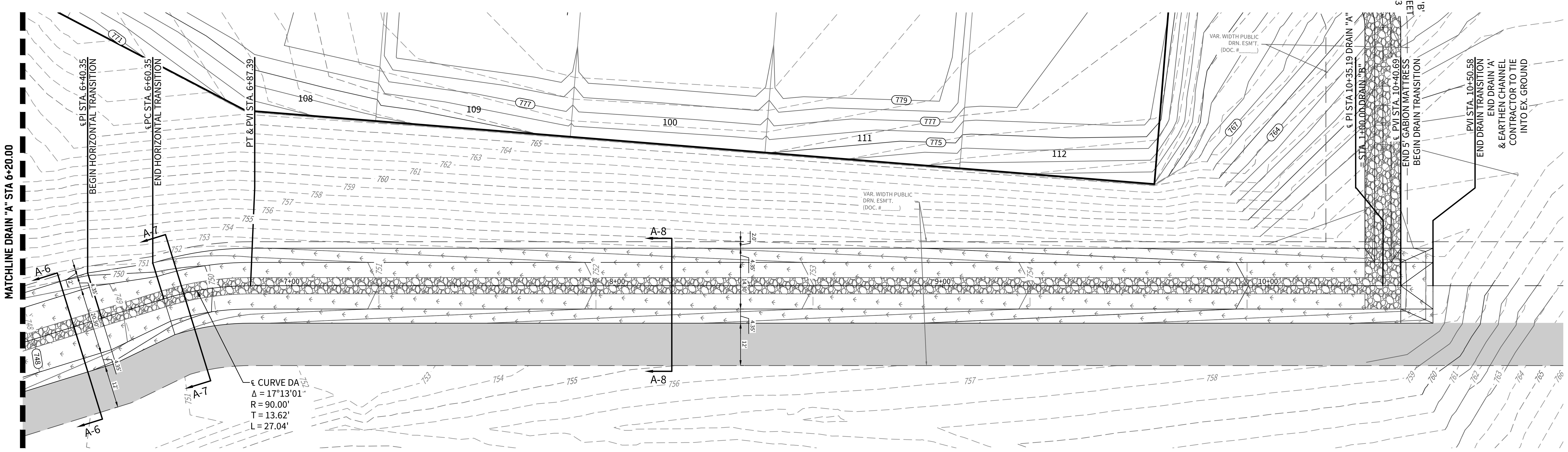
8.

4/16/26
TORY DUANE MILLER
135598

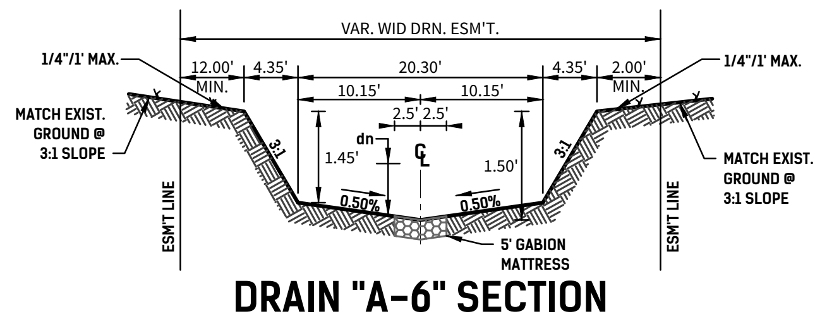
CUDE ENGINEERS
TBPELS No. 10048500

C6.01


MATCHLINE DRAIN "A" STA 6+20.00
℄ PI STA. 6+40.35
BEGIN HORIZONTAL TRANSITION
℄ PC STA. 6+60.35
END HORIZONTAL TRANSITION
PT & PVI STA. 6+87.39
℄ PI STA 10+35.19 DRAIN "A"
= STA. 1+00.00 DRAIN "B"
℄ PVI STA. 10+40.69
END 5' GABION MATTRESS
BEGIN DRAIN TRANSITION
PVI STA. 10+50.58
END DRAIN TRANSITION
END DRAIN 'A'
& EARTHEN CHANNEL
CONTRACTOR TO TIE
INTO EX. GROUND
DRAIN 'B'
SEE SHEET
C6.03
VAR. WIDTH PUBLIC
DRN. ESM'T.
(DOC. #______)
A-6
A-7
A-8
7+00
8+00
9+00
10+00
108
109
100
111
112
777
779
775
767
764
℄ CURVE DA
Δ = 17°13'01"
R = 90.00'
T = 13.62'
L = 27.04'

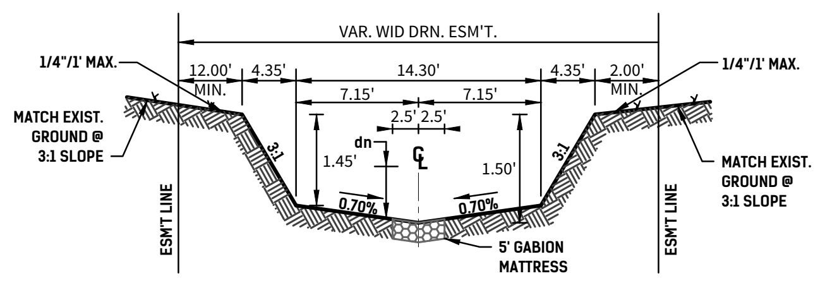
SCALE: 1"=50'

0 50 100


VAR. WID DRN. ESM'T.
1/4"/1' MAX.
12.00' MIN.
4.35'
20.30'
10.15'
10.15'
4.35'
2.00' MIN.
2.5' 2.5'
dn
℄
1.45'
1.50'
0.50%
0.50%
3:1
MATCH EXIST. GROUND @ 3:1 SLOPE
ESM'T LINE
5' GABION MATTRESS

DRAIN "A–6" SECTION

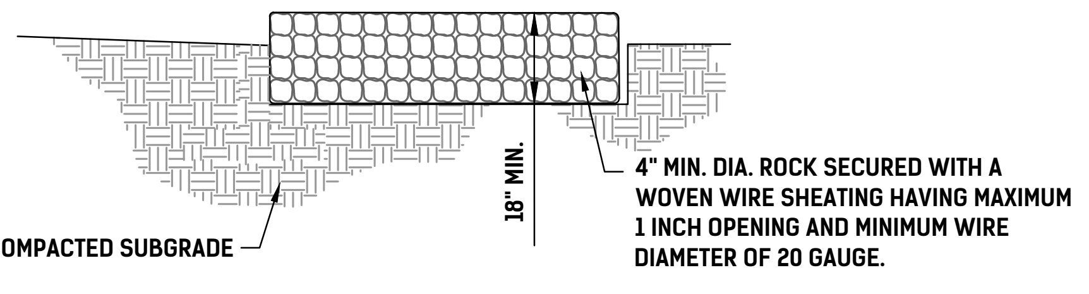
(N.T.S.)


VAR. WID DRN. ESM'T.
1/4"/1' MAX.
12.00' MIN.
4.35'
14.30'
7.15'
7.15'
4.35'
2.00' MIN.
2.5' 2.5'
dn
℄
1.45'
1.50'
0.70%
0.70%
3:1
MATCH EXIST. GROUND @ 3:1 SLOPE
ESM'T LINE
5' GABION MATTRESS

DRAIN "A–7, A–8" SECTION

(N.T.S.)

Name	A-6	A-7	A-8
BEGIN STA	5+49.12	6+60.35	6+87.39
END STA	6+40.35	6+87.39	10+40.69
Q25 (cfs)	93.79	91.34	91.34
h (ft)	1.50'	1.50'	1.50'
b_w (ft)	20.30'	14.30'	14.30'
z (_):1 left	3	3	3
z (_):1 right	3	3	3
t_w (ft)	29	23	23
n	0.035	0.035	0.035
Slope (%)	3.50%	3.50%	1.50%
d_n (ft)	0.71'	0.84'	1.08'
V (fps)	5.92	6.42	4.84


18" MIN.
4" MIN. DIA. ROCK SECURED WITH A WOVEN WIRE SHEATING HAVING MAXIMUM 1 INCH OPENING AND MINIMUM WIRE DIAMETER OF 20 GAUGE.
95% COMPACTED SUBGRADE

NOTE: GABION MATTRESS TO BE FREE OF GEO-TEXTILE FABRIC LINING.

GABION MATTRESS DETAIL (N.T.S.)

LEGEND:

▨	REVEGATATION
▒	MAINTENANCE PATH

KEYNOTES:

1 CONCRETE COLLARS SHALL BE INSTALLED FOR CAST-IN-PLACE & PRECAST CURB INLETS FOR EVERY PIPE CONNECTION

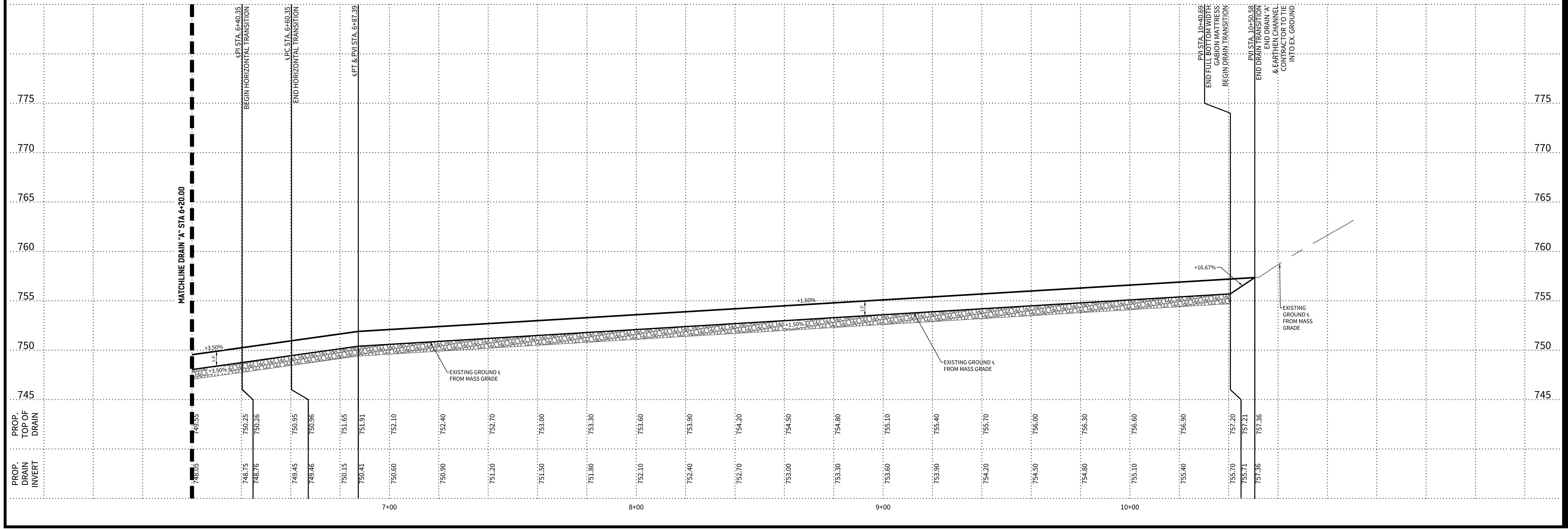
GENERAL NOTES

1. ALL CONCRETE LINING SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF NOT LESS THAN 3000 PSI IN 28 DAYS.
2. REFERENCE CITY OF SAN ANTONIO TYPICAL CONCRETE CHANNEL RIP-RAP STANDARDS FOUND ON SHEET C6.D1

DRAIN "A"

STA. 6+20.00 TO STA. 10+26.54

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 5'


MATCHLINE DRAIN "A" STA 6+20.00
℄ PI STA. 6+40.35
BEGIN HORIZONTAL TRANSITION
℄ PC STA. 6+60.35
℄ END HORIZONTAL TRANSITION
℄ PT & PVI STA. 6+87.39
PVI STA. 10+40.69
END FULL BOTTOM WIDTH
GABION MATTRESS
BEGIN DRAIN TRANSITION
PVI STA. 10+50.58
END DRAIN TRANSITION
END DRAIN 'A'
& EARTHEN CHANNEL
CONTRACTOR TO TIE
INTO EX. GROUND
775
770
765
760
755
750
745
+3.50%
+3.50%
+1.60%
+1.50%
+16.67%
1.5'
EXISTING GROUND ℄ FROM MASS GRADE
EXISTING GROUND ℄ FROM MASS GRADE
EXISTING GROUND ℄ FROM MASS GRADE
7+00
8+00
9+00
10+00

PROP. TOP OF DRAIN	PROP. DRAIN INVERT
749.55	748.05
750.25	748.75
750.26	748.76
750.95	749.45
750.96	749.46
751.65	750.15
751.91	750.41
752.10	750.60
752.40	750.90
752.70	751.20
753.00	751.50
753.30	751.80
753.60	752.10
753.90	752.40
754.20	752.70
754.50	753.00
754.80	753.30
755.10	753.60
755.40	753.90
755.70	754.20
756.00	754.50
756.30	754.80
756.60	755.10
756.90	755.40
757.20	755.70
757.21	755.71
757.36	757.36

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FLYING W
UNIT 2

DRAINAGE PLAN & PROFILE - DRAIN 'A'

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
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2.
3.
4.
5.
6.
7.
8.

4/16/26

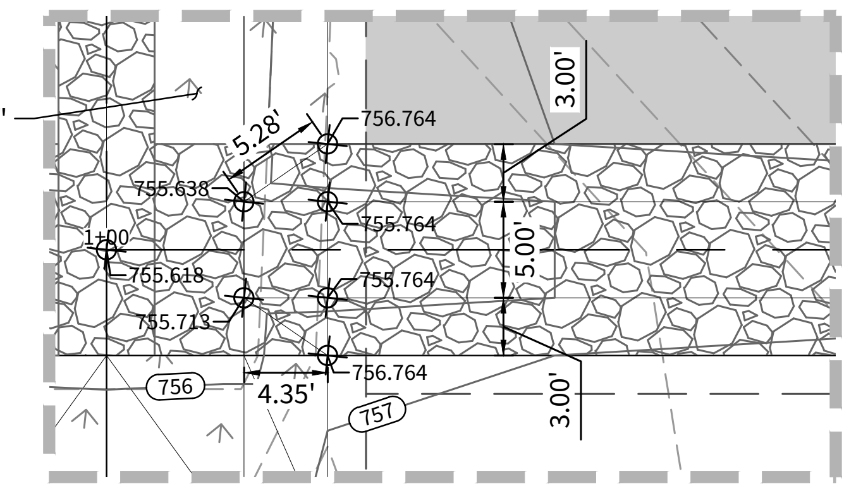
TORY DUANE MILLER
135598

Tory Miller

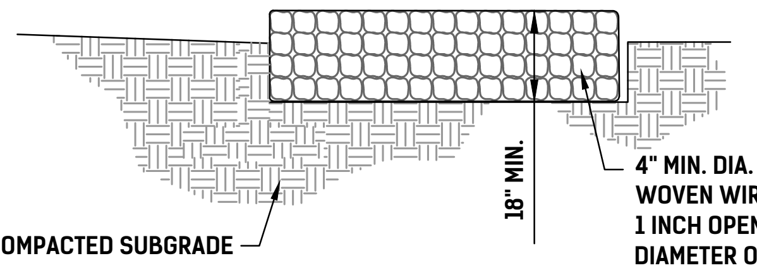
CUDE ENGINEERS
TBPELS No. 10048500

C6.02

C6.00 DRAINAGE PLAN & PROFILE - DRAIN A SG.dwg 2026/04/16 8:38am sgonzales


DRAIN "A"
5.28'
756.764
755.638
755.764
1+00
755.618
755.764
755.713
756.764
756
4.35'
757
3.00'
5.00'
3.00'

DETAIL "A"
(SCALE 1"=10')


18" MIN.
4" MIN. DIA. ROCK SECURED WITH A WOVEN WIRE SHEATING HAVING MAXIMUM 1 INCH OPENING AND MINIMUM WIRE DIAMETER OF 20 GAUGE.
95% COMPACTED SUBGRADE

NOTE: GABION MATTRESS TO BE FREE OF GEO-TEXTILE FABRIC LINING.

GABION MATTRESS DETAIL (N.T.S.)

KEYNOTES:

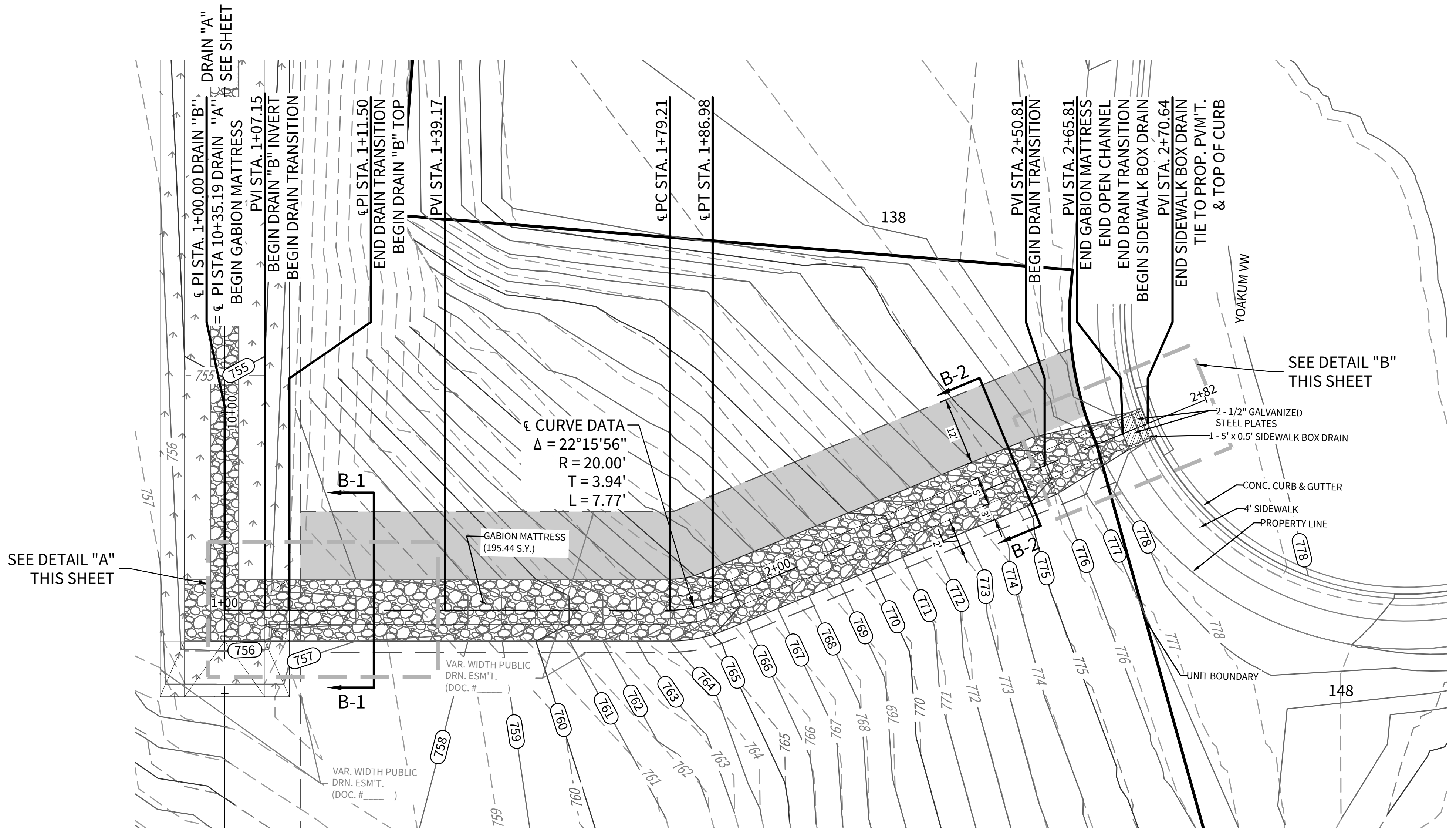
1	CONCRETE COLLARS SHALL BE INSTALLED FOR CAST-IN-PLACE & PRECAST CURB INLETS FOR EVERY PIPE CONNECTION

LEGEND:

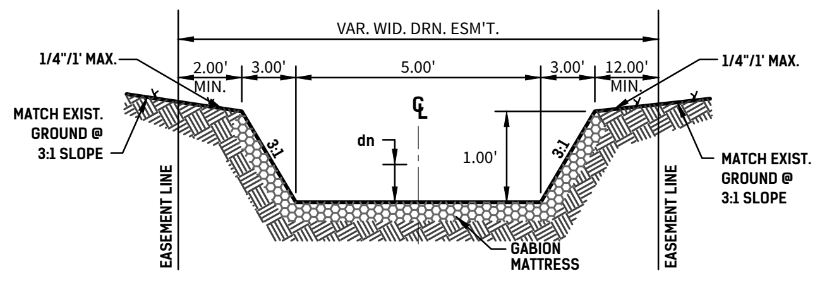
⁂	REVEGATATION
▦	GABION MATTRESS
▒	PROPOSED 12' ACCESS PATH

GENERAL NOTES

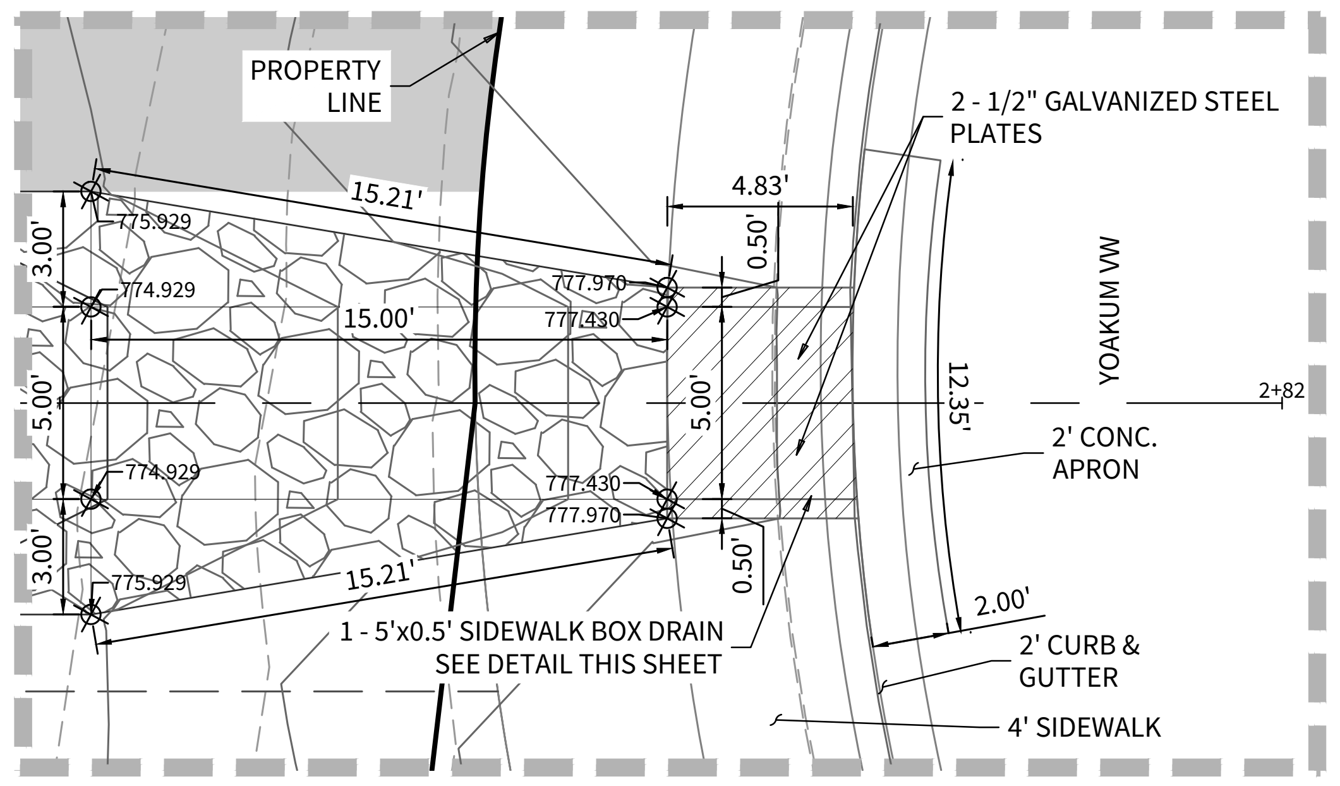
1. ALL CONCRETE LINING SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF NOT LESS THAN 3000 PSI IN 28 DAYS.
2. REFERENCE CITY OF SAN ANTONIO TYPICAL CONCRETE CHANNEL RIP-RAP STANDARDS FOUND ON SHEET C6.D1


℄ PI STA. 1+00.00 DRAIN "B" = ℄ PI STA 10+35.19 DRAIN "A" BEGIN GABION MATTRESS
DRAIN "A" SEE SHEET C6.02
PVI STA. 1+07.15 BEGIN DRAIN "B" INVERT BEGIN DRAIN TRANSITION
℄ PI STA. 1+11.50 END DRAIN TRANSITION BEGIN DRAIN "B" TOP
PVI STA. 1+39.17
℄ PC STA. 1+79.21
℄ PT STA. 1+86.98
PVI STA. 2+50.81 BEGIN DRAIN TRANSITION
PVI STA. 2+65.81 END GABION MATTRESS END OPEN CHANNEL END DRAIN TRANSITION BEGIN SIDEWALK BOX DRAIN
PVI STA. 2+70.64 END SIDEWALK BOX DRAIN TIE TO PROP. PVM'T. & TOP OF CURB
138
YOAKUM VW
SEE DETAIL "B" THIS SHEET
2+82
2 - 1/2" GALVANIZED STEEL PLATES
1 - 5' x 0.5' SIDEWALK BOX DRAIN
CONC. CURB & GUTTER
4' SIDEWALK
PROPERTY LINE
℄ CURVE DATA
Δ = 22°15'56"
R = 20.00'
T = 3.94'
L = 7.77'
B-1
B-2
12'
GABION MATTRESS (195.44 S.Y.)
SEE DETAIL "A" THIS SHEET
1+00
10+00
2+00
VAR. WIDTH PUBLIC DRN. ESM'T. (DOC. #______)
UNIT BOUNDARY
148
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778

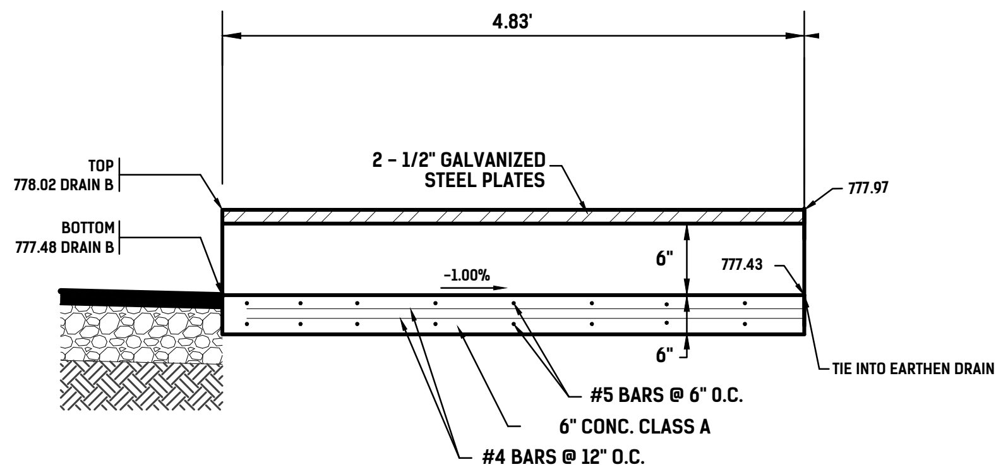
Name	B-1	B-2
BEGIN STA	1+11.50	1+39.17
END STA	1+39.17	2+50.81
Q25 (cfs)	9.22	9.22
h (ft)	1.00'	1.00'
b_w (ft)	5.00'	5.00'
z (_):1 left	3	3
z (_):1 right	3	3
t_w (ft)	11	11
n	0.035	0.035
Slope (%)	2.00%	16.67%
d_n (ft)	0.45'	0.25'
V (fps)	3.12	6.34


VAR. WID. DRN. ESM'T.
1/4"/1' MAX.
1/4"/1' MAX.
2.00' MIN.
3.00'
5.00'
3.00'
12.00' MIN.
MATCH EXIST. GROUND @ 3:1 SLOPE
MATCH EXIST. GROUND @ 3:1 SLOPE
℄
dn
1.00'
3:1
3:1
EASEMENT LINE
EASEMENT LINE
GABION MATTRESS

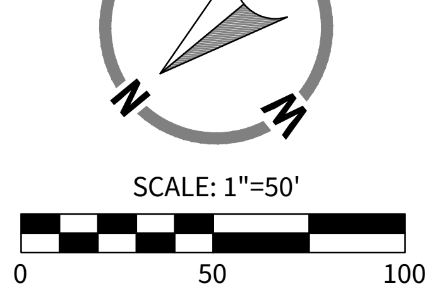
DRAIN "B-1, B-2" SECTIONS
(N.T.S.)


PROPERTY LINE
2 - 1/2" GALVANIZED STEEL PLATES
15.21'
15.00'
15.21'
4.83'
0.50'
0.50'
3.00'
5.00'
3.00'
5.00'
12.35'
2.00'
775.929
774.929
774.929
775.929
777.970
777.430
777.430
777.970
YOAKUM VW
2+82
2' CONC. APRON
2' CURB & GUTTER
4' SIDEWALK
1 - 5'x0.5' SIDEWALK BOX DRAIN SEE DETAIL THIS SHEET

DETAIL "B"
(SCALE 1"=5')


4.83'
TOP 778.02 DRAIN B
BOTTOM 777.48 DRAIN B
2 - 1/2" GALVANIZED STEEL PLATES
777.97
6"
777.43
-1.00%
6"
TIE INTO EARTHEN DRAIN
#5 BARS @ 6" O.C.
6" CONC. CLASS A
#4 BARS @ 12" O.C.

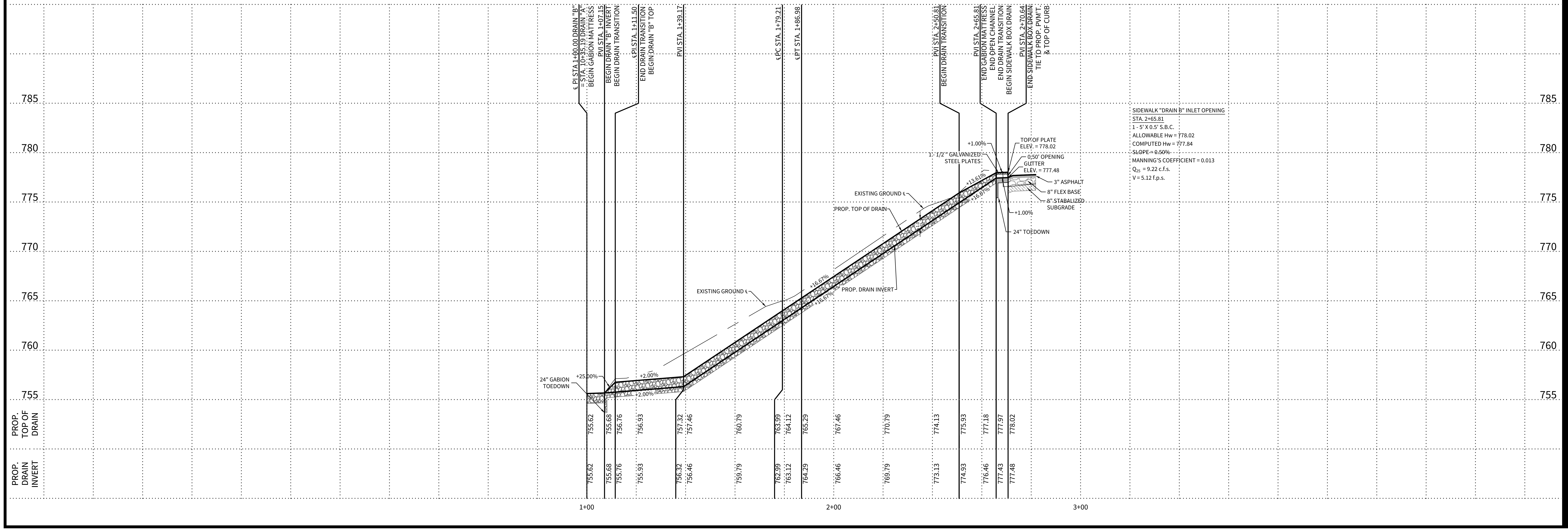
DRAIN "B" INLET SECTION
(N.T.S)


N
E
S
W
SCALE: 1"=50'
0
50
100

DRAIN "B"

STA. 1+00.00 TO STA. 2+70.64

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 5'


℄ PI STA 1+00.00 DRAIN "B" = STA. 10+35.19 DRAIN "A" BEGIN GABION MATTRESS
PVI STA. 1+07.15 BEGIN DRAIN "B" INVERT BEGIN DRAIN TRANSITION
℄PI STA. 1+11.50 END DRAIN TRANSITION BEGIN DRAIN "B" TOP
PVI STA. 1+39.17
℄PC STA. 1+79.21
℄PT STA. 1+86.98
PVI STA. 2+50.81 BEGIN DRAIN TRANSITION
PVI STA. 2+65.81 END GABION MATTRESS END OPEN CHANNEL END DRAIN TRANSITION BEGIN SIDEWALK BOX DRAIN
PVI STA. 2+70.64 END SIDEWALK BOX DRAIN TIE TO PROP. PVM'T. & TOP OF CURB
785
780
775
770
765
760
755
+1.00%
TOP OF PLATE ELEV. = 778.02
1 - 1/2" GALVANIZED STEEL PLATES
0.50' OPENING
GUTTER ELEV. = 777.48
3" ASPHALT
8" FLEX BASE
8" STABALIZED SUBGRADE
+1.00%
24" TOEDOWN
EXISTING GROUND ℄
PROP. TOP OF DRAIN
+13.61%
+16.67%
EXISTING GROUND ℄
PROP. DRAIN INVERT
+16.67%
+16.67%
24" GABION TOEDOWN
+25.00%
+2.00%
+2.00%
PROP. TOP OF DRAIN
755.62
755.68
756.76
756.93
757.32
757.46
760.79
763.99
764.12
765.29
767.46
770.79
774.13
775.93
777.18
777.97
778.02
PROP. DRAIN INVERT
755.62
755.68
755.76
755.93
756.32
756.46
759.79
762.99
763.12
764.29
766.46
769.79
773.13
774.93
776.46
777.43
777.48
1+00
2+00
3+00

SIDEWALK "DRAIN B" INLET OPENING
STA. 2+65.81
1 - 5' X 0.5' S.B.C.
ALLOWABLE Hw = 778.02
COMPUTED Hw = 777.84
SLOPE = 0.50%
MANNING'S COEFFICIENT = 0.013
Q_{25} = 9.22 c.f.s.
V = 5.12 f.p.s.

CUDEENGINEERS.COM

CUDE ENGINEERS
EST. 1980

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

DRAINAGE PLAN & PROFILE - DRAIN "B"

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

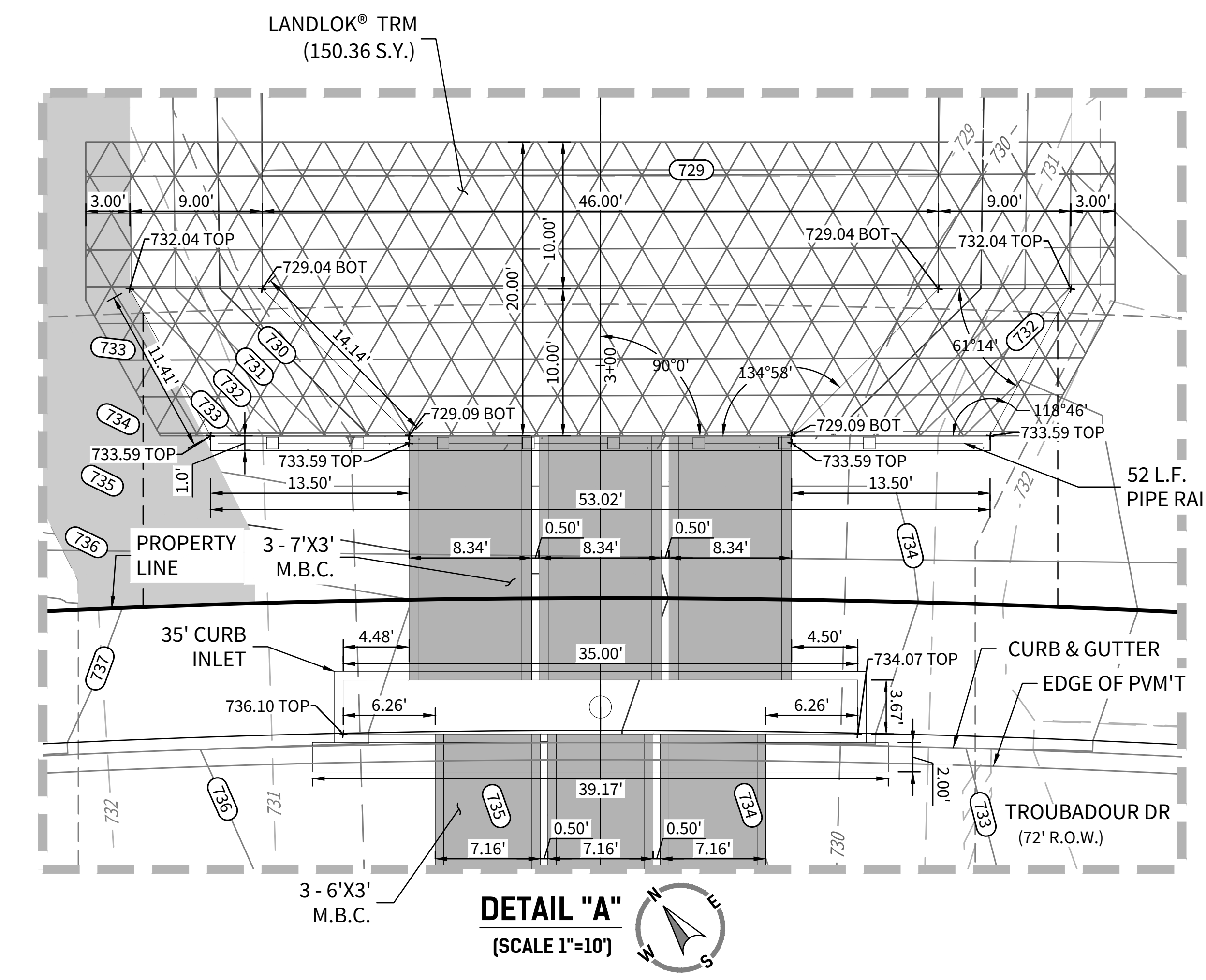
CHECKED BY
JL/TM

REVISIONS
1.
2.
3.
4.
5.
6.
7.
8.

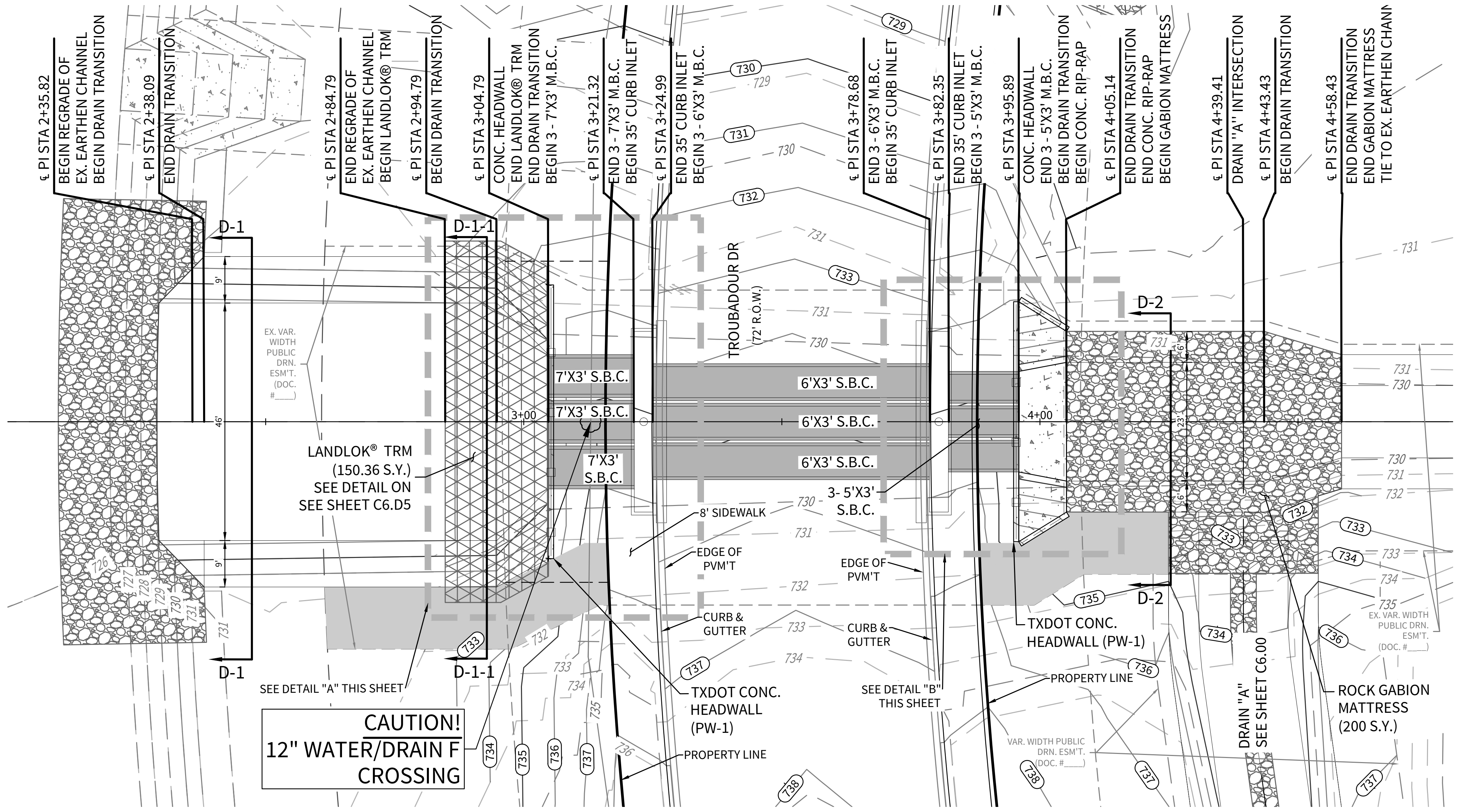
4/16/26
TORY DUANE MILLER
135598

CUDE ENGINEERS
TBPELS No. 10048500

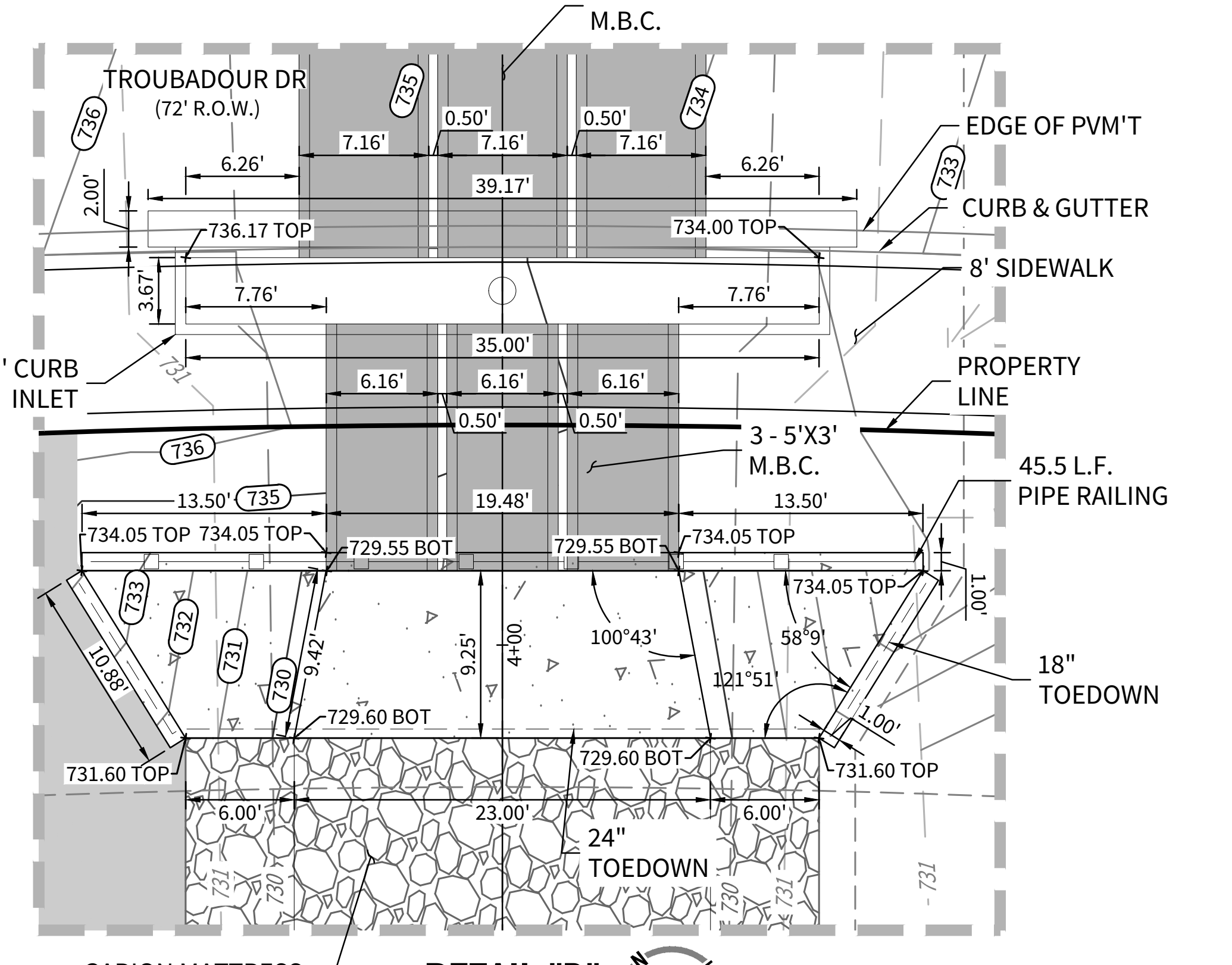
C6.03


LANDLOK® TRM
(150.36 S.Y.)
3.00'
9.00'
46.00'
732.04 TOP
729.04 BOT
729.09 BOT
733.59 TOP
13.50'
53.02'
0.50'
8.34'
52 L.F.
PIPE RAILING
PROPERTY LINE
3 - 7'X3'
M.B.C.
35' CURB INLET
35.00'
4.48'
4.50'
734.07 TOP
736.10 TOP
6.26'
CURB & GUTTER
EDGE OF PVM'T
39.17'
7.16'
TROUBADOUR DR
(72' R.O.W.)
3 - 6'X3'
M.B.C.

DETAIL "A"
(SCALE 1"=10')


℄ PI STA 2+35.82
BEGIN REGRADE OF
EX. EARTHEN CHANNEL
BEGIN DRAIN TRANSITION
℄ PI STA 2+38.09
END DRAIN TRANSITION
℄ PI STA 2+84.79
END REGRADE OF
EX. EARTHEN CHANNEL
BEGIN LANDLOK® TRM
℄ PI STA 2+94.79
BEGIN DRAIN TRANSITION
℄ PI STA 3+04.79
CONC. HEADWALL
END LANDLOK® TRM
END DRAIN TRANSITION
BEGIN 3 - 7'X3' M.B.C.
℄ PI STA 3+21.32
END 3 - 7'X3' M.B.C.
BEGIN 35' CURB INLET
℄ PI STA 3+24.99
END 35' CURB INLET
BEGIN 3 - 6'X3' M.B.C.
℄ PI STA 3+78.68
END 3 - 6'X3' M.B.C.
BEGIN 35' CURB INLET
℄ PI STA 3+82.35
END 35' CURB INLET
BEGIN 3 - 5'X3' M.B.C.
℄ PI STA 3+95.89
CONC. HEADWALL
END 3 - 5'X3' M.B.C.
BEGIN DRAIN TRANSITION
BEGIN CONC. RIP-RAP
℄ PI STA 4+05.14
END DRAIN TRANSITION
END CONC. RIP-RAP
BEGIN GABION MATTRESS
℄ PI STA 4+39.41
DRAIN "A" INTERSECTION
℄ PI STA 4+43.43
BEGIN DRAIN TRANSITION
℄ PI STA 4+58.43
END DRAIN TRANSITION
END GABION MATTRESS
TIE TO EX. EARTHEN CHANNEL
D-1
D-1-1
D-2
EX. VAR. WIDTH PUBLIC DRN. ESM'T. (DOC. #____)
LANDLOK® TRM
(150.36 S.Y.)
SEE DETAIL ON
SEE SHEET C6.D5
7'X3' S.B.C.
7'X3' S.B.C.
6'X3' S.B.C.
5'X3' S.B.C.
TROUBADOUR DR
(72' R.O.W.)
8' SIDEWALK
EDGE OF PVM'T
CURB & GUTTER
3- 5'X3' S.B.C.
TXDOT CONC. HEADWALL (PW-1)
PROPERTY LINE
SEE DETAIL "A" THIS SHEET
SEE DETAIL "B" THIS SHEET
CAUTION!
12" WATER/DRAIN F
CROSSING
DRAIN "A"
SEE SHEET C6.00
ROCK GABION MATTRESS
(200 S.Y.)
VAR. WIDTH PUBLIC DRN. ESM'T. (DOC. #____)
3+00
4+00

SCALE: 1"=20'
0 10 20


3 - 6'X3'
M.B.C.
TROUBADOUR DR
(72' R.O.W.)
7.16'
0.50'
39.17'
6.26'
EDGE OF PVM'T
CURB & GUTTER
8' SIDEWALK
736.17 TOP
734.00 TOP
7.76'
35.00'
6.16'
35' CURB INLET
PROPERTY LINE
3 - 5'X3'
M.B.C.
45.5 L.F.
PIPE RAILING
13.50'
19.48'
734.05 TOP
729.55 BOT
100°43'
18"
TOEDOWN
729.60 BOT
731.60 TOP
6.00'
23.00'
24"
TOEDOWN
GABION MATTRESS
(200 S.Y.)

DETAIL "B"
(SCALE 1"=10')

KEYNOTES:

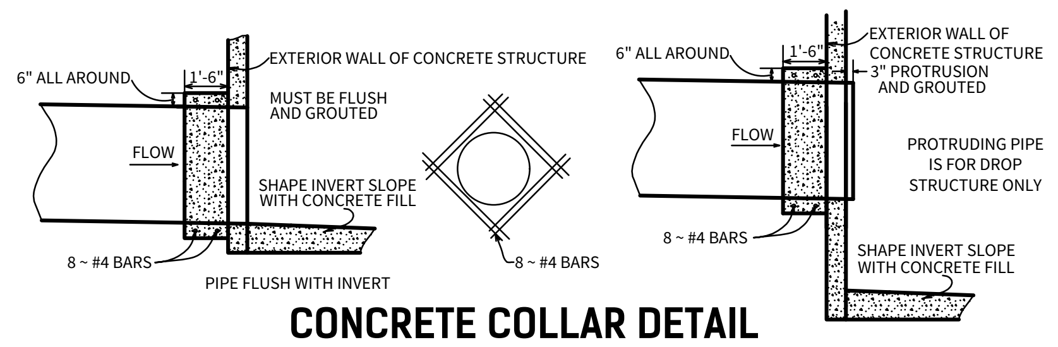
☐1 CONCRETE COLLARS SHALL BE INSTALLED FOR CAST-IN-PLACE & PRECAST CURB INLETS FOR EVERY PIPE CONNECTION

LEGEND:

▩	PROPOSED M.B.C.
⁖	PROPOSED CONCRETE RIP-RAP
▨	PROPOSED LANDLOK® TRM
●	GABION MATTRESS
▒	PROPOSED 12' MAINTENANCE PATH

GENERAL NOTES

1. ALL CONCRETE LINING SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF NOT LESS THAN 3000 PSI IN 28 DAYS.
2. REFERENCE CITY OF SAN ANTONIO TYPICAL CONCRETE CHANNEL RIP-RAP STANDARDS FOUND ON SHEET C6.D1


6" ALL AROUND
EXTERIOR WALL OF CONCRETE STRUCTURE
MUST BE FLUSH AND GROUTED
FLOW
SHAPE INVERT SLOPE WITH CONCRETE FILL
8 ~ #4 BARS
PIPE FLUSH WITH INVERT
3" PROTRUSION AND GROUTED
PROTRUDING PIPE IS FOR DROP STRUCTURE ONLY

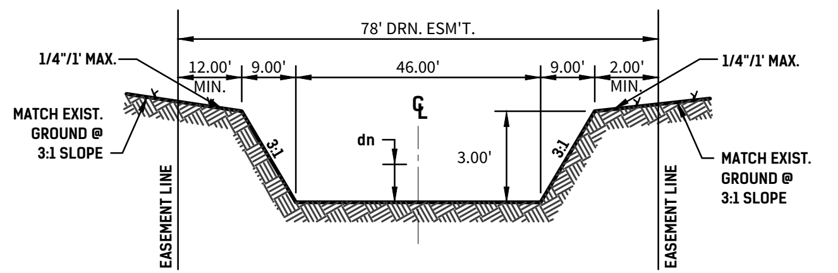
CONCRETE COLLAR DETAIL
(N.T.S.)

Name	D-1	D-1-1	D-2
BEGIN STA	2+38.09	2+84.79	4+05.14
END STA	2+84.79	2+94.79	4+43.43
Q100 (cfs)	259.54	259.54	213.26
h (ft)	3.00'	3.00'	2.00'
b_w (ft)	46.00'	46.00'	23.00'
z (_):1 left	3	3	3
z (_):1 right	3	3	3
t_w (ft)	64	64	35
n	0.035	0.025	0.035
Slope (%)	0.50%	0.50%	0.51%
d_n (ft)	1.43'	1.17'	1.85'
V (fps)	3.60	4.46	4.03

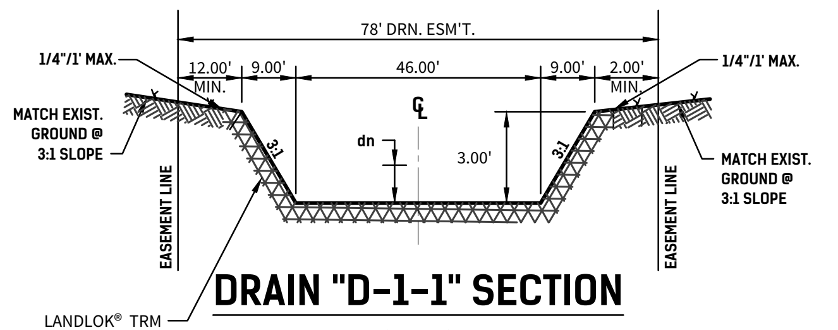
Name	D-1	D-1-1	D-2
BEGIN STA	2+38.09	2+84.79	4+05.14
END STA	2+84.79	2+94.79	4+43.43
Q25 (cfs)	186.17	186.17	152.64
h (ft)	3.00'	3.00'	2.00'
b_w (ft)	46.00'	46.00'	23.00'
z (_):1 left	3	3	3
z (_):1 right	3	3	3
t_w (ft)	64	64	35
n	0.035	0.025	0.035
Slope (%)	0.50%	0.50%	0.51%
d_n (ft)	1.18'	0.97'	1.53'
V (fps)	3.19	3.95	3.61

DRAIN "D"

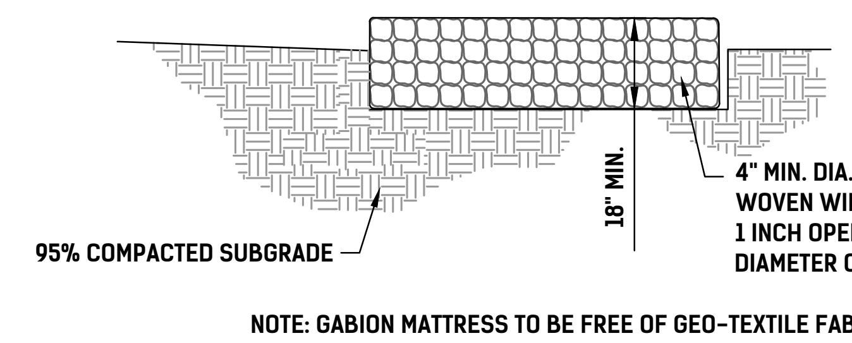
STA. 2+35.82 TO STA. 4+58.43


78' DRN. ESM'T.
1/4"/1' MAX.
12.00' MIN.
9.00'
46.00'
℄
dn
3.00'
MATCH EXIST. GROUND @ 3:1 SLOPE
EASEMENT LINE

DRAIN "D-1" SECTION
(N.T.S.)

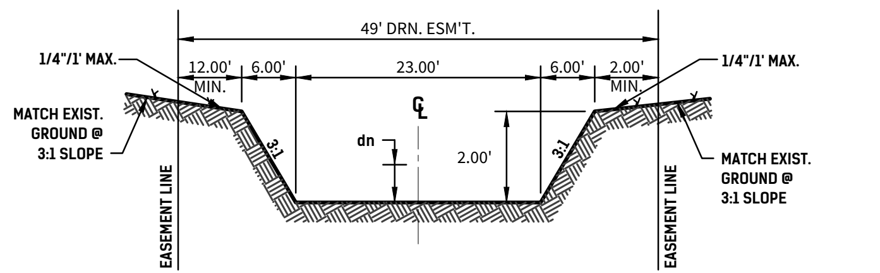

78' DRN. ESM'T.
1/4"/1' MAX.
12.00' MIN.
9.00'
46.00'
℄
dn
3.00'
MATCH EXIST. GROUND @ 3:1 SLOPE
EASEMENT LINE
LANDLOK® TRM

DRAIN "D-1-1" SECTION
(N.T.S.)


95% COMPACTED SUBGRADE
18" MIN.
4" MIN. DIA. ROCK SECURED WITH A WOVEN WIRE SHEATING HAVING MAXIMUM 1 INCH OPENING AND MINIMUM WIRE DIAMETER OF 20 GAUGE.

NOTE: GABION MATTRESS TO BE FREE OF GEO-TEXTILE FABRIC LINING.

GABION MATTRESS DETAIL
(N.T.S.)


49' DRN. ESM'T.
1/4"/1' MAX.
12.00' MIN.
6.00'
23.00'
℄
dn
2.00'
MATCH EXIST. GROUND @ 3:1 SLOPE
EASEMENT LINE

DRAIN "D-2" SECTION
(N.T.S.)

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 5'

3 – 7' x 3' M.B.C.
DRAIN "D" – 25YR
STA. 3+04.79 TO 3+21.32

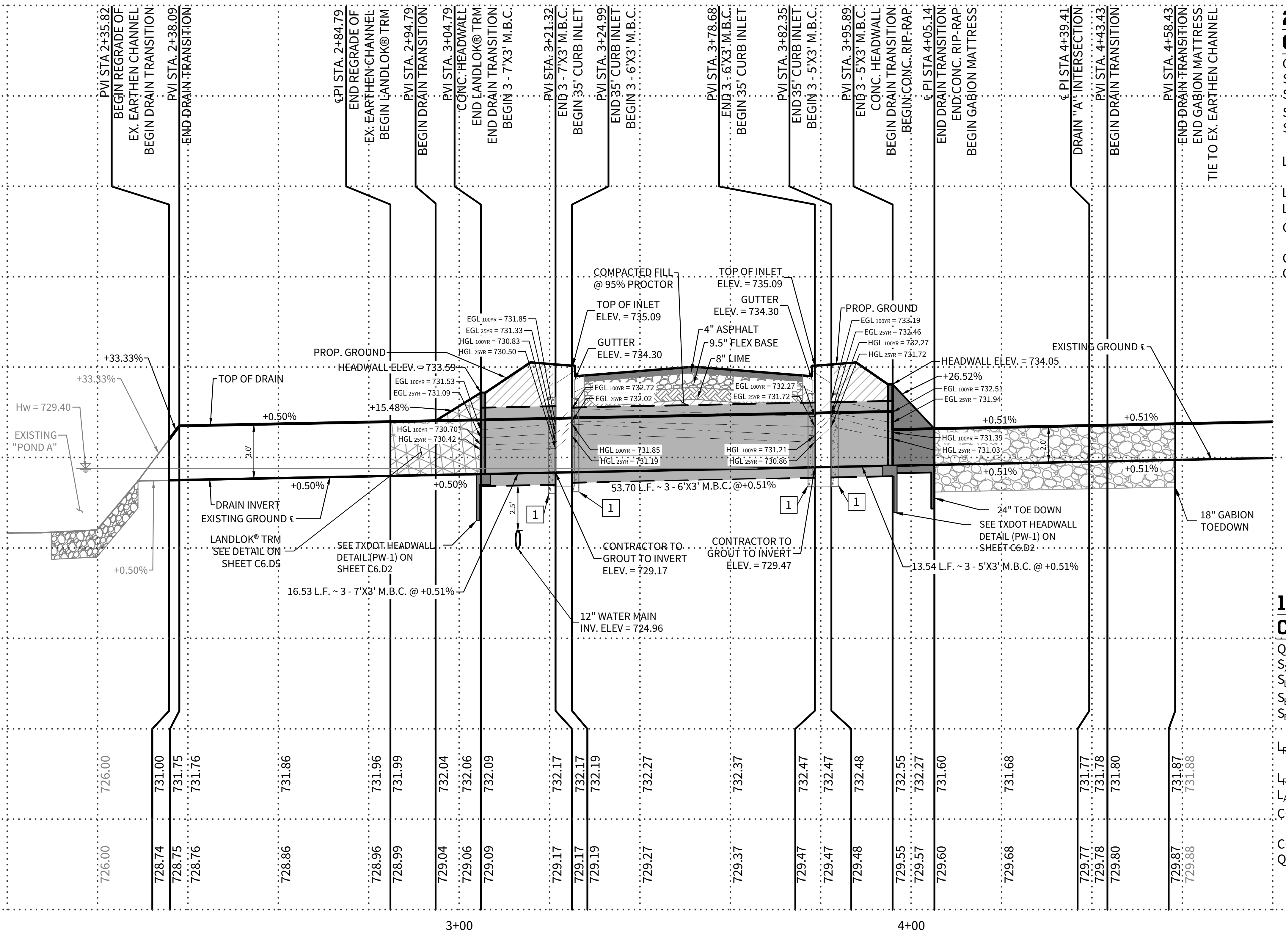
PIPE SLOPE = 0.51 %
Q_{25} = 182.68 c.f.s.
DEPTH OF FLOW = 1.33 ft
FLOW AREA = 27.93 ft^2
% FULL = 44.33%
VELOCITY$_{25}$ = 6.54 ft/s
n = 0.013

3 – 6' x 3' M.B.C.
DRAIN "D" – 25YR
STA. 3+24.99 TO 3+78.68

PIPE SLOPE = 0.51 %
Q_{25} = 167.66 c.f.s.
DEPTH OF FLOW = 2.14 ft
FLOW AREA = 38.48 ft^2
% FULL = 71.26%
VELOCITY$_{25}$ = 4.36 ft/s
n = 0.013

3 – 5' x 3' M.B.C.
DRAIN "D" – 25YR
STA. 3+82.35 TO 3+95.89

PIPE SLOPE = 0.51 %
Q_{25} = 152.64 c.f.s.
DEPTH OF FLOW = 2.24 ft
FLOW AREA = 33.66 ft^2
% FULL = 74.8 %
VELOCITY$_{25}$ = 4.53 ft/s
n = 0.013


℄ PVI STA 2+35.82
BEGIN REGRADE OF EX. EARTHEN CHANNEL
BEGIN DRAIN TRANSITION
PVI STA 2+38.09
END DRAIN TRANSITION
℄ PI STA 2+84.79
END REGRADE OF EX. EARTHEN CHANNEL
BEGIN LANDLOK® TRM
PVI STA 2+94.79
BEGIN DRAIN TRANSITION
PVI STA 3+04.79
CONC. HEADWALL
END LANDLOK® TRM
END DRAIN TRANSITION
BEGIN 3 - 7'X3' M.B.C.
PVI STA 3+21.32
END 3 - 7'X3' M.B.C.
BEGIN 35' CURB INLET
PVI STA 3+24.99
END 35' CURB INLET
BEGIN 3 - 6'X3' M.B.C.
PVI STA 3+78.68
END 3 - 6'X3' M.B.C.
BEGIN 35' CURB INLET
PVI STA 3+82.35
END 35' CURB INLET
BEGIN 3 - 5'X3' M.B.C.
PVI STA 3+95.89
CONC. HEADWALL
END 3 - 5'X3' M.B.C.
BEGIN DRAIN TRANSITION
BEGIN CONC. RIP-RAP
℄ PI STA 4+05.14
END DRAIN TRANSITION
END CONC. RIP-RAP
BEGIN GABION MATTRESS
℄ PI STA 4+39.41
DRAIN "A" INTERSECTION
PVI STA 4+43.43
BEGIN DRAIN TRANSITION
PVI STA 4+58.43
END DRAIN TRANSITION
END GABION MATTRESS
TIE TO EX. EARTHEN CHANNEL
Hw = 729.40
EXISTING "POND A"
+33.33%
TOP OF DRAIN
+0.50%
DRAIN INVERT
EXISTING GROUND
LANDLOK® TRM SEE DETAIL ON SHEET C6.D5
PROP. GROUND
HEADWALL ELEV. = 733.59
+15.48%
SEE TXDOT HEADWALL DETAIL (PW-1) ON SHEET C6.D2
16.53 L.F. ~ 3 - 7'X3' M.B.C. @ +0.50%
COMPACTED FILL @ 95% PROCTOR
TOP OF INLET ELEV. = 735.09
GUTTER ELEV. = 734.30
4" ASPHALT
9.5" FLEX BASE
8" LIME
53.70 L.F. ~ 3 - 6'X3' M.B.C. @+0.51%
CONTRACTOR TO GROUT TO INVERT ELEV. = 729.17
CONTRACTOR TO GROUT TO INVERT ELEV. = 729.47
12" WATER MAIN INV. ELEV = 724.96
PROP. GROUND
HEADWALL ELEV. = 734.05
+26.52%
13.54 L.F. ~ 3 - 5'X3' M.B.C. @ +0.51%
24" TOE DOWN
SEE TXDOT HEADWALL DETAIL (PW-1) ON SHEET C6.D2
EXISTING GROUND
+0.51%
18" GABION TOEDOWN
1
PROP. TOP OF DRAIN
726.00
731.00
731.75
731.76
731.86
731.96
731.99
732.04
732.06
732.09
732.17
732.19
732.27
732.37
732.47
732.47
732.48
732.55
732.27
731.60
731.68
731.77
731.78
731.80
731.87
PROP. DRAIN INVERT
726.00
728.74
728.75
728.76
728.86
728.96
728.99
729.04
729.06
729.09
729.17
729.19
729.27
729.37
729.47
729.47
729.48
729.55
729.57
729.60
729.68
729.77
729.78
729.80
729.87
3+00
4+00
735
730
725

3 – 7' x 3' M.B.C.
DRAIN "D" – 100YR
STA. 3+04.79 TO 3+21.32

PIPE SLOPE = 0.51 %
Q_{100} = 255.84 c.f.s.
DEPTH OF FLOW = 1.61 ft
FLOW AREA = 33.81 ft^2
% FULL = 53.67 %
VELOCITY$_{100}$ = 7.57 ft/s
n = 0.013

3 – 6' x 3' M.B.C.
DRAIN "D" – 100YR
STA. 3+24.99 TO 3+78.68

PIPE SLOPE = 0.51 %
Q_{100} = 234.55 c.f.s.
DEPTH OF FLOW = 2.66 ft
FLOW AREA = 47.86 ft^2
% FULL = 88.63 %
VELOCITY$_{100}$ = 4.90 ft/s
n = 0.013

3 – 5' x 3' M.B.C.
DRAIN "D" – 100YR
STA. 3+82.35 TO 3+95.89

PIPE SLOPE = 0.51 %
Q_{100} = 213.26 c.f.s.
DEPTH OF FLOW = 2.79 ft
FLOW AREA = 41.88 ft^2
% FULL = 92.89 %
VELOCITY$_{100}$ = 5.10 ft/s
n = 0.013

25YR INLET "D" STA. 3+21.32 TO 3+24.99
CURB INLET ON GRADE – TxDOT METHOD

Q_{25} = 16.88 C.F.S.
S_X = GUTTER CROSS SLOPE = 0.02
S_L = STREET SLOPE = 0.06
$S_E = S_X + (\frac{A}{W})E_O$
S_E = EQUIVALENT CROSS SLOPE = 0.07

$L_R = ZQ^{0.42}S^{0.3}(\frac{1}{NSE})^{0.6}$

L_R = 99.10' INLET (TOTAL) REQ'D
L_A = 2 -35' (70' TOTAL) CURB INLET USED
CO_T = CARRY OVER FLOW = $Q_{25}[(1-\frac{LA}{LR})^{1.8}]$

CO_T = 1.86 C.F.S.
Q_I = ACTUAL INLET INTERCEPTION = 15.02 C.F.S.

25YR INLET "D" STA. 3+78.68 TO 3+82.35
CURB INLET ON GRADE – TxDOT METHOD

Q_{25} = 16.88 C.F.S.
S_X = GUTTER CROSS SLOPE = 0.02
S_L = STREET SLOPE = 0.06
$S_E = S_X + (\frac{A}{W})E_O$
S_E = EQUIVALENT CROSS SLOPE = 0.07

$L_R = ZQ^{0.42}S^{0.3}(\frac{1}{NSE})^{0.6}$

L_R = 99.10' INLET (TOTAL) REQ'D
L_A = 2 -35' (70' TOTAL) CURB INLET USED
CO_T = CARRY OVER FLOW = $Q_{25}[(1-\frac{LA}{LR})^{1.8}]$

CO_T = 1.86 C.F.S.
Q_I = ACTUAL INLET INTERCEPTION = 15.02 C.F.S.

100YR INLET "D" STA. 3+21.32 TO 3+24.99
CURB INLET ON GRADE – TxDOT METHOD

Q_{100} = 29.13 C.F.S.
S_X = GUTTER CROSS SLOPE = 0.02
S_L = STREET SLOPE = 0.06
$S_E = S_X + (\frac{A}{W})E_O$
S_E = EQUIVALENT CROSS SLOPE = 0.06

$L_R = ZQ^{0.42}S^{0.3}(\frac{1}{NSE})^{0.6}$

L_R = 135.22' INLET (TOTAL) REQ'D
L_A = 2 -35' (70' TOTAL) CURB INLET USED
CO_T = CARRY OVER FLOW = $Q_{100}[(1-\frac{LA}{LR})^{1.8}]$

CO_T = 7.83 C.F.S.
Q_I = ACTUAL INLET INTERCEPTION = 21.29 C.F.S.

100YR INLET "D" STA. 3+78.68 TO 3+82.35
CURB INLET ON GRADE – TxDOT METHOD

Q_{100} = 29.13 C.F.S.
S_X = GUTTER CROSS SLOPE = 0.02
S_L = STREET SLOPE = 0.06
$S_E = S_X + (\frac{A}{W})E_O$
S_E = EQUIVALENT CROSS SLOPE = 0.06

$L_R = ZQ^{0.42}S^{0.3}(\frac{1}{NSE})^{0.6}$

L_R = 135.22' INLET (TOTAL) REQ'D
L_A = 2 -35' (70' TOTAL) CURB INLET USED
CO_T = CARRY OVER FLOW = $Q_{100}[(1-\frac{LA}{LR})^{1.8}]$

CO_T = 7.83 C.F.S.
Q_I = ACTUAL INLET INTERCEPTION = 21.29 C.F.S.

CUDEENGINEERS.COM
CUDE ENGINEERS
EST. 1980
4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

DRAINAGE PLAN & PROFILE - DRAIN "D"

DATE
04/16/2026
PROJECT NO.
04024-018
DRAWN BY
C7
CHECKED BY
JL/TM

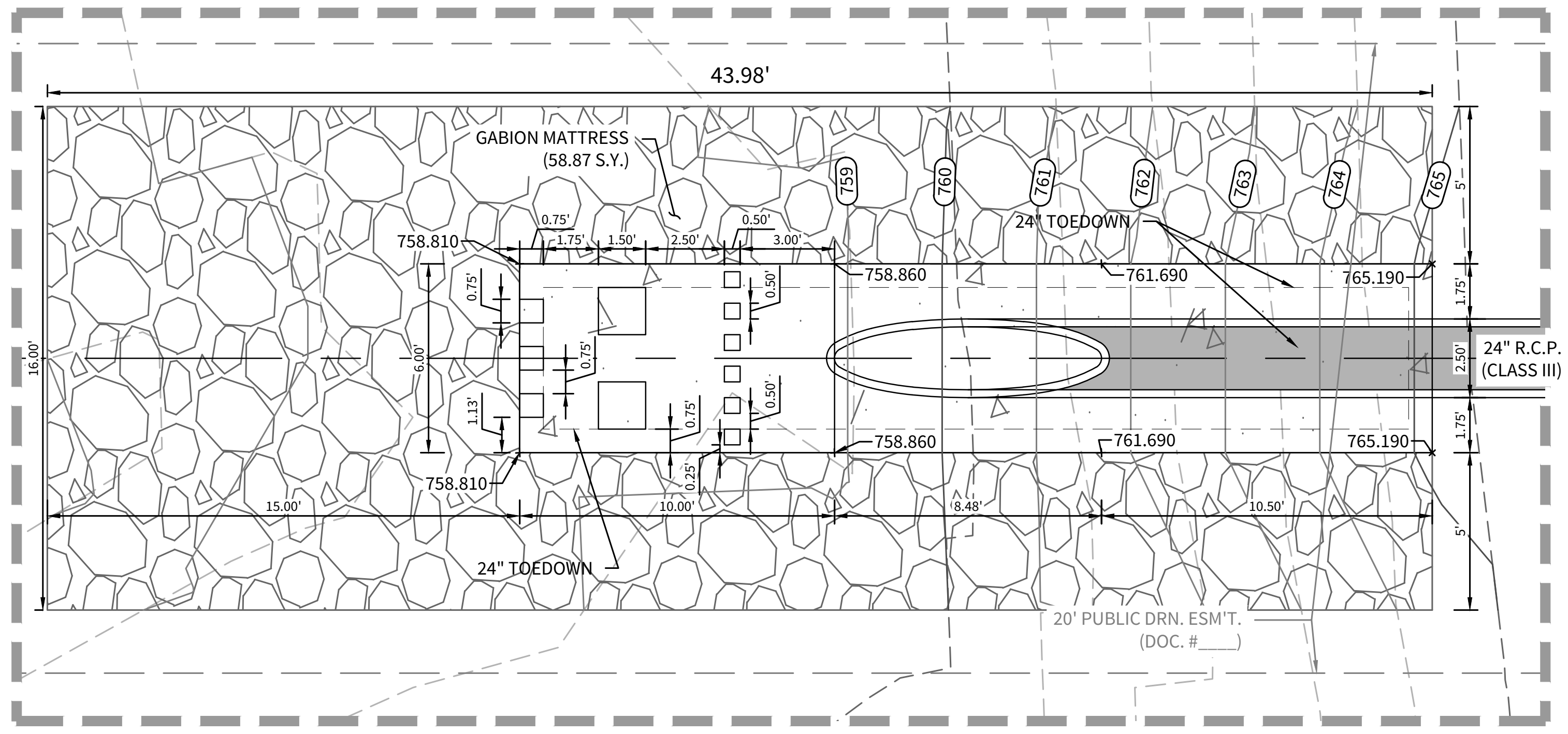
REVISIONS
1.
2.
3.
4.
5.
6.
7.
8.

4/16/26
TORY DUANE MILLER
135598
Tory Miller

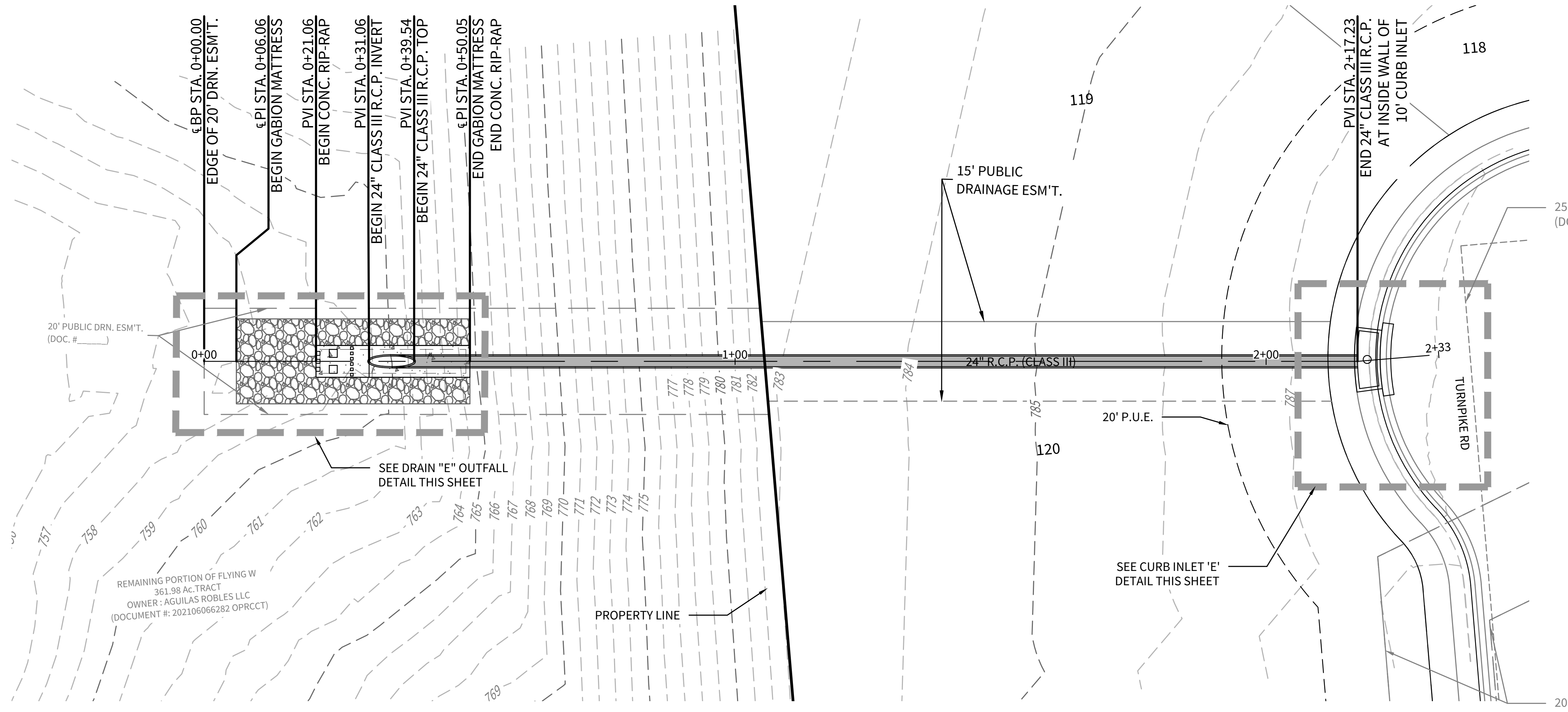
CUDE ENGINEERS
TBPELS No. 10048500

C6.04

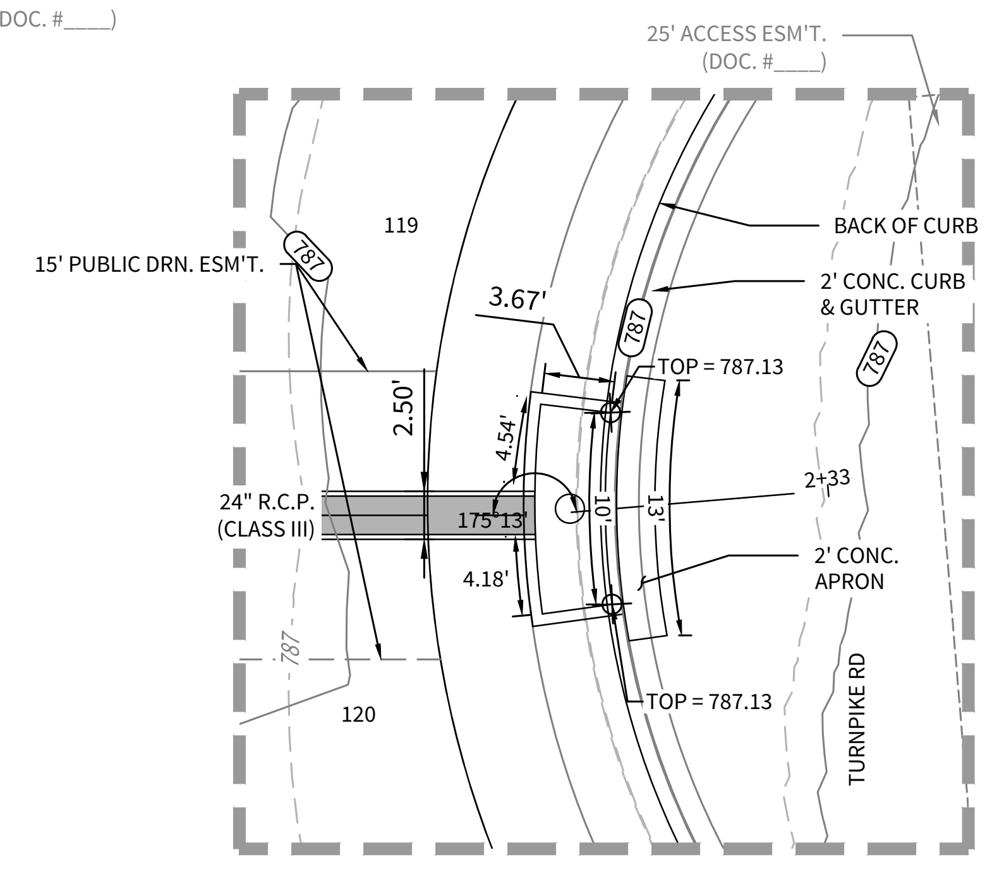
R:\04024\018\2-DWG\4-Plans\C6.02 DRAINAGE PLAN & PROFILE - DRAIN D.dwg 2026/04/16 8:38am sgonzales


43.98'
GABION MATTRESS (58.87 S.Y.)
24" TOEDOWN
758.810
758.860
761.690
765.190
24" R.C.P. (CLASS III)
15.00'
10.00'
10.50'
20' PUBLIC DRN. ESM'T. (DOC. #____)

DRAIN "E" OUTFALL DETAIL
(SCALE 1" = 5')


¢ BP STA. 0+00.00 EDGE OF 20' DRN. ESM'T.
¢ PI STA. 0+06.06 BEGIN GABION MATTRESS
PVI STA. 0+21.06 BEGIN CONC. RIP-RAP
PVI STA. 0+31.06 BEGIN 24" CLASS III R.C.P. INVERT
PVI STA. 0+39.54 BEGIN 24" CLASS III R.C.P. TOP
¢ PI STA. 0+50.05 END GABION MATTRESS END CONC. RIP-RAP
PVI STA. 2+17.23 END 24" CLASS III R.C.P. AT INSIDE WALL OF 10' CURB INLET
15' PUBLIC DRAINAGE ESM'T.
24" R.C.P. (CLASS III)
20' P.U.E.
25' ACCESS ESM'T. (DOC. #____)
20' SEW. ESM'T. (DOC. #____)
20' PUBLIC DRN. ESM'T. (DOC. #____)
SEE DRAIN "E" OUTFALL DETAIL THIS SHEET
SEE CURB INLET 'E' DETAIL THIS SHEET
PROPERTY LINE
REMAINING PORTION OF FLYING W 161.38 Ac. TRACT OWNER : AGUILAS ROBLES LLC (DOCUMENT #: 20210606282 OPRCCT)
TURNPIKE RD
118
119
120
0+00
1+00
2+00
2+33

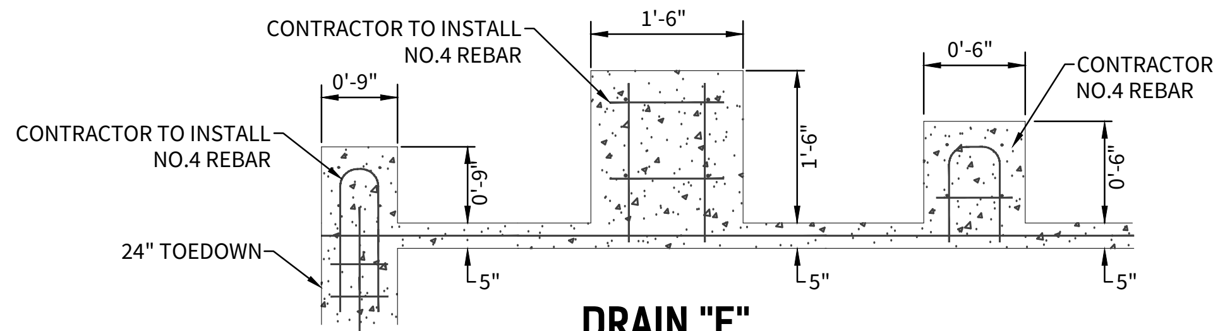
SCALE: 1"=20'
0 10 20


25' ACCESS ESM'T. (DOC. #____)
15' PUBLIC DRN. ESM'T.
119
120
3.67'
2.50'
4.54'
4.18'
24" R.C.P. (CLASS III)
BACK OF CURB
2' CONC. CURB & GUTTER
TOP = 787.13
2+33
2' CONC. APRON
TOP = 787.13
TURNPIKE RD

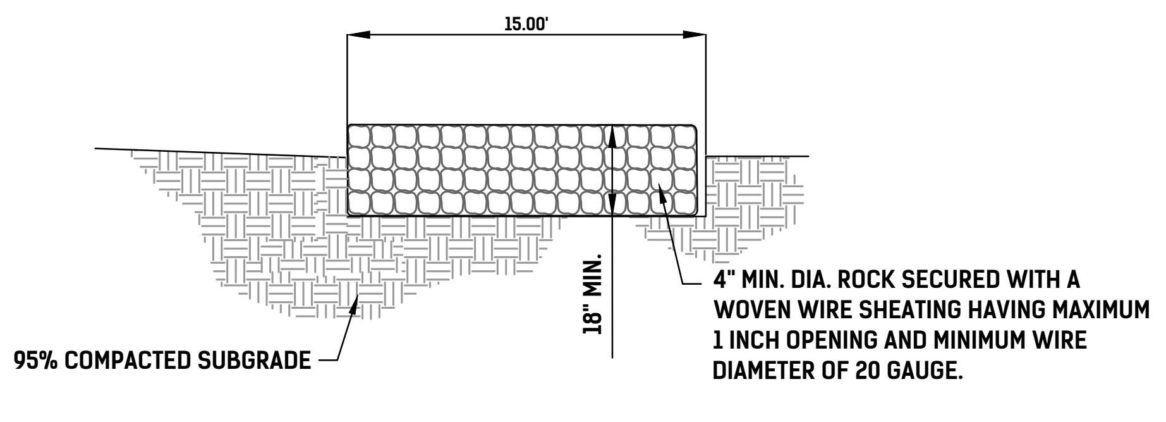
CURB INLET 'E' DETAIL
(SCALE 1" = 10')

LEGEND:

▨	PROPOSED R.C.P.
▨	PROPOSED CONCRETE RIP-RAP
▨	GABION MATTRESS

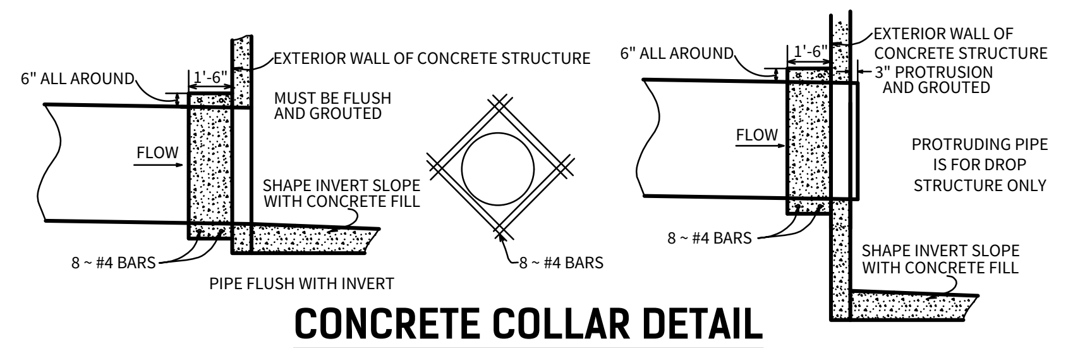

CONTRACTOR TO INSTALL NO.4 REBAR
CONTRACTOR TO INSTALL NO.4 REBAR
CONTRACTOR TO INSTALL NO.4 REBAR
24" TOEDOWN
0'-9"
1'-6"
0'-6"
0'-9"
1'-6"
0'-6"
5"
5"
5"

DRAIN "E" BAFFLE BLOCK REINFORCEMENT DETAIL
(N.T.S.)


15.00'
18" MIN.
95% COMPACTED SUBGRADE
4" MIN. DIA. ROCK SECURED WITH A WOVEN WIRE SHEATING HAVING MAXIMUM 1 INCH OPENING AND MINIMUM WIRE DIAMETER OF 20 GAUGE.

NOTE: GABION MATTRESS TO BE FREE OF GEO-TEXTILE FABRIC LINING.

GABION MATTRESS DETAIL (N.T.S.)


6" ALL AROUND
EXTERIOR WALL OF CONCRETE STRUCTURE
MUST BE FLUSH AND GROUTED
FLOW
SHAPE INVERT SLOPE WITH CONCRETE FILL
8 - #4 BARS
PIPE FLUSH WITH INVERT
8 - #4 BARS
6" ALL AROUND
EXTERIOR WALL OF CONCRETE STRUCTURE
3" PROTRUSION AND GROUTED
FLOW
PROTRUDING PIPE IS FOR DROP STRUCTURE ONLY
8 - #4 BARS
SHAPE INVERT SLOPE WITH CONCRETE FILL

CONCRETE COLLAR DETAIL
(N.T.S.)

KEYNOTES:

1 CONCRETE COLLARS SHALL BE INSTALLED FOR CAST-IN-PLACE & PRECAST CURB INLETS FOR EVERY PIPE CONNECTION

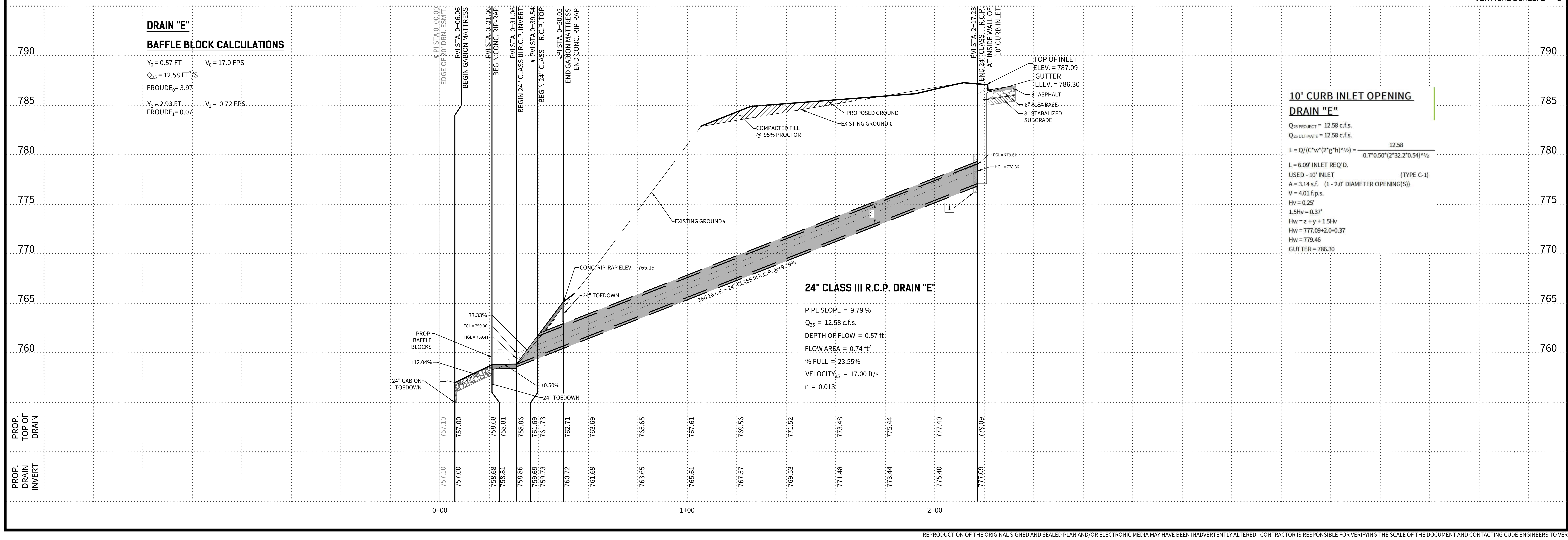
GENERAL NOTES

1. ALL CONCRETE LINING SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF NOT LESS THAN 3000 PSI IN 28 DAYS.
2. REFERENCE CITY OF SAN ANTONIO TYPICAL CONCRETE CHANNEL RIP-RAP STANDARDS FOUND ON SHEET C6.D1

DRAIN "E"

STA. 0+06.06 TO STA. 2+17.23

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 5'


790
785
780
775
770
765
760
¢ PI STA 0+00.00 EDGE OF 20' DRN. ESM'T.
PI STA. 0+06.06 BEGIN GABION MATTRESS
PVI STA. 0+21.06 BEGIN CONC. RIP-RAP
PVI STA. 0+31.06 BEGIN 24" CLASS III R.C.P. INVERT
¢ PVI STA 0+39.54 BEGIN 24" CLASS III R.C.P. TOP
¢ PI STA. 0+50.05 END GABION MATTRESS END CONC. RIP-RAP
PVI STA. 2+17.23 END 24" CLASS III R.C.P. AT INSIDE WALL OF 10' CURB INLET
TOP OF INLET ELEV. = 787.09
GUTTER ELEV. = 786.30
3" ASPHALT
8" FLEX BASE
8" STABALIZED SUBGRADE
PROPOSED GROUND
EXISTING GROUND
COMPACTED FILL @ 95% PROCTOR
EXISTING GROUND
EGL = 779.83
HGL = 778.36
1
CONC. RIP-RAP ELEV. = 765.19
24" TOEDOWN
186.16 L.F. - 24" CLASS III R.C.P. @+9.79%
+33.33%
EGL = 759.96
HGL = 759.41
PROP. BAFFLE BLOCKS
+12.04%
24" GABION TOEDOWN
+0.50%
24" TOEDOWN
PROP. TOP OF DRAIN
757.10
757.00
758.68
758.81
758.86
761.69
761.73
762.71
763.69
765.65
767.61
769.56
771.52
773.48
775.44
777.40
779.09
PROP. DRAIN INVERT
757.10
757.00
758.68
758.81
758.86
759.69
759.73
760.72
761.69
763.65
765.61
767.57
769.53
771.48
773.44
775.40
777.09
0+00
1+00
2+00

DRAIN "E"

BAFFLE BLOCK CALCULATIONS

Y_0 = 0.57 FT V_0 = 17.0 FPS

Q_{25} = 12.58 FT^3/S

$FROUDE_0$ = 3.97

Y_1 = 2.93 FT V_1 = 0.72 FPS

$FROUDE_1$ = 0.07

10' CURB INLET OPENING DRAIN "E"

$Q_{25\,PROJECT}$ = 12.58 c.f.s.

$Q_{25\,ULTIMATE}$ = 12.58 c.f.s.

$$L = Q/(C^*w^*(2^*g^*h)^\wedge½) = \frac{12.58}{0.7^*0.50^*(2^*32.2^*0.54)^\wedge½}$$

L = 6.09' INLET REQ'D.

USED - 10' INLET (TYPE C-1)

A = 3.14 s.f. (1 - 2.0' DIAMETER OPENING(S))

V = 4.01 f.p.s.

Hv = 0.25'

1.5Hv = 0.37'

Hw = z + y + 1.5Hv

Hw = 777.09+2.0+0.37

Hw = 779.46

GUTTER = 786.30

24" CLASS III R.C.P. DRAIN "E"

PIPE SLOPE = 9.79 %

Q_{25} = 12.58 c.f.s.

DEPTH OF FLOW = 0.57 ft

FLOW AREA = 0.74 ft^2

% FULL = 23.55%

$VELOCITY_{25}$ = 17.00 ft/s

n = 0.013

CUDEENGINEERS.COM

CUDE ENGINEERS EST. 1980

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W UNIT 2

DRAINAGE PLAN & PROFILE - DRAIN "E"

DATE	04/16/2026
PROJECT NO.	04024-018
DRAWN BY	C7
CHECKED BY	JL/TM

REVISIONS
1.
2.
3.
4.
5.
6.
7.
8.

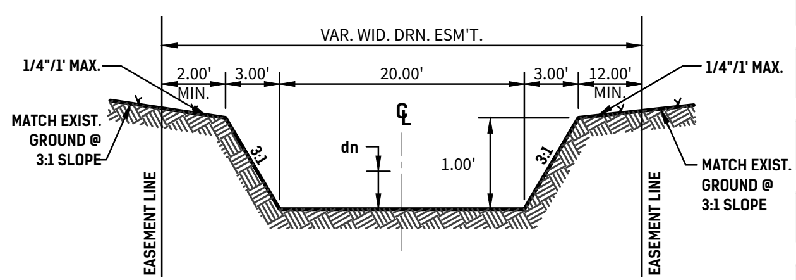
4/16/26

TORY DUANE MILLER
135598

CUDE ENGINEERS
TBPELS No. 10048500

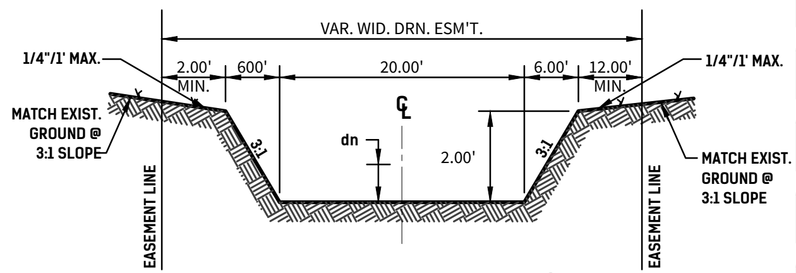
C6.05

R:\04024\018\2-DWG\4-Plans\C6.03 DRAINAGE PLAN & PROFILE - DRAIN E.dwg 2026/04/16 8:41am sgonzales


VAR. WID. DRN. ESM'T.
2.00'
3.00'
20.00'
3.00'
2.00'
1/4"/1' MAX.
MATCH EXIST. GROUND @ 3:1 SLOPE
dn
1.00'
EASEMENT LINE

DRAIN "F-1" SECTION

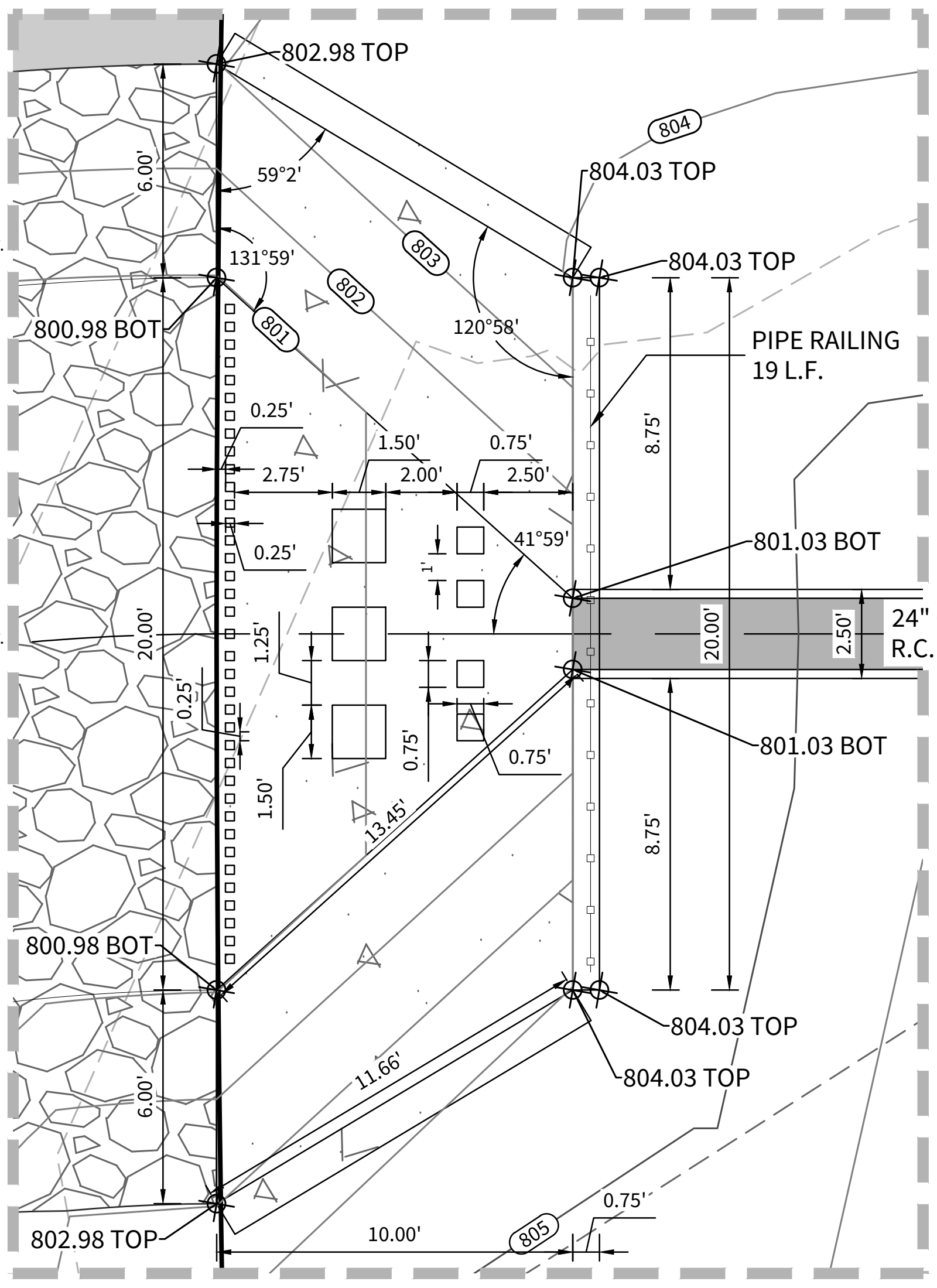
(N.T.S.)


VAR. WID. DRN. ESM'T.
2.00'
6.00'
20.00'
6.00'
12.00'
1/4"/1' MAX.
MATCH EXIST. GROUND @ 3:1 SLOPE
3:1
dn
2.00'
EASEMENT LINE

DRAIN "F-2" SECTION

(N.T.S.)

Name	F-1	F-2
BEGIN STA	+88.82	1+30.16
END STA	+88.82	1+35.94
Q25 (cfs)	21.77	21.77
h (ft)	1.00'	1.00'
b_w (ft)	20.00'	20.00'
z (_):1 left	3	3
z (_):1 right	3	3
t_w (ft)	26	26
n	0.035	0.035
Slope (%)	20.70%	0.50%
d_n (ft)	0.18'	0.54'
V (fps)	5.99	1.88


802.98 TOP
804.03 TOP
804.03 TOP
800.98 BOT
59°2'
131°59'
120°58'
PIPE RAILING 19 L.F.
41°59'
801.03 BOT
24" CLASS III R.C.P.
801.03 BOT
800.98 BOT
804.03 TOP
804.03 TOP
802.98 TOP
8.75'
8.75'
20.00'
2.50'
10.00'
11.66'
0.75'
0.25'
2.75'
1.50'
2.00'
2.50'
13.45'
6.00'
805
804
803

DETAIL "A"

(SCALE 1"=5')

KEYNOTES:

1. CONCRETE COLLARS SHALL BE INSTALLED FOR CAST-IN-PLACE & PRECAST CURB INLETS FOR EVERY PIPE CONNECTION

LEGEND:

▩	PROPOSED S.B.C.
░	PROPOSED CONCRETE RIP-RAP
▨	GABION MATTRESS
▒	12' MAINTENANCE PATH

GENERAL NOTES

1. ALL CONCRETE LINING SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF NOT LESS THAN 3000 PSI IN 28 DAYS.
2. REFERENCE CITY OF SAN ANTONIO TYPICAL CONCRETE CHANNEL RIP-RAP STANDARDS FOUND ON SHEET C6.D1

DRAIN "F"

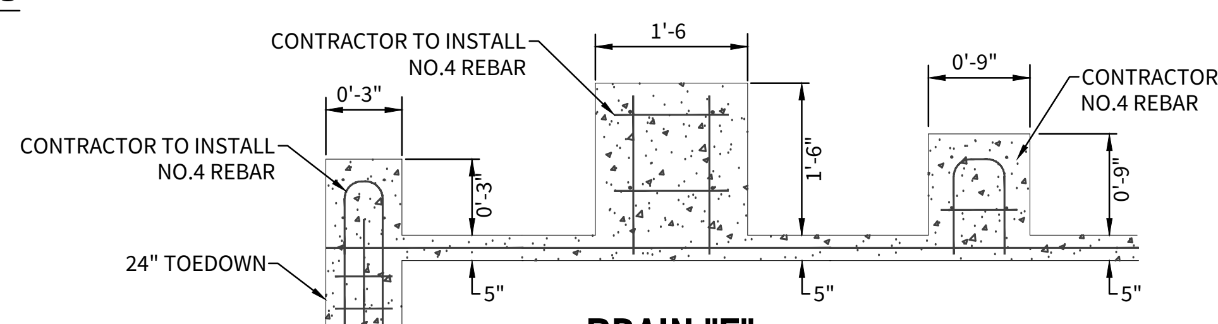
BAFFLE BLOCK CALCULATIONS

Y_0 = 1.18 FT V_0 = 11.34 FPS

Q_{25} = 21.77 FT^3/S

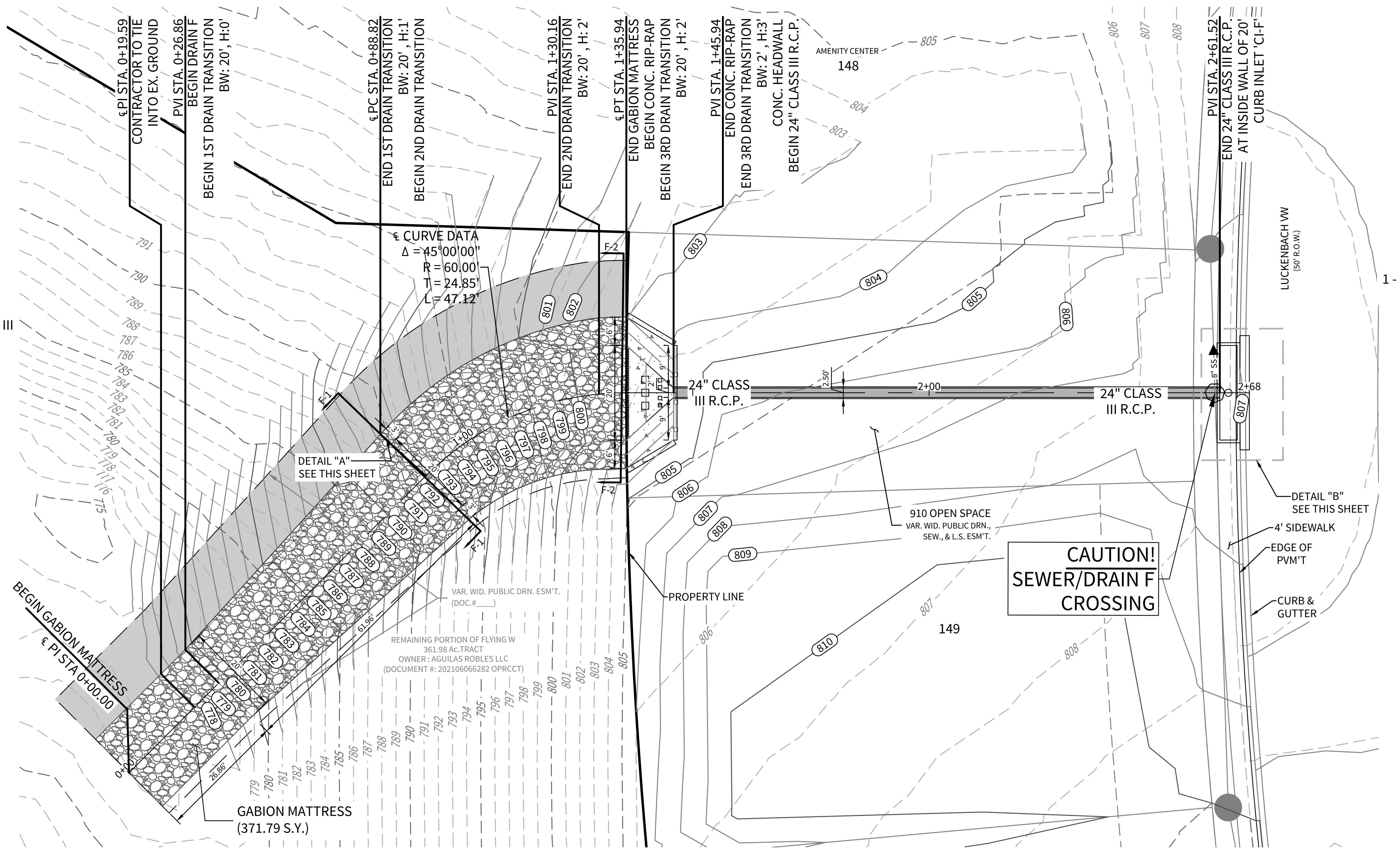
$FROUDE_0$ = 1.84
END SILL FACTOR = 0.09

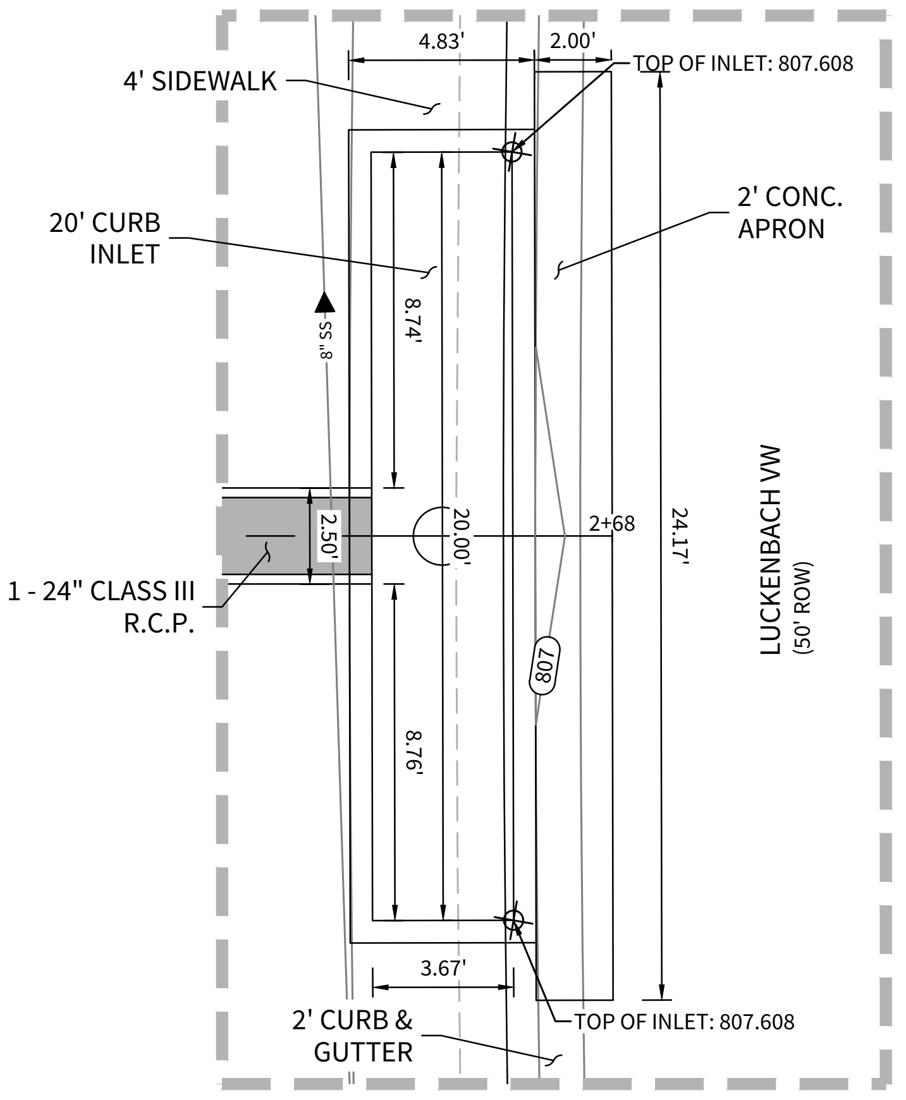
Y_1 = 2.79 FT V_1 = 3.24 FPS
$FROUDE_1$ = 0.34


CONTRACTOR TO INSTALL NO.4 REBAR
CONTRACTOR TO INSTALL NO.4 REBAR
CONTRACTOR TO INSTALL NO.4 REBAR
24" TOEDOWN
1'-6
0'-3"
0'-9"
0'-3"
1'-6"
0'-9"
5"
5"
5"

DRAIN "F" BAFFLE BLOCK REINFORCEMENT DETAIL

(N.T.S.)

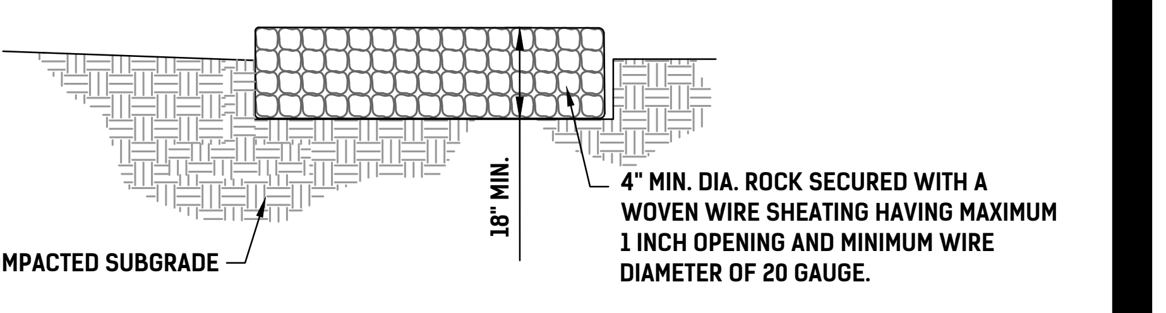

℄ PI STA. 0+19.59 CONTRACTOR TO TIE INTO EX. GROUND
℄ PI STA. 0+26.86 BEGIN DRAIN F BEGIN 1ST DRAIN TRANSITION BW: 20', H:0'
℄ PC STA. 0+88.82 END 1ST DRAIN TRANSITION BW: 20', H:1' BEGIN 2ND DRAIN TRANSITION
PVI STA. 1+30.16 END 2ND DRAIN TRANSITION BW: 20', H: 2'
℄ PT STA. 1+35.94 END GABION MATTRESS BEGIN CONC. RIP-RAP BEGIN 3RD DRAIN TRANSITION BW: 20', H: 2'
PVI STA. 1+45.94 END CONC. RIP-RAP END 3RD DRAIN TRANSITION BW: 2', H:3 CONC. HEADWALL BEGIN 24" CLASS III R.C.P.
℄ PI STA. 2+61.52 END 24" CLASS III R.C.P. AT INSIDE WALL OF 20' CURB INLET 'CI-F'
AMENITY CENTER 148
℄ CURVE DATA
Δ = 45°00'00"
R = 60.00'
T = 24.85'
L = 47.12'
24" CLASS III R.C.P.
24" CLASS III R.C.P.
DETAIL "A" SEE THIS SHEET
DETAIL "B" SEE THIS SHEET
4' SIDEWALK
EDGE OF PVM'T
CURB & GUTTER
LUCKENBACH VW (50' ROW)
910 OPEN SPACE VAR. WID. PUBLIC DRN., SEW., & L.S. ESM'T.
CAUTION! SEWER/DRAIN F CROSSING
PROPERTY LINE
149
VAR. WID. PUBLIC DRN. ESM'T. (DOC.#)
REMAINING PORTION OF FLYING W 361.56 AC TRACT OWNER: AGUILAS ROBLES LLC (DOCUMENT #: 20210606282 OPRCCT)
BEGIN GABION MATTRESS ℄ PVI STA 0+00.00
GABION MATTRESS (371.79 S.Y.)
26.86'
F-1
F-2
0+00
1+00
2+00
2+68


4' SIDEWALK
4.83'
2.00'
TOP OF INLET: 807.608
20' CURB INLET
2' CONC. APRON
1 - 24" CLASS III R.C.P.
8.74'
20.00'
8.76'
2.50'
24.17'
2+68
LUCKENBACH VW (50' ROW)
3.67'
2' CURB & GUTTER
TOP OF INLET: 807.608

DETAIL "B"

(SCALE 1"=5')

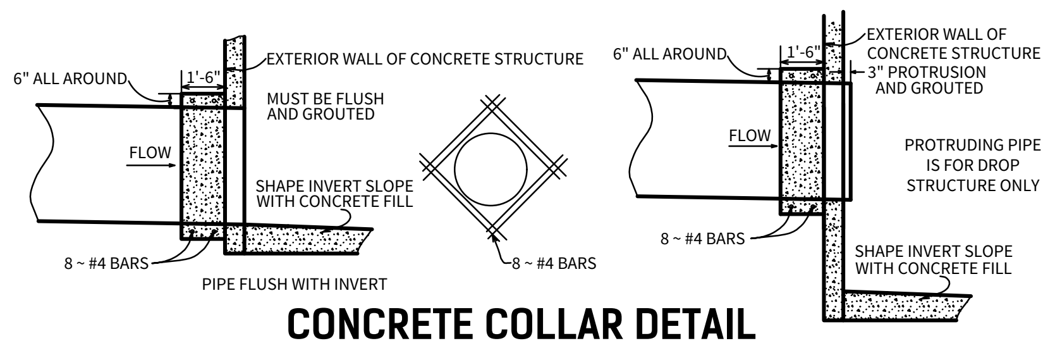
SCALE: 1"=20'
0 10 20


95% COMPACTED SUBGRADE
18" MIN.
4" MIN. DIA. ROCK SECURED WITH A WOVEN WIRE SHEATING HAVING MAXIMUM 1 INCH OPENING AND MINIMUM WIRE DIAMETER OF 20 GAUGE.

NOTE: GABION MATTRESS TO BE FREE OF GEO-TEXTILE FABRIC LINING.

GABION MATTRESS DETAIL

(N.T.S.)


6" ALL AROUND
1'-6"
EXTERIOR WALL OF CONCRETE STRUCTURE
MUST BE FLUSH AND GROUTED
FLOW
SHAPE INVERT SLOPE WITH CONCRETE FILL
8 ~ #4 BARS
PIPE FLUSH WITH INVERT
8 ~ #4 BARS
6" ALL AROUND
1'-6"
EXTERIOR WALL OF CONCRETE STRUCTURE
3" PROTRUSION AND GROUTED
FLOW
PROTRUDING PIPE IS FOR DROP STRUCTURE ONLY
8 ~ #4 BARS
SHAPE INVERT SLOPE WITH CONCRETE FILL

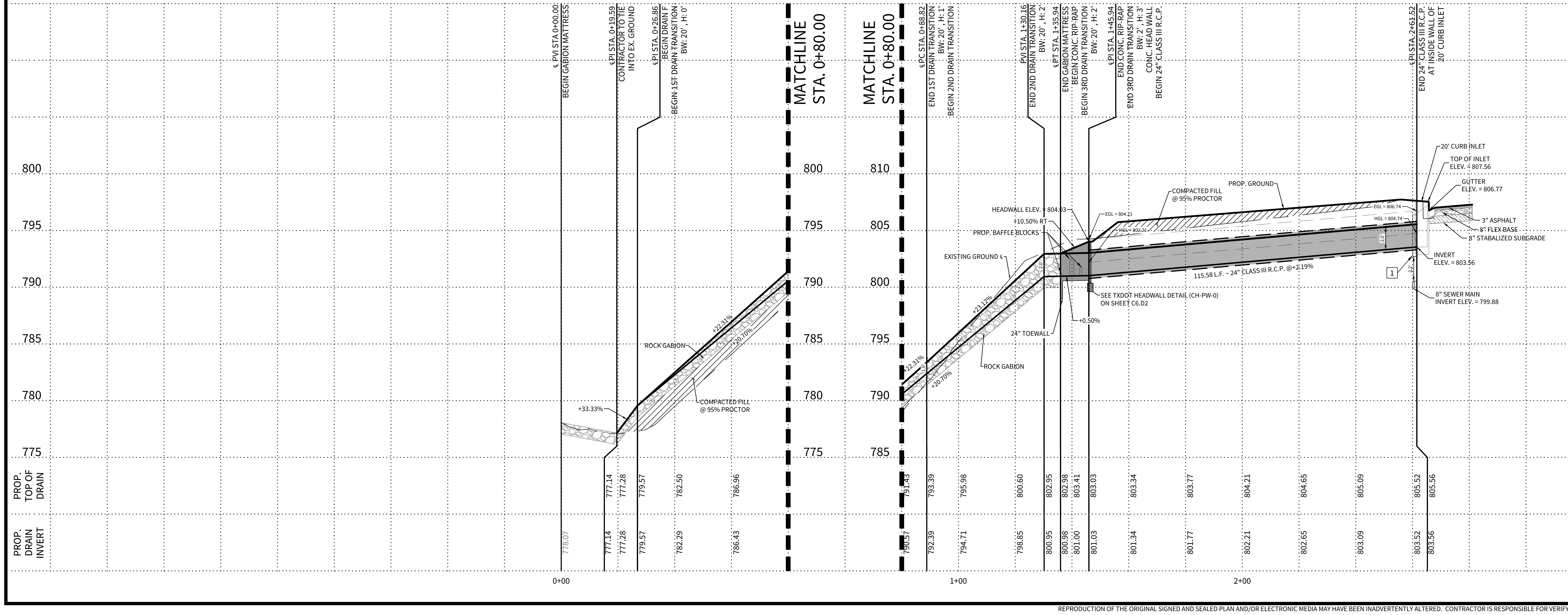
CONCRETE COLLAR DETAIL

(N.T.S.)

DRAIN "F"

STA. 0+26.86 TO STA. 2+61.52

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 5'


℄ PVI STA 0+00.00 BEGIN GABION MATTRESS
℄ PI STA. 0+19.59 CONTRACTOR TO TIE INTO EX. GROUND
℄ PI STA. 0+26.86 BEGIN DRAIN F BEGIN 1ST DRAIN TRANSITION BW: 20', H: 0'
MATCHLINE STA. 0+80.00
MATCHLINE STA. 0+80.00
℄ PC STA. 0+88.82 END 1ST DRAIN TRANSITION BW: 20', H: 1' BEGIN 2ND DRAIN TRANSITION
PVI STA. 1+30.16 END 2ND DRAIN TRANSITION BW: 20', H: 2'
℄ PT STA. 1+35.94 END GABION MATTRESS BEGIN CONC. RIP-RAP BEGIN 3RD DRAIN TRANSITION BW: 20', H: 2'
PVI STA. 1+45.94 END CONC. RIP-RAP END 3RD DRAIN TRANSITION BW: 2', H: 3 CONC. HEAD WALL BEGIN 24" CLASS III R.C.P.
℄ PI STA. 2+61.52 END 24" CLASS III R.C.P. AT INSIDE WALL OF 20' CURB INLET
20' CURB INLET
TOP OF INLET ELEV. = 807.56
GUTTER ELEV. = 806.77
3" ASPHALT
8" FLEX BASE
8" STABALIZED SUBGRADE
INVERT ELEV. = 803.56
8" SEWER MAIN INVERT ELEV. = 799.88
PROP. GROUND
COMPACTED FILL @ 95% PROCTOR
HEADWALL ELEV. = 804.03
+10.50% RT
PROP. BAFFLE BLOCKS
EXISTING GROUND
115.58 L.F. ~ 24" CLASS III R.C.P. @+2.19%
SEE TXDOT HEADWALL DETAIL (CH-PW-0) ON SHEET C6.D2
24" TOEWALL
+0.50%
ROCK GABION
+23.12%
+22.31%
+20.70%
+33.33%
ROCK GABION
COMPACTED FILL @ 95% PROCTOR
1
800
795
790
785
780
775
800
795
790
785
780
775
810
805
800
795
790
785
810
805
800
795
790
785
PROP. TOP OF DRAIN
777.14 777.28 779.57 782.50 786.96 791.43 793.39 795.98 800.60 802.95 802.98 803.41 803.03 803.34 803.77 804.21 804.65 805.09 805.52 805.56
PROP. DRAIN INVERT
778.07 777.14 777.28 779.57 782.29 786.43 790.57 792.39 794.71 798.85 800.95 800.98 801.00 801.03 801.34 801.77 802.21 802.65 803.09 803.52 803.56
0+00
1+00
2+00

20' CURB INLET OPENING

DRAIN "F"

$Q_{25\ PROJECT}$ = 21.77 c.f.s.
$Q_{25\ ULTIMATE}$ = 21.77 c.f.s.
L = Q/(C*w*(2*g*h)^½) = $\frac{21.77}{0.7*0.50*(2*32.2*0.54)^{½}}$
L = 10.55' INLET REQ'D.
USED - 20' INLET (TYPE C-1)
A = 3.14 s.f. (1 - 2.0' DIAMETER OPENING(S))
V = 6.93 f.p.s.
Hv = 0.75'
1.5Hv = 1.12'
Hw = z + y + 1.5Hv
Hw = 803.56+2.0+1.12
Hw = 806.68
GUTTER = 806.77

3' X 2' S.B.C. DRAIN "F" STA. 0+37.78 TO 2+06.44

PIPE SLOPE = 2.19 %
Q_{25} = 21.77 c.f.s.
DEPTH OF FLOW = 1.18 ft
FLOW AREA = 1.92 ft^2
% FULL = 61.12%
$VELOCITY_{25}$ = 11.34 ft/s
n = 0.013

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CUDE ENGINEERS EST. 1980

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W UNIT 2

DRAINAGE PLAN & PROFILE - DRAIN "F"

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
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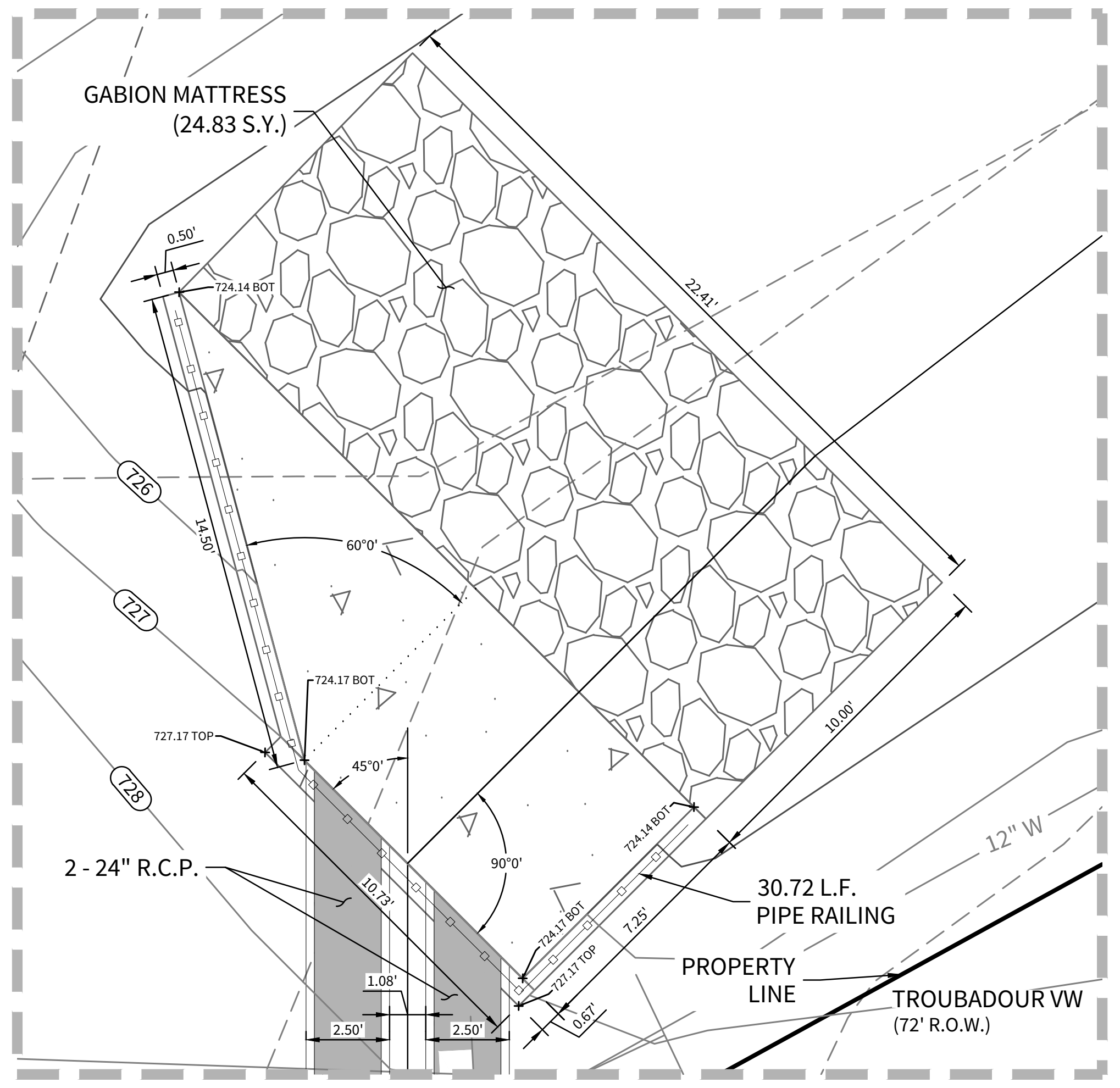
4/16/26
TORY DUANE MILLER
135598

CUDE ENGINEERS
TBPELS No. 10048500

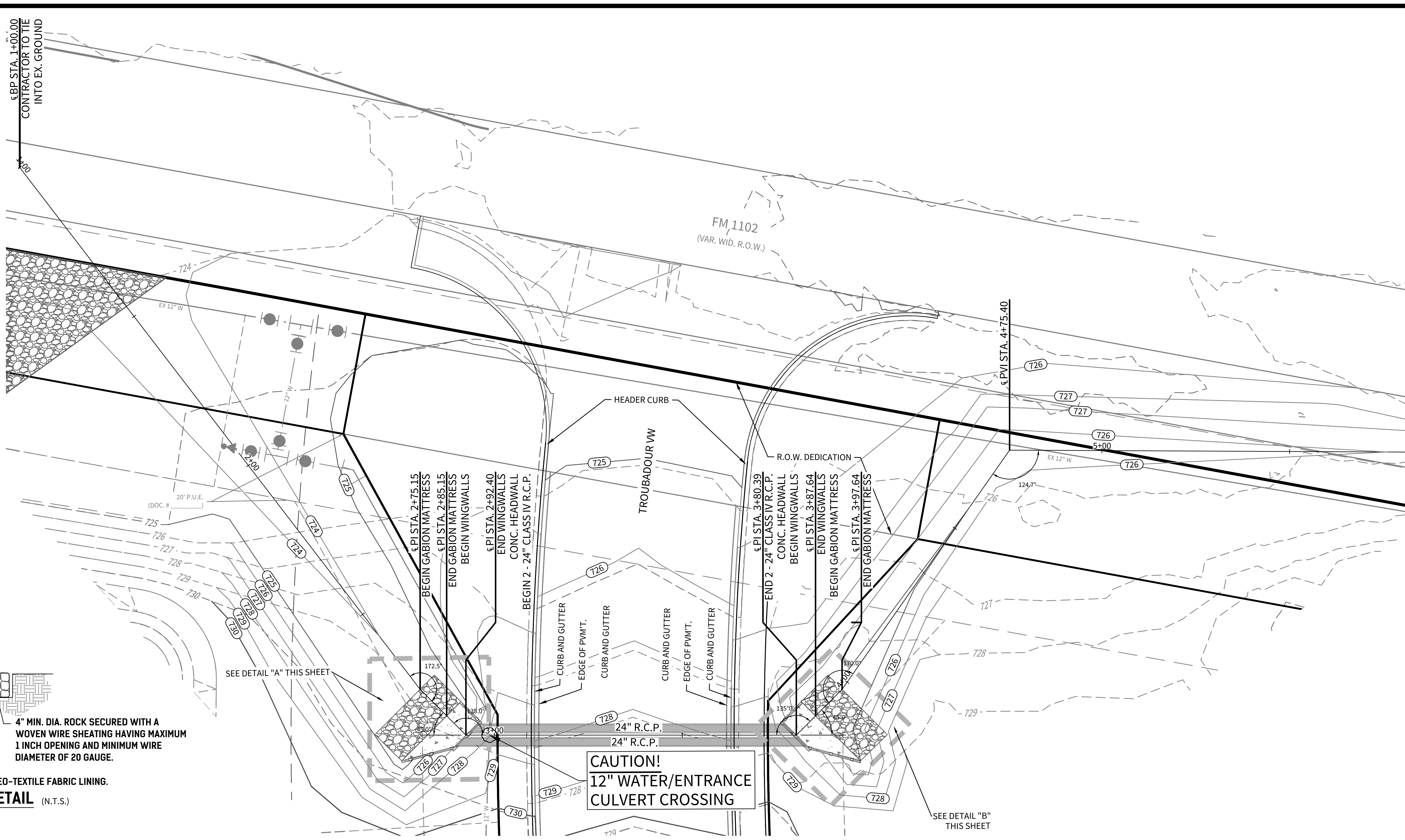
C6.06

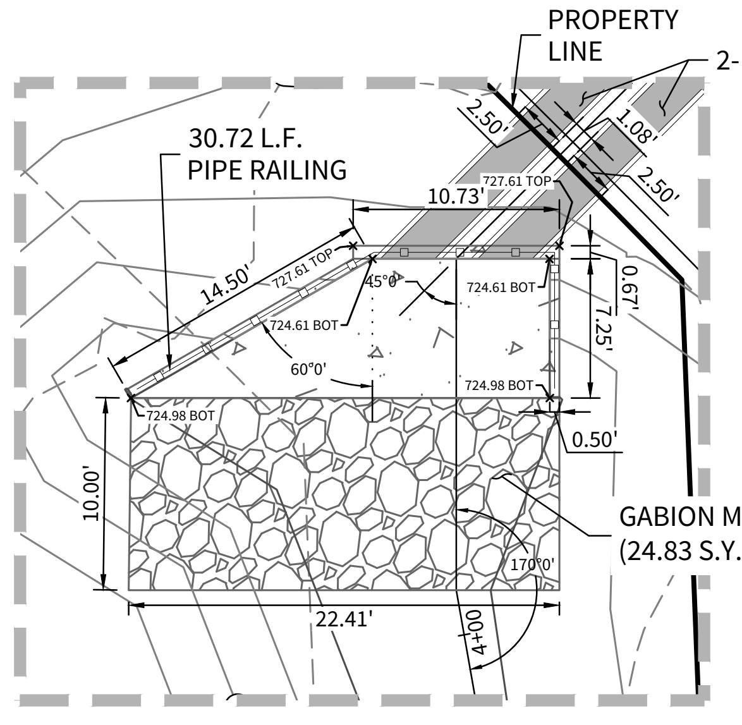
R:\04024\018\2-DWG\4-Plans\C6.04 DRAINAGE PLAN & PROFILE - DRAIN F.dwg 2026/04/16 8:40am sgonzales

REPRODUCTION OF THE ORIGINAL SIGNED AND SEALED PLAN AND/OR ELECTRONIC MEDIA MAY HAVE BEEN INADVERTENTLY ALTERED. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE SCALE OF THE DOCUMENT AND CONTACTING CUDE ENGINEERS TO VERIFY DISCREPANCIES PRIOR TO CONSTRUCTION.


GABION MATTRESS (24.83 S.Y.)
2 - 24" R.C.P.
30.72 L.F. PIPE RAILING
PROPERTY LINE
TROUBADOUR VW (72' R.O.W.)
60°0'
45°0'
90°0'
12" W
2.50'
1.08'

DETAIL "A"
(SCALE 1"=5')

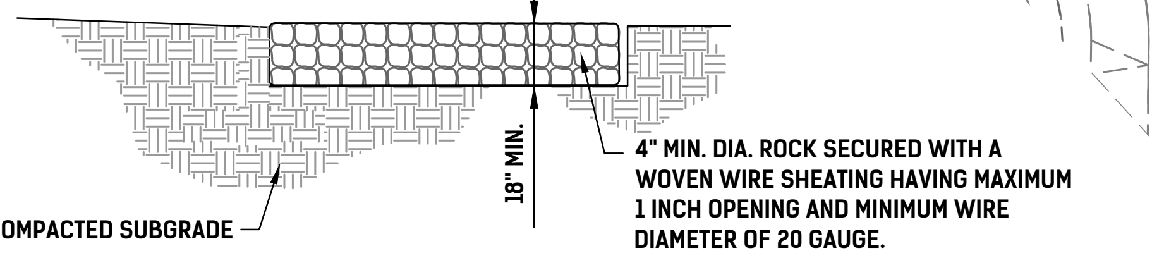

¢BP STA. 1+00.00 CONTRACTOR TO TIE INTO EX. GROUND
FM 1102 (VAR. WID. R.O.W.)
HEADER CURB
TROUBADOUR VW
R.O.W. DEDICATION
¢PI STA. 2+75.15 BEGIN GABION MATTRESS
¢PI STA. 2+85.15 END GABION MATTRESS BEGIN WINGWALLS
¢PI STA. 2+92.40 END WINGWALLS CONC. HEADWALL BEGIN 2 - 24" CLASS IV R.C.P.
END 2 - 24" CLASS IV R.C.P. CONC. HEADWALL BEGIN WINGWALLS ¢PI STA. 3+80.39
¢PI STA. 3+87.64 END WINGWALLS BEGIN GABION MATTRESS
¢PI STA. 3+97.64 END GABION MATTRESS
PVI STA. 4+75.40
¢EP STA. 6+08.73 CONTRACTOR TO TIE INTO EX. GROUND
CURB AND GUTTER
EDGE OF PVMT.
SEE DETAIL "A" THIS SHEET
SEE DETAIL "B" THIS SHEET
24" R.C.P.
24" R.C.P.
CAUTION! 12" WATER/ENTRANCE CULVERT CROSSING
SCALE: 1"=20'
0 10 20


PROPERTY LINE
2- 24" R.C.P.
30.72 L.F. PIPE RAILING
GABION MATTRESS (24.83 S.Y.)
10.73'
14.50'
10.00'
22.41'
0.50'
60°0'
45°0'

DETAIL "B"
(SCALE 1"=10')

LEGEND:

▇	PROPOSED M.B.C.
░	PROPOSED CONCRETE RIP-RAP
▨	GABION MATTRESS


4" MIN. DIA. ROCK SECURED WITH A WOVEN WIRE SHEATING HAVING MAXIMUM 1 INCH OPENING AND MINIMUM WIRE DIAMETER OF 20 GAUGE.
18" MIN.
95% COMPACTED SUBGRADE

NOTE: GABION MATTRESS TO BE FREE OF GEO-TEXTILE FABRIC LINING.

GABION MATTRESS DETAIL (N.T.S.)

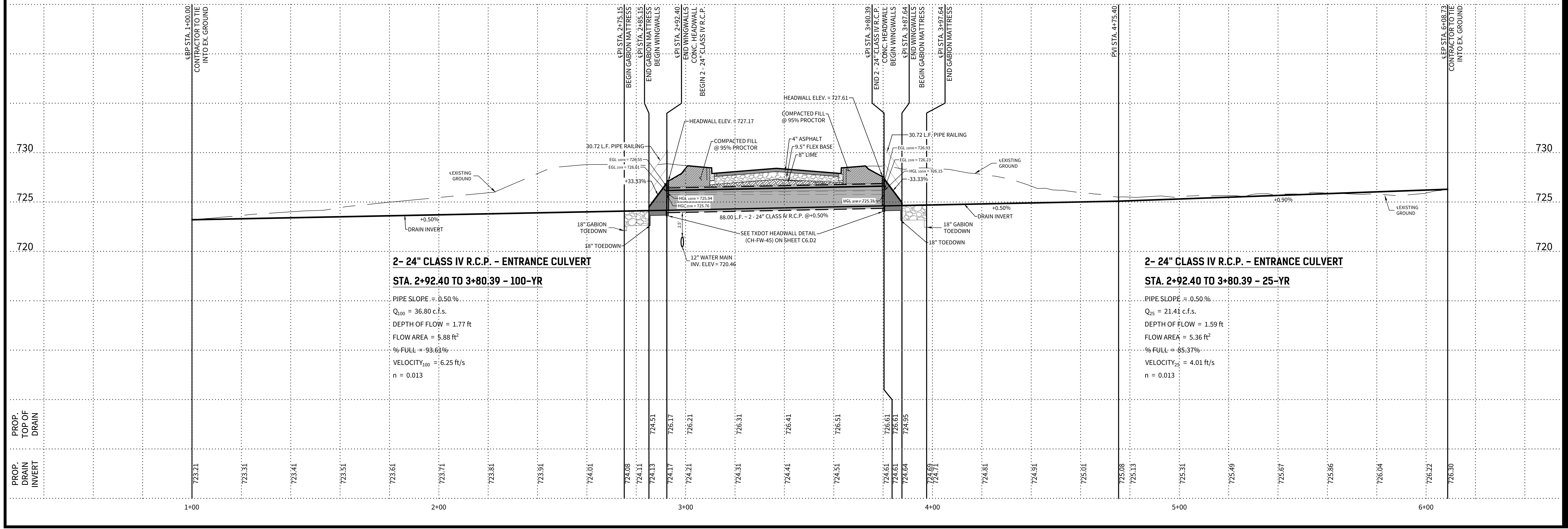
GENERAL NOTES

1. ALL CONCRETE LINING SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF NOT LESS THAN 3000 PSI IN 28 DAYS.
2. REFERENCE CITY OF SAN ANTONIO TYPICAL CONCRETE CHANNEL RIP-RAP STANDARDS FOUND ON SHEET C6.D1

ENTRANCE CULVERT

STA. 1+00.00 TO STA. 6+08.73

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 5'


¢BP STA. 1+00.00 CONTRACTOR TO TIE INTO EX. GROUND
¢PI STA. 2+75.15 BEGIN GABION MATTRESS
¢PI STA. 2+85.15 END GABION MATTRESS BEGIN WINGWALLS
¢PI STA. 2+92.40 END WINGWALLS CONC. HEADWALL BEGIN 2 - 24" CLASS IV R.C.P.
¢PI STA. 3+80.39 END 2 - 24" CLASS IV R.C.P. CONC. HEADWALL BEGIN WINGWALLS
¢PI STA. 3+87.64 END WINGWALLS BEGIN GABION MATTRESS
¢PI STA. 3+97.64 END GABION MATTRESS
PVI STA. 4+75.40
¢EP STA. 6+08.73 CONTRACTOR TO TIE INTO EX. GROUND
730
725
720
HEADWALL ELEV. = 727.17
HEADWALL ELEV. = 727.61
COMPACTED FILL @ 95% PROCTOR
4" ASPHALT
9.5" FLEX BASE
8" LIME
30.72 L.F. PIPE RAILING
EGL 100YR = 726.55
EGL 25YR = 726.01
EGL 100YR = 726.53
EGL 25YR = 726.23
HGL 100YR = 726.15
HGL 100YR = 725.94
HGL 25YR = 725.76
HGL 25YR = 725.28
+33.33%
-33.33%
¢EXISTING GROUND
+0.50%
+0.90%
DRAIN INVERT
18" GABION TOEDOWN
18" TOEDOWN
2.5'
88.00 L.F. - 2 - 24" CLASS IV R.C.P. @+0.50%
SEE TXDOT HEADWALL DETAIL (CH-FW-45) ON SHEET C6.D2
12" WATER MAIN INV. ELEV = 720.46
PROP. TOP OF DRAIN
724.51 726.17 726.21 726.31 726.41 726.51 726.61 726.61 724.95
PROP. DRAIN INVERT
723.21 723.31 723.41 723.51 723.61 723.71 723.81 723.91 724.01 724.08 724.11 724.13 724.17 724.21 724.31 724.41 724.51 724.61 724.61 724.64 724.69 724.71 724.81 724.91 725.01 725.08 725.13 725.31 725.49 725.67 725.86 726.04 726.22 726.30
1+00
2+00
3+00
4+00
5+00
6+00

2- 24" CLASS IV R.C.P. – ENTRANCE CULVERT

STA. 2+92.40 TO 3+80.39 – 100–YR

PIPE SLOPE = 0.50 %
Q_{100} = 36.80 c.f.s.
DEPTH OF FLOW = 1.77 ft
FLOW AREA = 5.88 ft^2
% FULL = 93.61%
$VELOCITY_{100}$ = 6.25 ft/s
n = 0.013

2- 24" CLASS IV R.C.P. – ENTRANCE CULVERT

STA. 2+92.40 TO 3+80.39 – 25–YR

PIPE SLOPE = 0.50 %
Q_{25} = 21.41 c.f.s.
DEPTH OF FLOW = 1.59 ft
FLOW AREA = 5.36 ft^2
% FULL = 85.37%
$VELOCITY_{25}$ = 4.01 ft/s
n = 0.013

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FLYING W
UNIT 2

DRAINAGE PLAN & PROFILE - ENTRANCE CULVERT

DATE	04/16/2026
PROJECT NO.	04024-018
DRAWN BY	C7
CHECKED BY	JL/TM

REVISIONS
1.
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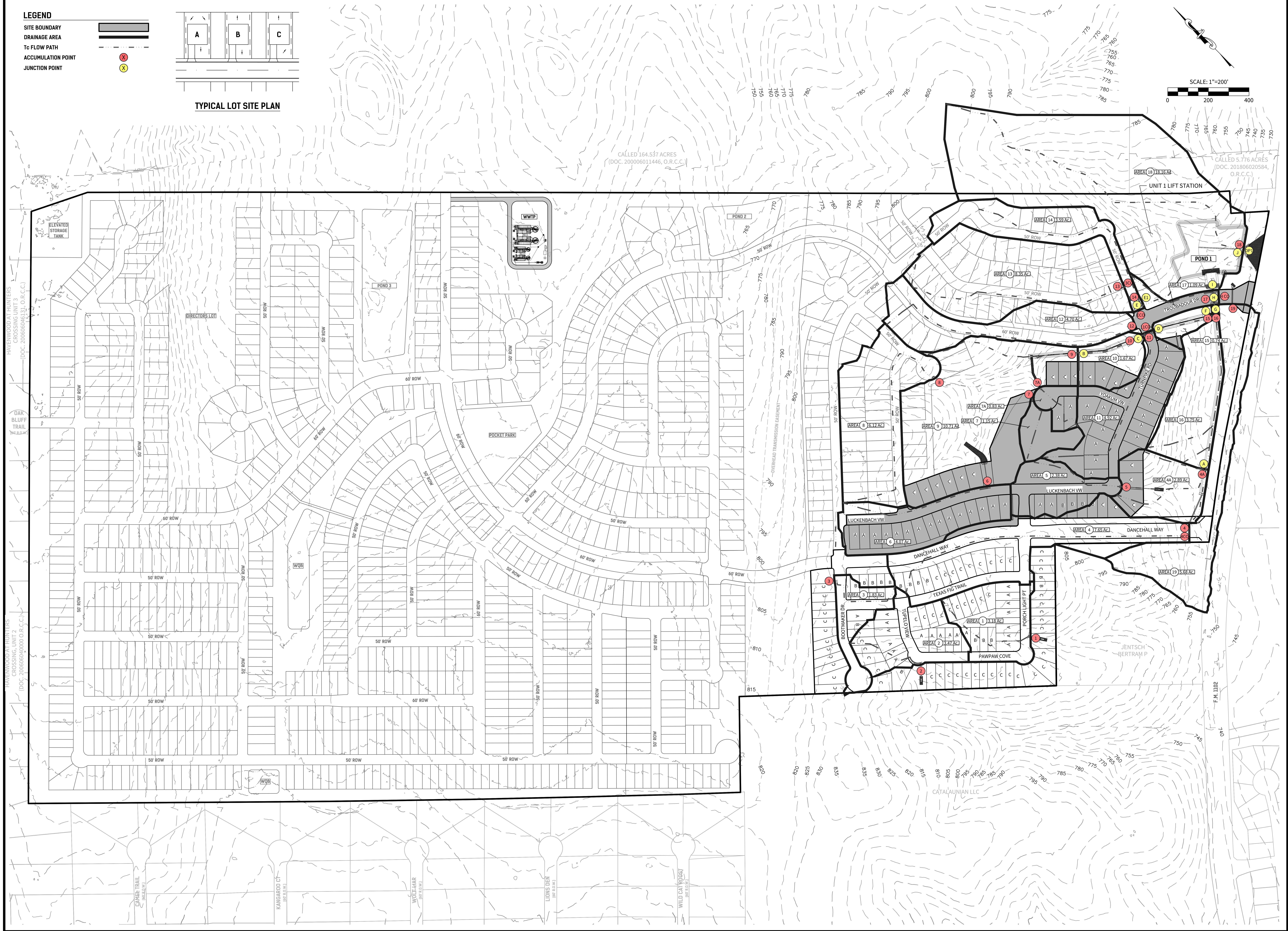
4/16/26
TORY DUANE MILLER
135598
Tory Miller

CUDE ENGINEERS
TBPELS No. 10048500

C6.07


LEGEND
SITE BOUNDARY
DRAINAGE AREA
Tc FLOW PATH
ACCUMULATION POINT
JUNCTION POINT
A
B
C
TYPICAL LOT SITE PLAN
SCALE: 1"=200'
0
200
400
AREA 1 3.18 Ac.
AREA 2 3.47 Ac.
AREA 3 1.83 Ac.
AREA 4 7.65 Ac.
AREA 4A 2.89 Ac.
AREA 5 2.38 Ac.
AREA 6 4.07 Ac.
AREA 7 1.15 Ac.
AREA 7A 0.83 Ac.
AREA 8 6.12 Ac.
AREA 9 10.71 Ac.
AREA 10 1.67 Ac.
AREA 11 4.92 Ac.
AREA 12 4.70 Ac.
AREA 13 8.35 Ac.
AREA 14 3.59 Ac.
AREA 15 0.74 Ac.
AREA 16 3.75 Ac.
AREA 17 1.09 Ac.
AREA 18 18.16 Ac.
AREA 19 5.68 Ac.
UNIT 1 LIFT STATION
POND 1
POND 2
POND 3
DP1
TROUBADOUR DR
TURNPIKE RD
YOAKUM VW
LUCKENBACH VW
DANCEHALL WAY
TEXAS FIG TRAIL
BOOTMAKER DR.
TUPELO VIEW
PORCH LIGHT PT
PAWPAW COVE
F.M. 1102
CALLED 164.537 ACRES (DOC. 200006011446, O.R.C.C.)
CALLED 5.776 ACRES (DOC. 201806020584, O.R.C.C.)
JENTSCH BERTRAM P
CATALAUNIAN LLC
HAVENWOOD AT HUNTERS CROSSING UNIT 3
HAVENWOOD AT HUNTERS CROSSING UNIT 2
OAK BLUFF TRAIL
ELEVATED STORAGE TANK
WWTP
DIRECTORS LOT
POCKET PARK
WQB
OVERHEAD TRANSMISSION EASEMENT
50' ROW
60' ROW
CAMER TRAIL
KANGAROO CT
WOLF LAIR
LIONS DEN
WILD CAT ROOST

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FLYING W
UNIT 2

PROJECT CONDITIONS DRAINAGE AREA MAP

DATE	04/16/2026
PROJECT NO.	04024-018
DRAWN BY	C7
CHECKED BY	JL/TM

REVISIONS
1.
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4/16/26

TORY DUANE MILLER
135598

CUDE ENGINEERS
TBPELS No. 10048500

C6.08

R:\04024\018\2-DWG\4-Plans\C6.08 PROJECT CONDITIONS.dwg 2026/04/16 8:38am sgonzales

Project Name: Flying W Tract
Calculation Summary for Time of Concentrations & Ultimate Flow

PA1

HYDROLOGY										Sheet Flow Tc Compuations						Shallow Conc. Tc Compuations					Concentrated Tc Computations			Overall	INTENSITY						Q FLOW						
Drainage Shed	Shed Area (Ac.)	Total Shed Area (Ac.)	AREA OF ACCUMULATION (Ac.)	C2	C5	C10	C25	C50	C100	*Length < 100'*	Paved (Y or N)	Upstream Elev.	Downstream Elev	Slope	Time of Concentration	*Length*	Paved (Y or N)	Downstream Elev	Slope	Time of Concentration	*Length*	Velocity (fps)	Time of Concentration	Time of Concentration (min)	I2	I5	I10	I25	I50	I100	Q2	Q5	Q10	Q25	Q50	Q100	Drainage Shed
1	3.18	3.18	= 1	0.56	0.60	0.62	0.67	0.71	0.75	100.00	N	827.00	822.28	4.72%	11.00	383.97	N	802.07	5.26%	1.72	45.66	6	0.13	12.85	4.56	5.74	6.76	8.18	9.30	10.48	8.12	10.95	13.33	17.43	21.00	24.99	1
2	3.47	3.47	= 2	0.56	0.60	0.62	0.67	0.71	0.75	100.00	N	824.35	823.03	1.32%	14.36	218.42	N	814.00	4.13%	1.11	67.83	6	0.19	15.66	4.15	5.20	6.10	7.35	8.36	9.41	8.06	10.83	13.12	17.09	20.60	24.49	2
3	1.83	1.83	= 3	0.63	0.67	0.70	0.75	0.78	0.83	92.96	N	829.70	828.46	1.33%	14.33						327.99	6	0.91	15.24	4.21	5.28	6.19	7.46	8.49	9.56	4.85	6.47	7.93	10.24	12.12	14.52	3
4	7.65	7.65	= 4	0.54	0.58	0.61	0.65	0.69	0.73	100.00	N	829.12	827.49	1.63%	13.74	106.03	N	825.37	2.00%	0.78	1315.47	6	3.65	18.18	3.84	4.80	5.63	6.78	7.70	8.67	15.86	21.30	26.27	33.71	40.64	48.42	4
4 CAP	5.75	7.65	= 4 CAP																												15.86	20.66	24.29	28.93	32.68	36.42	4 CAP
4 CO	1.90	7.65	= 4 CO																												0.00	0.64	1.98	4.78	7.96	12.00	4 CO
4A	2.89	2.89	= 4A	0.38	0.41	0.43	0.48	0.51	0.55	100.00	N	787.69	771.14	16.55%	10.00	201.83	N	744.16	13.37%	0.57	400.60	6	1.11	11.68	4.75	5.99	7.05	8.56	9.73	10.97	5.22	7.10	8.76	11.87	14.34	17.44	4A
5	2.38	2.38	= 5	0.52	0.56	0.59	0.63	0.67	0.71	100.00	N	810.00	805.17	4.83%	11.00	194.57	N	790.44	7.57%	0.73	167.80	6	0.47	12.20	4.67	5.88	6.92	8.39	9.54	10.75	5.78	7.84	9.72	12.58	15.21	18.17	5
A	11.02	12.92	= 4 CAP + 4A + 5	0.50	0.54	0.57	0.61	0.64	0.69	100.00	N	829.12	827.49	1.63%	13.74	106.03	N	825.37	2.00%	0.78	1663.59	6	4.62	19.14	3.74	4.67	5.48	6.60	7.48	8.43	24.16	31.94	38.38	47.24	53.89	63.15	A
6	4.07	4.07	= 6	0.57	0.61	0.63	0.68	0.72	0.76	100.00	N	820.76	817.67	3.09%	11.91	133.99	N	814.00	2.74%	0.84	508.27	6	1.41	14.16	4.37	5.48	6.43	7.77	8.85	9.97	10.14	13.61	16.49	21.50	25.93	30.84	6
7	1.15	1.15	= 7	0.33	0.36	0.38	0.42	0.45	0.49	100.00	N	810.67	804.74	5.93%	10.07	144.37	N	779.00	17.83%	0.35	82.98	6	0.23	10.65	4.93	6.21	7.32	8.90	10.13	11.41	1.87	2.57	3.20	4.30	5.24	6.43	7
7A	0.83	0.83	= 7A	0.59	0.64	0.66	0.71	0.75	0.79	100.0	N	792.6	783.4	9.17%	10.00	117.51	N	780.45	2.54%	0.76	95.00	6	0.26	11.03	4.87	6.12	7.22	8.77	9.98	11.25	2.38	3.25	3.96	5.17	6.21	7.38	7A
8	6.12	6.12	= 8	0.56	0.60	0.63	0.67	0.71	0.76	100.00	N	820.76	817.71	3.05%	11.95	167.96	N	813.49	2.51%	1.10	896.48	6	2.49	15.54	4.16	5.22	6.13	7.38	8.39	9.45	14.26	19.17	23.63	30.26	36.46	43.95	8
9	10.71	10.71	= 9	0.39	0.42	0.45	0.49	0.52	0.56	100.00	N	801.27	798.64	2.63%	12.00	384.76	N	763.00	9.26%	1.30	281.06	6	0.78	14.08	4.38	5.49	6.45	7.80	8.87	10.00	18.29	24.70	31.09	40.93	49.40	59.98	9
B	22.88	22.88	= 6+7+7A+8+9	0.47	0.51	0.53	0.58	0.61	0.65	100.00	N	820.76	817.71	3.05%	11.95	167.96	N	813.49	2.51%	1.10	1670.34	6	4.64	17.68	3.90	4.88	5.71	6.88	7.82	8.80	41.94	56.94	69.24	91.30	109.14	130.87	B
10	1.67	1.67	= 10	0.43	0.46	0.48	0.52	0.56	0.60	100.00	N	782.85	779.71	3.14%	11.86						371.93	6	1.03	12.89	4.56	5.73	6.75	8.17	9.29	10.47	3.27	4.40	5.41	7.09	8.69	10.49	10
C	24.55	24.55	= B + 10	0.47	0.51	0.53	0.57	0.61	0.65	100.00	N	820.76	817.71	3.05%	11.95	167.96	N	813.49	2.51%	1.10	1988.83	6	5.52	18.57	3.80	4.75	5.57	6.70	7.61	8.57	43.85	59.47	72.47	93.76	113.96	136.76	C
11	4.92	4.92	= 11	0.55	0.59	0.62	0.66	0.70	0.74	100.00	N	808.36	803.52	4.84%	11.00	63.36	N	801.58	3.06%	0.37	794.98	6	2.21	13.58	4.45	5.59	6.58	7.95	9.05	10.19	12.04	16.23	20.07	25.82	31.17	37.10	11
11 CAP	2.21	4.92	= 11 CAP																												9.01	10.74	12.09	13.84	15.27	16.69	11 CAP
11 CO	2.71	4.92	= 11 CO																												3.03	5.49	7.98	11.98	15.90	20.41	11 CO
D	26.76	29.47	= C + 11 CAP	0.48	0.52	0.54	0.59	0.62	0.67	100.00	N	820.76	817.71	3.05%	11.95	167.96	N	813.49	2.51%	1.10	2052.21	6	5.70	18.75	3.78	4.73	5.54	6.67	7.57	8.52	50.44	66.99	80.18	103.99	122.41	147.82	D
12	4.70	4.70	= 12	0.54	0.58	0.61	0.65	0.69	0.73	100.00	N	810.63	808.41	2.22%	12.56	65.98	N	802.02	9.68%	0.22	1156.32	6	3.21	15.99	4.10	5.14	6.03	7.26	8.25	9.29	10.41	14.01	17.29	22.18	26.75	31.87	12
13	8.35	8.35	= 13	0.56	0.60	0.63	0.67	0.71	0.75	100.00	N	804.64	803.76	0.88%	15.20	351.61	N	782.83	5.95%	1.49	741.08	6	2.06	18.74	3.78	4.73	5.54	6.67	7.57	8.53	17.68	23.70	29.14	37.32	44.88	53.42	13
13 CAP	5.27	8.35	= 13 CAP																												16.68	20.58	23.57	27.44	30.57	33.73	13 CAP
13 CO	3.08	8.35	= 13 CO																												1.00	3.12	5.57	9.88	14.31	19.69	13 CO
14	3.59	3.59	= 14	0.52	0.56	0.58	0.63	0.66	0.71	100.00	N	802.11	797.46	4.65%	11.00	185.86	N	784.00	7.24%	0.71	789.69	6	2.19	13.91	4.40	5.53	6.49	7.85	8.93	10.07	8.21	11.12	13.51	17.75	21.16	25.67	14
E	6.67	11.94	= 13 CO + 14	0.55	0.59	0.61	0.66	0.69	0.74	100.00	N	804.64	803.76	0.88%	15.20	351.61	N	782.83	5.95%	1.49	790.31	6	2.20	18.88	3.76	4.71	5.52	6.64	7.54	8.49	8.02	12.60	16.63	24.89	31.55	41.29	E
E CAP	4.21	11.94	= E CAP																												8.02	12.51	15.74	20.95	24.36	28.60	E CAP
E CO	2.05	11.94	= E CO																												0.00	0.09	0.89	3.94	7.19	12.69	E CO
E1	9.48	20.29	= 13 CAP+ E CAP																												24.69	33.09	39.31	48.39	54.93	62.32	E1
15	0.74	0.74	= 15	0.35	0.38	0.41	0.45	0.48	0.52	57.10	N	753.00	751.63	2.40%	12.20						235.90	6	0.66	12.86	4.56	5.74	6.76	8.17	9.30	10.48	1.18	1.61	2.05	2.72	3.30	4.03	15
F	27.50	30.21	= D +15	0.48	0.52	0.54	0.58	0.62	0.66	100.00	N	820.76	817.71	3.05%	11.95	167.96	N	813.49	2.51%	1.10	2426.12	6	6.74	19.78	3.67	4.60	5.39	6.49	7.35	8.28	53.22	66.77	79.95	101.74	121.77	144.68	F
16	3.75	3.75	= 16	0.33	0.36	0.38	0.42	0.45	0.49	100.00	N	786.49	768.07	18.42%	10.00	222.92	N	735.76	14.49%	0.60	609.88	6	1.69	12.29	4.65	5.86	6.90	8.36	9.51	10.71	5.75	7.91	9.83	13.17	16.05	19.68	16
G	42.28	46.88	= A + F + 16	0.47	0.51	0.53	0.58	0.61	0.66	100.00	N	829.12	827.49	1.63%	13.74	106.03	N	825.37	2.00%	0.78	2472.42	6	6.87	21.39	3.53	4.42	5.18	6.23	7.05	7.94	74.75	99.55	118.74	152.64	177.75	213.26	G
17	1.09	1.09	= 17	0.59	0.64	0.66	0.71	0.75	0.79	100.00	N	754.00	748.53	5.47%	10.53	140.43	N	740.25	5.90%	0.60	214.74	6	0.60	11.72	4.75	5.98	7.04	8.54	9.72	10.95	3.05	4.17	5.06	6.61	7.95	9.43	17
H	10.55	22.65	= 11CO + 12 + ECO + 17	0.55	0.59	0.61	0.66	0.70	0.74	100.00	N	804.64	803.76	0.88%	15.20	351.61	N	782.83	5.95%	1.49	1263.55	6	3.51	20.20	3.63	4.55	5.33	6.42	7.27	8.19	11.52	16.98	22.24	33.75	45.07	58.26	H
H CAP	7.71	16.55																													11.52	16.98	21.85	30.03	36.38	42.58	H CAP
H CO	2.84	6.10																													0.00	0.00	0.39	3.72	8.69	15.68	H CO
I	49.99	63.43	= G + H CAP	0.52	0.55	0.58	0.62	0.66	0.70	100.00	N	829.12	827.49	1.63%	13.74	106.03	N	825.37	2.00%	0.78	2594.39	6	7.21	21.73	3.50	4.38	5.14	6.18	7.00	7.87	90.76	119.08	147.42	186.17	221.49	259.45	I
18	18.16	18.16	= 18	0.35	0.38	0.40	0.44	0.47	0.51	100.00	N	800.00	800.00	0.00%	17.00	321.60	N	781.15	5.86%	1.37	1354.11	6	3.76	22.13	3.47	4.34	5.09	6.12	6.93	7.80	22.06	29.96	36.98	48.91	59.16	72.25	18
J	77.63	101.89	= E1 + I + 18	0.45	0.48	0.51	0.55	0.58	0.62	100.00	N	829.12	827.49	1.63%	13.74	106.03	N	825.37	2.00%	0.78	2828.06	6	7.86	22.38	3.45	4.32	5.06	6.09	6.89	7.75	158.18	210.63	260.56	332.77	390.51	461.89	J
DP1	77.63	101.89	= J + E1	0.45	0.48	0.51	0.55	0.58	0.62	100.00	N	829.12	827.49	1.63%	13.74	106.03	N	825.37	2.00%	0.78	2828.06	6	7.86	22.38	3.45	4.32	5.06	6.09	6.89	7.75	158.18	211.27	262.93	341.27	407.16	489.57	DP1
19	5.68	5.68	= 19	0.33	0.36	0.38	0.42	0.45	0.49	100.00	N	798.59	795.99	2.60%	12.00	516.22	N	746.14	9.66%	1.71	1278.60	6	3.55	17.26	3.94	4.94	5.79	6.97	7.92	8.91	7.39	10.74	14.48	21.41	28.20	36.80	19

CUDEENGINEERS.COM

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CUDE
ENGINEERS

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

PROJECT CONDITIONS DRAINAGE CALCULATIONS

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
1.
2.
3.
4.
5.
6.
7.
8.

4/16/26

TORY DUANE MILLER
135596

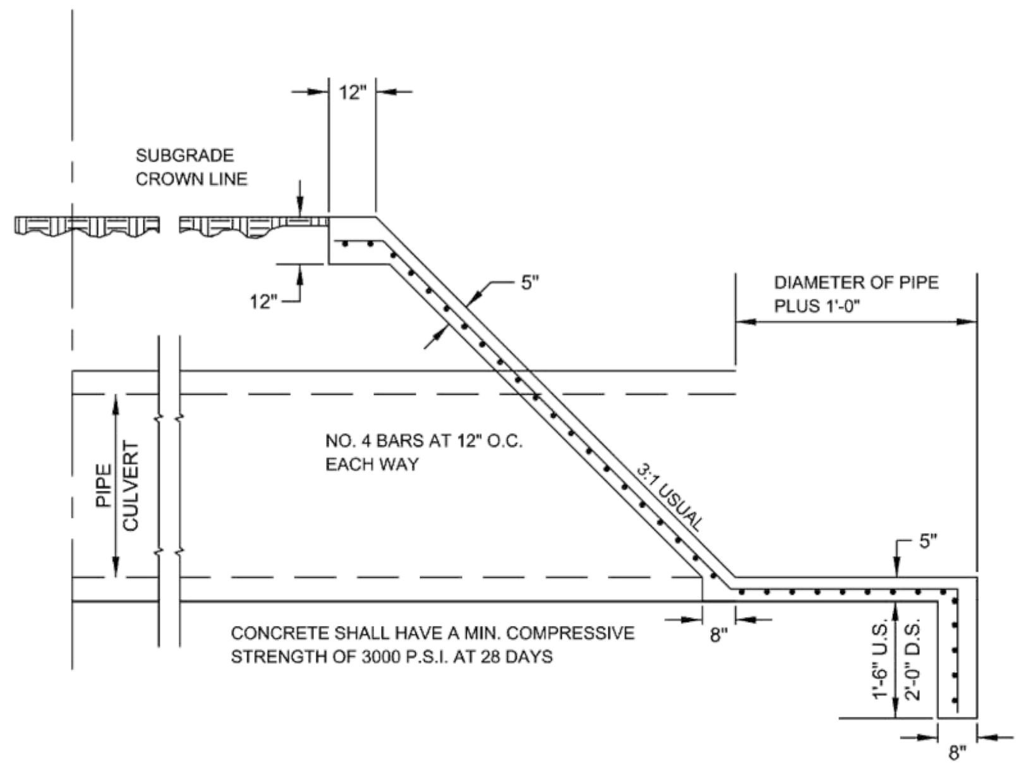
CUDE ENGINEERS
TBPELS No. 10048500

C6.09

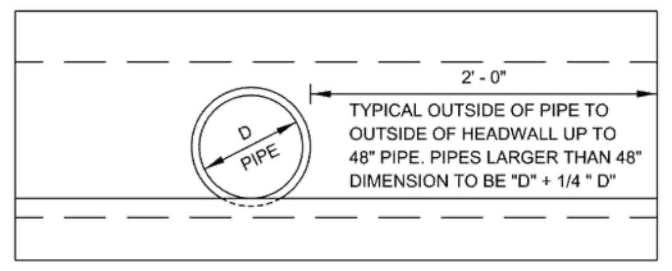
REPRODUCTION OF THE ORIGINAL SIGNED AND SEALED PLAN AND/OR ELECTRONIC MEDIA MAY HAVE BEEN INADVERTENTLY ALTERED. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE SCALE OF THE DOCUMENT AND CONTACTING CUDE ENGINEERS TO VERIFY DISCREPANCIES PRIOR TO CONSTRUCTION.

RIPRAP HEADWALL

HALF SECTION

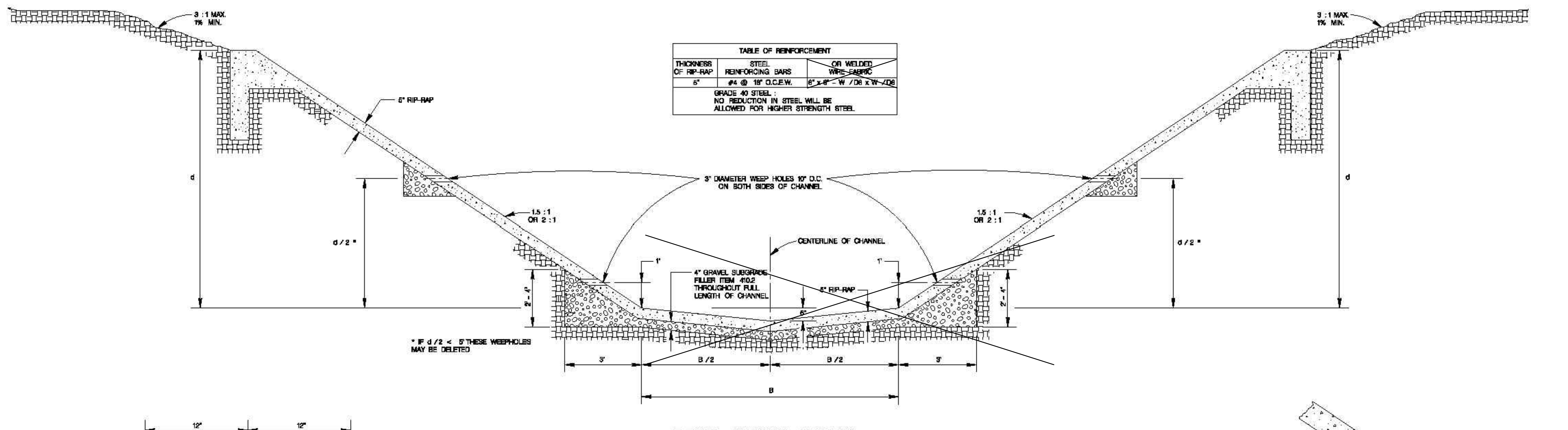

12"
SUBGRADE CROWN LINE
12"
5"
DIAMETER OF PIPE PLUS 1'-0"
PIPE
CULVERT
NO. 4 BARS AT 12" O.C. EACH WAY
3:1 USUAL
5"
CONCRETE SHALL HAVE A MIN. COMPRESSIVE STRENGTH OF 3000 P.S.I. AT 28 DAYS
8"
1'-6" U.S.
2'-0" D.S.
8"

END VIEW

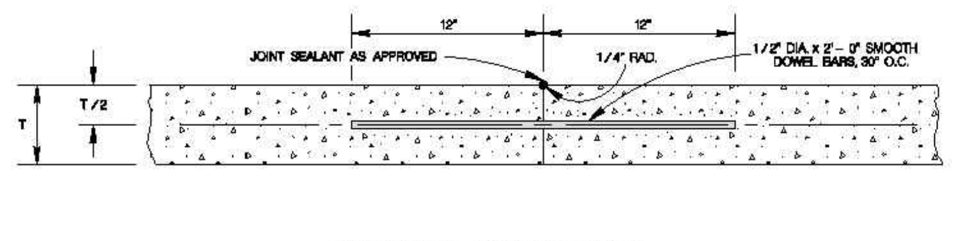

2'-0"
D
PIPE
TYPICAL OUTSIDE OF PIPE TO OUTSIDE OF HEADWALL UP TO 48" PIPE. PIPES LARGER THAN 48" DIMENSION TO BE "D" + 1/4 " D"

DATE APPROVED: 07/2008	DWG. NO: ST-023	SCALE: N.T.S.	City of New Braunfels — ENGINEERING DEPARTMENT
DRAWN BY: RAS	SHEET: 1 OF 1		
FILENAME: RIPRAP HEADWALL			

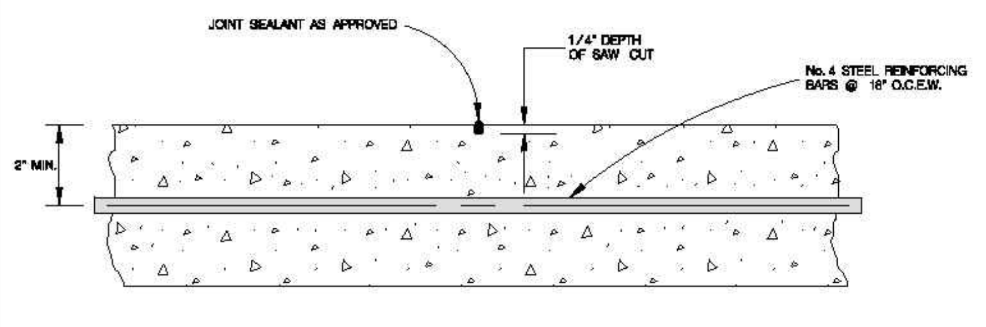
TABLE OF REINFORCEMENT		
THICKNESS OF RIP-RAP	STEEL REINFORCING BARS	~~OR WELDED WIRE FABRIC~~
5"	#4 @ 18" O.C.E.W.	~~6" x 6" - W /D6 x W /D6~~
GRADE 40 STEEL : NO REDUCTION IN STEEL WILL BE ALLOWED FOR HIGHER STRENGTH STEEL		


3 : 1 MAX.
1% MIN.
5" RIP-RAP
3" DIAMETER WEEP HOLES 10' O.C. ON BOTH SIDES OF CHANNEL
CENTERLINE OF CHANNEL
1.5 : 1
OR 2 : 1
d
d / 2 *
4" GRAVEL SUBGRADE FILLER ITEM 410.2 THROUGHOUT FULL LENGTH OF CHANNEL
5" RIP-RAP
* IF d / 2 < 3' THESE WEEPHOLES MAY BE DELETED
B / 2
B

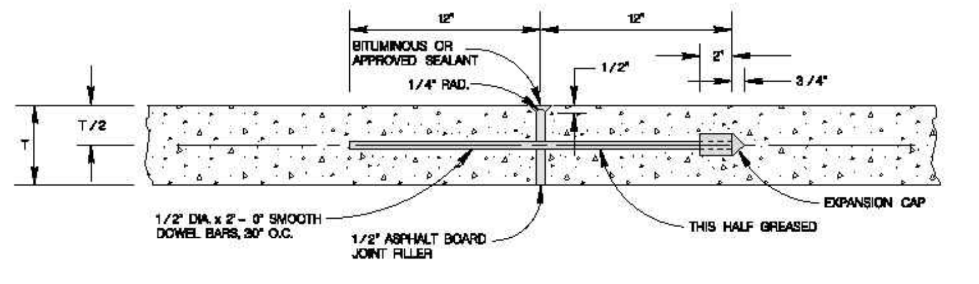
TYPICAL CHANNEL SECTION
LOOKING DOWNSTREAM
SCALE : 1" = 4'


JOINT SEALANT AS APPROVED
1/2" DIA. x 2' - 3" SMOOTH DOWEL BARS 30" O.C.
1/4" RAD.
T/2
T

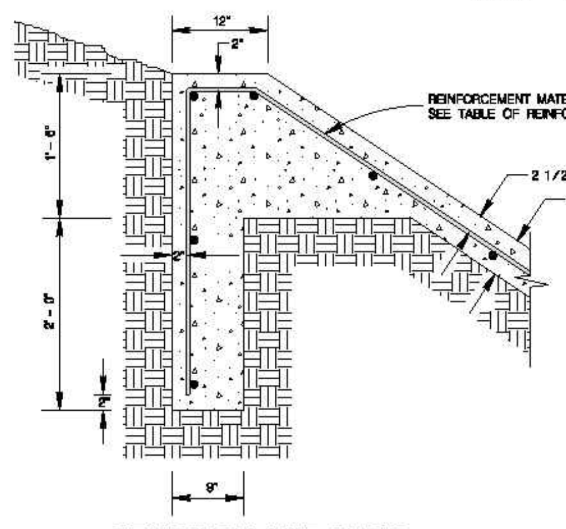
CONVERSE CONTRACTION
OR CONSTRUCTION JOINT
SCALE : 1" = 1'


JOINT SEALANT AS APPROVED
1/4" DEPTH OF SAW CUT
No.4 STEEL REINFORCING BARS @ 18" O.C.E.W.
5" MIN.

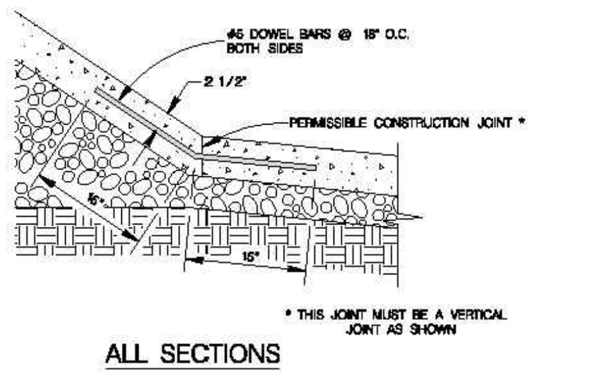
"SAW CUT" CONTRACTION JOINT
SCALE : 1" = 5'


BITUMINOUS OR APPROVED SEALANT
1/4" RAD.
1/2"
3/4"
T/2
T
1/2" DIA. x 2' - 3" SMOOTH DOWEL BARS 30" O.C.
1/2" ASPHALT BOARD JOINT FILLER
THIS HALF GREASED
EXPANSION CAP

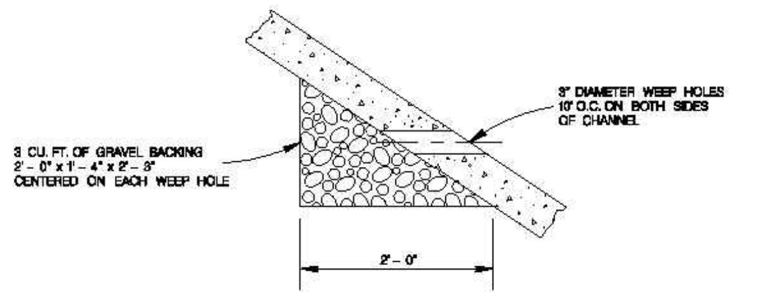
TRANSVERSE EXPANSION JOINT
SCALE : 1" = 1'


REINFORCEMENT MATERIAL SEE TABLE OF REINFORCEMENT
2 1/2" TYP.
5" TYP.
18"

REINFORCEMENT DETAIL
TOE-DOWN
SCALE : 1" = 2'


#4 DOWEL BARS @ 18" O.C. BOTH SIDES
2 1/2"
PERMISSIBLE CONSTRUCTION JOINT *
* THIS JOINT MUST BE A VERTICAL JOINT AS SHOWN

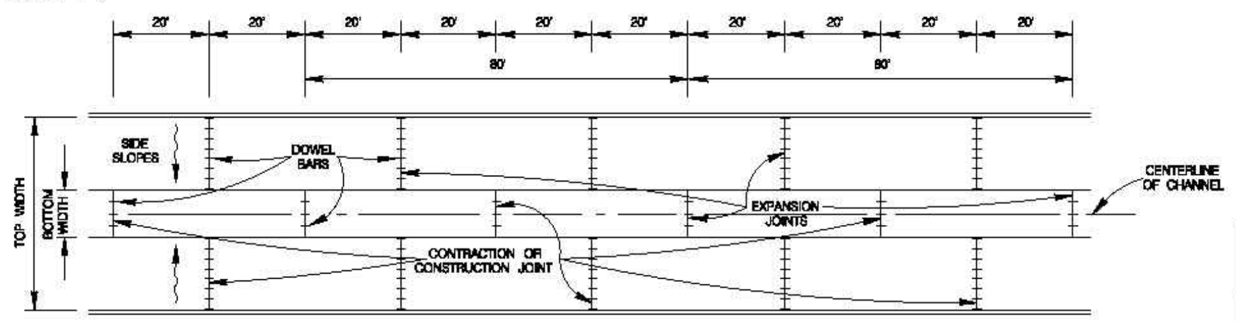
ALL SECTIONS
SCALE : 1" = 2'


3 CU. FT. OF GRAVEL BACKING 3'-0" x 1'-6" x 8" CENTERED ON EACH WEEP HOLE
3" DIAMETER WEEP HOLES 10' O.C. ON SIDES OF CHANNEL
2' - 0"

WEEP HOLES DETAILS
FOR SIDE SLOPES
SCALE : 1" = 2'

GENERAL NOTES

1. CONCRETE FOR CHANNEL RIP-RAP SHALL BE CLASS "A" 3000 P.S.I.
2. ALL DIMENSIONS RELATING TO REINFORCING STEEL ARE TO CENTER OF BARS UNLESS OTHERWISE SHOWN.
3. ALL REINFORCEMENT STEEL SHALL MEET ASTM DESIGNATIONS AS CALLED FOR IN THE "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION".
4. NEW RIP-RAP SHOULD BE ATTACHED TO EXISTING RIP-RAP BY NO. 4 BARS DOWELED 6" INTO EXISTING RIP-RAP. THESE BARS ARE TO BE SPACED 18" O.C. AND HAVE A LENGTH OF 18".


20'
80'
SIDE SLOPES
DOWEL BARS
TOP WIDTH
BOTTOM WIDTH
EXPANSION JOINTS
CONTRACTION OR CONSTRUCTION JOINT
CENTERLINE OF CHANNEL

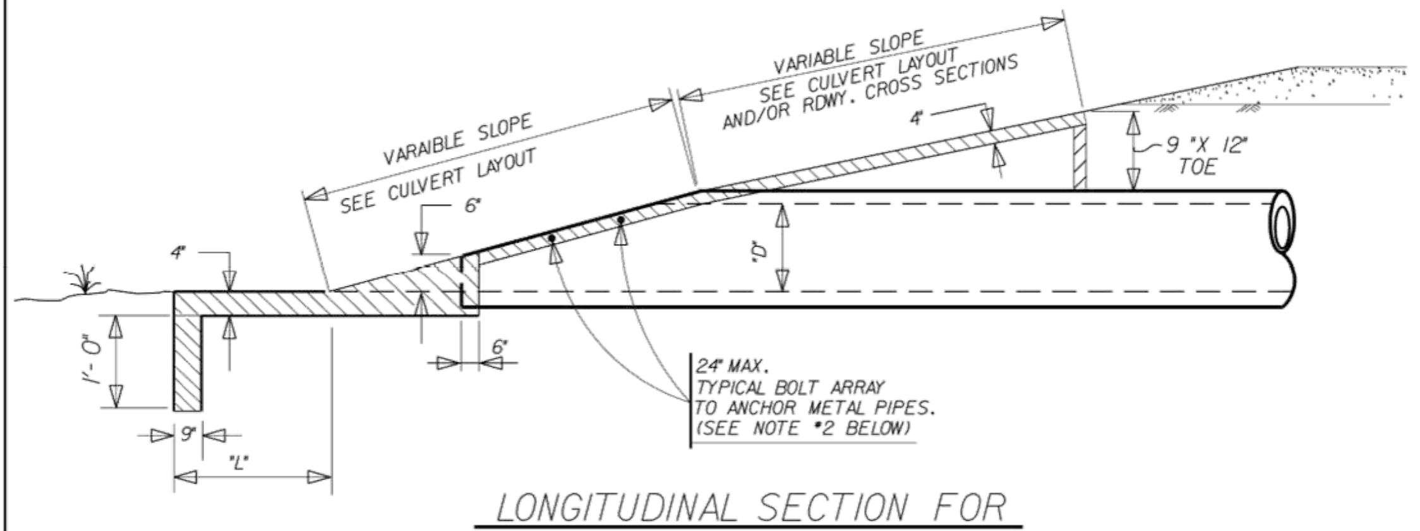
EXPANSION AND CONTRACTION JOINTS
FOR CONCRETE CHANNEL LINING
SCALE : 1" = 40'

MAY 2009

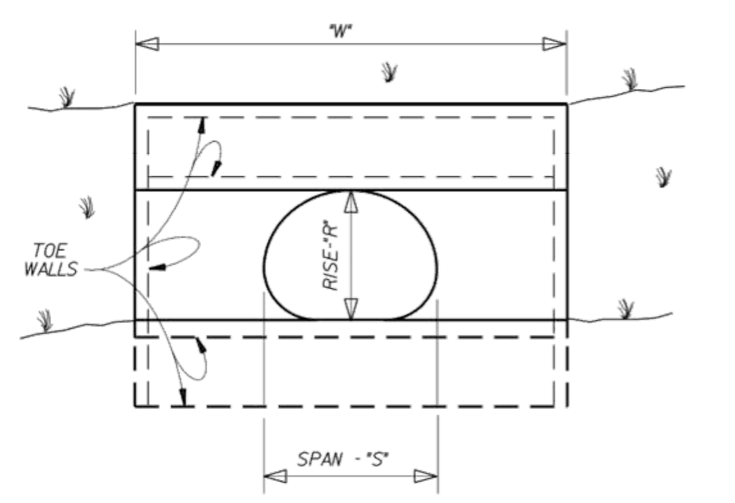
CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

TYPICAL CONCRETE CHANNEL
RIP-RAP STANDARDS

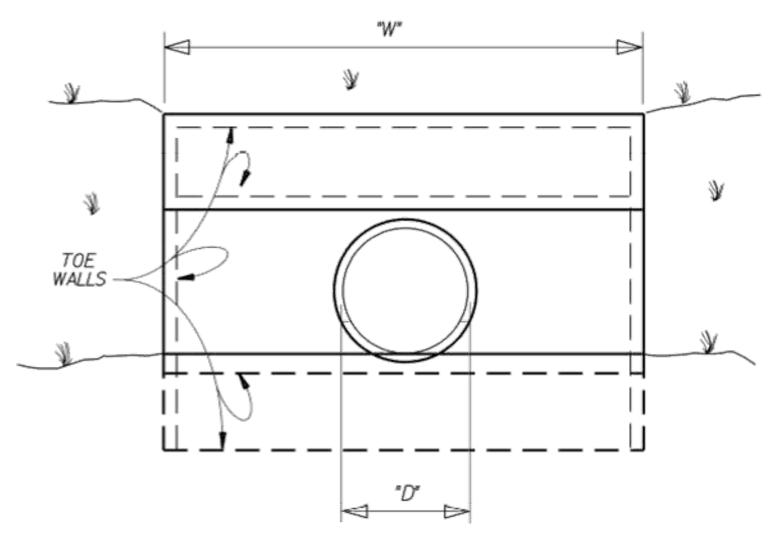
_____% SUBMITTAL	PROJECT NO.:_____		DATE:_____
DRWN. BY: V. VASQUEZ	DSGN. BY:_____	CHKD. BY:_____	SHEET NO.:____OF____


VARIABLE SLOPE
SEE CULVERT LAYOUT
VARIABLE SLOPE
SEE CULVERT LAYOUT AND/OR ROWY. CROSS SECTIONS
9" X 12" TOE
6"
4"
D
1'-0"
9"
"L"
24" MAX.
TYPICAL BOLT ARRAY TO ANCHOR METAL PIPES. (SEE NOTE *2 BELOW)

LONGITUDINAL SECTION FOR
CIRCULAR & ARCH PIPES


"W"
TOE WALLS
RISE-"R"
SPAN - "S"

SINGLE C.M.P. ARCH PIPE CULVERT

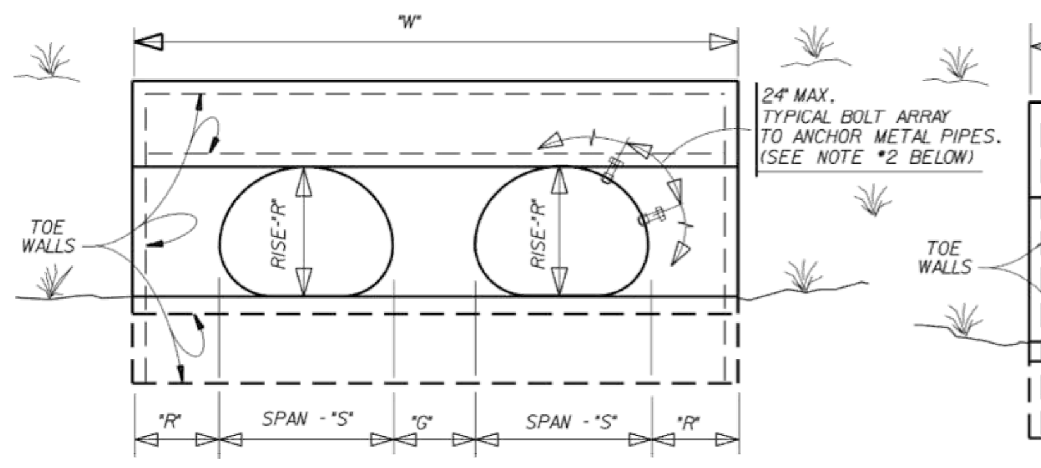

"W"
TOE WALLS
"D"

SINGLE CIRCULAR PIPE CULVERT
(CMP or RCP)

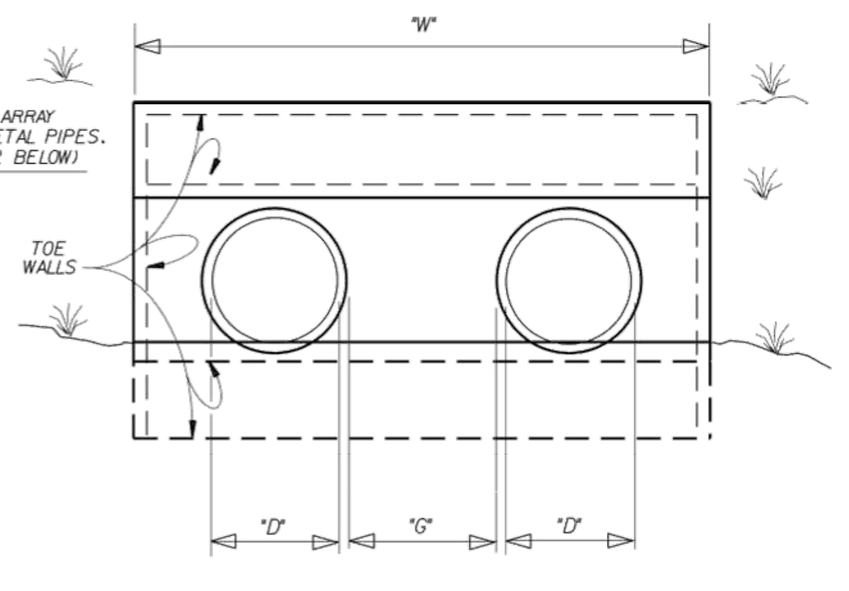
DIMENSIONS FOR CIRCULAR (CMP and RCP)
PIPE CULVERTS

"D" INSIDE DIA. of PIPE	"L"	"G"		SINGLE	DOUBLE	TRIPLE	QUADRUPLE
		CGM	RCP	"W"			
18"	2'- 0"	1'- 2"	0'- 9"	4'- 6"	7'- 2"	9'- 10"	12'- 6"
21"	2'- 6"	1'- 3"	0'- 10"	5'- 3"	8'- 4"	11'- 4"	13'- 4"
24"	3'- 0"	1'- 5"	0'- 11"	6'- 0"	9'- 5"	12'- 10"	16'- 3"
30"	4'- 0"	1'- 8"	1'- 1"	7'- 6"	11'- 8"	15'- 10"	20'- 0"
36"	5'- 0"	1'- 11"	1'- 3"	9'- 0"	13'-11"	18'- 10"	23'- 9"
42"	6'- 0"	2'- 2"	1'- 5"	10'- 6"	16'- 2"	21'- 10"	27'- 6"
48"	7'- 0"	2'- 5"	1'- 7"	12'- 0"	18'- 5"	24'- 10"	31'- 3"
54"	8'- 0"	2'- 10"	1'- 11"	13'-6"	20'- 10"	28'- 2"	35'- 6"
60"	9'- 0"	3'- 2"	2'- 0"	15'- 0"	23'- 2"	31'- 4"	39'- 6"

"G" IS MEASURED BETWEEN THE OUTER SURFACES OF THE PIPES.


"W"
24" MAX.
TYPICAL BOLT ARRAY TO ANCHOR METAL PIPES. (SEE NOTE *2 BELOW)
TOE WALLS
RISE-"R"
"R"
SPAN - "S"
"G"

MULTIPLE C.M.P. ARCH PIPE CULVERT


"W"
TOE WALLS
"D"
"G"
"D"

MULTIPLE CIRCULAR PIPE CULVERT
(CMP or RCP)

DIMENSIONS FOR C.M.P. ARCH PIPE CULVERTS

DESIGN SIZE	APPROX. ARCH DIM.		"L"	"G"	SINGLE	DOUBLE	TRIPLE	QUADRUPLE
	SPAN "S"	RISE "R"			"W"			
2	21"	15"	2'- 0"	1'- 2"	4'- 3"	7'- 2"	10'- 1"	13'- 0"
3	28"	20"	3'- 0"	1'- 5"	5'- 8"	9'- 5"	13'- 2"	16'- 11"
4	35"	24"	4'- 0"	1'- 8"	6'- 11"	11'- 6"	16'- 1"	20'- 8"
5	42"	29"	5'- 0"	1'- 11"	8'- 4"	13'- 9"	19'- 2"	24'- 7"
6	49"	33"	6'- 0"	2'- 2"	9'- 7"	15'- 10"	22'- 1"	28'- 4"
7	57"	38"	7'- 0"	2'- 5"	11'- 1"	18'- 3"	25'- 5"	32'- 7"
8	64"	43"	8'- 0"	2'- 10"	12'- 5"	20'- 8"	28'- 10"	37'- 0"
9	71"	47"	9'- 0"	3'- 2"	13'- 9"	22'- 10"	31'- 11"	41'- 0"

BASED ON 2-2/3" X 1/2" CORRUGATION
"G" IS MEASURED BETWEEN THE OUTER SURFACES OF THE PIPES.

NOTES:

1.) FOR RIPRAP QUANTITIES AND SLOPES, SEE CULVERT LAYOUT SHEET. CONCRETE SHALL BE CLASS B UNLESS OTHERWISE SHOWN IN THE PLANS.
2.) ALL METAL PIPES (CIRCULAR AND/OR ARCH) SHALL HAVE 5/8" X 6" GALVANIZED BOLTS WITH 2 HEX NUTS AT 24" CENTERS TO ANCHOR THE PIPE TO THE CONCRETE. THIS WORK WILL BE SUBSIDIARY TO THE RIPRAP HEADWALL.
3.) FOR CONCRETE ARCH PIPES, THE CMP ARCH PIPE CULVERT DIMENSIONS WILL HAVE TO BE ADJUSTED FOR THE PIPE WALL THICKNESS.
4.) FOR PIPES LARGER THAN SHOWN, USE THE CLEAR DISTANCE BETWEEN PIPES SHOWN IN ITEMS 460 AND/OR 464.
5.) IF THE SIDES OF THE HEADWALL IS ADJACENT TO A RIPRAP SLOPE AND IF THE TOP OF THE HEADWALL IS ADJACENT TO THE ROADWAY FOUNDATION OR RIPRAP SLOPE, THE SIDE AND TOP TOE WALLS MAY BE ELIMINATED IF APPROVED BY THE ENGINEER.

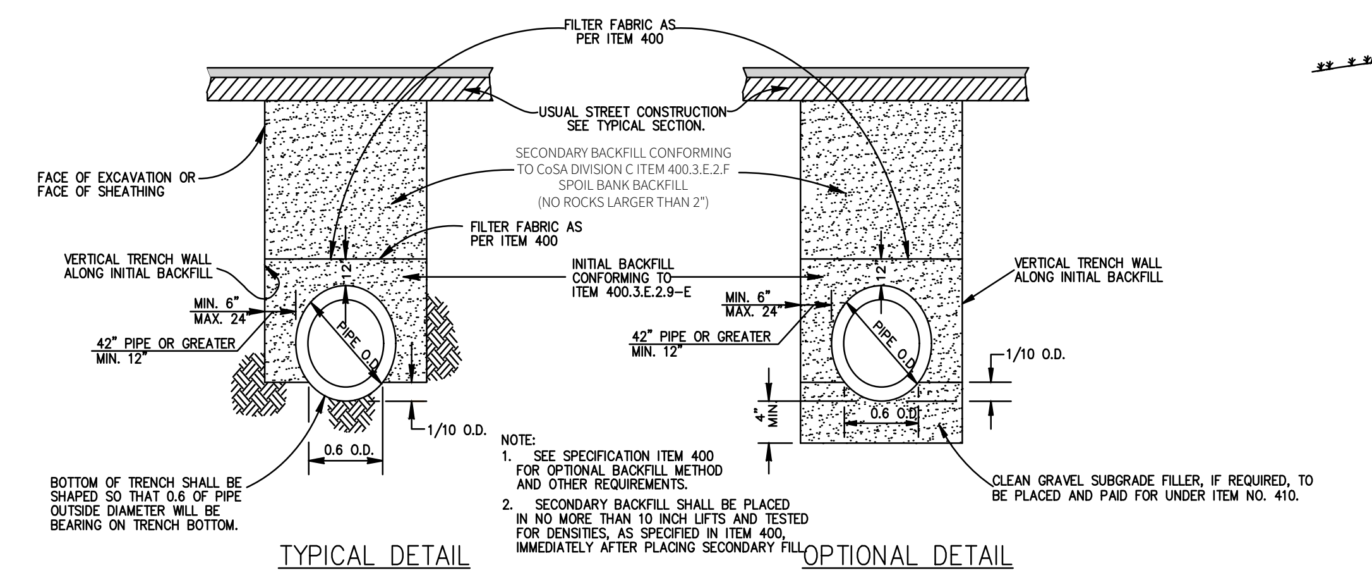
SAN ANTONIO
DISTRICT STANDARD
RIPRAP HEADWALL

© 1998 Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			
STATE	STATE DISTRICT	COUNTY	
TEXAS	SAT		
CONT.	SECT.	JOB	HIGHWAY NO.

10/95

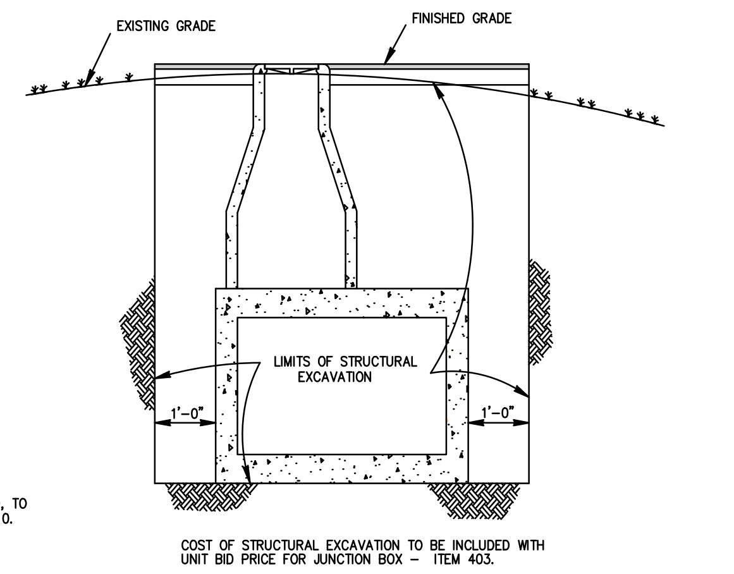
STRUCTURE DESIGN
/BRIDGE/STDS/Drh15hdwl.dgn


FILTER FABRIC AS PER ITEM 400
USUAL STREET CONSTRUCTION SEE TYPICAL SECTION.
SECONDARY BACKFILL CONFORMING TO CoSA DIVISION C ITEM 400.3.E.2.F SPOIL BANK BACKFILL (NO ROCKS LARGER THAN 2")
FACE OF EXCAVATION OR FACE OF SHEATHING
FILTER FABRIC AS PER ITEM 400
VERTICAL TRENCH WALL ALONG INITIAL BACKFILL
INITIAL BACKFILL CONFORMING TO ITEM 400.3.E.2.9-E
MIN. 6"
MAX. 24"
42" PIPE OR GREATER MIN. 12"
12
PIPE O.D.
1/10 O.D.
0.6 O.D.
4" MIN
BOTTOM OF TRENCH SHALL BE SHAPED SO THAT 0.6 OF PIPE OUTSIDE DIAMETER WILL BE BEARING ON TRENCH BOTTOM.
CLEAN GRAVEL SUBGRADE FILLER, IF REQUIRED, TO BE PLACED AND PAID FOR UNDER ITEM NO. 410.

NOTE:
1. SEE SPECIFICATION ITEM 400 FOR OPTIONAL BACKFILL METHOD AND OTHER REQUIREMENTS.
2. SECONDARY BACKFILL SHALL BE PLACED IN NO MORE THAN 10 INCH LIFTS AND TESTED FOR DENSITIES, AS SPECIFIED IN ITEM 400, IMMEDIATELY AFTER PLACING SECONDARY FILL.

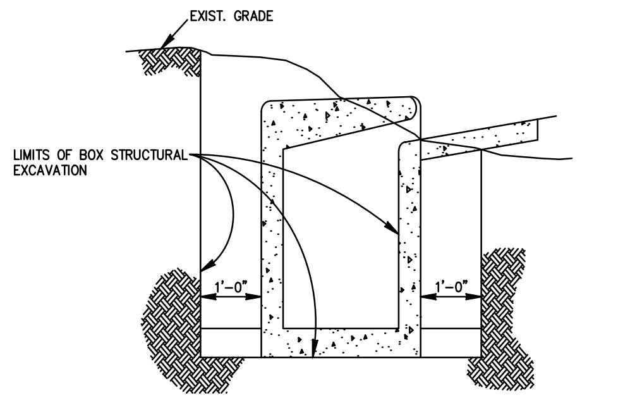
TYPICAL DETAIL
OPTIONAL DETAIL

PIPE BEDDING & BACKFILL DETAILS

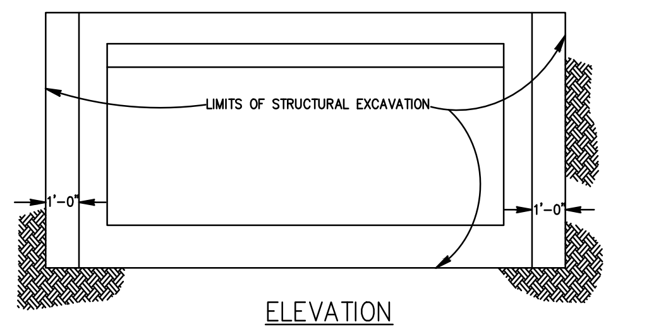

EXISTING GRADE
FINISHED GRADE
LIMITS OF STRUCTURAL EXCAVATION
1'-0"
1'-0"

COST OF STRUCTURAL EXCAVATION TO BE INCLUDED WITH UNIT BID PRICE FOR JUNCTION BOX - ITEM 403.

STRUCTURAL EXCAVATION AT JUNCTION BOXES
NO SCALE


EXIST. GRADE
LIMITS OF BOX STRUCTURAL EXCAVATION
1'-0"
1'-0"

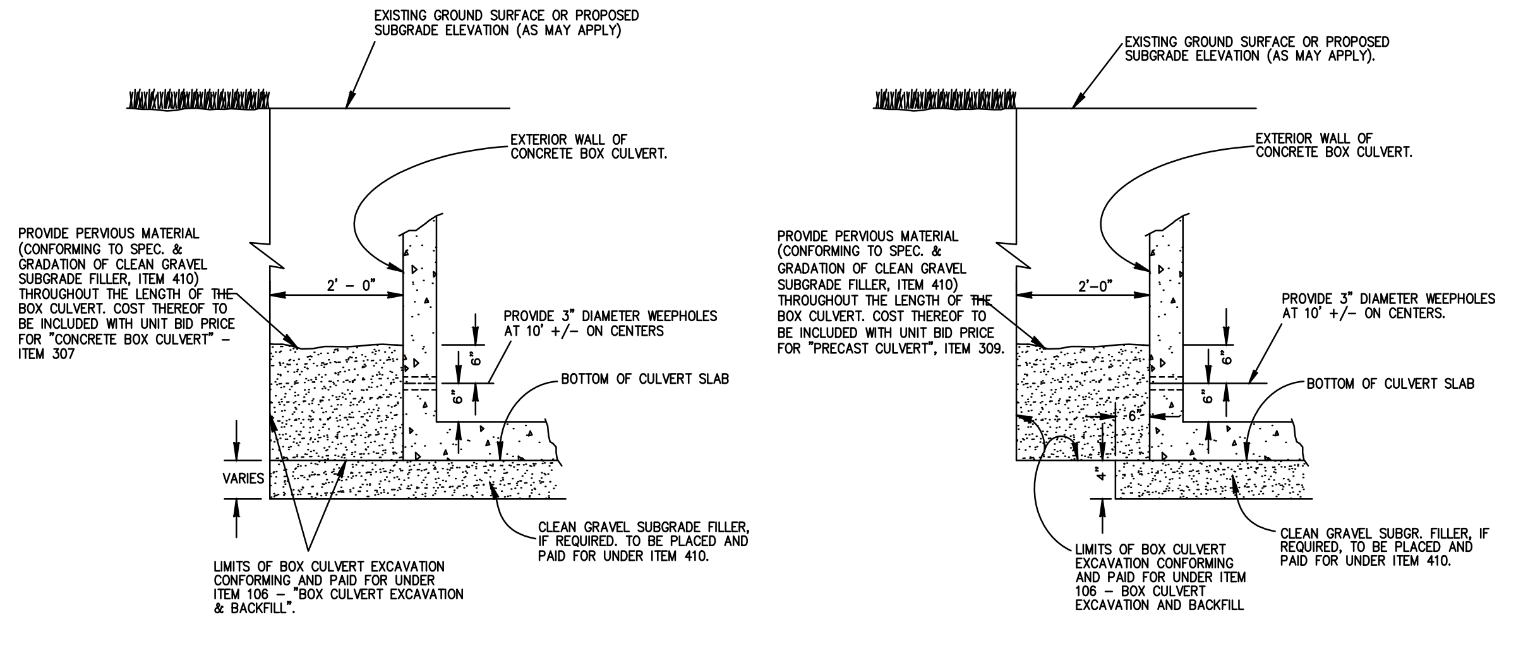
SIDE VIEW


LIMITS OF STRUCTURAL EXCAVATION
1'-0"
1'-0"

ELEVATION

COST OF STRUCTURAL EXCAVATION TO BE INCLUDED WITH UNIT BID PRICE FOR INLETS - ITEM 403.

STRUCTURAL EXCAVATIONS
AT DRAINAGE INLETS
NO SCALE


EXISTING GROUND SURFACE OR PROPOSED SUBGRADE ELEVATION (AS MAY APPLY)
EXTERIOR WALL OF CONCRETE BOX CULVERT.
PROVIDE PERVIOUS MATERIAL (CONFORMING TO SPEC. & GRADATION OF CLEAN GRAVEL SUBGRADE FILLER, ITEM 410) THROUGHOUT THE LENGTH OF THE BOX CULVERT. COST THEREOF TO BE INCLUDED WITH UNIT BID PRICE FOR "CONCRETE BOX CULVERT" - ITEM 307
2' - 0"
PROVIDE 3" DIAMETER WEEPHOLES AT 10' +/- ON CENTERS
6"
6"
BOTTOM OF CULVERT SLAB
VARIES
LIMITS OF BOX CULVERT EXCAVATION CONFORMING AND PAID FOR UNDER ITEM 106 - "BOX CULVERT EXCAVATION & BACKFILL".
CLEAN GRAVEL SUBGRADE FILLER, IF REQUIRED. TO BE PLACED AND PAID FOR UNDER ITEM 410.
EXISTING GROUND SURFACE OR PROPOSED SUBGRADE ELEVATION (AS MAY APPLY).
EXTERIOR WALL OF CONCRETE BOX CULVERT.
PROVIDE PERVIOUS MATERIAL (CONFORMING TO SPEC. & GRADATION OF CLEAN GRAVEL SUBGRADE FILLER, ITEM 410) THROUGHOUT THE LENGTH OF THE BOX CULVERT. COST THEREOF TO BE INCLUDED WITH UNIT BID PRICE FOR "PRECAST CULVERT", ITEM 309.
2'-0"
PROVIDE 3" DIAMETER WEEPHOLES AT 10' +/- ON CENTERS.
6"
4"
BOTTOM OF CULVERT SLAB
LIMITS OF BOX CULVERT EXCAVATION CONFORMING AND PAID FOR UNDER ITEM 106 - BOX CULVERT EXCAVATION AND BACKFILL
CLEAN GRAVEL SUBGR. FILLER, IF REQUIRED, TO BE PLACED AND PAID FOR UNDER ITEM 410.

CAST-IN-PLACE BOX CULVERT
PRECAST BOX CULVERT

CONCRETE BOX CULVERT

MAY 2009

CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

PIPE BEDDING & MISCELLANEOUS
DRAINAGE DETAILS

_____% SUBMITTAL	PROJECT NO.:_____		DATE:_____
DRWN. BY:_____	DSGN. BY:_____	CHKD. BY:_____	SHEET NO.:____OF____

CUDEENGINEERS.COM

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

CONCRETE RIP-RAP & MISC. DRAINAGE DETAILS

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
1.
2.
3.
4.
5.
6.
7.
8.

CUDE ENGINEERS
TBPELS No. 10048500

C6.D1

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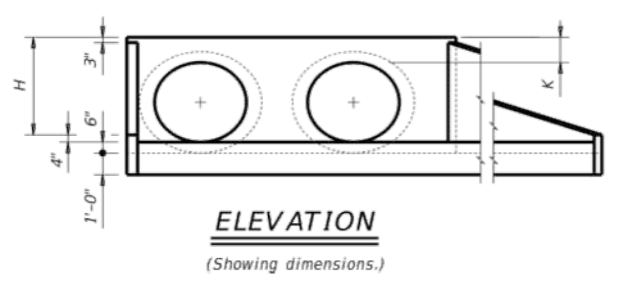
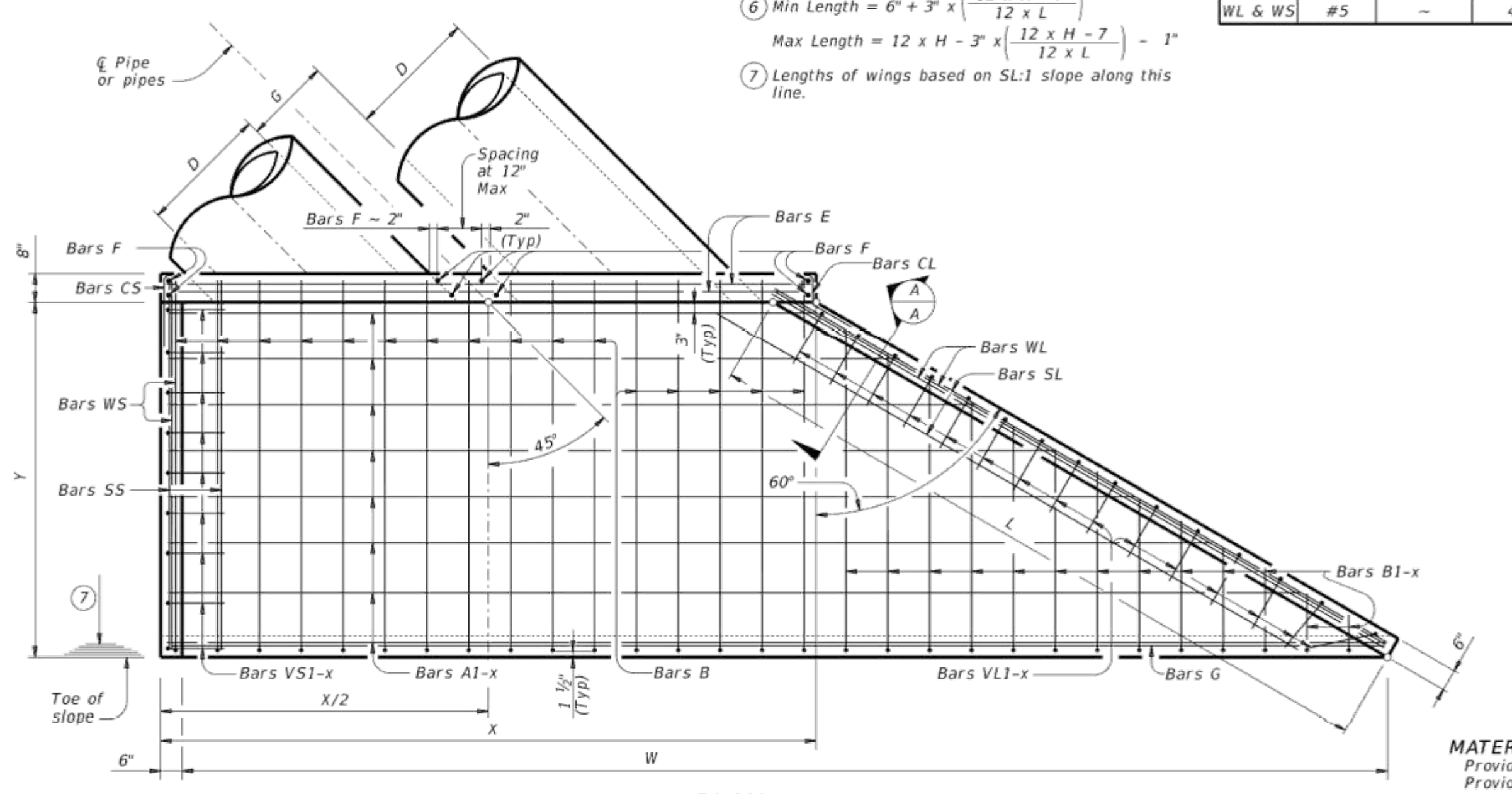
TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL ⑤

Slope	Dia of Pipe (D)	Values for One Pipe						Values to be Added for Each Addt'l Pipe		
		W	X	Y	L	Reinf (Lbs)	Conc (CY) ①	X and W	Reinf (Lbs)	Conc (CY) ①
2:1	12"	7' - 7 ¾"	4' - 3"	2' - 10"	5' - 8"	119	0.9	2' - 5 ¾"	26	0.3
	15"	8' - 10 ½"	4' - 7 ¼"	3' - 4"	6' - 8"	135	1.1	3' - 0 ¾"	32	0.4
	18"	10' - 1 ¼"	4' - 11 ½"	3' - 10"	7' - 8"	167	1.3	3' - 9 ¼"	48	0.5
	21"	11' - 3 ¾"	5' - 3 ¾"	4' - 4"	8' - 8"	187	1.6	4' - 4 ¼"	54	0.6
	24"	12' - 6 ½"	5' - 8"	4' - 10"	9' - 8"	214	1.8	5' - 0 ¾"	67	0.8
	27"	13' - 9"	6' - 0 ¼"	5' - 4"	10' - 8"	231	2.1	5' - 6 ½"	73	0.9
	30"	14' - 11 ¾"	6' - 4 ½"	5' - 10"	11' - 8"	265	2.5	6' - 1 ½"	86	1.1
	33"	16' - 3"	6' - 9 ½"	6' - 4"	12' - 8"	292	2.8	6' - 7 ¼"	92	1.2
	36"	17' - 6 ¼"	7' - 2 ¼"	6' - 10"	13' - 8"	324	3.2	7' - 2 ¼"	107	1.4
	42"	20' - 1"	8' - 0 ¼"	7' - 10"	15' - 8"	391	4.0	8' - 3"	138	1.8
	48"	23' - 6"	8' - 10 ¼"	9' - 4"	18' - 8"	478	5.4	9' - 3 ¾"	167	2.4
	54"	26' - 0 ¾"	9' - 8"	10' - 4"	20' - 8"	561	6.4	10' - 7 ¼"	198	3.0
	60"	28' - 7 ½"	10' - 6"	11' - 4"	22' - 8"	632	7.5	11' - 8"	243	3.6
	66"	31' - 2 ¼"	11' - 3 ¾"	12' - 4"	24' - 8"	724	8.8	12' - 4 ½"	269	4.0
	72"	33' - 8 ¾"	12' - 1 ¾"	13' - 4"	26' - 8"	803	10.1	13' - 2 ½"	303	4.6
3:1	12"	10' - 1 ¼"	4' - 3"	4' - 3"	8' - 6"	158	1.3	2' - 5 ¾"	28	0.3
	15"	11' - 9 ¼"	4' - 7 ¼"	5' - 0"	10' - 0"	188	1.6	3' - 0 ¾"	37	0.5
	18"	13' - 5"	4' - 11 ½"	5' - 9"	11' - 6"	229	2.0	3' - 9 ¼"	55	0.6
	21"	15' - 0 ¾"	5' - 3 ¾"	6' - 6"	13' - 0"	260	2.4	4' - 4 ¼"	62	0.8
	24"	16' - 8 ¾"	5' - 8"	7' - 3"	14' - 6"	297	2.8	5' - 0 ¾"	77	1.0
	27"	18' - 4 ½"	6' - 0 ¼"	8' - 0"	16' - 0"	335	3.3	5' - 6 ½"	88	1.2
	30"	20' - 0 ¼"	6' - 4 ½"	8' - 9"	17' - 6"	383	3.9	6' - 1 ½"	103	1.4
	33"	21' - 8 ¾"	6' - 9 ½"	9' - 6"	19' - 0"	421	4.4	6' - 7 ¼"	111	1.6
	36"	23' - 5 ½"	7' - 2 ¼"	10' - 3"	20' - 6"	470	5.1	7' - 2 ¼"	126	1.9
	42"	26' - 10 ½"	8' - 0 ¼"	11' - 0"	23' - 6"	579	6.4	8' - 3"	168	2.4
	48"	31' - 7 ¼"	8' - 10 ¼"	14' - 9"	28' - 0"	722	8.7	9' - 3 ¾"	210	3.2
	54"	35' - 0 ¼"	9' - 8"	15' - 6"	31' - 0"	842	10.5	10' - 7 ¼"	249	4.0
	60"	38' - 5 ¼"	10' - 6"	17' - 0"	34' - 0"	966	12.4	11' - 8"	306	4.8
	66"	41' - 10 ¼"	11' - 3 ¾"	18' - 6"	37' - 0"	1,106	14.5	12' - 4 ½"	338	5.5
4:1	12"	12' - 6 ¾"	4' - 3"	5' - 8"	11' - 4"	207	1.7	2' - 5 ¾"	32	0.4
	15"	14' - 7 ¾"	4' - 7 ¼"	6' - 8"	13' - 4"	246	2.2	3' - 0 ¾"	43	0.6
	18"	16' - 8 ¾"	4' - 11 ½"	7' - 8"	15' - 4"	300	2.8	3' - 9 ¼"	61	0.8
	21"	18' - 9 ¾"	5' - 3 ¾"	8' - 8"	17' - 4"	349	3.4	4' - 4 ¼"	73	1.0
	24"	20' - 10 ¾"	5' - 8"	9' - 8"	19' - 4"	400	4.0	5' - 0 ¾"	90	1.3
	27"	23' - 0"	6' - 0 ¼"	10' - 8"	21' - 4"	451	4.8	5' - 6 ½"	103	1.5
	30"	25' - 1"	6' - 4 ½"	11' - 8"	23' - 4"	516	5.5	6' - 1 ½"	120	1.8
	33"	27' - 2 ¾"	6' - 9 ½"	12' - 8"	25' - 4"	580	6.4	6' - 7 ¼"	134	2.0
	36"	29' - 4 ½"	7' - 2 ¼"	13' - 8"	27' - 4"	639	7.3	7' - 2 ¼"	152	2.4
	42"	33' - 8"	8' - 0 ¼"	15' - 8"	31' - 4"	789	9.4	8' - 3"	198	3.0
	48"	39' - 8"	8' - 10 ¼"	18' - 8"	37' - 4"	1,001	12.8	9' - 3 ¾"	255	4.0
6:1	12"	17' - 5 ¾"	4' - 3"	8' - 6"	17' - 0"	299	2.9	2' - 5 ¾"	38	0.5
	15"	20' - 5"	4' - 7 ¼"	10' - 0"	20' - 0"	371	3.7	3' - 0 ¾"	51	0.8
	18"	23' - 4 ½"	4' - 11 ½"	11' - 6"	23' - 0"	449	4.7	3' - 9 ¼"	73	1.0
	21"	26' - 4"	5' - 3 ¾"	13' - 0"	26' - 0"	537	5.8	4' - 4 ¼"	89	1.3
	24"	29' - 3 ¼"	5' - 8"	14' - 6"	29' - 0"	611	7.0	5' - 0 ¾"	110	1.7
	27"	32' - 2 ¾"	6' - 0 ¼"	16' - 0"	32' - 0"	708	8.3	5' - 6 ½"	129	2.0
	30"	35' - 2 ¼"	6' - 4 ½"	17' - 6"	35' - 0"	807	9.7	6' - 1 ½"	150	2.4
	33"	38' - 2 ¼"	6' - 9 ½"	19' - 0"	38' - 0"	921	11.3	6' - 7 ¼"	170	2.8



ELEVATION
(Showing dimensions.)


℄ Pipe or pipes
Spacing at 12" Max
Bars E
Bars F
Bars CL
Bars CS
Bars WL
Bars SL
Bars WS
Bars SS
Bars VS1-x
Bars A1-x
Bars B
Bars VL1-x
Bars G
Bars B1-x
Toe of slope
X/2
X
W
Y
45°
60°
3" (Typ)
6"

PLAN

① Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

② For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

③ Provide a 1'-0" footing as shown where required to maintain 4" minimum cover for pipes.

④ Dimensions shown are usual and maximum.

⑤ Quantities shown are for one structure end only (one headwall).

⑥ Min Length = 6" + 3" x $\left(\frac{12 \times H - 7}{12 \times L}\right)$

Max Length = 12 x H - 3" x $\left(\frac{12 \times H - 7}{12 \times L}\right)$ - 1"

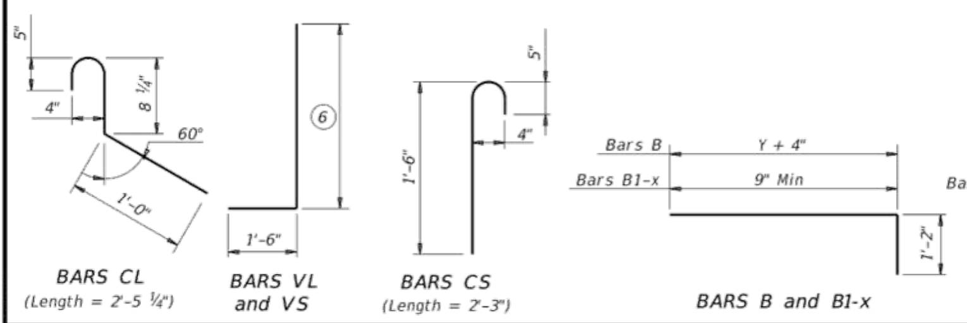
⑦ Lengths of wings based on SL:1 slope along this line.

TABLE OF REINFORCING STEEL ⑤

Bar	Size	Spa	No.
A	#4	1' - 0"	~
B	#3	1' - 6"	~
CL & CS	#4	1' - 0"	~
D	#3	1' - 0"	~
E	#5	~	4
F	#5	~	~
G	#3	~	2
SL & SS	#4	~	6
VL & VS	#4	1' - 0"	~
WL & WS	#5	~	4

TABLE OF CONSTANT DIMENSIONS

Dia of Pipe (D)	G	K ④	H
12"	0' - 9"	1' - 0"	2' - 0"
15"	0' - 11"	1' - 0"	2' - 3"
18"	1' - 2"	1' - 0"	2' - 6"
21"	1' - 4"	1' - 0"	2' - 9"
24"	1' - 7"	1' - 0"	3' - 0"
27"	1' - 8"	1' - 0"	3' - 3"
30"	1' - 10"	1' - 0"	3' - 6"
33"	1' - 11"	1' - 0"	3' - 9"
36"	2' - 1"	1' - 0"	4' - 0"
42"	2' - 4"	1' - 0"	4' - 6"
48"	2' - 7"	1' - 3"	5' - 3"
54"	3' - 0"	1' - 3"	5' - 9"
60"	3' - 3"	1' - 3"	6' - 3"
66"	3' - 3"	1' - 3"	6' - 9"
72"	3' - 4"	1' - 3"	7' - 3"

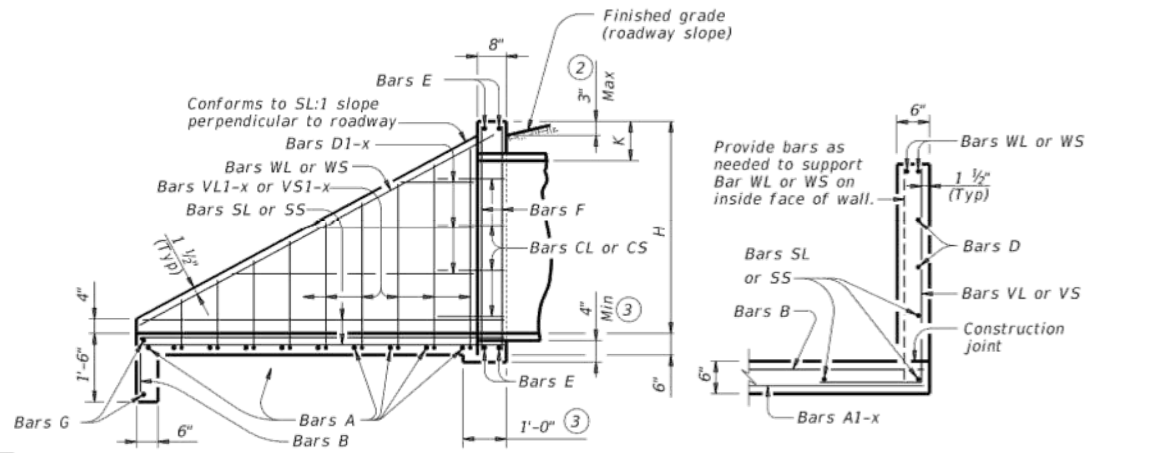

5"
4"
8 ¼"
60°
1'-0"
⑥
1'-6"
5"
4"
1'-6"
Bars B
Y + 4"
Bars B1-x
9" Min
2"

BARS CL (Length = 2'-5 ½")

BARS VL and VS

BARS CS (Length = 2'-3")

BARS B and B1-x


Finished grade (roadway slope)
Conforms to SL:1 slope perpendicular to roadway
Bars E
Bars D1-x
Bars WL or WS
Bars VL1-x or VS1-x
Bars SL or SS
Bars F
Bars CL or CS
Bars G
Bars A
Bars B
Provide bars as needed to support Bar WL or WS on inside face of wall.
Bars WL or WS
Bars D
Bars VL or VS
Bars SL or SS
Bars B
Construction joint
Bars A1-x
Bars E
6"
3" Max

TYPICAL WING ELEVATION

SECTION A-A

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide Class C concrete (f'c = 3,600 psi).

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Do not mount bridge rails of any type directly to these culvert headwalls.
This standard may not be used for wall heights, H, exceeding the values shown.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing dimensions are out-to-out of bars.

Texas Department of Transportation | Bridge Division Standard

CONCRETE HEADWALLS
WITH FLARED WINGS FOR
45° SKEW PIPE CULVERTS

CH-FW-45

FILE: CD-CH-FW45-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.

DATE:
FILE:

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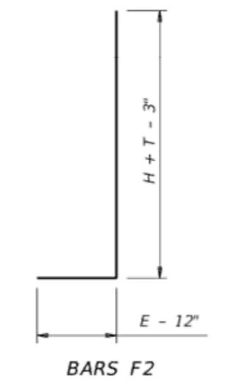
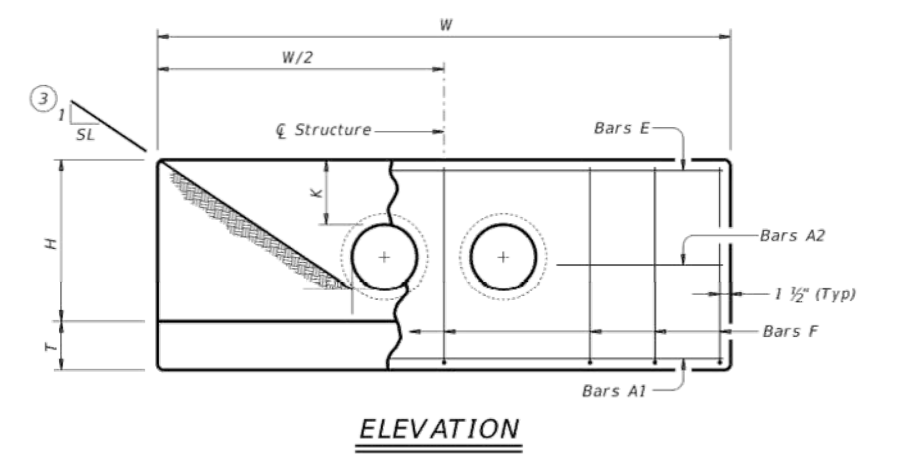
TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL ⑤

Slope	Dia of Pipe (D)	Values for One Pipe			Values To Be Added for Each Addt'l Pipe		
		W	Reinf (Lbs) ①	Conc (CY) ②	W	Reinf (Lbs) ①	Conc (CY) ②
2:1	12"	9' - 0"	122	1.1	1' - 9"	15	0.2
	15"	10' - 3"	136	1.3	2' - 2"	16	0.2
	18"	11' - 6"	163	1.5	2' - 8"	19	0.3
	21"	12' - 9"	200	1.8	3' - 1"	31	0.4
	24"	14' - 0"	217	2.1	3' - 7"	34	0.4
	27"	15' - 3"	254	2.4	3' - 11"	37	0.5
	30"	16' - 6"	272	2.7	4' - 4"	40	0.6
	33"	17' - 9"	314	3.1	4' - 8"	43	0.6
	36"	19' - 0"	371	3.9	5' - 1"	46	0.8
	42"	21' - 6"	442	4.9	5' - 10"	52	1.0
	48"	25' - 0"	569	6.4	6' - 7"	59	1.3
	54"	27' - 6"	701	7.5	7' - 6"	82	1.6
	60"	30' - 0"	794	8.8	8' - 3"	90	1.8
	66"	32' - 6"	894	10.2	8' - 9"	96	2.0
	72"	35' - 0"	1,055	11.7	9' - 4"	103	2.3
3:1	12"	13' - 0"	175	1.6	1' - 9"	14	0.2
	15"	14' - 9"	193	1.9	2' - 2"	17	0.2
	18"	16' - 6"	228	2.2	2' - 8"	19	0.3
	21"	18' - 3"	299	2.6	3' - 1"	31	0.4
	24"	20' - 0"	323	3.0	3' - 7"	33	0.4
	27"	21' - 9"	371	3.5	3' - 11"	37	0.5
	30"	23' - 6"	415	4.0	4' - 4"	40	0.5
	33"	25' - 3"	469	4.6	4' - 8"	43	0.6
	36"	27' - 0"	556	5.7	5' - 1"	46	0.8
	42"	30' - 6"	675	7.1	5' - 10"	52	1.0
	48"	35' - 6"	837	9.2	6' - 7"	59	1.3
	54"	39' - 0"	1,015	11.0	7' - 6"	84	1.6
	60"	42' - 6"	1,171	12.9	8' - 3"	91	1.8
	66"	46' - 0"	1,298	14.9	8' - 9"	98	2.0
	72"	49' - 6"	1,561	17.1	9' - 4"	103	2.3
4:1	12"	17' - 0"	229	2.0	1' - 9"	15	0.2
	15"	19' - 3"	266	2.4	2' - 2"	17	0.2
	18"	21' - 6"	308	2.9	2' - 8"	19	0.3
	21"	23' - 9"	382	3.5	3' - 1"	31	0.3
	24"	26' - 0"	430	3.9	3' - 7"	34	0.4
	27"	28' - 3"	486	4.7	3' - 11"	37	0.5
	30"	30' - 6"	539	5.2	4' - 4"	40	0.6
	33"	32' - 9"	603	6.0	4' - 8"	42	0.6
	36"	35' - 0"	738	7.5	5' - 1"	47	0.8
	42"	39' - 6"	881	9.3	5' - 10"	52	1.0
	48"	46' - 0"	1,102	12.1	6' - 7"	61	1.3
	54"	50' - 6"	1,364	14.4	7' - 6"	84	1.6
	60"	55' - 0"	1,547	16.9	8' - 3"	91	1.8
	66"	59' - 6"	1,741	19.5	8' - 9"	98	2.0
	72"	64' - 0"	2,077	22.4	9' - 4"	102	2.3
6:1	12"	25' - 0"	336	3.0	1' - 9"	14	0.2
	15"	28' - 3"	384	3.6	2' - 2"	17	0.2
	18"	31' - 6"	452	4.2	2' - 8"	19	0.3
	21"	34' - 9"	581	5.1	3' - 1"	31	0.4
	24"	38' - 0"	644	5.8	3' - 7"	34	0.4
	27"	41' - 3"	737	6.9	3' - 11"	37	0.5
	30"	44' - 6"	807	7.7	4' - 4"	39	0.6
	33"	47' - 9"	912	8.9	4' - 8"	44	0.6
	36"	51' - 0"	1,108	11.0	5' - 1"	48	0.8
	42"	57' - 6"	1,318	13.7	5' - 10"	54	1.0
	48"	67' - 0"	1,682	17.9	6' - 7"	59	1.3
	54"	73' - 6"	2,072	21.3	7' - 6"	83	1.6
	60"	80' - 0"	2,351	24.9	8' - 3"	89	1.8
	66"	86' - 6"	2,643	28.9	8' - 9"	96	2.0
	72"	93' - 0"	3,121	33.1	9' - 4"	101	2.3

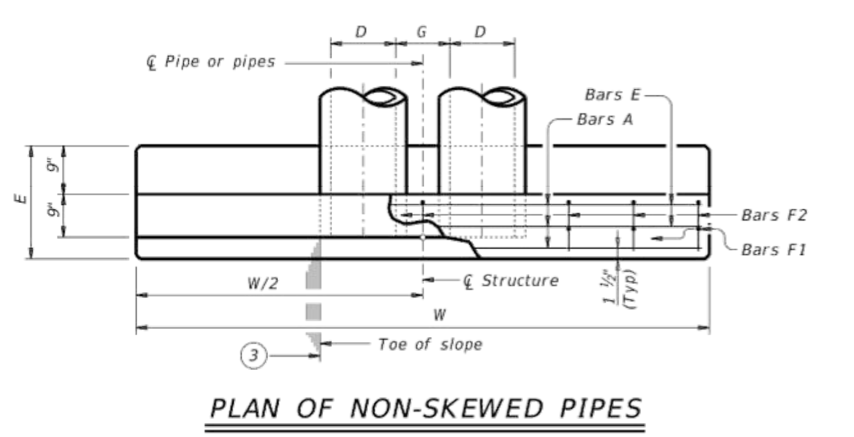
DATE:
FILE:



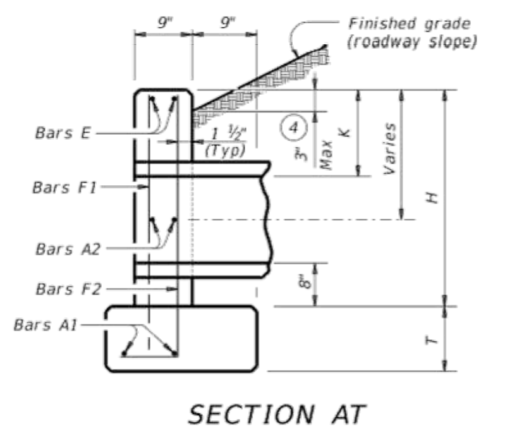
BARS F2


W
W/2
③
SL
1
℄ Structure
Bars E
Bars A2
1 ½" (Typ)
Bars F
Bars A1
H
T

ELEVATION


D
G
D
℄ Pipe or pipes
Bars E
Bars A
Bars F2
Bars F1
W/2
℄ Structure
③
Toe of slope
1 ½" (Typ)
E
K

PLAN OF NON-SKEWED PIPES


9"
9"
Finished grade (roadway slope)
④
1 ½" (Typ)
3" Max
Bars E
Bars F1
Bars A2
Bars F2
Bars A1
H
Varies
T
6"

SECTION AT CENTER OF PIPE

① Total quantities include one 3'-1" lap for bars over 60' in length.

② Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

③ Indicated slope is perpendicular to centerline pipe or pipes.

④ For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

⑤ Dimensions shown are usual and maximum.

⑥ Quantities shown are for one structure end only (one headwall).

TABLE OF CONSTANT DIMENSIONS

Dia of Pipe (D)	G	K ⑤	H	T	E
12"	0' - 9"	1' - 0"	2' - 8"	0' - 9"	1' - 9"
15"	0' - 11"	1' - 0"	2' - 11"	0' - 9"	1' - 9"
18"	1' - 2"	1' - 0"	3' - 2"	0' - 9"	1' - 9"
21"	1' - 4"	1' - 0"	3' - 5"	0' - 9"	2' - 0"
24"	1' - 7"	1' - 0"	3' - 8"	0' - 9"	2' - 0"
27"	1' - 8"	1' - 0"	3' - 11"	0' - 9"	2' - 3"
30"	1' - 10"	1' - 0"	4' - 2"	0' - 9"	2' - 3"
33"	1' - 11"	1' - 0"	4' - 5"	0' - 9"	2' - 6"
36"	2' - 1"	1' - 0"	4' - 8"	1' - 0"	2' - 6"
42"	2' - 4"	1' - 0"	5' - 2"	1' - 0"	2' - 9"
48"	2' - 7"	1' - 3"	5' - 11"	1' - 0"	3' - 0"
54"	3' - 0"	1' - 3"	6' - 5"	1' - 0"	3' - 3"
60"	3' - 3"	1' - 3"	6' - 11"	1' - 0"	3' - 6"
66"	3' - 3"	1' - 3"	7' - 5"	1' - 0"	3' - 9"
72"	3' - 4"	1' - 3"	7' - 11"	1' - 0"	4' - 0"

TABLE OF REINFORCING STEEL ⑥

Bar	Size	Spa	No.
A1	#5	~	2
A2	#5	1' - 6"	~
E	#5	~	2
F	#5	1' - 0"	~

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide Class C concrete (f'c = 3,600 psi).

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Do not mount bridge rails of any type directly to these culvert headwalls.
This standard may not be used for wall heights, H, exceeding the values shown.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing dimensions are out-to-out of bars.

Texas Department of Transportation | Bridge Division Standard

CONCRETE HEADWALLS
WITH PARALLEL WINGS FOR
NON-SKEWED PIPE CULVERTS

CH-PW-0

FILE: CD-CH-PW0-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.

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TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

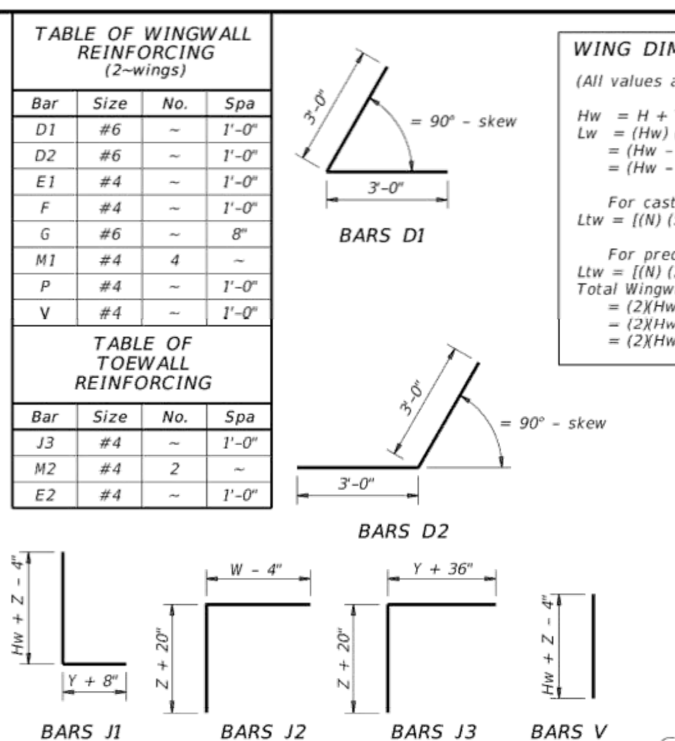
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2~wings) ④		Estimated Quantities per ft of Toewall (1~toewall)	
					Bars J1		Bars J2					
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	48.64	0.406	6.85	0.071
2'-9"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.31	0.424	6.85	0.071
3'-0"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.98	0.444	6.85	0.071
3'-3"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.32	0.462	6.85	0.071
3'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.98	0.480	6.85	0.071
4'-0"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	55.77	0.532	6.85	0.071
4'-6"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	59.77	0.568	6.85	0.071
5'-0"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	63.45	0.632	6.96	0.075
5'-6"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	67.46	0.668	6.96	0.075
6'-0"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	80.67	0.730	7.07	0.078
6'-6"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	85.05	0.768	7.07	0.078
7'-0"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	92.15	0.864	8.07	0.093
7'-6"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	96.54	0.902	8.07	0.093
8'-0"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	139.04	0.962	8.13	0.095
8'-6"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	144.47	1.000	8.13	0.095
9'-6"	6'-0"	2'-10"	2'-2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'-6"	6'-5"	3'-0"	2'-5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117
11'-6"	7'-2"	3'-6"	2'-8"	11"	#6	6"	#6	6"	230.13	1.438	9.52	0.140
12'-6"	7'-8"	3'-9"	2'-11"	1'-0"	#7	6"	#6	6"	283.41	1.592	9.74	0.157
13'-6"	8'-2"	4'-0"	3'-2"	1'-2"	#8	6"	#6	6"	348.72	1.804	10.02	0.186
14'-6"	8'-10"	4'-5"	3'-5"	1'-4"	#9	6"	#6	6"	432.94	2.046	10.30	0.218
15'-6"	9'-6"	4'-10"	3'-8"	1'-6"	#9	6"	#7	6"	489.52	2.302	11.24	0.253
16'-0"	9'-11"	5'-0"	3'-11"	1'-7"	#9	6"	#7	6"	505.72	2.448	11.47	0.279

TABLE OF WINGWALL REINFORCING
(2~wings)

Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

Bar	Size	No.	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"


3'-0"
= 90° - skew
3'-0"
3'-0"
= 90° - skew
3'-0"
Hw + Z - 4"
Y + 8"
W - 4"
Z + 20"
Y + 36"
Z + 20"
Hw + Z - 4"

BARS D1

BARS D2

BARS J1

BARS J2

BARS J3

BARS V

WING DIMENSION FORMULAS:

(All values are in feet.)

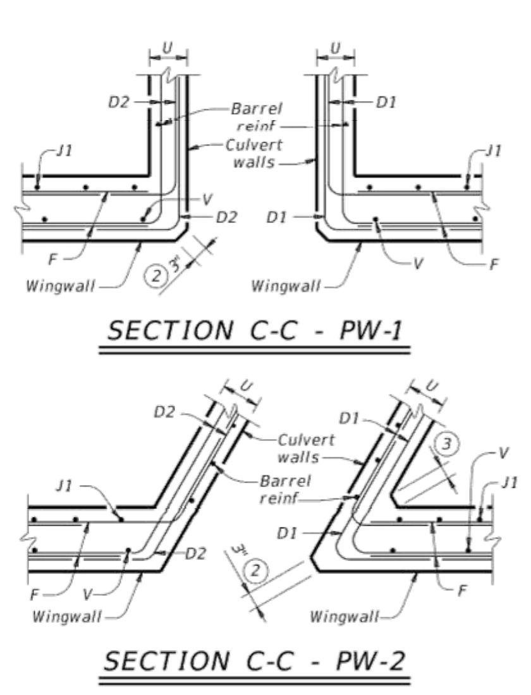
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW-1
= (Hw - 1') (SL) ÷ cosine (θ) for Type PW-2 and Hw ≥ 4'
= (Hw - 0.5') (SL) ÷ cosine (θ) for Type PW-2 and Hw < 4'

For cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

For precast culverts:
Ltw = [(N) (2 U + S) + (N - 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW-1
= (2)(Hw)(Lw) - 6 SF for Type PW-2 and Hw ≥ 4'
= (2)(Hw)(Lw) - 1.5 SF for Type PW-2 and Hw < 4'

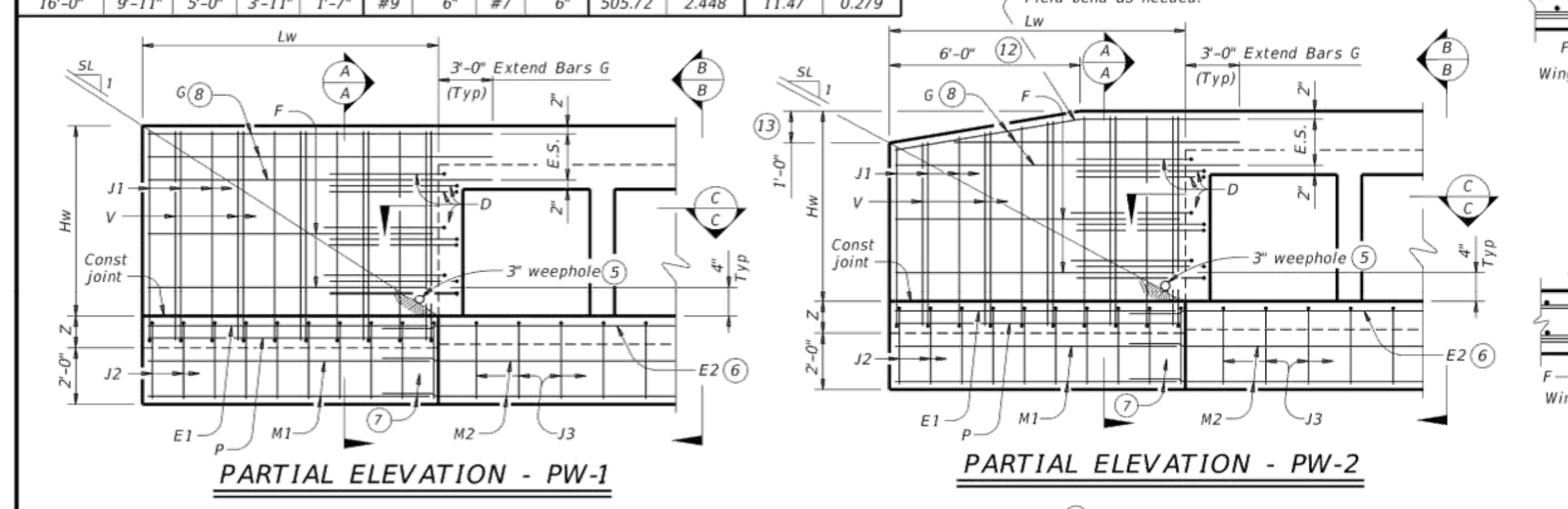
Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
SL:1 = Channel slope ratio. (horizontal: 1 vertical, usual value is 2:1)
θ = Culvert skew

See applicable box culvert standard sheet for S, H, T, and U values.


U
U
D2
D1
Barrel reinf
Culvert walls
J1
J1
V
F
Wingwall
Wingwall
D2
D1
Culvert walls
Barrel reinf
③
V
J1
Wingwall
F

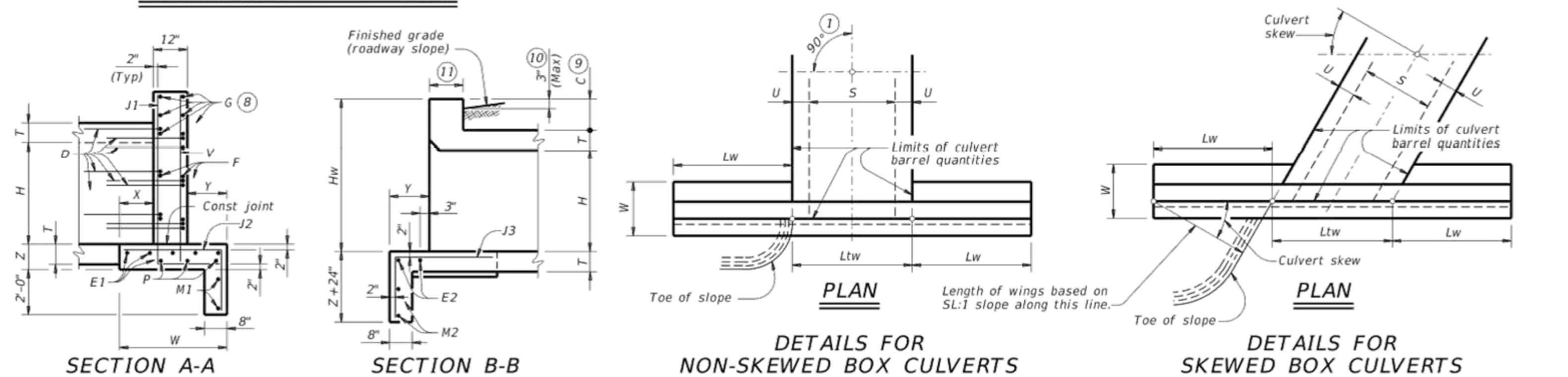
SECTION C-C - PW-1

SECTION C-C - PW-2


Lw
3'-0" Extend Bars G (Typ)
SL
1
G ⑧
F
A A
B B
C C
J1
V
Const joint
Hw
D
E.S.
2"
3" weephole ⑤
E2 ⑥
E1
P
M1
J2
⑦
Field bend as needed.
Lw
6'-0" ⑫
⑬
1'-0"
⑪
Typ

PARTIAL ELEVATION - PW-1

PARTIAL ELEVATION - PW-2


12" (Typ)
Finished grade (roadway slope)
⑨
⑩
②
J1
F
G
Const joint
J3
M2
E2
E1
Hw
Lw
U
S
U
Limits of culvert barrel quantities
Ltw
Toe of slope
Lengths of wings based on SL:1 slope along this line.
Culvert skew
Lw
Limits of culvert barrel quantities
Ltw
Culvert skew
Toe of slope

SECTION A-A
(Showing wing reinforcement.)

SECTION B-B
(Showing wing reinforcement.)

PLAN

DETAILS FOR NON-SKEWED BOX CULVERTS

PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

① Skew = 0°

② At discharge end, chamfer may be ¾" minimum.

③ For 15° skew ~ 1"
For 30° skew ~ 2"
For 45° skew ~ 3"

④ Quantities shown are for two Type PW-1 wings. Adjust concrete volume for Type PW-2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.

⑤ Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.

⑥ Extend Bars E2 1'-6" minimum into the wingwall footing.

⑦ Lap Bars M1 1'-6" minimum with Bars M2.

⑧ Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.

⑨ 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

⑩ For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

⑪ 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.

⑫ 3'-0" for Hw < 4'.

⑬ 6" for Hw < 4'.

DESIGNER NOTES:
Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW-2 can only be used for applications without a railing mounted to the wingwall.

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.

GENERAL NOTES:
Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing dimensions are out-to-out of bars.

Texas Department of Transportation | Bridge Division Standard

CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR
BOX CULVERTS
TYPES PW-1 AND PW-2

PW

FILE: CD-PW-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
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REVISIONS	DIST	COUNTY		SHEET NO.

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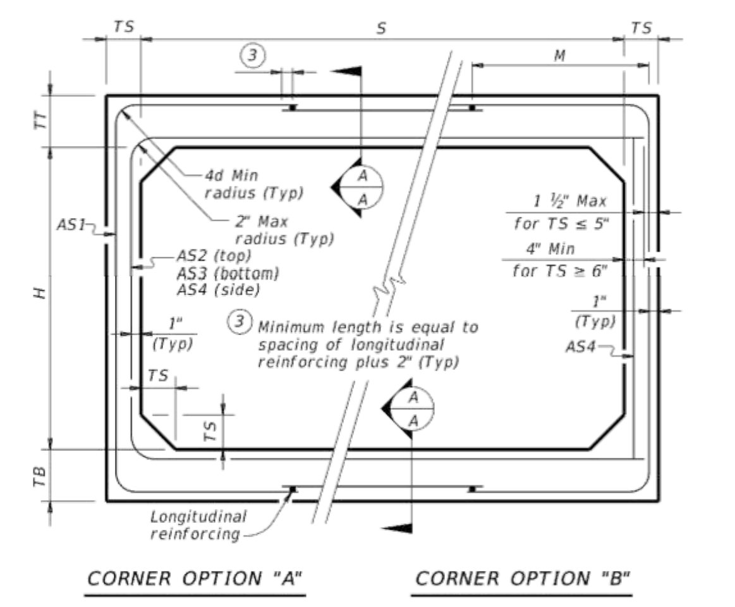
BOX DATA

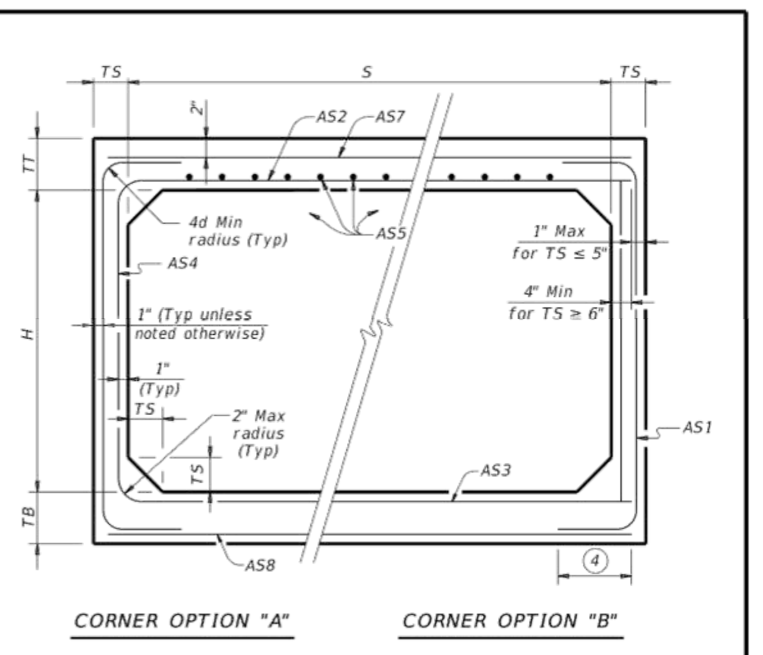
SECTION DIMENSIONS					Fill Height (ft.)	M (Min) (in.)	REINFORCING (sq. in. / ft.) ②							① Lift Weight (tons)
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)			AS1	AS2	AS3	AS4	AS5	AS7	AS8	
4	2	7.5	6	5	< 2	-	0.18	0.27	0.15	0.12	0.18	0.18	0.14	4.5
4	2	5	5	5	2 < 3	38	0.18	0.19	0.17	0.12	-	-	-	3.6
4	2	5	5	5	3 - 5	38	0.13	0.13	0.13	0.12	-	-	-	3.6
4	2	5	5	5	10	38	0.12	0.12	0.12	0.12	-	-	-	3.6
4	2	5	5	5	15	38	0.14	0.16	0.16	0.12	-	-	-	3.6
4	2	5	5	5	20	38	0.18	0.20	0.21	0.12	-	-	-	3.6
4	2	5	5	5	25	38	0.23	0.25	0.25	0.12	-	-	-	3.6
4	2	5	5	5	30	38	0.28	0.30	0.30	0.12	-	-	-	3.6
4	3	7.5	6	5	< 2	-	0.18	0.31	0.18	0.12	0.18	0.18	0.14	5.0
4	3	5	5	5	2 < 3	38	0.15	0.23	0.20	0.12	-	-	-	4.1
4	3	5	5	5	3 - 5	38	0.12	0.16	0.16	0.12	-	-	-	4.1
4	3	5	5	5	10	38	0.12	0.14	0.14	0.12	-	-	-	4.1
4	3	5	5	5	15	38	0.12	0.18	0.18	0.12	-	-	-	4.1
4	3	5	5	5	20	38	0.14	0.23	0.24	0.12	-	-	-	4.1
4	3	5	5	5	25	38	0.17	0.29	0.29	0.12	-	-	-	4.1
4	3	5	5	5	30	38	0.21	0.35	0.35	0.12	-	-	-	4.1
4	4	7.5	6	5	< 2	-	0.18	0.33	0.20	0.12	0.18	0.18	0.14	5.5
4	4	5	5	5	2 < 3	38	0.12	0.26	0.23	0.12	-	-	-	4.6
4	4	5	5	5	3 - 5	38	0.12	0.18	0.18	0.12	-	-	-	4.6
4	4	5	5	5	10	38	0.12	0.15	0.15	0.12	-	-	-	4.6
4	4	5	5	5	15	38	0.12	0.19	0.20	0.12	-	-	-	4.6
4	4	5	5	5	20	38	0.12	0.25	0.25	0.12	-	-	-	4.6
4	4	5	5	5	25	38	0.14	0.31	0.31	0.12	-	-	-	4.6
4	4	5	5	5	30	38	0.17	0.37	0.37	0.12	-	-	-	4.6


TS
S
TS
③
M
TT
H
TB
AS3
4d Min radius (Typ)
2" Max radius (Typ)
AS2 (top)
AS3 (bottom)
AS4 (side)
1" (Typ)
1 ½" Max for TS ≤ 5"
4" Min for TS > 6"
1" (Typ)
AS4
Minimum length is equal to spacing of longitudinal reinforcing plus 2" (Typ)
④
A A
Longitudinal reinforcement
AS1

CORNER OPTION "A"

CORNER OPTION "B"

FILL HEIGHT 2 FT AND GREATER

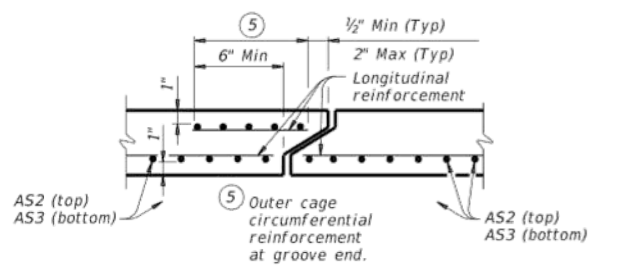

TS
S
TS
AS2
AS7
AS5
AS4
4d Min radius (Typ)
1" (Typ unless noted otherwise)
1" (Typ)
2" Max radius (Typ)
1" Max for TS ≤ 5"
4" Min for TS > 6"
AS3
AS1
AS8
TT
H
TB

CORNER OPTION "A"

CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

④ Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)


⑤
½" Min (Typ)
6" Min
2" Max (Typ)
Longitudinal reinforcement
AS2 (top)
AS3 (bottom)
⑤ Outer cage circumferential reinforcement at groove end.
AS2 (top)
AS3 (bottom)

SECTION A-A
(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:
Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.
Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:
Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.
See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.
In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)."

HL93 LOADING

Texas Department of Transportation | Bridge Division Standard

SINGLE BOX CULVERTS
PRECAST
4'-0" SPAN

SCP-4

FILE: CD-SCP04-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.

① For box length = 8'-0"

② AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.

DATE:
FILE:

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EST. 1980
CUDE
ENGINEERS

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

HEADWALL & BOX CULVERT DRAINAGE DETAILS

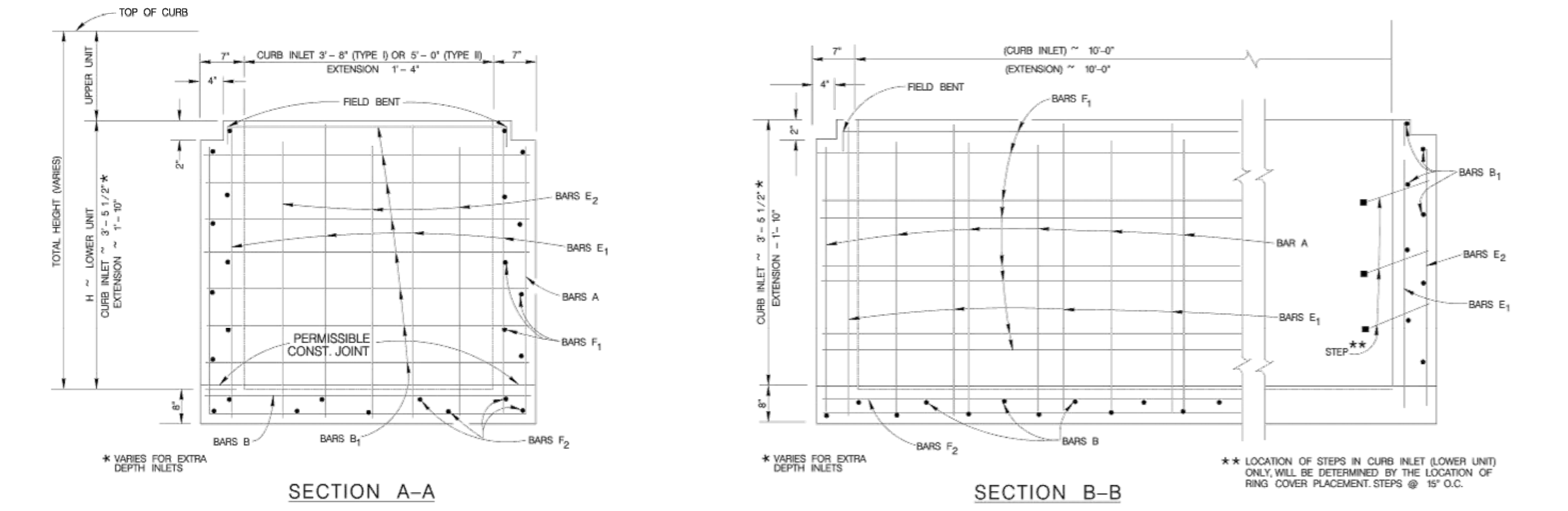
DATE
04/16/2026
PROJECT NO.
04024-018
DRAWN BY
C7
CHECKED BY
JL/TM

REVISIONS
1.
2.
3.
4.
5.
6.
7.
8.

CUDE ENGINEERS
TBPELS No. 10048500

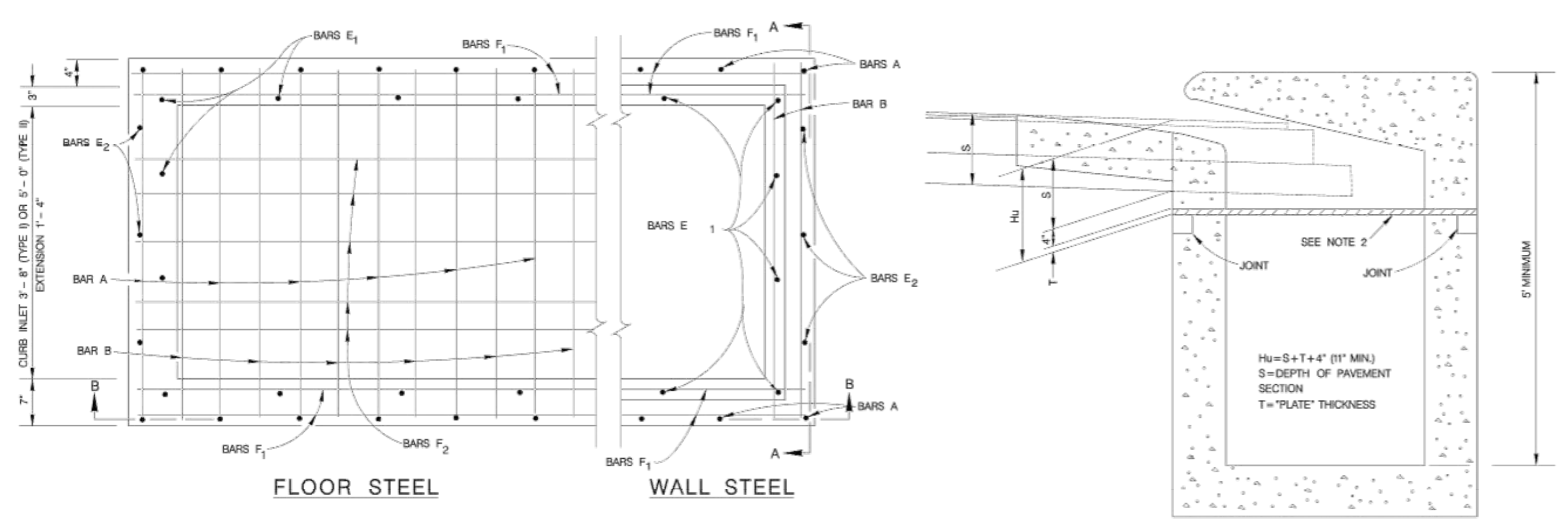
C6.D2

R:\04024\018\2-DWG\4-Plans\C6.D2 DRDP.dwg 2026/04/16 8:40am sgonzales


TOP OF CURB
CURB INLET 3'-8" (TYPE I) OR 5'-0" (TYPE II)
EXTENSION 1'-4"
FIELD BENT
BARS E2
BARS E1
BARS A
BARS F1
BARS F2
BARS B
BARS B1
PERMISSIBLE CONST. JOINT
STEP
★ VARIES FOR EXTRA DEPTH INLETS
★★ LOCATION OF STEPS IN CURB INLET (LOWER UNIT) ONLY WILL BE DETERMINED BY THE LOCATION OF RING COVER PLACEMENT. STEPS @ 15" O.C.

SECTION A–A

SECTION B–B


BARS E1
BARS E2
BARS F1
BARS F2
BAR A
BAR B
BARS A
BARS B
BARS E
SEE NOTE 2
JOINT
Hu = 8 + T + 4" (11" MIN.)
S = DEPTH OF PAVEMENT SECTION
T = "PLATE" THICKNESS
5' MINIMUM

FLOOR STEEL

WALL STEEL

PLAN

PHASE CONSTRUCTION

NOTES FOR PHASE CONSTRUCTION (WHEN DIRECTED BY THE ENGINEER):

1. THE CURB INLET AND EXTENSION SHALL BE CONSTRUCTED TO A DEPTH "Hu" BELOW THE INLET AND EXTENSION GUTTER LINE ELEVATION.
2. CAP THE CURB INLET AND EXTENSION WITH A STEEL PLATE APPROVED BY THE ENGINEER AND CONSTRUCT THE ROADWAY OVER THE PLATE.
3. AFTER THE ROADWAY IS COMPLETED, BUT PRIOR TO THE FINAL HMAC OVERLAY, SAW CUT THE PAVEMENT, REMOVE THE PLATE AND COMPLETE THE UPPER PORTION OF THE CURB INLET AND /OR EXTENSION.

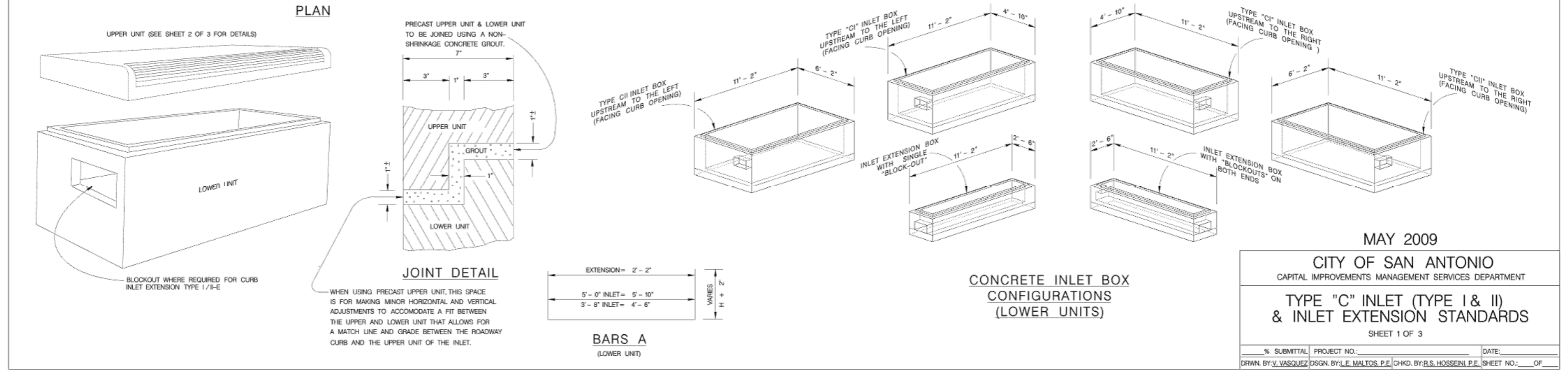
REINFORCING STEEL

LOWER UNIT 10' X 3' – 8" (TYPE I)				
BAR	NO.	SIZE	SPAC.	LENGTH
A	12	#4	12"	VARIES
B	11	#4	12"	4'-6"
B_1	VARIES	#4	12"	4'-6"
E_1	20	#4	18"±	VARIES
E_2	6	#4	18"±	VARIES
F_1	VARIES	#4	12"±	10'-10"
F_2	9	#4	—	10'-10"

LOWER UNIT 10' X 5' – 0" (TYPE II)				
BAR	NO.	SIZE	SPAC.	LENGTH
A	12	#4	12"	VARIES
B	11	#4	12"	5'-10"
B_1	VARIES	#4	12"	5'-10"
E_1	22	#4	18"±	VARIES
E_2	8	#4	18"±	VARIES
F_1	VARIES	#4	12"±	10'-10"
F_2	11	#4	—	10'-10"

GENERAL NOTES

1. 5' INLETS AND 5' EXTENSIONS MUST BE IN ACCORDANCE WITH THE LATEST TXDOT CURB INLET TYPE "C" AND EXTENSION TYPE E (IL-C).
2. TYPE C-II INLET TO BE USED ONLY WHEN STORM DRAIN PIPE IS IN-LINE WITH CURB INLET AND APPROVED BY THE ENGINEER.
3. QUANTITIES SHOWN ARE FOR CONTRACTORS INFORMATION ONLY.
4. CONCRETE FOR STRUCTURES SHALL BE CLASS "A", 3000 PSI IN 28 DAYS.
5. ALL DIMENSIONS RELATING TO REINFORCING STEEL ARE TO CENTER OF BARS.
6. ALL REINFORCING STEEL SHALL HAVE A MINIMUM COVER OF 1 1/2".
7. ALL REINFORCING STEEL SHALL CONFORM TO A.S.T.M. A-615, GRADE 60 REQUIREMENTS.
8. ALL EXPOSED CORNERS SHALL BE CHAMFERED 3 /4".
9. DEPRESSION SLAB SHALL RECEIVE A WOOD FLOAT FINISH.
10. FACE OF INLET TO CONFORM TO FACE OF CURB LINE.
11. ALL BARS INTERCEPTING MANHOLE RING & COVER SHALL BE CUT OR BENT.
12. PAYMENT FOR ALL EXCAVATION. BACK-FILLING. CONCRETE. REINFORCING STEEL. RING AND COVER, CURB ARMOR AND STEPS SHALL BE INCLUDED IN THE UNIT COST OF ITEM 403 "STORM SEWER JUNCTION BOXES AND INLETS".
13. CAST IRON MANHOLE RING AND COVER TO BE PLACED NEXT TO OUTLET PIPE, EXCEPT FOR VERTICAL OUTLET PIPE IN WHICH CASE MANHOLE RING AND COVER WILL BE OFFSET.
14. GALVANIZED BOLTS, NUTS, WASHERS, PLATES AND GASKETS ARE SUBSIDIARY TO INLETS.
15. THE CONTRACTOR SHALL PROVIDE AN ADEQUATE MEANS TO LIFT AND PLACE THE INLETS, WHEN USING PRECAST UNITS.
16. ALL BARS AT PIPE BLOCKOUT LOCATIONS SHALL BE CUT OR BEND.
17. ALL LOWER UNITS SHALL RECEIVE INVERT MORTAR SHAPING.
18. PIPE BLOCKOUTS IN INLET WALLS SHOULD NOT EXCEED 3" BEYOND THE OUTER SHELL OF THE PIPE, TAKING INTO ACCOUNT THE SKEW OF THE PIPE AS NECESSARY. CONSTRUCTION JOINT MAY BE RAISED A MAXIMUM OF 6".


UPPER UNIT (SEE SHEET 2 OF 3 FOR DETAILS)
LOWER UNIT
BLOCKOUT WHERE REQUIRED FOR CURB INLET EXTENSION TYPE I N-E
PRECAST UPPER UNIT & LOWER UNIT TO BE JOINTED USING A NON-SHRINKAGE CONCRETE GROUT.
GROUT
EXTENSION = 2' - 2"
5' - 0" INLET = 5' - 10"
3' - 8" INLET = 4' - 6"
VARIES
TYPE "CI" INLET BOX UPSTREAM TO THE LEFT (FACING CURB OPENING)
TYPE "CI" INLET BOX UPSTREAM TO THE RIGHT (FACING CURB OPENING)
INLET EXTENSION BOX WITH SINGLE "BLOCK-OUT"
INLET EXTENSION BOX WITH "BLOCK-OUTS" ON BOTH ENDS
11' - 2"
6' - 10"
4' - 10"

PLAN

JOINT DETAIL

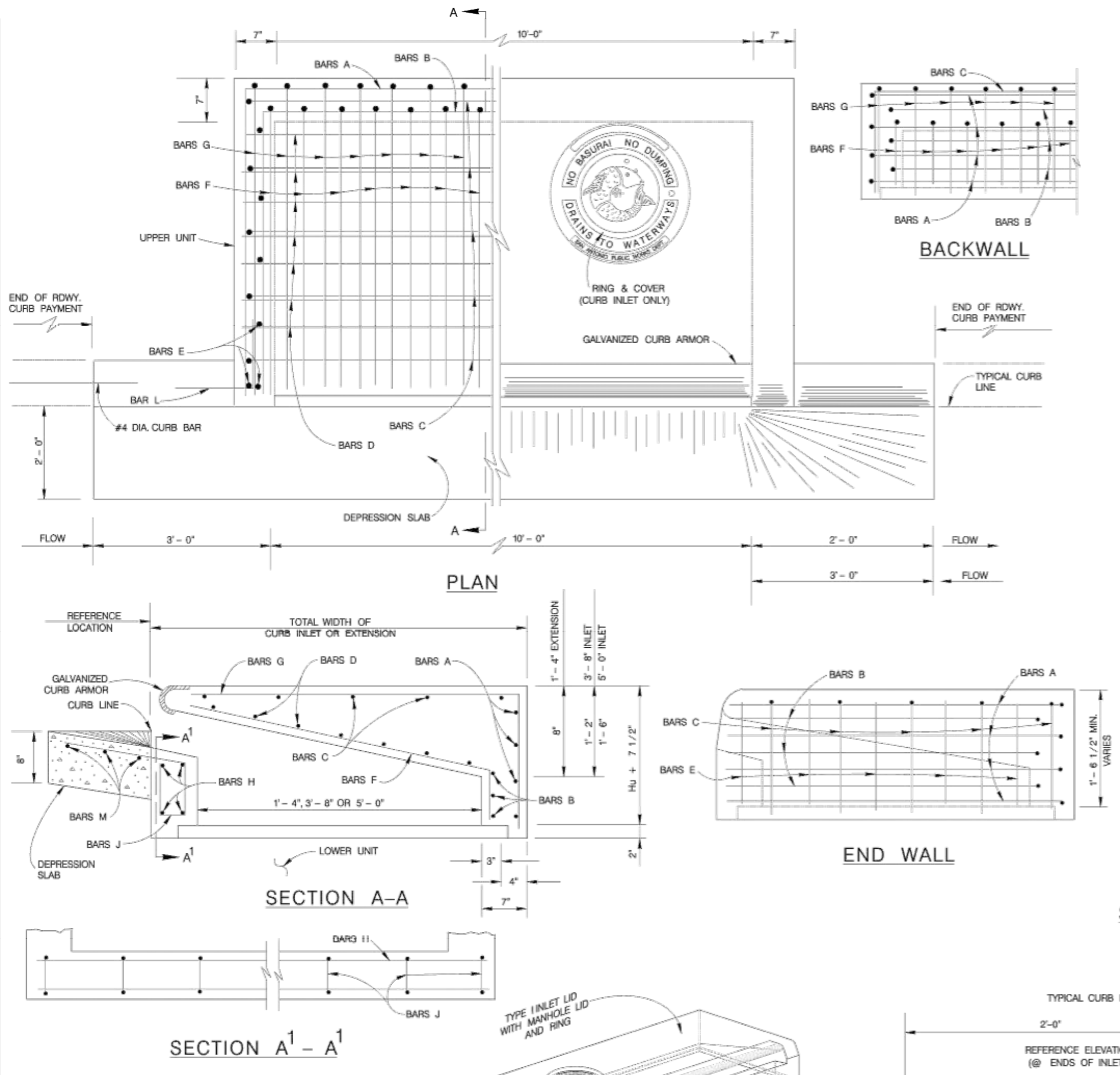
WHEN USING PRECAST UPPER UNIT, THIS SPACE IS FOR MAKING MINOR HORIZONTAL AND VERTICAL ADJUSTMENTS TO ACCOMMODATE A FIT BETWEEN THE UPPER AND LOWER UNIT THAT ALLOWS FOR A MATCH LINE AND GRADE BETWEEN THE ROADWAY CURB AND THE UPPER UNIT OF THE INLET.

BARS A
(LOWER UNIT)

CONCRETE INLET BOX CONFIGURATIONS
(LOWER UNITS)

MAY 2009
CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT
TYPE "C" INLET (TYPE I & II)
& INLET EXTENSION STANDARDS
SHEET 1 OF 3

____% SUBMITTAL	PROJECT NO.:____		DATE:____
DRWN. BY: V. VASQUEZ	DSGN. BY: L.E. MALTOS, P.E.	CHKD. BY: R.S. HOSSEINI, P.E.	SHEET NO.:____OF____


BARS B
BARS A
BARS G
BARS F
BARS E
BARS C
BARS D
BAR L
UPPER UNIT
END OF ROW/ CURB PAYMENT
#4 DIA CURB BAR
DEPRESSION SLAB
RING & COVER (CURB INLET ONLY)
GALVANIZED CURB ARMOR
FLOW
REFERENCE LOCATION
GALVANIZED CURB ARMOR
CURB LINE
TOTAL WIDTH OF CURB INLET OR EXTENSION
BARS H
BARS M
BARS J
LOWER UNIT
DEPRESSION SLAB
BARS C
BARS E
BARS J

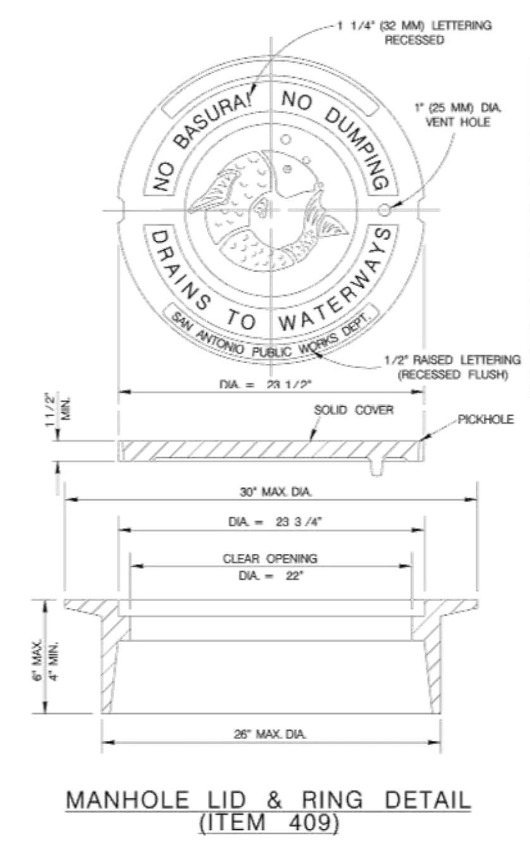
PLAN

BACKWALL

SECTION A–A

END WALL

SECTION A1 – A1


1 1/4" (32 MM) LETTERING RECESSED
1" (25 MM) DIA. VENT HOLE
NO BASURA
NO DUMPING
DRAINS TO WATERWAYS
SAN ANTONIO PUBLIC WORKS DEPT.
1/2" RAISED LETTERING (RECESSED FLUSH)
PICKHOLE
SOLID COVER
30" MAX DIA.
DIA. = 23 3/4"
CLEAR OPENING DIA. = 22"
6" MAX. 4" MIN.
26" MAX. DIA.

MANHOLE LID & RING DETAIL
(ITEM 409)

NOTES FOR MANHOLE LID AND RING

1. FOR LID DESIGN OUTSIDE OF CITY OF SAN ANTONIO, DELETE "SAN ANTONIO PUBLIC WORKS DEPT.".
2. CASTING NUMBER AND MANUFACTURER'S I.D. ON LID AND RING.
3. LOAD BEARING CAPABILITY OF HS-20 MINIMUM.
4. THE LOAD BEARING SURFACES SHALL BE MACHINE GROUND.
5. THE COMBINED WEIGHT OF THE MANHOLE RING AND COVER MUST BE AT LEAST 260 LBS.

SEE SHEET 1 OF 3 FOR GENERAL NOTES.

REINFORCING STEEL (FOR Hu = 11")

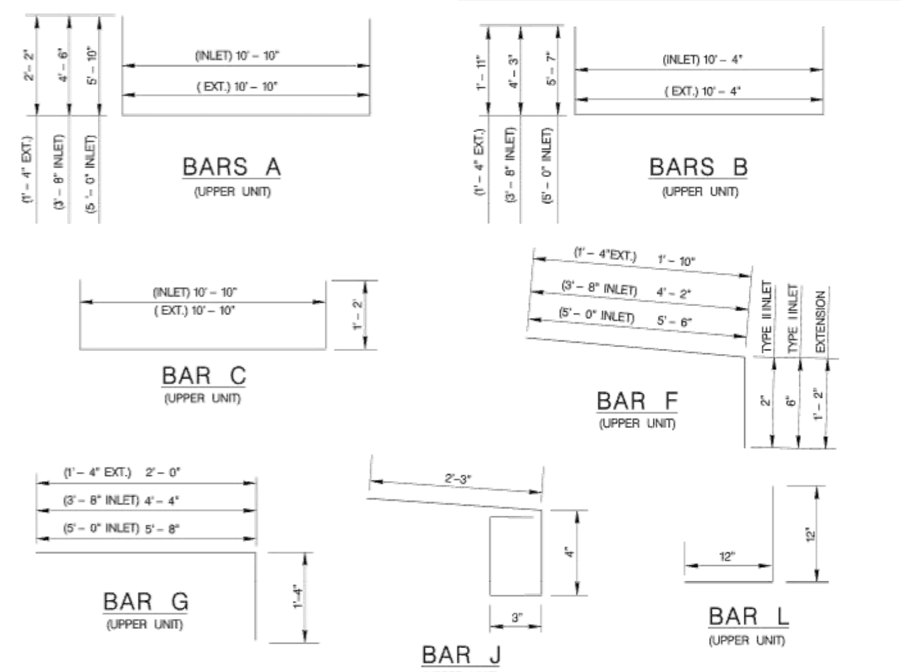
UPPER UNIT 10' X 3'-8" (TYPE I)					
BAR	NO.	SIZE	SPAC.	LENGTH	WEIGHT
A	4	#4	—	19'-10"	53
B	3	#4	—	18'-10"	38
C	5	#4	11"	13'-2"	44
D	7	#4	6"	10'-10"	51
E	12	#4	11"	1'-2"	9
F	21	#6	6"	4'-8"	147
G	22	#6	6"	5'-8"	187
H	4	#4	—	10'-10"	29
J	12	#4	12"	3'-6"	28
L	4	#4	—	2'-0"	5
M	3	#4	—	14'-8"	29
TOTAL WEIGHT					620 LBS.

UPPER UNIT 10' X 5' (TYPE II)					
BAR	NO.	SIZE	SPAC.	LENGTH	WEIGHT
A	4	#4	—	22'-6"	60
B	3	#4	—	21'-6"	43
C	7	#4	11"	13'-2"	62
D	11	#4	6"	10'-10"	80
E	16	#4	11"	1'-2"	13
F	21	#6	6"	5'-8"	179
G	22	#6	6"	7'-0"	231
H	4	#4	—	10'-10"	29
J	12	#4	12"	3'-6"	28
L	4	#4	—	2'-0"	5
M	3	#4	—	14'-8"	29
TOTAL WEIGHT					759 LBS.

CLASS "A" CONCRETE QUANTITIES (FOR Hu = 11")

DEPRESSION SLAB	C.Y.
10' INLET	0.7
10' EXTENSION	0.7

UPPER UNIT (ONLY)		C.Y.
10' X 3'-8"	CURB INLET	1.9
10' X 5'-0"	CURB INLET	2.7
10'	EXTENSION	1.0


2'- 2"
4' - 6"
5' - 10"
(1' - 4" EXT.)
(3' - 8" INLET)
(5' - 0" INLET)
(INLET) 10' - 10"
(EXT.) 10' - 10"
1' - 11"
4' - 3"
5' - 7"
(INLET) 10' - 4"
(EXT.) 10' - 4"
(INLET) 10' - 10"
(EXT.) 10' - 10"
2'-0"
12"

BARS A
(UPPER UNIT)

BARS B
(UPPER UNIT)

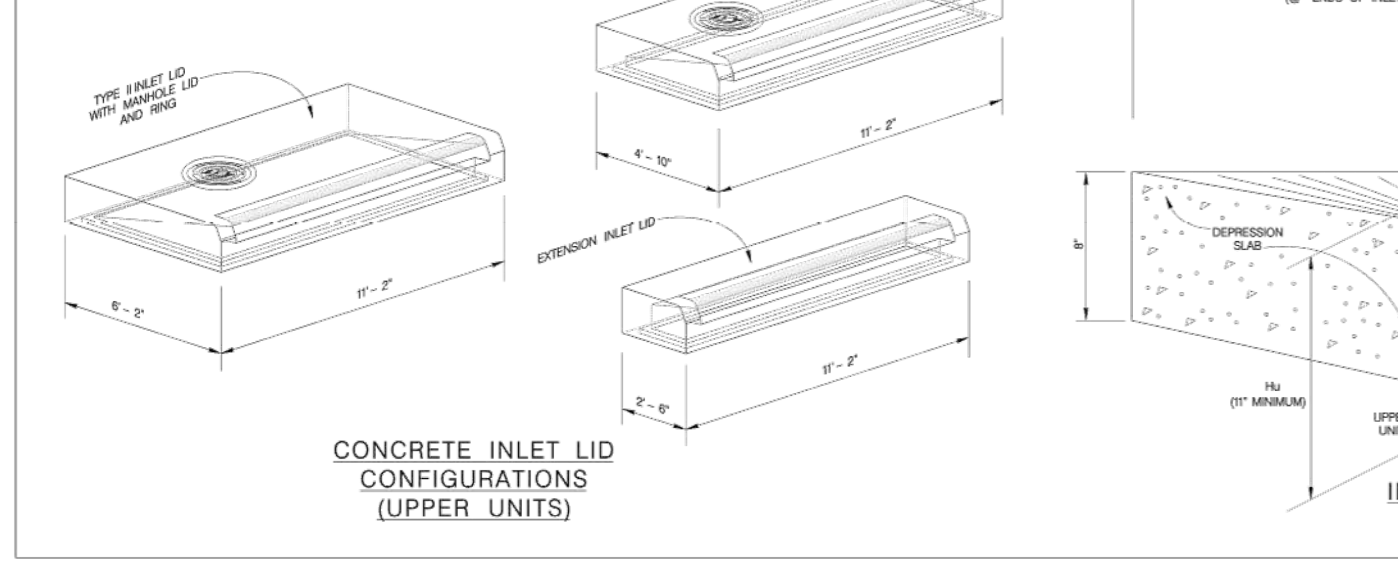
BAR C
(UPPER UNIT)

BAR F
(UPPER UNIT)

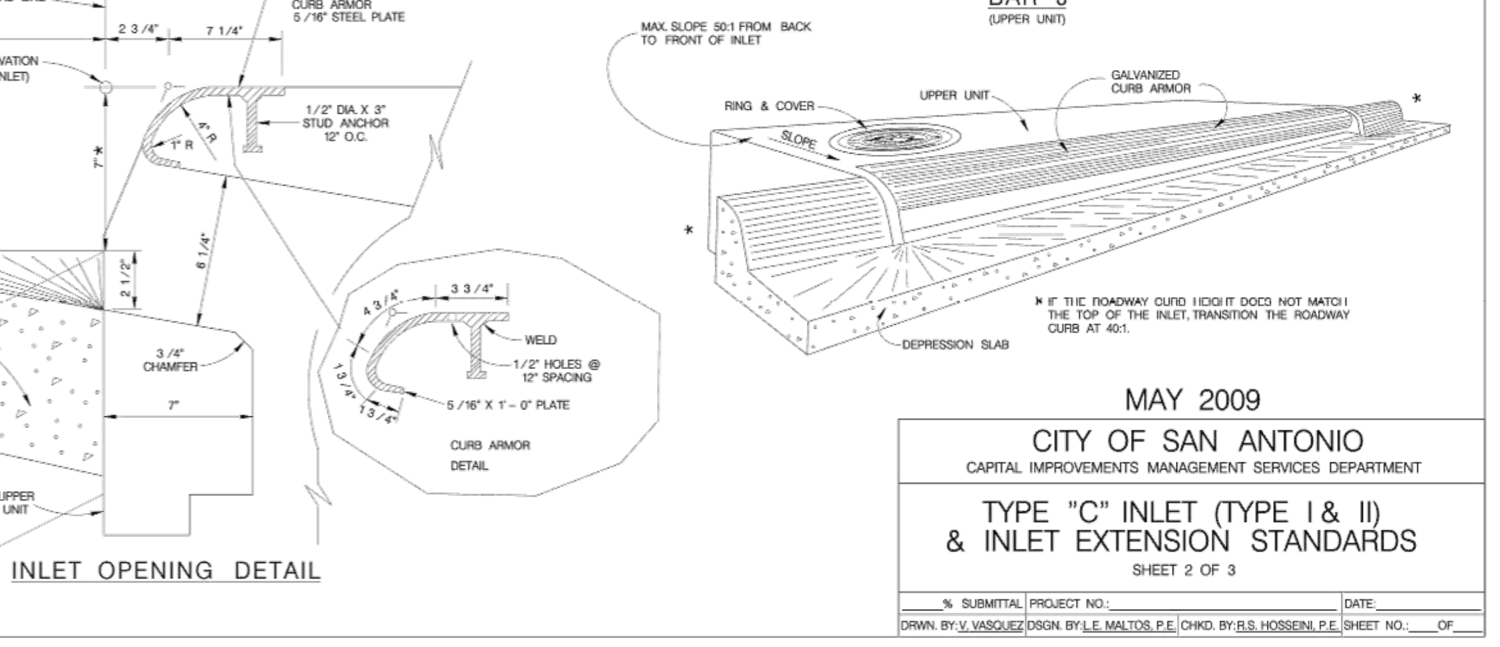
BAR G
(UPPER UNIT)

BAR J
(UPPER UNIT)

BAR L
(UPPER UNIT)


TYPE "CI" INLET LID WITH MANHOLE LID AND RING
TYPE "CI" INLET LID WITH MANHOLE LID AND RING
EXTENSION INLET LID

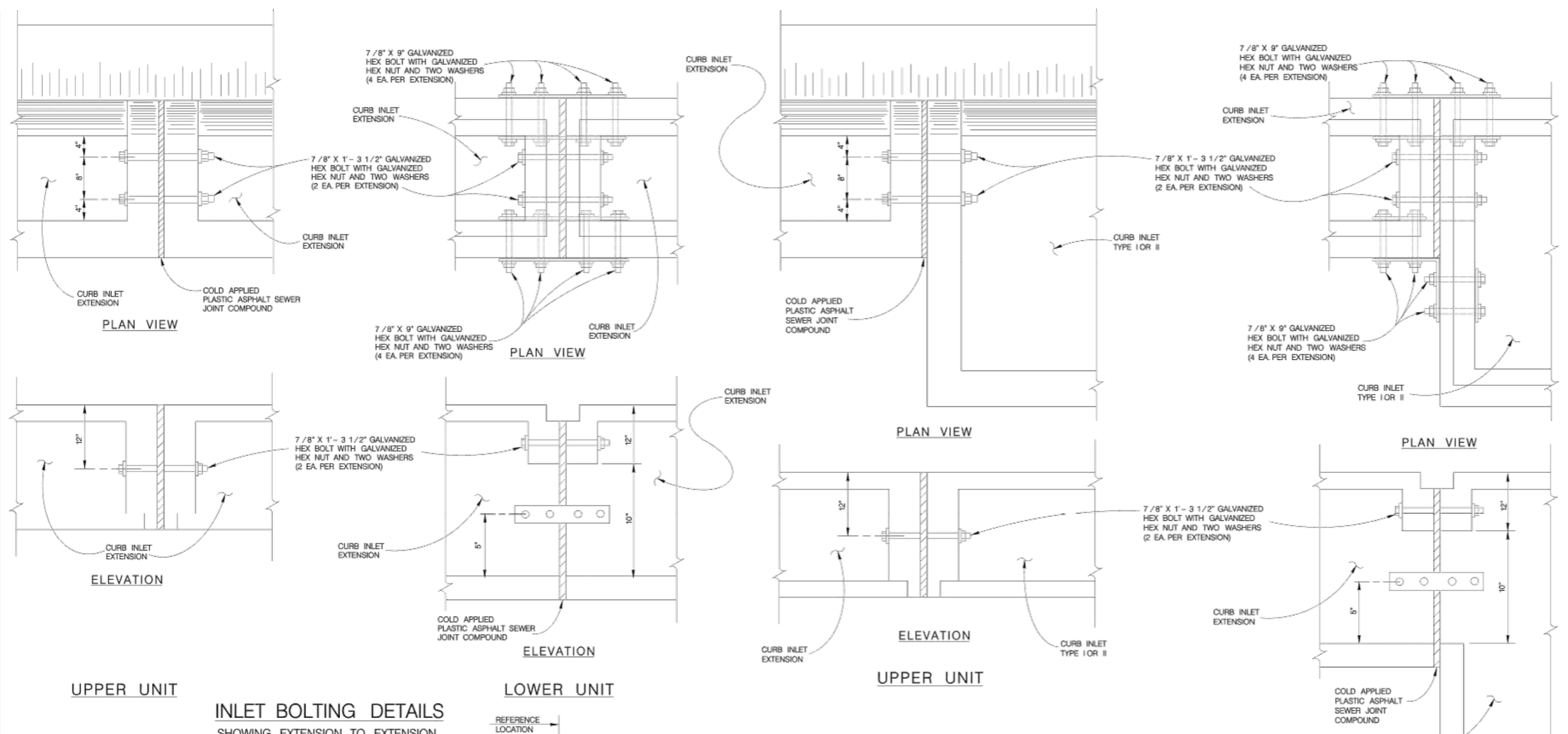
CONCRETE INLET LID CONFIGURATIONS
(UPPER UNITS)


TYPICAL CURB LINE
GALVANIZED CURB ARMOR 5 /16" STEEL PLATE
2'-0"
2 3 /4"
7 1/4"
REFERENCE ELEVATION (@ ENDS OF INLET)
1/2" DIA. X 3" STUD ANCHOR 12" O.C.
DEPRESSION SLAB
3 /4" CHAMFER
Hu (11" MINIMUM)
UPPER UNIT
WELD
1" -1/2" HOLES @ 12" SPACING
5 /16" X 1' - 0" PLATE
CURB ARMOR DETAIL
MAX. SLOPE 30:1 FROM BACK TO FRONT OF INLET
RING & COVER
SLOPE
UPPER UNIT
GALVANIZED CURB ARMOR
DEPRESSION SLAB
★ IF THE ROADWAY CURB LOCATION DOES NOT MATCH THE TOP OF THE INLET, TRANSITION THE ROADWAY CURB AT 45°.

INLET OPENING DETAIL

MAY 2009
CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT
TYPE "C" INLET (TYPE I & II)
& INLET EXTENSION STANDARDS
SHEET 2 OF 3

____% SUBMITTAL	PROJECT NO.:____		DATE:____
DRWN. BY: V. VASQUEZ	DSGN. BY: L.E. MALTOS, P.E.	CHKD. BY: R.S. HOSSEINI, P.E.	SHEET NO.:____OF____


7 /8" X 8" GALVANIZED HEX BOLT WITH GALVANIZED HEX NUT AND TWO WASHERS (4 EA PER EXTENSION)
CURB INLET EXTENSION
7 /8" X 1' - 3 1/2" GALVANIZED HEX BOLT WITH GALVANIZED HEX NUT AND TWO WASHERS (2 EA PER EXTENSION)
CURB INLET EXTENSION
COLD APPLIED PLASTIC ASPHALT SEWER JOINT COMPOUND
CURB INLET TYPE I OR II
12"
10"

PLAN VIEW

ELEVATION

UPPER UNIT

LOWER UNIT

INLET BOLTING DETAILS
SHOWING EXTENSION TO EXTENSION

PLAN VIEW

ELEVATION

UPPER UNIT

LOWER UNIT

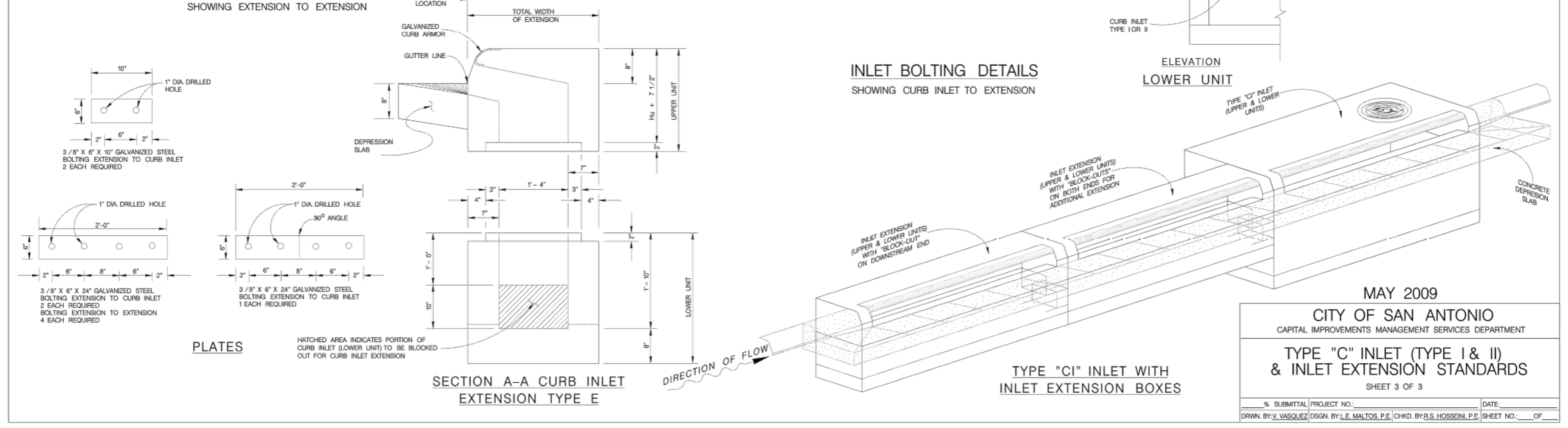
INLET BOLTING DETAILS
SHOWING CURB INLET TO EXTENSION

UPPER UNIT EXTENSION (FOR Hu = 11")					
BAR	NO.	SIZE	SPAC.	LENGTH	WEIGHT
A	4	#4	—	15' – 2"	41
B	3	#4	—	14' – 2"	28
C	3	#4	11"	13' – 2"	26
D	3	#4	6"	10' – 10"	22
E	8	#4	11"	1 '– 2"	6
F	21	#6	6"	2' – 0"	63
G	22	#6	6"	3' – 4"	110
H	4	#4	—	10' – 10"	29
J	12	#4	12"	3' – 6"	28
L	4	#4	—	2' – 0"	5
M	3	#4	—	14' – 8"	29
REINFORCING STEEL				LBS.	387
CLASS "A" CONCRETE				C.Y.	1.0

LOWER UNIT EXTENSION					
BAR	NO.	SIZE	SPAC.	LENGTH	WEIGHT
A	12	#4	12"	6' – 2"	49
B	11	#4	12"	2' – 2"	16
B_1	3	#4	12"	2' – 2"	4
E_1	18	#4	18" ±	2' – 3"	27
E_2	4	#4	18" ±	2' – 1"	6
F_1	16	#4	12" ±	10' – 10"	116
F_2	5	#4	—	10' – 10"	36
REINFORCING STEEL				LBS.	254
CLASS. "A" CONCRETE				C.Y.	1.4

GENERAL NOTES

1. WHEN INLET EXTENSIONS ARE REQUIRED FOR ON GRADE INLETS THE EXTENSION(S) SHALL BE PLACED ON THE UPSTREAM END OF THE INLET.
2. FOR CURB INLET EXTENSION REINFORCING STEEL, NOTES & VARIOUS OTHER APPLICABLE DETAILS NOT FOUND ON THIS SHEET, REFER TO SHEETS 1 & 2.


1" DIA DRILLED HOLE
7 /8" X 8" X 10" GALVANIZED STEEL BOLTING EXTENSION TO CURB INLET 2 EACH REQUIRED
7 /8" X 8" X 34" GALVANIZED STEEL BOLTING EXTENSION TO CURB INLET 2 EACH REQUIRED BOLTING EXTENSION TO EXTENSION 4 EACH REQUIRED
1" DIA DRILLED HOLE
90° ANGLE
7 /8" X 4" X 24" GALVANIZED STEEL BOLTING EXTENSION TO CURB INLET 1 EACH REQUIRED
REFERENCE LOCATION
TOTAL WIDTH OF EXTENSION
GALVANIZED CURB ARMOR
GUTTER LINE
DEPRESSION SLAB
UPPER UNIT
LOWER UNIT
HATCHED AREA INDICATES PORTION OF CURB INLET (LOWER UNIT) TO BE BLOCKED OUT FOR CURB INLET EXTENSION
TYPE "CI" INLET (UPPER & LOWER UNITS)
INLET EXTENSION (UPPER & LOWER UNITS) WITH "BLOCK-OUTS" ON BOTH ENDS FOR ADDITIONAL EXTENSION
INLET EXTENSION (UPPER & LOWER UNITS) WITH "BLOCK-OUT" ON DOWNSTREAM END
DIRECTION OF FLOW
CONCRETE DEPRESSION SLAB

PLATES

SECTION A-A CURB INLET
EXTENSION TYPE E

TYPE "CI" INLET WITH
INLET EXTENSION BOXES

MAY 2009
CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT
TYPE "C" INLET (TYPE I & II)
& INLET EXTENSION STANDARDS
SHEET 3 OF 3

____% SUBMITTAL	PROJECT NO.:____		DATE:____
DRWN. BY: V. VASQUEZ	DSGN. BY: L.E. MALTOS, P.E.	CHKD. BY: R.S. HOSSEINI, P.E.	SHEET NO.:____OF____

CUDEENGINEERS.COM

EST. 1980 CUDE ENGINEERS

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

TYPE C CURB INLET PRECAST DRAINAGE DETAILS

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
1.
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CUDE ENGINEERS
TBPELS No. 10048500

C6.D3

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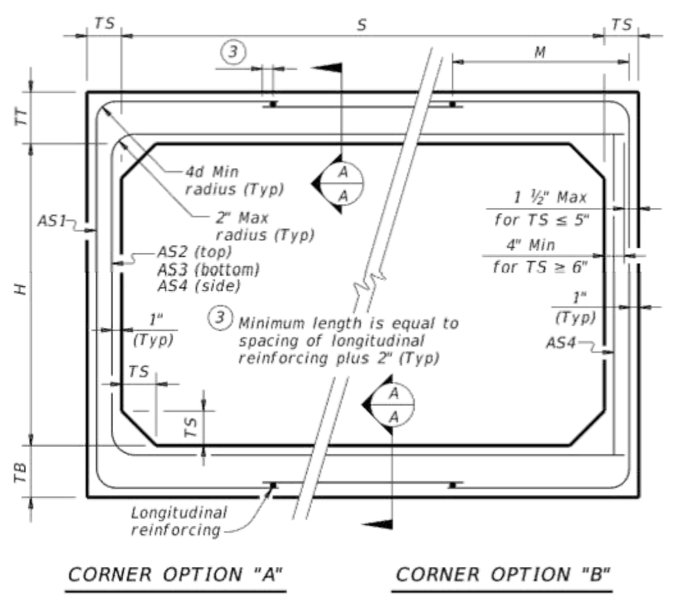
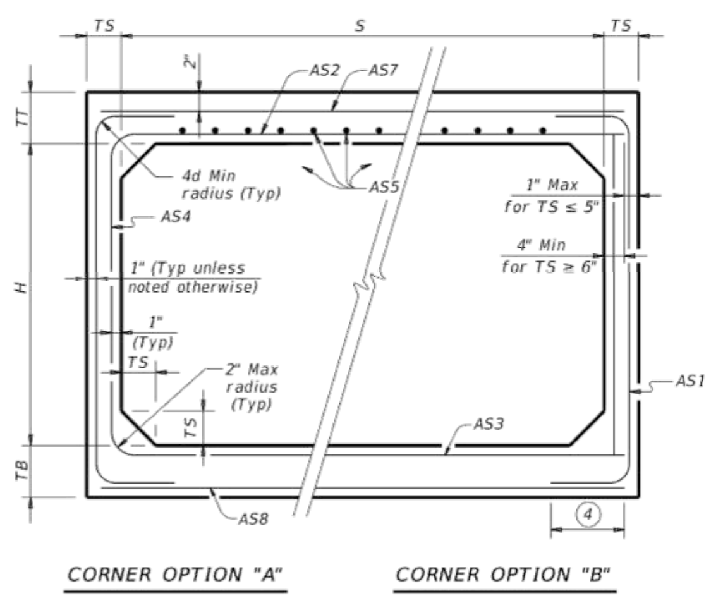
BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) ②							① Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
5	2	8	7	6	< 2	–	0.19	0.27	0.18	0.14	0.19	0.19	0.17	6.0
5	2	6	6	6	2 < 3	44	0.22	0.20	0.16	0.14	–	–	–	5.1
5	2	6	6	6	3 – 5	44	0.16	0.14	0.14	0.14	–	–	–	5.1
5	2	6	6	6	10	36	0.15	0.14	0.14	0.14	–	–	–	5.1
5	2	6	6	6	15	36	0.20	0.18	0.18	0.14	–	–	–	5.1
5	2	6	6	6	20	36	0.26	0.23	0.24	0.14	–	–	–	5.1
5	2	6	6	6	25	36	0.33	0.29	0.29	0.14	–	–	–	5.1
5	2	6	6	6	30	36	0.39	0.34	0.35	0.14	–	–	–	5.1
5	3	8	7	6	< 2	–	0.19	0.31	0.21	0.14	0.19	0.19	0.17	6.6
5	3	6	6	6	2 < 3	45	0.18	0.24	0.19	0.14	–	–	–	5.7
5	3	6	6	6	3 – 5	36	0.14	0.17	0.16	0.14	–	–	–	5.7
5	3	6	6	6	10	36	0.14	0.16	0.17	0.14	–	–	–	5.7
5	3	6	6	6	15	35	0.16	0.21	0.22	0.14	–	–	–	5.7
5	3	6	6	6	20	35	0.21	0.27	0.28	0.14	–	–	–	5.7
5	3	6	6	6	25	35	0.26	0.34	0.34	0.14	–	–	–	5.7
5	3	6	6	6	30	35	0.31	0.41	0.41	0.14	–	–	–	5.7
5	4	8	7	6	< 2	–	0.19	0.33	0.24	0.14	0.19	0.19	0.17	7.2
5	4	6	6	6	2 < 3	45	0.16	0.27	0.22	0.14	–	–	–	6.3
5	4	6	6	6	3 – 5	45	0.14	0.19	0.18	0.14	–	–	–	6.3
5	4	6	6	6	10	36	0.14	0.18	0.18	0.14	–	–	–	6.3
5	4	6	6	6	15	35	0.14	0.23	0.24	0.14	–	–	–	6.3
5	4	6	6	6	20	35	0.17	0.30	0.31	0.14	–	–	–	6.3
5	4	6	6	6	25	35	0.21	0.37	0.38	0.14	–	–	–	6.3
5	4	6	6	6	30	35	0.25	0.44	0.45	0.14	–	–	–	6.3
5	5	8	7	6	< 2	–	0.19	0.35	0.26	0.14	0.19	0.19	0.17	7.8
5	5	6	6	6	2 < 3	45	0.14	0.29	0.24	0.14	–	–	–	6.9
5	5	6	6	6	3 – 5	45	0.14	0.21	0.20	0.14	–	–	–	6.9
5	5	6	6	6	10	45	0.14	0.19	0.20	0.14	–	–	–	6.9
5	5	6	6	6	15	36	0.14	0.24	0.25	0.14	–	–	–	6.9
5	5	6	6	6	20	35	0.15	0.31	0.32	0.14	–	–	–	6.9
5	5	6	6	6	25	35	0.18	0.38	0.39	0.14	–	–	–	6.9
5	5	6	6	6	30	35	0.21	0.46	0.47	0.14	–	–	–	6.9


TS
S
TS
M
TT
H
TB
AS1
AS2 (top)
AS3 (bottom)
AS4 (side)
4d Min radius (Typ)
2" Max radius (Typ)
Minimum length is equal to spacing of longitudinal reinforcing plus 2" (Typ)
1 ½" Max for TS ≤ 5"
4" Min for TS = 6"
1" (Typ)
Longitudinal reinforcing
A
③

CORNER OPTION "A" CORNER OPTION "B"

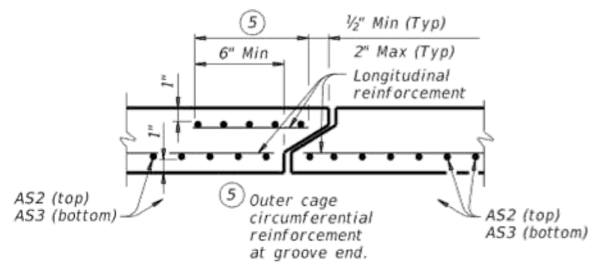
FILL HEIGHT 2 FT AND GREATER


TS
S
TS
AS2
AS7
AS5
AS4
AS1
AS3
AS8
1" Max for TS ≤ 5"
4" Min for TS = 6"
4d Min radius (Typ)
1" (Typ unless noted otherwise)
2" Max radius (Typ)
④

CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

④ Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)


⑤
½" Min (Typ)
6" Min
2" Max (Typ)
Longitudinal reinforcement
AS2 (top)
AS3 (bottom)
⑤ Outer cage circumferential reinforcement at groove end.
AS2 (top)
AS3 (bottom)

SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:
Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.
Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:
Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.
See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.
In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)."

① For box length = 8'-0"

② AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.

HL93 LOADING

Texas Department of Transportation | Bridge Division Standard

SINGLE BOX CULVERTS PRECAST
5'-0" SPAN
SCP-5

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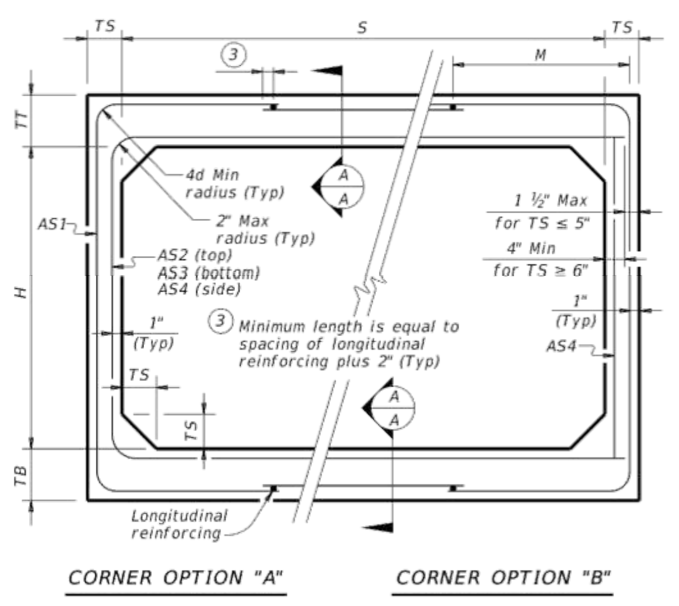
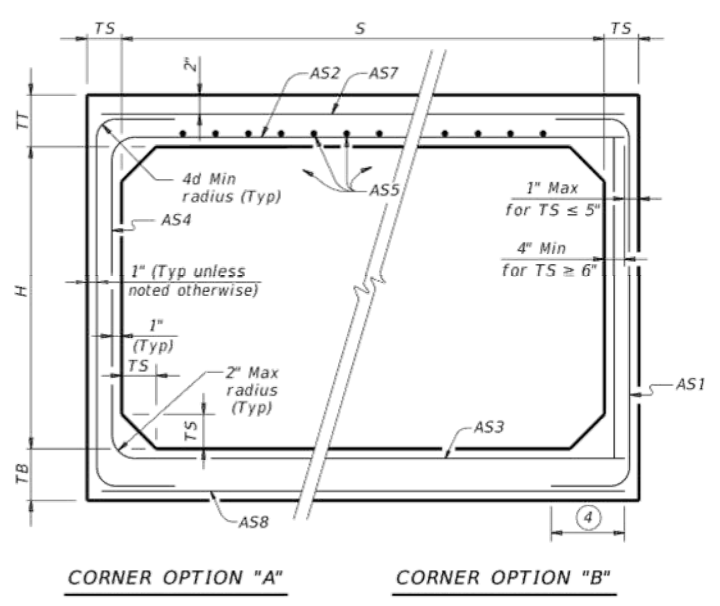
BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) ②							① Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
6	2	8	7	7	< 2	–	0.23	0.27	0.19	0.17	0.19	0.19	0.17	7.2
6	2	7	7	7	2 < 3	43	0.25	0.21	0.17	0.17	–	–	–	6.8
6	2	7	7	7	3 – 5	43	0.20	0.17	0.17	0.17	–	–	–	6.8
6	2	7	7	7	10	39	0.20	0.17	0.17	0.17	–	–	–	6.8
6	2	7	7	7	15	39	0.26	0.20	0.20	0.17	–	–	–	6.8
6	2	7	7	7	20	39	0.34	0.26	0.26	0.17	–	–	–	6.8
6	2	7	7	7	25	39	0.43	0.32	0.32	0.17	–	–	–	6.8
6	2	7	7	7	30	39	0.52	0.38	0.39	0.17	–	–	–	6.8
6	3	8	7	7	< 2	–	0.20	0.31	0.22	0.17	0.19	0.19	0.17	7.9
6	3	7	7	7	2 < 3	43	0.21	0.24	0.19	0.17	–	–	–	7.5
6	3	7	7	7	3 – 5	39	0.17	0.18	0.17	0.17	–	–	–	7.5
6	3	7	7	7	10	39	0.17	0.18	0.19	0.17	–	–	–	7.5
6	3	7	7	7	15	38	0.22	0.24	0.24	0.17	–	–	–	7.5
6	3	7	7	7	20	38	0.28	0.31	0.31	0.17	–	–	–	7.5
6	3	7	7	7	25	38	0.35	0.38	0.39	0.17	–	–	–	7.5
6	3	7	7	7	30	38	0.42	0.46	0.46	0.17	–	–	–	7.5
6	4	8	7	7	< 2	–	0.19	0.34	0.25	0.17	0.19	0.19	0.17	8.6
6	4	7	7	7	2 < 3	43	0.19	0.27	0.21	0.17	–	–	–	8.2
6	4	7	7	7	3 – 5	39	0.17	0.21	0.19	0.17	–	–	–	8.2
6	4	7	7	7	10	39	0.17	0.20	0.21	0.17	–	–	–	8.2
6	4	7	7	7	15	38	0.18	0.27	0.27	0.17	–	–	–	8.2
6	4	7	7	7	20	38	0.24	0.34	0.35	0.17	–	–	–	8.2
6	4	7	7	7	25	38	0.29	0.43	0.42	0.17	–	–	–	8.2
6	4	7	7	7	30	38	0.35	0.51	0.52	0.17	–	–	–	8.2
6	5	8	7	7	< 2	–	0.19	0.37	0.28	0.17	0.19	0.19	0.17	9.3
6	5	7	7	7	2 < 3	43	0.17	0.30	0.24	0.17	–	–	–	8.9
6	5	7	7	7	3 – 5	43	0.17	0.23	0.21	0.17	–	–	–	8.9
6	5	7	7	7	10	39	0.17	0.22	0.23	0.17	–	–	–	8.9
6	5	7	7	7	15	38	0.17	0.28	0.29	0.17	–	–	–	8.9
6	5	7	7	7	20	38	0.20	0.37	0.38	0.17	–	–	–	8.9
6	5	7	7	7	25	38	0.25	0.45	0.46	0.17	–	–	–	8.9
6	5	7	7	7	30	38	0.30	0.54	0.55	0.17	–	–	–	8.9
6	6	8	7	7	< 2	–	0.19	0.38	0.30	0.17	0.19	0.19	0.17	10
6	6	7	7	7	2 < 3	52	0.17	0.32	0.26	0.17	–	–	–	9.6
6	6	7	7	7	3 – 5	52	0.17	0.24	0.22	0.17	–	–	–	9.6
6	6	7	7	7	10	43	0.17	0.23	0.24	0.17	–	–	–	9.6
6	6	7	7	7	15	39	0.17	0.29	0.31	0.17	–	–	–	9.6
6	6	7	7	7	20	39	0.18	0.38	0.39	0.17	–	–	–	9.6
6	6	7	7	7	25	38	0.23	0.46	0.48	0.17	–	–	–	9.6
6	6	7	7	7	30	38	0.27	0.55	0.57	0.17	–	–	–	9.6


TS
S
TS
M
TT
H
TB
AS1
AS2 (top)
AS3 (bottom)
AS4 (side)
4d Min radius (Typ)
2" Max radius (Typ)
Minimum length is equal to spacing of longitudinal reinforcing plus 2" (Typ)
1 ½" Max for TS ≤ 5"
4" Min for TS = 6"
1" (Typ)
Longitudinal reinforcing
③

CORNER OPTION "A" CORNER OPTION "B"

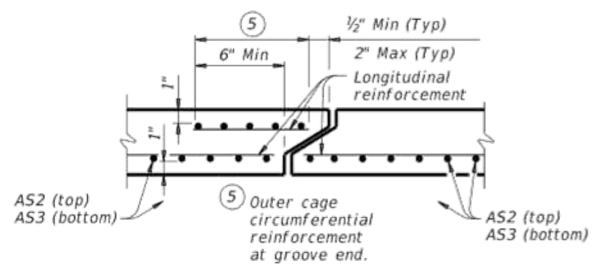
FILL HEIGHT 2 FT AND GREATER


TS
S
TS
AS2
AS7
AS5
AS4
AS1
AS3
AS8
1" Max for TS ≤ 5"
4" Min for TS = 6"
4d Min radius (Typ)
1" (Typ unless noted otherwise)
2" Max radius (Typ)
④

CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

④ Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)


⑤
½" Min (Typ)
6" Min
2" Max (Typ)
Longitudinal reinforcement
AS2 (top)
AS3 (bottom)
⑤ Outer cage circumferential reinforcement at groove end.
AS2 (top)
AS3 (bottom)

SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:
Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.
Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:
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① For box length = 8'-0"

② AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.

HL93 LOADING

Texas Department of Transportation | Bridge Division Standard

SINGLE BOX CULVERTS PRECAST
6'-0" SPAN
SCP-6

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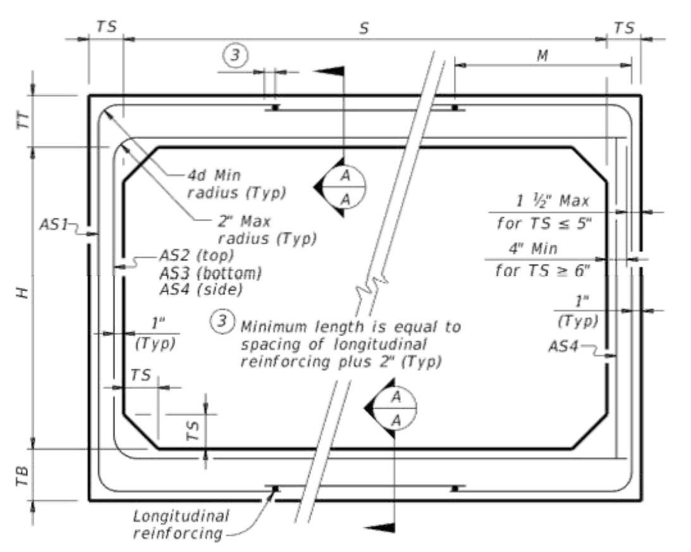
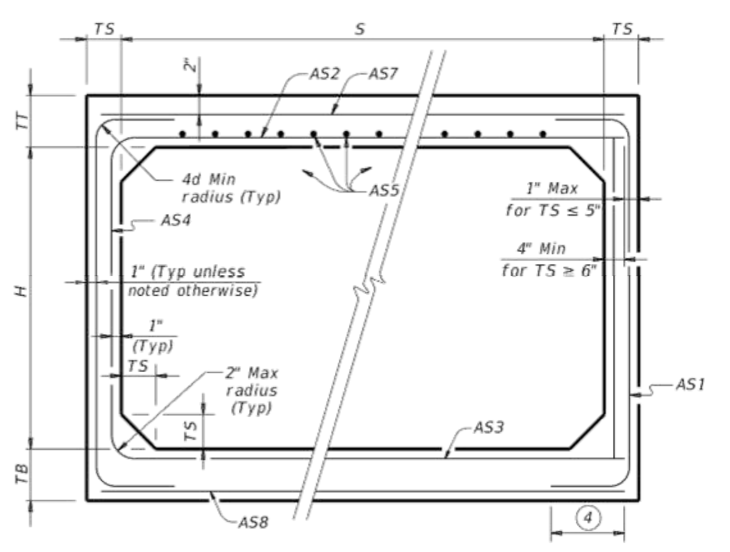
BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) ②							① Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
7	3	8	8	8	< 2	–	0.23	0.31	0.22	0.19	0.19	0.19	0.19	9.6
7	3	8	8	8	2 < 3	47	0.27	0.25	0.24	0.19	–	–	–	9.6
7	3	8	8	8	3 – 5	43	0.19	0.19	0.19	0.19	–	–	–	9.6
7	3	8	8	8	10	43	0.21	0.20	0.21	0.19	–	–	–	9.6
7	3	8	8	8	15	43	0.28	0.26	0.27	0.19	–	–	–	9.6
7	3	8	8	8	20	43	0.36	0.34	0.35	0.19	–	–	–	9.6
7	3	8	8	8	25	43	0.45	0.42	0.43	0.19	–	–	–	9.6
7	3	8	8	8	30	43	0.54	0.50	0.51	0.19	–	–	–	9.6
7	4	8	8	8	< 2	–	0.21	0.34	0.25	0.19	0.19	0.19	0.19	10.4
7	4	8	8	8	2 < 3	43	0.23	0.28	0.28	0.19	–	–	–	10.4
7	4	8	8	8	3 – 5	43	0.19	0.22	0.19	0.19	–	–	–	10.4
7	4	8	8	8	10	43	0.19	0.23	0.23	0.19	–	–	–	10.4
7	4	8	8	8	15	41	0.24	0.30	0.30	0.19	–	–	–	10.4
7	4	8	8	8	20	41	0.31	0.38	0.39	0.19	–	–	–	10.4
7	4	8	8	8	25	41	0.38	0.47	0.48	0.19	–	–	–	10.4
7	4	8	8	8	30	41	0.46	0.57	0.57	0.19	–	–	–	10.4
7	5	8	8	8	< 2	–	0.19	0.36	0.27	0.19	0.19	0.19	0.19	11.2
7	5	8	8	8	2 < 3	47	0.21	0.31	0.31	0.19	–	–	–	11.2
7	5	8	8	8	3 – 5	43	0.19	0.24	0.21	0.19	–	–	–	11.2
7	5	8	8	8	10	43	0.19	0.25	0.26	0.19	–	–	–	11.2
7	5	8	8	8	15	41	0.21	0.32	0.33	0.19	–	–	–	11.2
7	5	8	8	8	20	41	0.27	0.41	0.42	0.19	–	–	–	11.2
7	5	8	8	8	25	41	0.33	0.51	0.52	0.19	–	–	–	11.2
7	5	8	8	8	30	41	0.40	0.61	0.62	0.19	–	–	–	11.2
7	6	8	8	8	< 2	–	0.19	0.38	0.30	0.19	0.19	0.19	0.19	12.0
7	6	8	8	8	2 < 3	59	0.19	0.33	0.34	0.19	–	–	–	12.0
7	6	8	8	8	3 – 5	47	0.19	0.25	0.23	0.19	–	–	–	12.0
7	6	8	8	8	10	43	0.19	0.26	0.27	0.19	–	–	–	12.0
7	6	8	8	8	15	41	0.19	0.34	0.35	0.19	–	–	–	12.0
7	6	8	8	8	20	41	0.24	0.43	0.45	0.19	–	–	–	12.0
7	6	8	8	8	25	41	0.29	0.53	0.55	0.19	–	–	–	12.0
7	6	8	8	8	30	41	0.35	0.64	0.65	0.19	–	–	–	12.0
7	7	8	8	8	< 2	–	0.19	0.40	0.33	0.19	0.19	0.19	0.19	12.8
7	7	8	8	8	2 < 3	59	0.19	0.36	0.37	0.19	–	–	–	12.8
7	7	8	8	8	3 – 5	59	0.19	0.27	0.25	0.19	–	–	–	12.8
7	7	8	8	8	10	47	0.19	0.27	0.29	0.19	–	–	–	12.8
7	7	8	8	8	15	43	0.19	0.35	0.37	0.19	–	–	–	12.8
7	7	8	8	8	20	43	0.22	0.44	0.46	0.19	–	–	–	12.8
7	7	8	8	8	25	43	0.27	0.54	0.57	0.19	–	–	–	12.8
7	7	8	8	8	30	41	0.32	0.65	0.67	0.19	–	–	–	12.8


TS
S
TS
M
TT
H
TB
AS1
AS2 (top)
AS3 (bottom)
AS4 (side)
4d Min radius (Typ)
2" Max radius (Typ)
Minimum length is equal to spacing of longitudinal reinforcing plus 2" (Typ)
1 ½" Max for TS ≤ 5"
4" Min for TS = 6"
1" (Typ)
Longitudinal reinforcing
③

CORNER OPTION "A" CORNER OPTION "B"

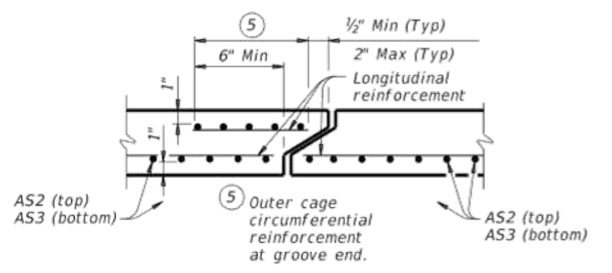
FILL HEIGHT 2 FT AND GREATER


TS
S
TS
AS2
AS7
AS5
AS4
AS1
AS3
AS8
1" Max for TS ≤ 5"
4" Min for TS = 6"
4d Min radius (Typ)
1" (Typ unless noted otherwise)
2" Max radius (Typ)

CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

④ Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)


⑤
½" Min (Typ)
6" Min
2" Max (Typ)
Longitudinal reinforcement
AS2 (top)
AS3 (bottom)
⑤ Outer cage circumferential reinforcement at groove end.
AS2 (top)
AS3 (bottom)

SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:
Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.
Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:
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① For box length = 8'-0"

② AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.

HL93 LOADING

Texas Department of Transportation | Bridge Division Standard

SINGLE BOX CULVERTS PRECAST
7'-0" SPAN
SCP-7

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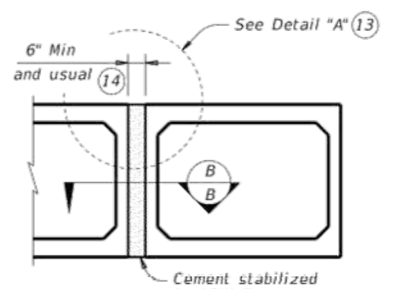
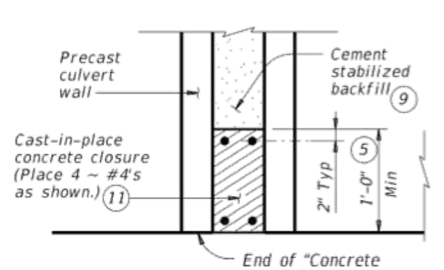
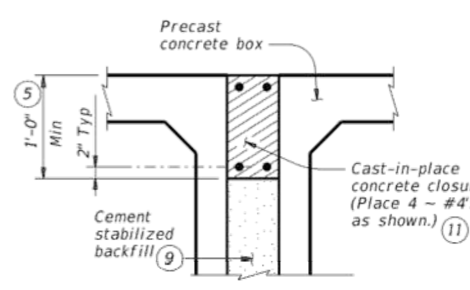

See Detail "A" ⑬
6" Min and usual ⑭
B
B
Cement stabilized backfill ⑨

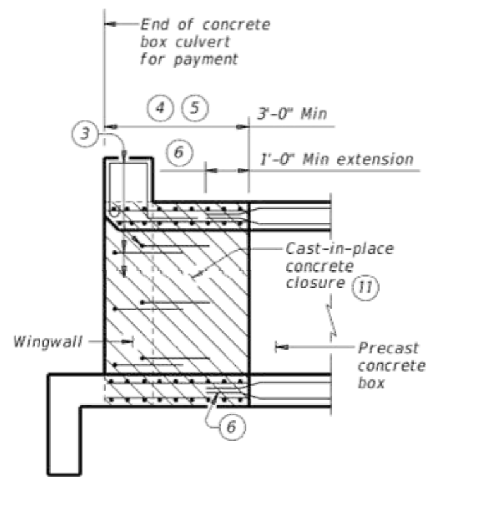
MULTIPLE UNIT PLACEMENT


Precast culvert wall
Cement stabilized backfill ⑨
Cast-in-place concrete closure (Place 4 ~ #4's as shown.) ⑪
⑤
2" Typ
1'-0" Min
End of "Concrete Box Culvert"

SECTION B-B

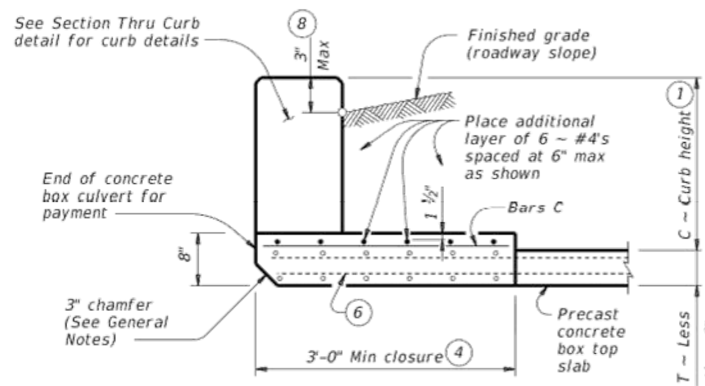

Precast concrete box
⑤
1'-0" Min
2" Typ
Cast-in-place concrete closure (Place 4 ~ #4's as shown.) ⑪
Cement stabilized backfill ⑨

DETAIL "A" ⑬

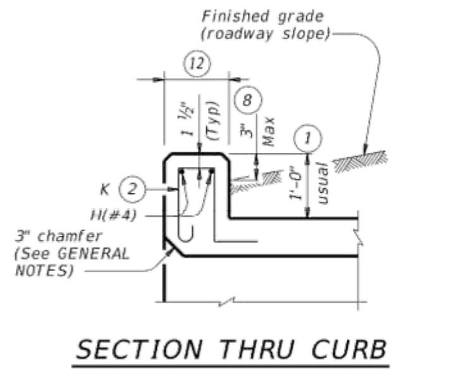

End of concrete box culvert for payment
③
3'-0" Min
1'-0" Min extension
Cast-in-place concrete closure ⑪
Precast concrete box
Wingwall
④
⑥

WINGWALL CONNECTION

(Also applies to safety end treatment.)

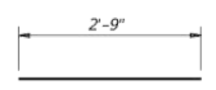

See Section Thru Curb detail for curb details
⑧
3" Max
Finished grade (roadway slope)
Place additional layer of 6 ~ #4's spaced at 6" max as shown
① Curb height
Bars C
End of concrete box culvert for payment
3" chamfer (See General Notes)
⑥
Precast concrete box top slab
3'-0" Min closure ④
T – Less than 8"

SECTION THRU TOP SLABS LESS THAN 8"

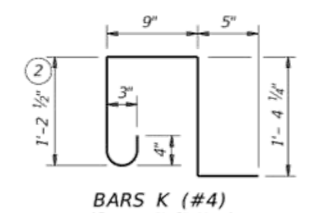

Finished grade (roadway slope)
⑫
1 ½" (Typ)
⑧
3" Max
①
K ②
H(#4)
1'-0" usual
3" chamfer (See GENERAL NOTES)

SECTION THRU CURB

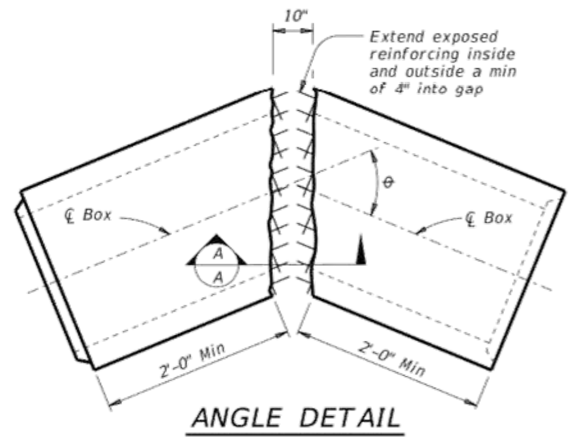
QUANTITIES PER FOOT OF CURB ⑩	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



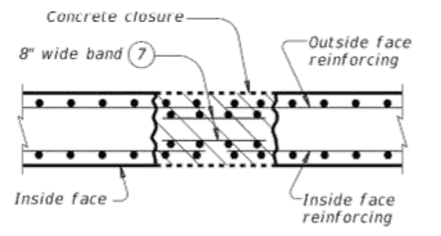
BARS C (#4)
(Spa = 1'-0" Max)


②
9"
5"
3"
1'-2 ½"
1'- 4 ¼"

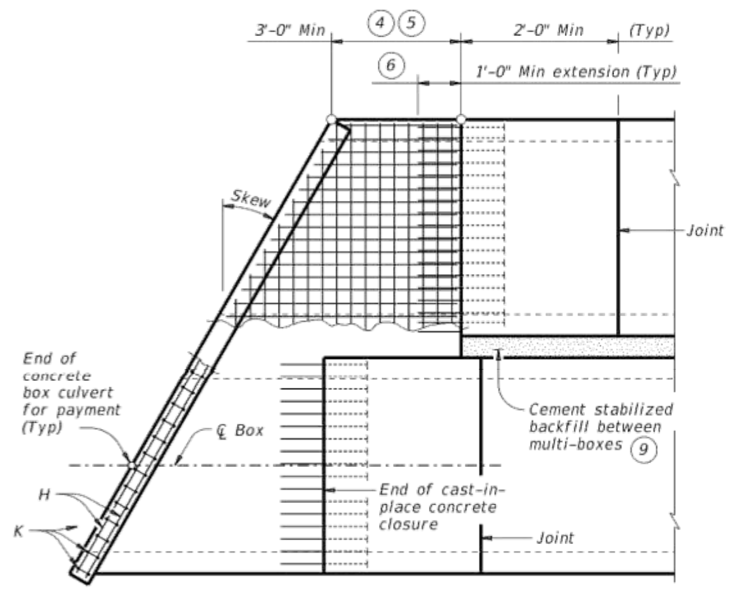
BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")


10"
Extend exposed reinforcing inside and outside a min of 4" into gap
℄ Box
℄ Box
2'-0" Min
2'-0" Min

ANGLE DETAIL


Concrete closure
8" wide band ⑦
Outside face reinforcing
Inside Face
Inside face reinforcing

SECTION A-A


3'-0" Min
④ ⑤
2'-0" Min
(Typ)
⑥
1'-0" Min extension (Typ)
Skew
Joint
Joint
End of concrete box culvert for payment (Typ)
℄ Box
Cement stabilized backfill between multi-boxes ⑨
End of cast-in-place concrete closure
H
K

PLAN OF SKEWED ENDS

(Showing multi-box placement.)

① 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

② For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

③ Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not fit into closure area.

④ Provide a 3'-0" Min cast-in-place concrete closure. Break back boxes in the field or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast-in-place closure flush with the inside and outside faces of the precast box section.

⑤ For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'-0" Min cast-in-place closure in the top slab, bottom slab, and exterior wall. See Section B-B detail when interior walls are cast full length.

⑥ Extend precast box reinforcing a minimum of 1'-0" into concrete closure (Typ).

⑦ Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.

⑧ For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

⑨ Cement stabilized backfill between boxes is considered part of the box culvert for payment.

⑩ All curb concrete and reinforcing is considered part of the box culvert for payment.

⑪ Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.

⑫ 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.

⑬ For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in Detail "A".

⑭ This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box." No payment will be made for any additional material in the gap between adjacent boxes.

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide ASTM A1064 welded wire reinforcement.
Provide Class C concrete (f'c = 3,600 psi) for the closures.
Provide cement stabilized backfill meeting the requirements of Item 400, "Excavation and Backfill for Structures."
Any additional concrete required for the closures will be considered subsidiary to the box culvert.

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to the Single Box Culverts Precast (SCP) standard sheets for details and notes not shown.
Chamfer the bottom edge of the top slab closure 3 inches at culvert closure ends.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bars dimensions are out-to-out of bars.

HL93 LOADING

Texas Department of Transportation | Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS
SCP-MD

FILE: CD-SCP-MD-20.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act." No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

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4122 Pond Hill Road, Suite 101
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FLYING W
UNIT 2
BOX CULVERT DRAINAGE DETAILS

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
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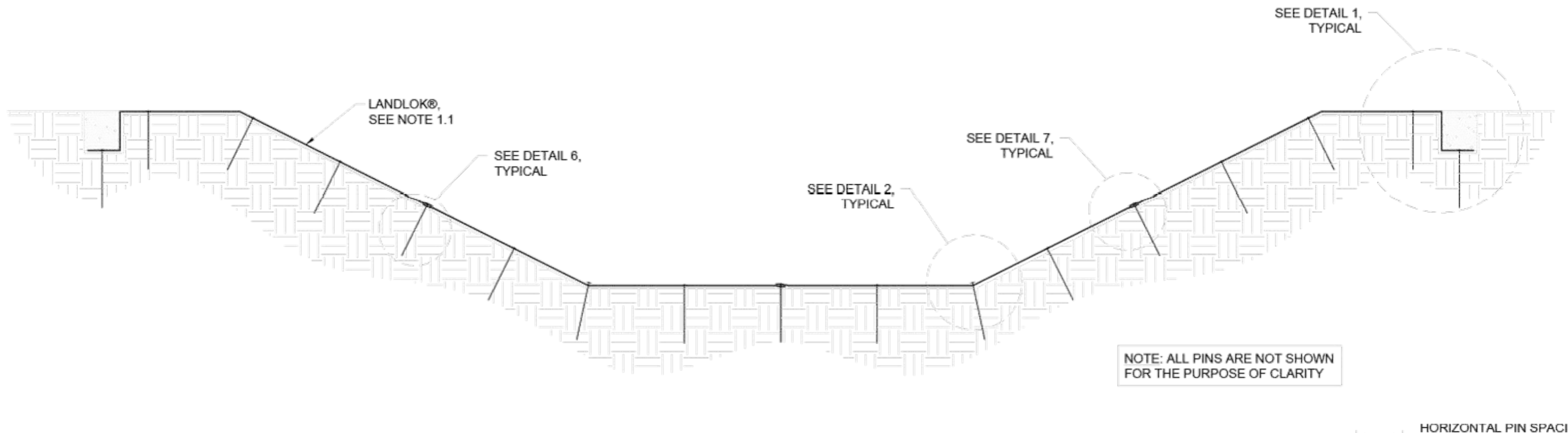
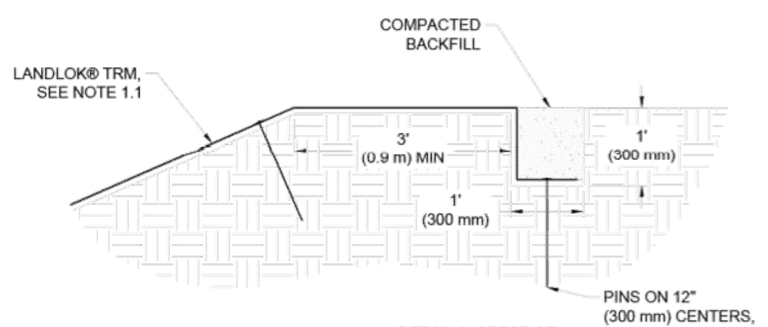
TBPELS No. 10048500

C6.D4

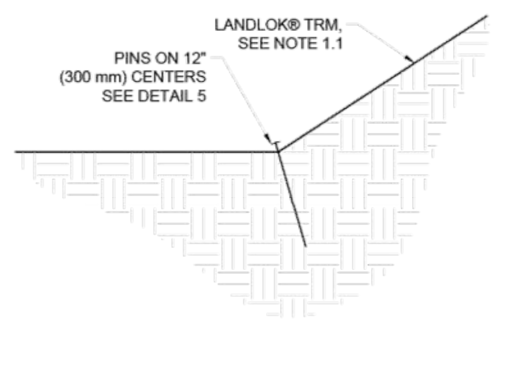

SEE DETAIL 1, TYPICAL
LANDLOK®, SEE NOTE 1.1
SEE DETAIL 6, TYPICAL
SEE DETAIL 7, TYPICAL
SEE DETAIL 2, TYPICAL

NOTE: ALL PINS ARE NOT SHOWN FOR THE PURPOSE OF CLARITY

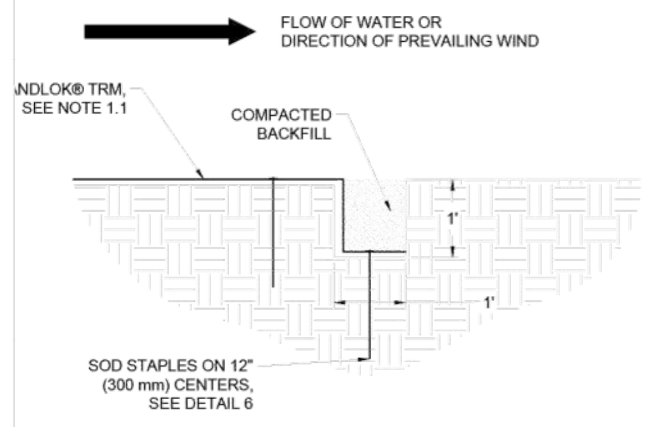
ELEVATION 1: PERPENDICULAR INSTALLATION OF LANDLOK® TRM IN A CHANNEL


COMPACTED BACKFILL
LANDLOK® TRM, SEE NOTE 1.1
3' (0.9 m) MIN
1' (300 mm)
1' (300 mm)
PINS ON 12" (300 mm) CENTERS, SEE DETAIL 5

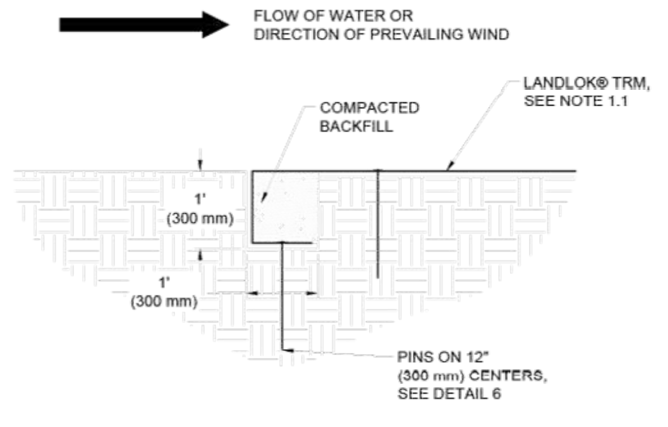
DETAIL 1: CREST OF SLOPE (COS) TRENCH


LANDLOK® TRM, SEE NOTE 1.1
PINS ON 12" (300 mm) CENTERS SEE DETAIL 5

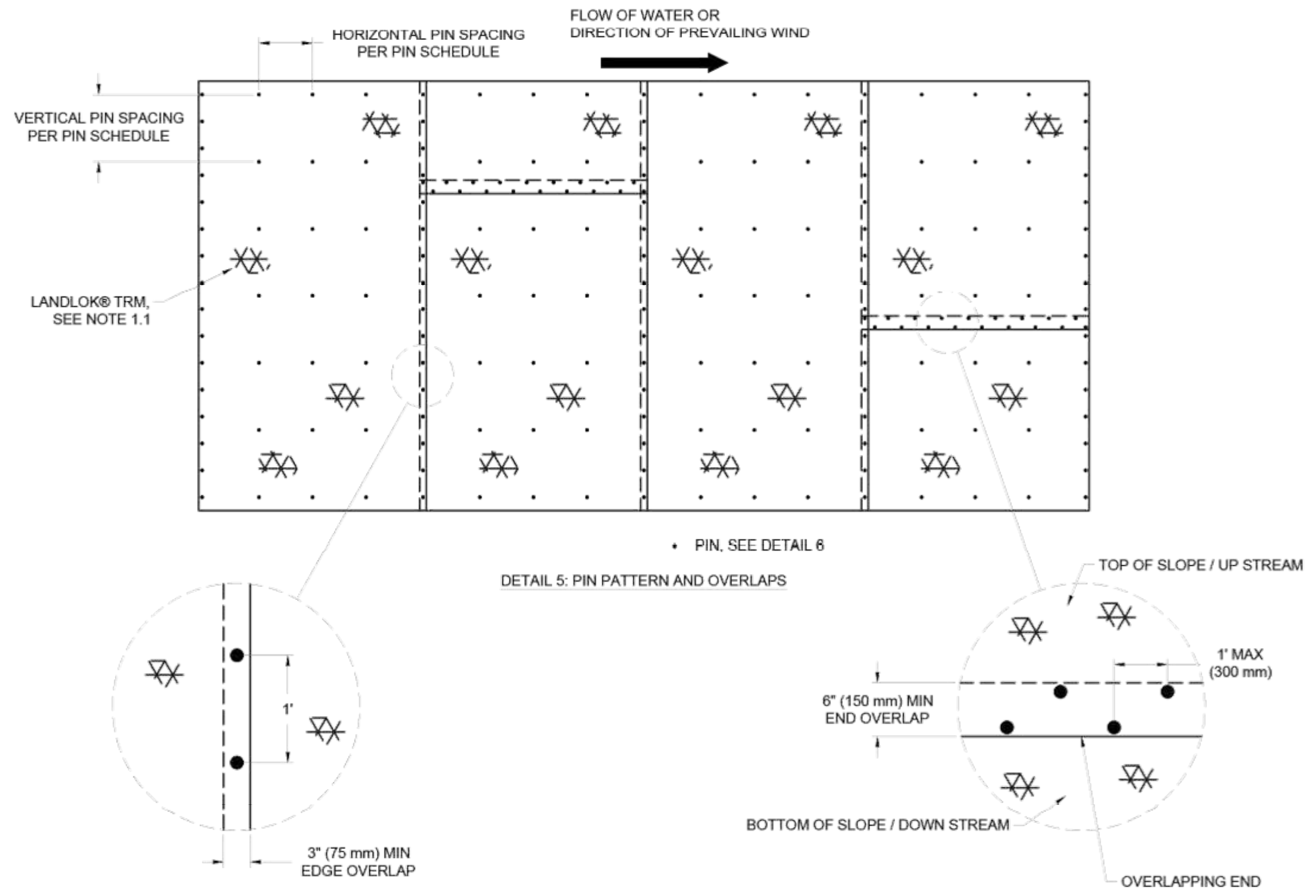
DETAIL 2: BREAK IN SLOPE INTERFACE


FLOW OF WATER OR DIRECTION OF PREVAILING WIND
LANDLOK® TRM, SEE NOTE 1.1
COMPACTED BACKFILL
1'
1'
SOD STAPLES ON 12" (300 mm) CENTERS, SEE DETAIL 6

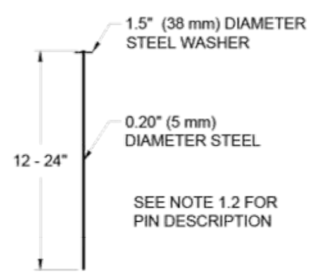
DETAIL 3: INITIAL CHANNEL (IC) TRENCH (DOWNSTREAM)


FLOW OF WATER OR DIRECTION OF PREVAILING WIND
COMPACTED BACKFILL
LANDLOK® TRM, SEE NOTE 1.1
1' (300 mm)
1' (300 mm)
PINS ON 12" (300 mm) CENTERS, SEE DETAIL 6

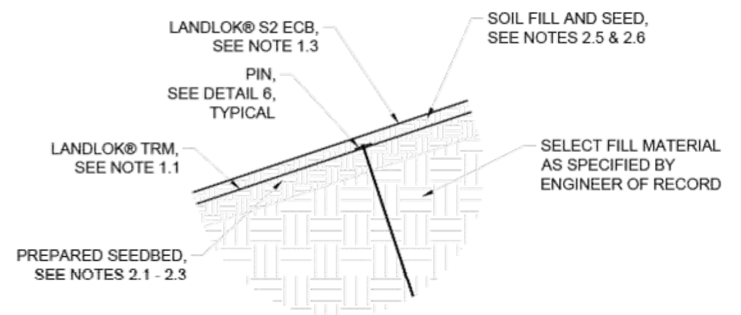
DETAIL 4: TERMINAL CHANNEL (TC) TRENCH (UPSTREAM)


HORIZONTAL PIN SPACING PER PIN SCHEDULE
FLOW OF WATER OR DIRECTION OF PREVAILING WIND
VERTICAL PIN SPACING PER PIN SCHEDULE
LANDLOK® TRM, SEE NOTE 1.1
• PIN, SEE DETAIL 6
1'
3" (75 mm) MIN EDGE OVERLAP
TOP OF SLOPE / UP STREAM
1' MAX (300 mm)
6" (150 mm) MIN END OVERLAP
BOTTOM OF SLOPE / DOWN STREAM
OVERLAPPING END

DETAIL 5: PIN PATTERN AND OVERLAPS


1.5" (38 mm) DIAMETER STEEL WASHER
0.20" (5 mm) DIAMETER STEEL
12 - 24"
SEE NOTE 1.2 FOR PIN DESCRIPTION

DETAIL 6: PIN


LANDLOK® S2 ECB, SEE NOTE 1.3
PIN, SEE DETAIL 6, TYPICAL
LANDLOK® TRM, SEE NOTE 1.1
PREPARED SEEDBED, SEE NOTES 2.1 - 2.3
SOIL FILL AND SEED, SEE NOTES 2.5 & 2.6
SELECT FILL MATERIAL AS SPECIFIED BY ENGINEER OF RECORD

DETAIL 7: VEGETATION ESTABLISHMENT

LANDLOK® TRM FOR EROSION CONTROL GENERAL INSTALLATION GUIDELINES

1. GENERAL NOTES

1.1. The LANDLOK® TRM is a three-dimensional, lofty, stitch-bonded polypropylene geotextile which is specially designed for erosion control applications on steep slopes and vegetated waterways. The matrix is composed of a dense web of crimped, interlocking fibers featuring X3® technology positioned between two biaxially oriented nets and mechanically bound together by parallel stitching with polypropylene thread.The material exhibits very high interlock and reinforcement capacity with both soil and root systems, demonstrates superior UV resistance, and enhances seedling emergence.

1.2. The 12", 18", and 24" Securing Pins are composed of a wire, mushroomed at the top. A washer is then placed on the wire and the wire is crimped or swedged about 3-1/2" below the top so the washer will not slide off. The end of the wire is cut at a 45 degree angle for easy penetration of the soil. These Pins with washers conform to industry standards for erosion control pins with washers.

1.3. LANDLOK® S2 Erosion Control Blankets consist of 100% wheat straw mechanically bound and covered on both sides by netting. The straw is homogeneously blended and evenly distributed throughout the blanket. The netting is photodegradable polypropylene with mesh openings of approximately 3/8 in. by 3/8 in. (11 mm by 11 mm). The blanket is sewn on approximately 2 in. (51 mm) centers with photodegradable polypropylene thread. This product is NTPEP approved for AASHTO standards.

2. VEGETATION ESTABLISHMENT

2.1. Prepare seedbed by loosening/scarifying top 2 to 3 in. (50 to 75 mm) of the soil surface.

2.2. Apply any necessary soil amendments needed to promote healthy vegetation.

2.3. Sow 25-35% of the total permanent seed mixture to the prepared seedbed. Note this seed mixture amount is in addition to the 100% total seed mixture being applied in further steps.

2.4. Install LANDLOK® TRM per guidelines and specifications.

2.5. Soil-fill the LANDLOK® TRM with 1 to 2 in. (25 to 50 mm) of amended topsoil or fill with a biotic soil media. Do not place excessive soil above the LANDLOK® TRM material.

2.6. Apply 100% of the total permanent seed mixture onto the topsoil/biotic soil media by broadcasting. Sown seed may need to be raked into place to ensure good contact between seed and soil.

2.7. Install surficial protection with LANDLOK® S2 Erosion Control Blanket (ECB). LANDLOK® S2 ECB is to be secured using 6" U-shaped staples with a frequency of 1.7 staples per square yard (2.0 staples per square meter).

2.8. Water and/or irrigate seeded areas as needed to establish and maintain vegetation until the desired vegetative density has been achieved. Frequent, light irrigation will need to be applied to seeded areas if natural rain events have not occurred within two weeks of seeding.

2.9. Rubber-tired or rubber-tracked vehicles shall be used, and sharp turns avoided. No heavy and/or metal tracked equipment or sharp turns shall be permitted on the installed LANDLOK® TRM. Foot traffic and construction equipment shall be avoided over the LANDLOK® TRM if loose or wet soil conditions exist.

BEFORE INSTALLATION BEGINS

- Coordinate with a Propex Representative: A pre-construction meeting is suggested with the construction team and a representative from Propex. This meeting should be scheduled by the contractor with at least a two week notice.
- Gather the Tools Needed: Tools that you will need to install LANDLOK® TRM include a pair of industrial shears to cut LANDLOK® TRM, tape measure, and hammer/palm driver for installation of securing pins.
- Determine how to Establish Vegetation: The method of vegetation establishment should be determined prior to the start of installation. Different vegetation establishment methods require different orders of installation. Refer to Establish Vegetation for further guidance.
- A site specific soil test should be conducted to determine the recommended soil amendments required to establish permanent vegetation.
- Please consult the Propex Website for the most up to date installation guidelines.

PIN SCHEDULE	
SECURING DEVICE	PIN
HORIZONTAL PIN SPACING	PER MANUFACTURER'S DESIGN
VERTICAL PIN SPACING	PER MANUFACTURER'S DESIGN
EMBEDMENT DEPTH	PER MANUFACTURER'S DESIGN

SOLMAX

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NOTE: THE STANDARD DETAILS ILLUSTRATED IN THESE DRAWINGS ARE FOR INFORMATION AND EVALUATION PURPOSES ONLY AND ARE NOT FOR CONSTRUCTION. PROJECT SPECIFIC CALCULATIONS, SHOP DRAWINGS AND SPECIFICATIONS, SIGNED AND SEALED BY A REGISTERED LICENSED ENGINEER, ARE REQUIRED FOR CONSTRUCTION.

CONCEPTUAL INSTALLATION DETAILS

LANDLOK® TRM FOR CHANNEL PROTECTION

DATE:	SCALE:	SHEET	OF
06/03/2024	NTS	1	1

PROPEX

TECHNICAL DATA SHEET

EROSION PROTECTION

PROPEX Landlok 450

PROPEX® Landlok® 450 turf reinforcement mat (TRM) features X3® technology that consists of a dense web of interlocking, multi-lobed polypropylene fibers positioned between two biaxially oriented nets and mechanically bound together by parallel stitching with polypropylene thread. The TRM is designed to accelerate seedling emergence, exhibit high resiliency, and possess strength and durability properties to minimize damage during installation. Every component of Landlok 450 is stabilized against chemical and ultraviolet degradation which are normally found in a natural soil environment. Furthermore, the TRM contains no biodegradable components.

Landlok 450 conforms to the property values listed below[1] and is manufactured at a Propex facility having achieved ISO 9001:2008 certification. Propex performs internal Manufacturing Quality Control (MQC) tests that have been accredited by the Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP).

Properties	Test Method	English	Metric
Origin of material			
% U.S. Manufactured		100%	100%
Physical Properties			
Mass/Unit Area [2]	ASTM D6566	10.0 oz/sy	339 g/m^2
Thickness [2]	ASTM D6526	0.50 in	12.7 mm
Light Penetration (% Passing) [2]	ASTM D6567	20%	
Color	Visual	Green or Tan	
Mechanical Properties			
Tensile Strength [2]	ASTM D6818	425 x 350 lb/ft	6.2 x 5.1 kN/m
Elongation [2]	ASTM D6818	50%	
Resiliency [2]	ASTM D6524	90%	
Flexibility [2]	ASTM D6575	0.026 in-lb	30,000 mg-cm
Endurance			
UV Resistance % Retained at 1,000 hrs [2]	ASTM D4355	80%	
Performance			
Velocity (Vegetated) [2,3]	Large Scale	18 ft/s	5.5 m/s
Shear Stress (Vegetated) [2,3]	Large Scale	10 lb/ft^2	479 Pa
Manning's n (Unvegetated) [2,4]	Calculated	0.025	
Seedling Emergence [2]	ASTM D7322	409%	
Roll Sizes		8.0 ft x 140 ft 16.0 ft x 140 ft 16.0 ft x 348.75 ft	2.45 m x 42.7 m 4.88 m x 42.7 m 4.88 m x 106.3 m

NOTES:

(1) The property values listed above are effective 05/01/2023 and are subject to change without notice. Values represent testing at time of manufacture.

(2) Values represent testing at time of manufacture and are shown as typical values.

(3) Maximum permissible velocity and shear stress has been obtained through vegetated testing programs featuring specific soil types, vegetation classes, flow conditions, and failure criteria. These conditions may not be relevant to every project nor are they replicated by other manufacturers. Please contact Solmax for further information.

(4) Calculated as typical values from large-scale flexible channel lining test programs with a flow depth of 6 to 12 inches.

Solmax is not a design or engineering professional and has not performed any such design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation, or specification.

REV 0123

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FLYING W
UNIT 2

LANDLOK® TRM DETAILS

DATE	04/16/2026
PROJECT NO.	04024-018
DRAWN BY	C7
CHECKED BY	JL/TM

REVISIONS
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TBPELS No. 10048500

C6.D5

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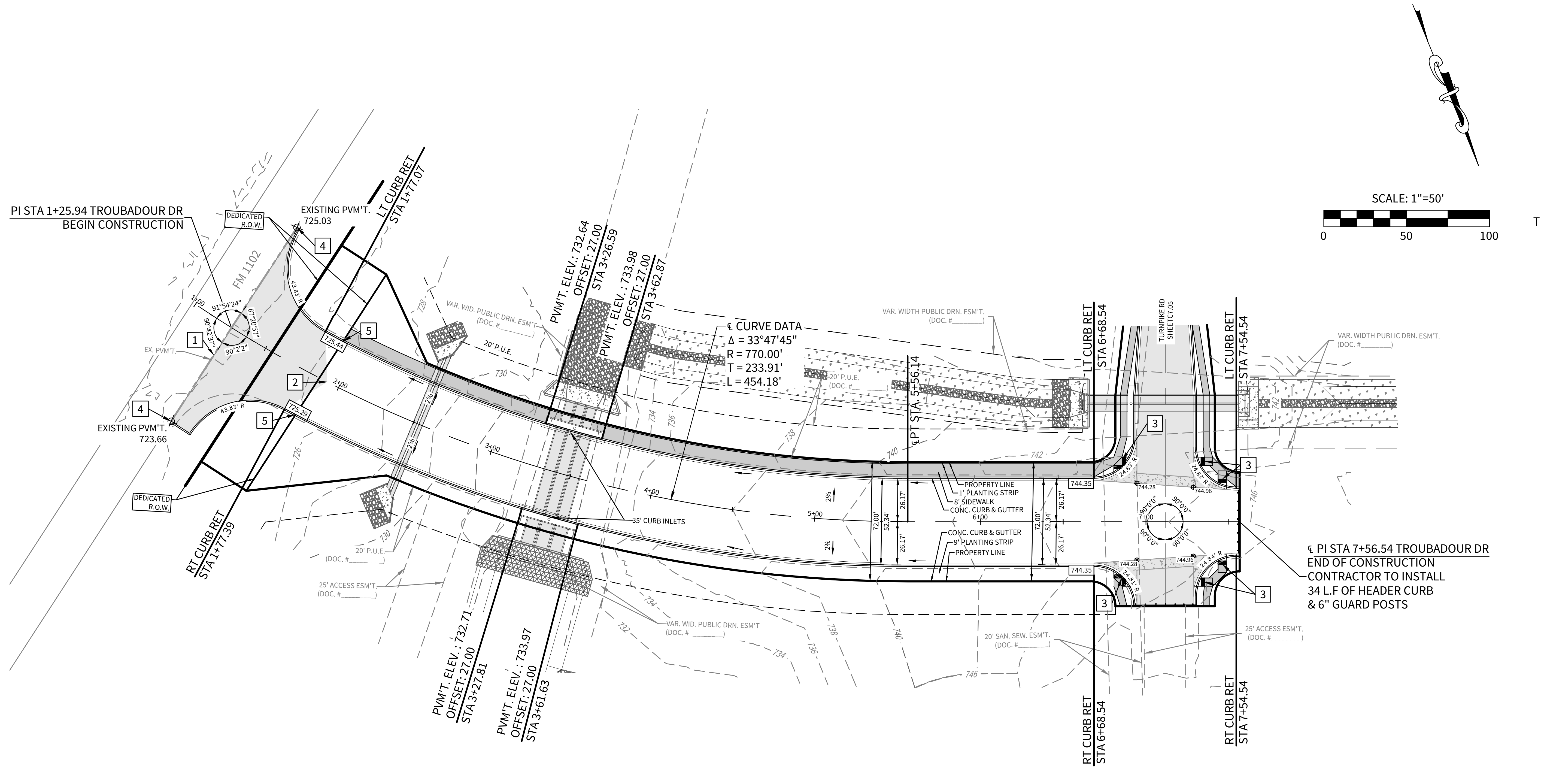
REPRODUCTION OF THE ORIGINAL SIGNED AND SEALED PLAN AND/OR ELECTRONIC MEDIA MAY HAVE BEEN INADVERTENTLY ALTERED. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE SCALE OF THE DOCUMENT AND CONTACTING CUDE ENGINEERS TO VERIFY DISCREPANCIES PRIOR TO CONSTRUCTION.

ELEVATIONS:

XXXX.XX	PROPOSED TOP OF CONCRETE CURB ELEVATION
XXXX.XX	PROPOSED ASPHALT PAVEMENT ELEVATION

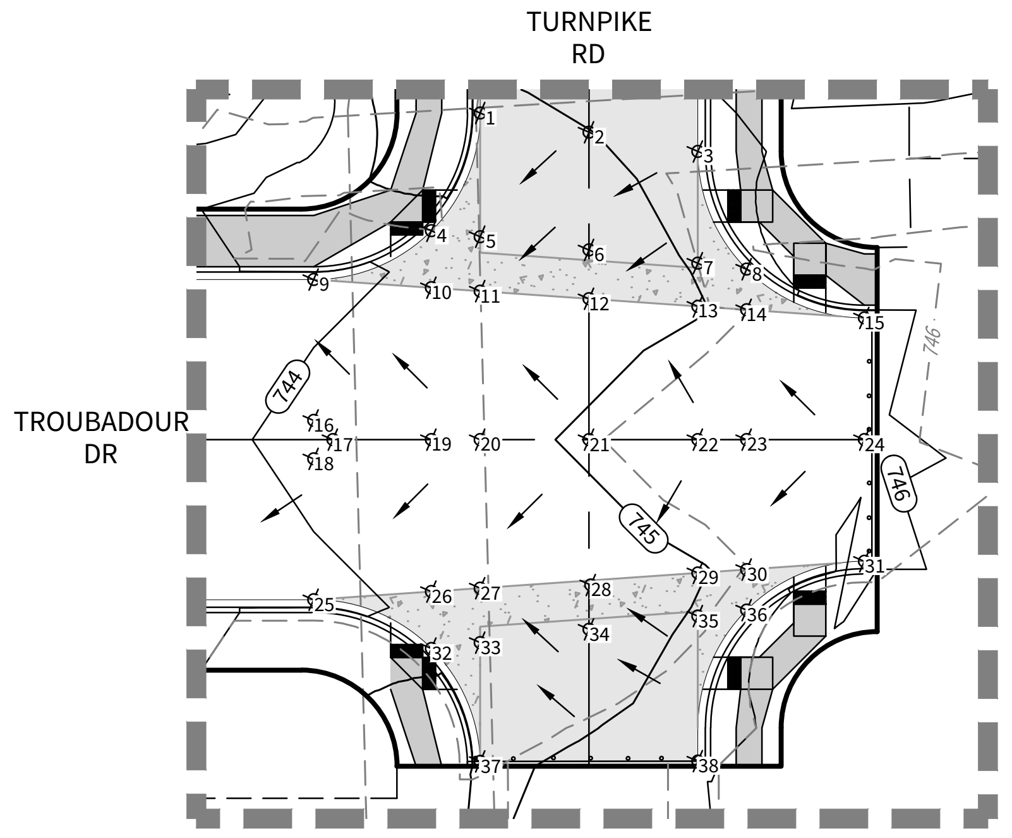
KEYNOTES:

1	BEGIN WASHOUT STA. 1+26.16
2	END WASHOUT STA. 1+92.17
3	ADA RAMP TO BE BUILT WITH INFRASTRUCTURE
4	BEGIN HEADER CURB
5	END HEADER CURB
6	BEGIN STREET TRANSITION FROM MAJOR COLLECTOR TO MINOR COLLECTOR (SEE POINT AND LINE TABLE) STA. 8+92.47
7	END STREET TRANSITION FROM MAJOR COLLECTOR TO MINOR COLLECTOR (SEE POINT AND LINE TABLE) STA. 9+92.69



PI STA 1+25.94 TROUBADOUR DR
BEGIN CONSTRUCTION
DEDICATED R.O.W.
EXISTING PVM'T. 725.03
LT CURB RET STA 1+77.07
FM 1102
91°54'24"
87°20'57"
90°42'37"
90°2'2"
1+00
EX. PVM'T.
43.83' R
725.44
725.29
EXISTING PVM'T. 723.66
RT CURB RET STA 1+77.39
2+00
3+00
4+00
5+00
6+00
7+00
20' P.U.E. (DOC. #________)
VAR. WID. PUBLIC DRN. ESM'T (DOC. #________)
25' ACCESS ESM'T. (DOC. #________)
2%
35' CURB INLETS
PVM'T. ELEV.: 732.64 OFFSET: 27.00 STA 3+26.59
PVM'T. ELEV.: 733.98 OFFSET: 27.00 STA 3+62.87
PVM'T. ELEV.: 732.71 OFFSET: 27.00 STA 3+27.81
PVM'T. ELEV.: 733.97 OFFSET: 27.00 STA 3+61.63
℄ CURVE DATA
Δ = 33°47'45"
R = 770.00'
T = 233.91'
L = 454.18'
VAR. WIDTH PUBLIC DRN. ESM'T. (DOC. #________)
℄ PT STA. 5+56.14
PROPERTY LINE
1' PLANTING STRIP
8' SIDEWALK
CONC. CURB & GUTTER
9' PLANTING STRIP
72.00'
52.34'
26.17'
744.35
LT CURB RET STA 6+68.54
RT CURB RET STA 6+68.54
TURNPIKE RD SHEETC7.05
LT CURB RET STA 7+54.54
RT CURB RET STA 7+54.54
24.83' R
24.81' R
24.84' R
744.28
744.96
90°0'0"
20' SAN. SEW. ESM'T. (DOC. #________)
℄ PI STA 7+56.54 TROUBADOUR DR
END OF CONSTRUCTION
CONTRACTOR TO INSTALL
34 L.F OF HEADER CURB
& 6" GUARD POSTS
SCALE: 1"=50'
0 50 100

TROUBADOUR DR



TURNPIKE RD
TROUBADOUR DR

INTERSECTION DETAIL

SCALE: 1" = 30'

Point Table		
POINT LETTER	ELEVATION	DESCRIPTION
1	744.81	PVM'T.
2	744.99	PVM'T.
3	745.22	PVM'T.
4	744.27	PVM'T.
5	744.40	PVM'T.
6	744.71	PVM'T.
7	745.04	PVM'T.
8	745.31	PVM'T.
9	743.79	PVM'T.
10	744.18	PVM'T.
11	744.35	PVM'T.
12	744.72	PVM'T.
13	744.97	PVM'T.
14	745.12	PVM'T.
15	745.51	PVM'T.
16	744.23	PVM'T.
17	744.35	PVM'T.
18	744.23	PVM'T.
19	744.66	PVM'T.
20	744.80	PVM'T.

Point Table		
POINT LETTER	ELEVATION	DESCRIPTION
21	745.09	PVM'T.
22	745.37	PVM'T.
23	745.52	PVM'T.
24	745.89	PVM'T.
25	743.79	PVM'T.
26	744.18	PVM'T.
27	744.35	PVM'T.
28	744.72	PVM'T.
29	744.97	PVM'T.
30	745.12	PVM'T.
31	745.51	PVM'T.
32	744.30	PVM'T.
33	744.40	PVM'T.
34	744.71	PVM'T.
35	745.06	PVM'T.
36	745.32	PVM'T.
37	744.85	PVM'T.
38	745.36	PVM'T.

LEGEND

⌒	CROSS GUTTER
▭	STREET WASHOUT (SEE SHEET C7.D1)
■	SIDEWALK TO BE CONSTRUCTED WITH INFRASTRUCTURE
░	SIDEWALK TO BE CONSTRUCTED WITH HOME BUILDING
▩	SIDEWALK TO BE INSTALLED WITH THE INFRASTRUCTURE TO ENSURE MANHOLES ARE INSTALLED FLUSH WITH THE SIDEWALK.

SPEED LIMIT DESIGNATED BY STREET TYPE;

RESIDENTIAL	20 MPH
RESIDENTIAL COLLECTOR	30 MPH
MINOR COLLECTOR	35 MPH

TxDOT TYPE "2" WHEEL CHAIR RAMPS ARE INDICATED THUS " ▥ " OR " ▥ " UNLESS OTHERWISE NOTED. (SHEET C7.D7) FOR ADA RAMPS AT SIDEWALK INTERSECTIONS

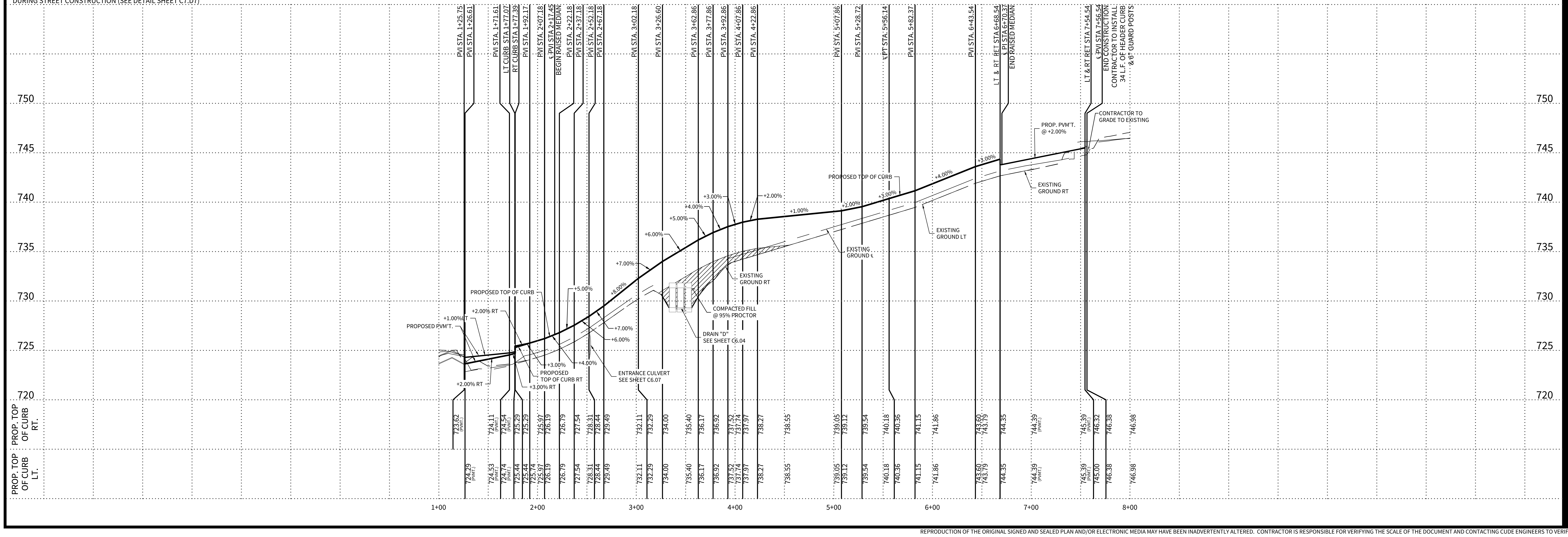
TYPE "10" DIRECTIONAL WHEEL CHAIR RAMPS ARE INDICATED THUS " " OR " " UNLESS OTHERWISE NOTED.

FOR ADA RAMPS AT SIDEWALK INTERSECTIONS . DETECTABLE WARNING PAVER WITH TRUNCATED DOMES ONLY. ALL PEDESTRIAN CROSSING RAMPS TO BE BUILT WITH INFRASTRUCTURE DURING STREET CONSTRUCTION (SEE DETAIL SHEET C7.D7)

TROUBADOUR DR

STA. 1+00.00 TO STA. 7+56.54

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'



PVI STA. 1+25.75
PVI STA. 1+26.61
PVI STA. 1+71.61
LT CURB STA 1+77.07
RT CURB STA 1+77.39
PVI STA. 1+92.17
PVI STA. 2+07.18
℄ PVI STA 2+17.45
BEGIN RAISED MEDIAN
PVI STA. 2+22.18
PVI STA. 2+37.18
PVI STA. 2+52.18
PVI STA. 2+67.18
PVI STA. 3+02.18
PVI STA. 3+26.60
PVI STA. 3+62.86
PVI STA. 3+77.86
PVI STA. 3+92.86
PVI STA. 4+07.86
PVI STA. 4+22.86
PVI STA. 5+07.86
PVI STA. 5+28.72
℄ PT STA. 5+56.14
PVI STA. 5+82.37
PVI STA. 6+43.54
LT & RT RET STA 6+68.54
℄ PI STA 6+70.37
END RAISED MEDIAN
LT & RT RET STA 7+54.54
℄ PVI STA 7+56.54
END CONSTRUCTION
CONTRACTOR TO INSTALL
34 L.F. OF HEADER CURB
& 6" GUARD POSTS
750
745
740
735
730
725
720
CONTRACTOR TO GRADE TO EXISTING
PROP. PVM'T. @ +2.00%
EXISTING GROUND RT
EXISTING GROUND LT
EXISTING GROUND
PROPOSED TOP OF CURB
+4.00%
+3.00%
+2.00%
+1.00%
+5.00%
+6.00%
+7.00%
+8.00%
COMPACTED FILL @ 95% PROCTOR
DRAIN "D" SEE SHEET C6.04
ENTRANCE CULVERT SEE SHEET C6.07
PROPOSED TOP OF CURB RT
+3.00% RT
+2.00% RT
+1.00% LT
PROPOSED PVM'T.
PROP. TOP OF CURB RT.
723.62 (PVMT.)
724.11 (PVMT.)
724.54 (PVMT.)
725.29
725.29
725.97
726.19
726.79
727.54
728.31
728.44
729.49
732.11
732.29
734.00
735.40
736.17
736.92
737.52
737.74
737.97
738.27
738.55
739.05
739.12
739.54
740.18
740.36
741.15
741.86
743.60
743.79
744.35
744.39 (PVMT.)
745.39 (PVMT.)
746.32
746.38
746.98
PROP. TOP OF CURB LT.
724.29 (PVMT.)
724.53 (PVMT.)
724.74 (PVMT.)
725.44
725.44
725.74
725.97
726.19
726.79
727.54
728.31
728.44
729.49
732.11
732.29
734.00
735.40
736.17
736.92
737.52
737.74
737.97
738.27
738.55
739.05
739.12
739.54
740.18
740.36
741.15
741.86
743.60
743.79
744.35
744.39 (PVMT.)
745.39 (PVMT.)
745.00
746.38
746.98
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00

CUDEENGINEERS.COM

CUDE
EST. 1980
ENGINEERS

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W UNIT 2

STREET PLAN AND PROFILE - TROUBADOUR DR

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
1.
2.
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8.

4/16/26
TORY DUANE MILLER
135598
Tory Miller

CUDE ENGINEERS
TBPELS No. 10048500

C7.00

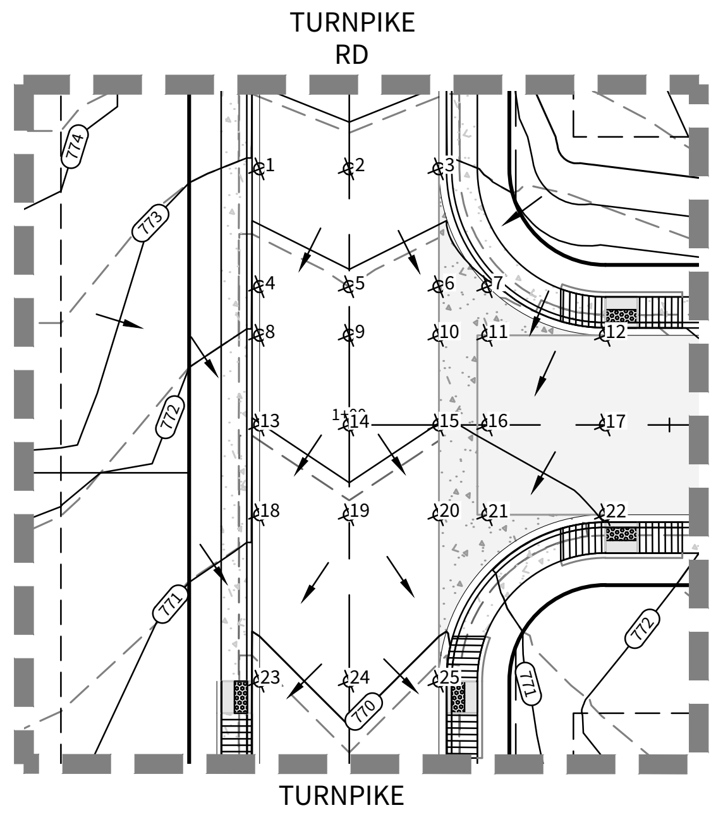
R:\04024\018\2-DWG\4-Plans\C7.00 STREET PLAN AND PROFILE - TROUBADOUR DR.dwg 2026/04/16 8:39am sgonzales

ELEVATIONS:

XXXX.XX	PROPOSED TOP OF CONCRETE CURB ELEVATION
XXXX.XX⊗	PROPOSED ASPHALT PAVEMENT ELEVATION

KEYNOTES:

1	CONTRACTOR TO INSTALL 5' X 5' SIDEWALK PASSING SPACE WITH HOMEBUILDING
2	CONTRACTOR TO INSTALL SIDEWALK WITH INFRASTRUCTURE
3	CONTRACTOR TO CONSTRUCT ADA RAMP WITH INFRASTRUCTURE
4	BEGIN WASHOUT STA. 1+15.17 PVM'T. ELEV. = 771.42
5	END WASHOUT STA. 2+13.69 PVM'T. ELEV. = 774.76


TURNPIKE RD
TURNPIKE RD
YOAKUM VW
774
773
772
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

INTERSECTION DETAIL

SCALE: 1" = 30'

Point Table		
POINT LETTER	ELEVATION	DESCRIPTION
1	772.35	PVM'T.
2	772.63	PVM'T.
3	772.35	PVM'T.
4	771.64	PVM'T.
5	771.92	PVM'T.
6	771.64	PVM'T.
7	771.91	PVM'T.
8	771.41	PVM'T.
9	771.69	PVM'T.
10	771.41	PVM'T.
11	771.65	PVM'T.
12	771.72	PVM'T.
13	770.99	PVM'T.
14	771.27	PVM'T.
15	770.99	PVM'T.
16	771.08	PVM'T.
17	771.38	PVM'T.
18	770.57	PVM'T.
19	770.85	PVM'T.
20	770.57	PVM'T.
21	770.65	PVM'T.
22	771.04	PVM'T.
23	769.86	PVM'T.
24	770.14	PVM'T.
25	769.86	PVM'T.

LEGEND

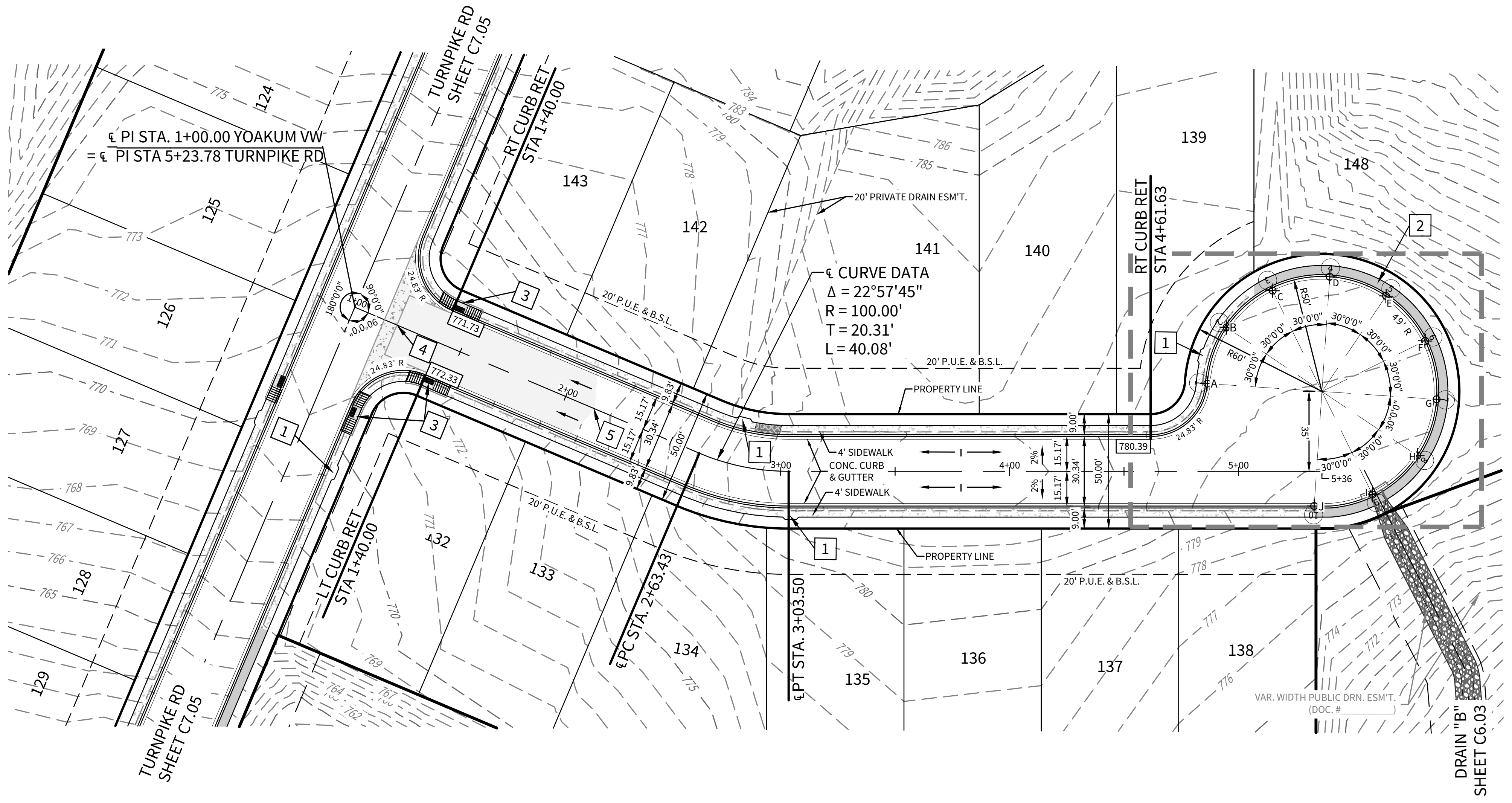
	CROSS GUTTER
▭	STREET WASHOUT (SEE SHEET C7.D1)
■	SIDEWALK TO BE CONSTRUCTED WITH INFRASTRUCTURE
░	SIDEWALK TO BE CONSTRUCTED WITH HOME BUILDING
▩	SIDEWALK TO BE INSTALLED WITH THE INFRASTRUCTURE TO ENSURE MANHOLES ARE INSTALLED FLUSH WITH THE SIDEWALK.

SPEED LIMIT DESIGNATED BY STREET TYPE;

RESIDENTIAL	20 MPH
RESIDENTIAL COLLECTOR	30 MPH
MINOR COLLECTOR	35 MPH

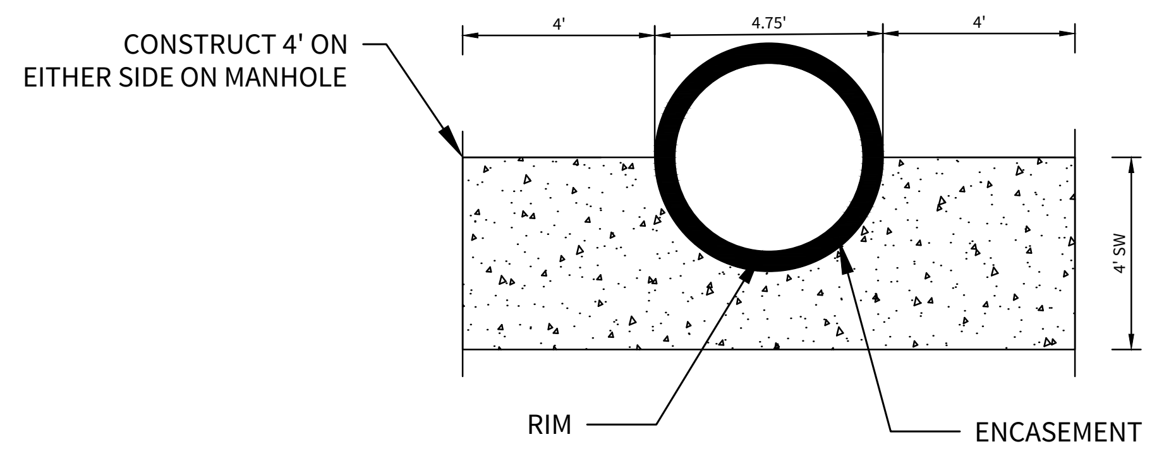
TxDOT TYPE "2" WHEEL CHAIR RAMPS ARE INDICATED THUS " ▥ " OR " ▥ " UNLESS OTHERWISE NOTED. (SHEET C7.D7)
FOR ADA RAMPS AT SIDEWALK INTERSECTIONS
TYPE "10" DIRECTIONAL WHEEL CHAIR RAMPS ARE INDICATED THUS " " OR " " UNLESS OTHERWISE NOTED.

FOR ADA RAMPS AT SIDEWALK INTERSECTIONS .
DETECTABLE WARNING PAVER WITH TRUNCATED DOMES ONLY. ALL PEDESTRIAN CROSSING RAMPS TO BE BUILT WITH INFRASTRUCTURE DURING STREET CONSTRUCTION (SEE DETAIL SHEET C7.D7)


TURNPIKE RD
SHEET C7.05
RT CURB RET
STA 1+40.00
℄ PI STA. 1+00.00 YOAKUM VW
= ℄ PI STA 5+23.78 TURNPIKE RD
124
125
126
127
128
129
143
142
141
140
139
148
132
133
134
135
136
137
138
20' PRIVATE DRAIN ESM'T.
℄ CURVE DATA
Δ = 22°57'45"
R = 100.00'
T = 20.31'
L = 40.08'
20' P.U.E. & B.S.L.
PROPERTY LINE
4' SIDEWALK
CONC. CURB & GUTTER
RT CURB RET
STA 4+61.63
771.73
772.33
780.39
24.83' R
2+00
3+00
4+00
5+00
5+36
15.17'
30.34'
50.00'
9.00'
2%
R60'
R50'
49' R
35'
30°0'0"
LT CURB RET
STA 1+40.00
℄ PC STA. 2+63.43
℄ PT STA. 3+03.50
VAR. WIDTH PUBLIC DRN. ESM'T. (DOC. #________)
DRAIN "B"
SHEET C6.03
TURNPIKE RD
SHEET C7.05
1
2
3
4
5

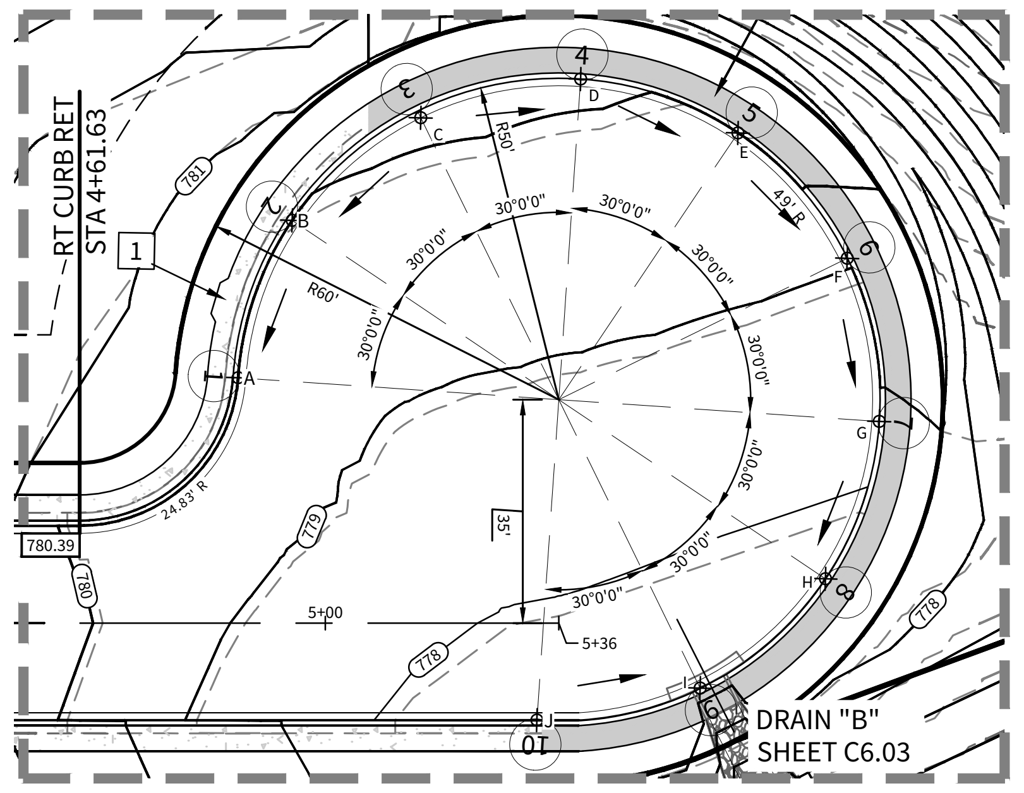
YOAKUM VW

STA. 1.00 TO END


CONSTRUCT 4' ON EITHER SIDE ON MANHOLE
4'
4.75'
4'
4' SW
RIM
ENCASEMENT

TYPICAL SANITARY SEWER IN SIDEWALK DETAIL

N.T.S.

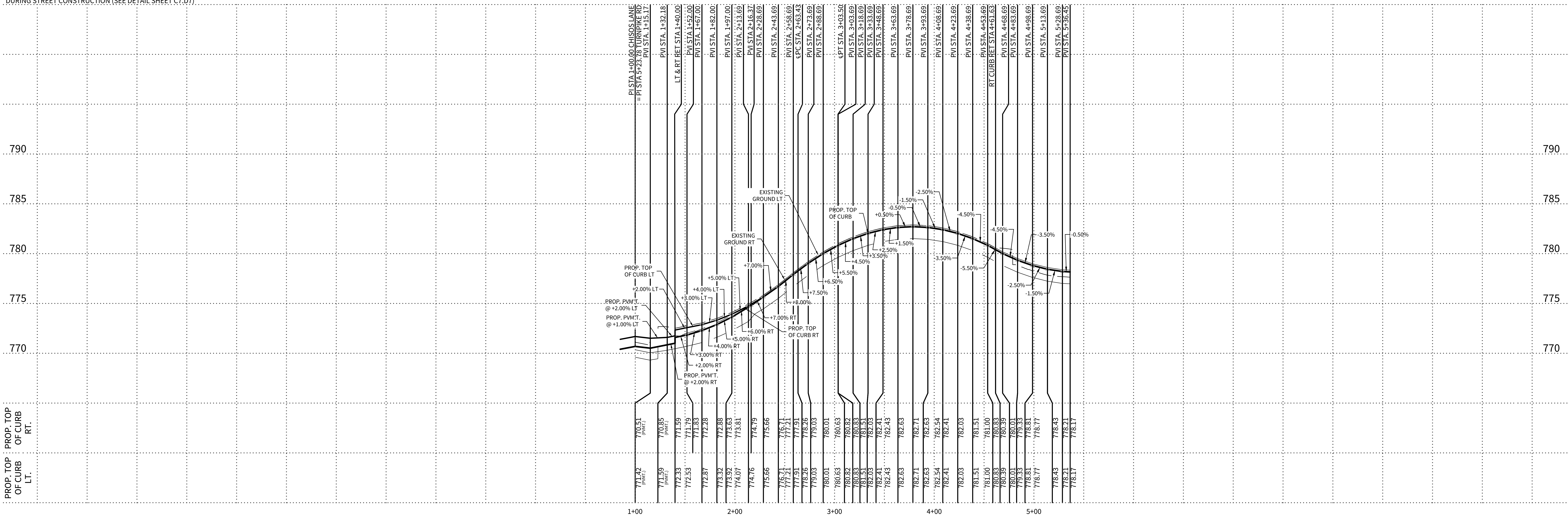

RT CURB RET
STA 4+61.63
780.39
5+00
5+36
A
B
C
D
E
F
G
H
I
J
1
2
3
4
5
6
7
8
9
10
30°0'0"
DRAIN "B"
SHEET C6.03

CUL-DE-SAC DETAIL

SCALE: 1" = 30'

Point	Elevation	Description
A(1)	779.81	PVMT
B(2)	779.99	PVMT
C(3)	780.18	PVMT
D(4)	780.14	PVMT
E(5)	779.79	PVMT
F(6)	779.10	PVMT
G(7)	778.32	PVMT
H(8)	777.75	PVMT
I(9)	777.53	PVMT
J(10)	777.60	PVMT

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'


PI STA 1+00.00 CHISOS LANE
= PI STA 5+23.78 TURNPIKE RD
PVI STA. 1+15.17
PVI STA. 1+32.18
LT & RT RET STA 1+40.00
PVI STA 1+52.00
PVI STA. 1+67.00
PVI STA. 1+82.00
PVI STA. 1+97.00
PVI STA. 2+13.69
PVI STA 2+16.37
PVI STA. 2+28.69
PVI STA. 2+43.69
PVI STA. 2+58.69
℄ PC STA. 2+63.43
PVI STA. 2+73.69
PVI STA. 2+88.69
℄ PT STA. 3+03.50
PVI STA. 3+03.69
PVI STA. 3+18.69
PVI STA. 3+33.69
PVI STA. 3+48.69
PVI STA. 3+63.69
PVI STA. 3+78.69
PVI STA. 3+93.69
PVI STA. 4+08.69
PVI STA. 4+23.69
PVI STA. 4+38.69
PVI STA. 4+53.69
RT CURB RET STA 4+61.63
PVI STA. 4+68.69
PVI STA. 4+83.69
PVI STA. 4+98.69
PVI STA. 5+13.69
PVI STA. 5+28.69
PVI STA. 5+36.45
790
785
780
775
770
EXISTING GROUND LT
EXISTING GROUND RT
PROP. TOP OF CURB
PROP. TOP OF CURB LT
PROP. TOP OF CURB RT
PROP. PVM'T. @ +2.00% LT
PROP. PVM'T. @ +1.00% LT
PROP. PVM'T. @ +2.00% RT
+2.00% LT
+3.00% LT
+4.00% LT
+5.00% LT
+7.00%
+8.00%
+7.50%
+6.50%
+5.50%
+4.50%
+3.50%
+2.50%
+1.50%
+0.50%
-0.50%
-1.50%
-2.50%
-4.50%
-3.50%
-5.50%
-4.50%
-3.50%
-2.50%
-1.50%
-0.50%
+2.00% RT
+3.00% RT
+4.00% RT
+5.00% RT
+6.00% RT
+7.00% RT
PROP. TOP OF CURB RT.
770.51 (PVMT.)
770.85 (PVMT.)
771.59
771.79
771.83
772.28
772.88
773.63
773.81
774.79
775.66
776.71
777.21
777.91
778.26
779.03
780.01
780.63
780.82
780.83
781.51
782.03
782.41
782.43
782.63
782.71
782.63
782.54
782.41
782.03
781.51
781.00
780.83
780.39
780.01
779.33
778.81
778.77
778.43
778.21
778.17
PROP. TOP OF CURB LT.
771.42 (PVMT.)
771.59 (PVMT.)
772.33
772.53
772.87
773.32
773.92
774.07
774.76
775.66
776.71
777.21
777.91
778.26
779.03
780.01
780.63
780.82
780.83
781.51
782.03
782.41
782.43
782.63
782.71
782.63
782.54
782.41
782.03
781.51
781.00
780.83
780.39
780.01
779.33
778.81
778.77
778.43
778.21
778.17
1+00
2+00
3+00
4+00
5+00

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FLYING W
UNIT 2

STREET PLAN AND PROFILE - YOAKUM VW

DATE	04/16/2026
PROJECT NO.	04024-018
DRAWN BY	C7
CHECKED BY	JL/TM

REVISIONS
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4/16/26
TORY DUANE MILLER
135598

CUDE ENGINEERS
TBPELS No. 10048500

C7.01

R:\04024\018\2-DWG\4-Plans\C7.01 STREET PLAN AND PROFILE - YOAKUM VW.dwg 2026/04/16 8:40am sgonzales

ELEVATIONS:

XXX.XX (boxed)	PROPOSED TOP OF CONCRETE CURB ELEVATION
×XXX.XX	PROPOSED ASPHALT PAVEMENT ELEVATION

KEYNOTES:

1	CONTRACTOR TO INSTALL 5' X 5' SIDEWALK PASSING SPACE WITH HOMEBUILDING
2	CONTRACTOR TO CONSTRUCT ADA RAMP WITH INFRASTRUCTURE
3	CONTRACTOR TO INSTALL SIDEWALK WITH INFRASTRUCTURE
4	BEGIN WASHOUT STA. 8+20.36 PVM'T. ELEV. = 808.87
5	END WASHOUT STA. 9+08.82 PVM'T ELEV. = 808.09
6	BEGIN STREET TRANSITION STA. 7+77.81 FROM RESIDENTIAL TO RESIDENTIAL COLLECTOR (SEE POINT AND LINE TABLE)
7	END STREET TRANSITION STA. 8+52.82 FROM RESIDENTIAL TO RESIDENTIAL COLLECTOR (SEE POINT AND LINE TABLE)
8	CONTRACTOR TO INSTALL 5' X 5' SIDEWALK PASSING SPACE WITH INFRASTRUCTURE

LEGEND

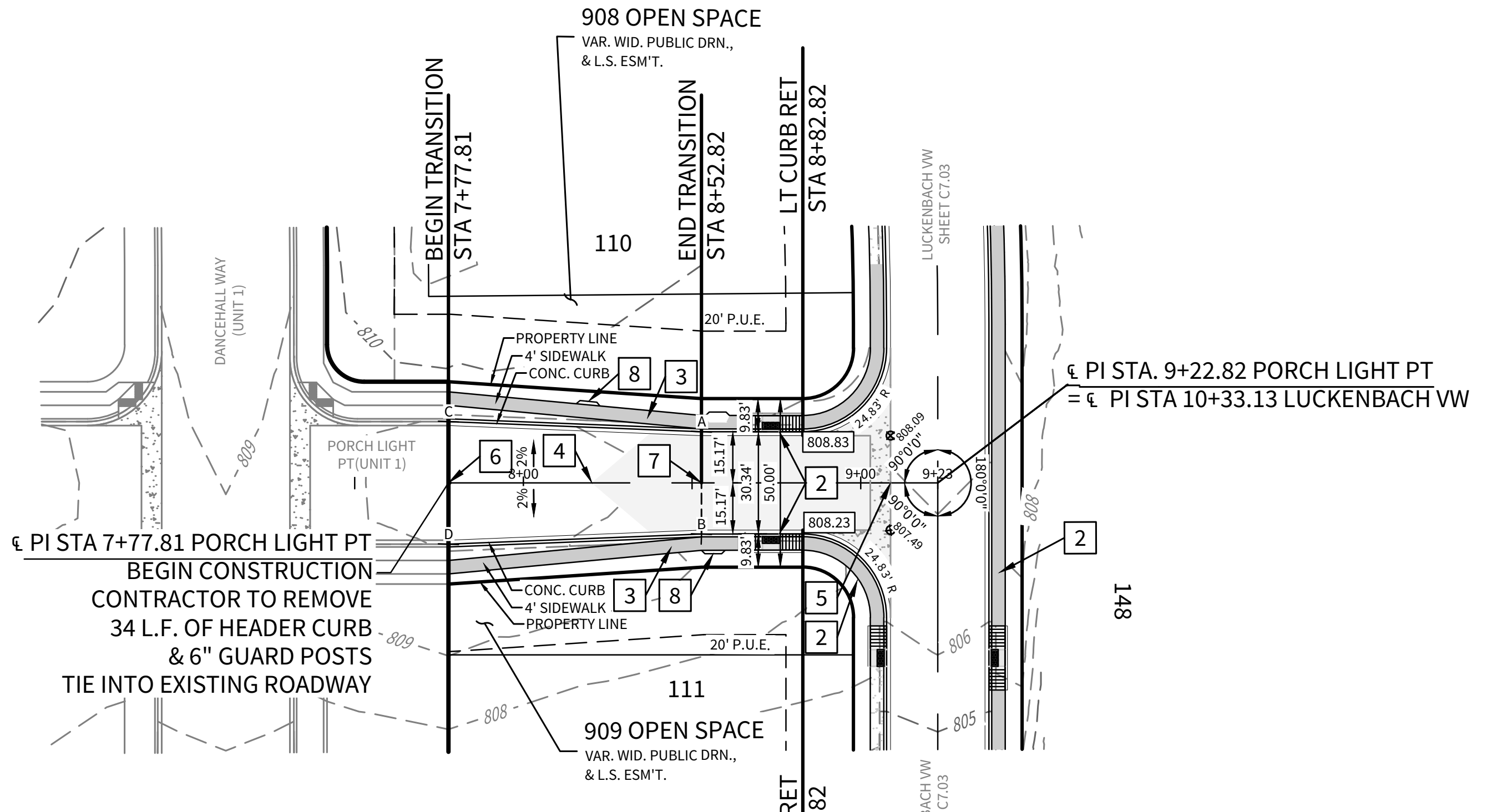
⌣	CROSS GUTTER
░	STREET WASHOUT (SEE SHEET C7.D1)
■	SIDEWALK TO BE CONSTRUCTED WITH INFRASTRUCTURE
▒	SIDEWALK TO BE CONSTRUCTED WITH HOME BUILDING
▨	SIDEWALK TO BE INSTALLED WITH THE INFRASTRUCTURE TO ENSURE MANHOLES ARE INSTALLED FLUSH WITH THE SIDEWALK.

SPEED LIMIT DESIGNATED BY STREET TYPE;

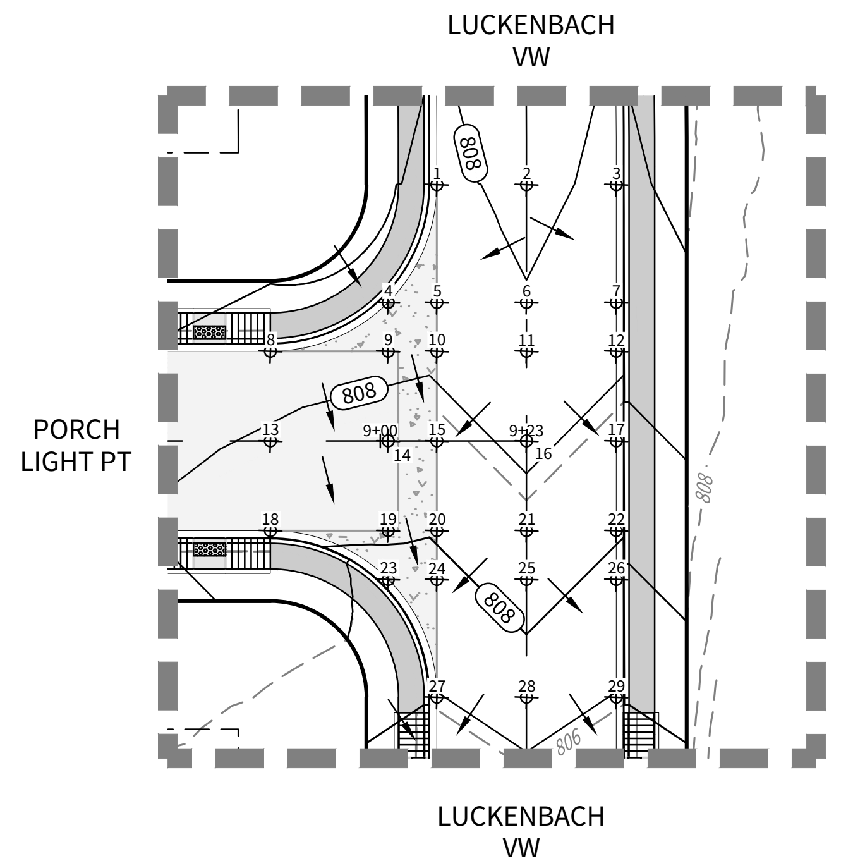
RESIDENTIAL	20 MPH
RESIDENTIAL COLLECTOR	30 MPH
MINOR COLLECTOR	35 MPH

TxDOT TYPE "2" WHEEL CHAIR RAMPS ARE INDICATED THUS " ▥ "
OR " ▥ " UNLESS OTHERWISE NOTED. (SHEET C7.D7)
FOR ADA RAMPS AT SIDEWALK INTERSECTIONS
TYPE "10" DIRECTIONAL WHEEL CHAIR RAMPS ARE INDICATED
THUS " ⬠ " OR " ⬠ " UNLESS OTHERWISE NOTED.

FOR ADA RAMPS AT SIDEWALK INTERSECTIONS .
DETECTABLE WARNING PAVER WITH TRUNCATED DOMES ONLY. ALL PEDESTRIAN CROSSING RAMPS TO BE BUILT WITH INFRASTRUCTURE DURING STREET CONSTRUCTION (SEE DETAIL SHEET C7.D7)


908 OPEN SPACE
VAR. WID. PUBLIC DRN., & L.S. ESM'T.
BEGIN TRANSITION STA 7+77.81
END TRANSITION STA 8+52.82
LT CURB RET STA 8+82.82
110
20' P.U.E.
PROPERTY LINE
4' SIDEWALK
CONC. CURB
8
3
DANCEHALL WAY (UNIT 1)
810
809
PORCH LIGHT PT(UNIT 1)
C
A
9.83'
808.83
6
4
7
2%
8+00
2%
15.17'
30.34'
50.00'
15.17'
2
9+00
9+23
24.83' R
808.09
90°0'0"
90°0'0"
180°0'0"
807.49
B
D
808.23
LUCKENBACH VW SHEET C7.03
℄ PI STA. 9+22.82 PORCH LIGHT PT
= ℄ PI STA 10+33.13 LUCKENBACH VW
℄ PI STA 7+77.81 PORCH LIGHT PT
BEGIN CONSTRUCTION
CONTRACTOR TO REMOVE
34 L.F. OF HEADER CURB
& 6" GUARD POSTS
TIE INTO EXISTING ROADWAY
CONC. CURB
4' SIDEWALK
PROPERTY LINE
3
8
5
2
2
148
808
806
805
111
20' P.U.E.
909 OPEN SPACE
VAR. WID. PUBLIC DRN., & L.S. ESM'T.
RT CURB RET STA 8+82.82
LUCKENBACH VW SHEET C7.03

Point	Elevation	Description
A	808.55'	PVMT
B	808.17'	PVMT
C	809.04'	PVMT
D	809.04'	PVMT


LUCKENBACH VW
PORCH LIGHT PT
LUCKENBACH VW
1
2
3
4
5
6
7
8
9
10
11
12
13
9+00
14
15
9+23
16
17
18
19
20
21
22
23
24
25
26
27
28
29
808
806

INTERSECTION DETAIL

SCALE: 1" = 30'

SCALE: 1"=50'
0 50 100

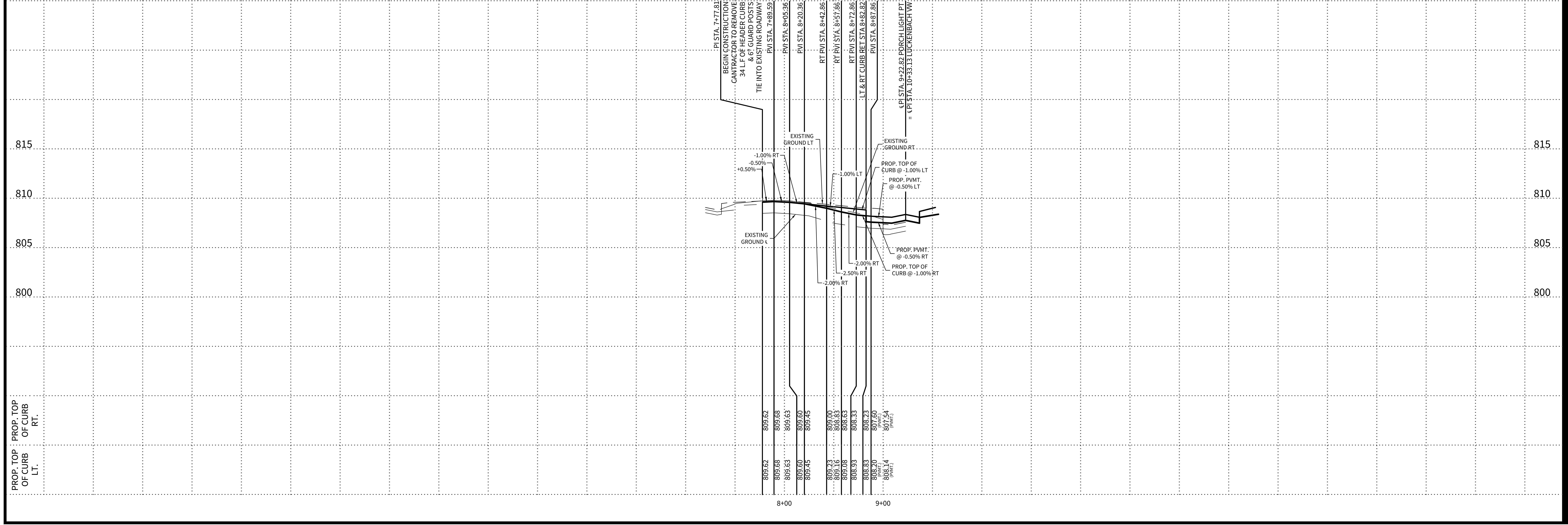
Point Table		
POINT LETTER	ELEVATION	DESCRIPTION
1	808.36	PVM'T.
2	808.65	PVM'T.
3	808.37	PVM'T.
4	808.27	PVM'T.
5	808.24	PVM'T.
6	808.47	PVM'T.
7	808.19	PVM'T.
8	808.22	PVM'T.
9	808.11	PVM'T.
10	808.10	PVM'T.
11	808.38	PVM'T.
12	808.10	PVM'T.
13	807.95	PVM'T.
14	807.83	PVM'T.
15	807.82	PVM'T.

Point Table		
POINT LETTER	ELEVATION	DESCRIPTION
16	808.10	PVM'T.
17	807.82	PVM'T.
18	807.67	PVM'T.
19	807.55	PVM'T.
20	807.54	PVM'T.
21	807.82	PVM'T.
22	807.54	PVM'T.
23	807.32	PVM'T.
24	807.38	PVM'T.
25	807.67	PVM'T.
26	807.39	PVM'T.
27	806.98	PVM'T.
28	807.26	PVM'T.
29	806.98	PVM'T.

PORCH LIGHT PT

STA. 7+77.81 TO STA. 9+22.82

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'


PI STA. 7+77.81
BEGIN CONSTRUCTION
CANTRACTOR TO REMOVE
34 L.F OF HEADER CURB
& 6" GUARD POSTS
TIE INTO EXISTING ROADWAY
PVI STA. 7+89.59
PVI STA. 8+05.36
PVI STA. 8+20.36
RT PVI STA. 8+42.86
RT PVI STA. 8+57.86
RT PVI STA. 8+72.86
LT & RT CURB RET STA 8+82.82
PVI STA. 8+87.86
℄ PI STA. 9+22.82 PORCH LIGHT PT
= ℄ PI STA. 10+33.13 LUCKENBACH VW
815
810
805
800
EXISTING GROUND LT
-1.00% RT
-0.50%
+0.50%
-1.00% LT
EXISTING GROUND RT
PROP. TOP OF CURB @ -1.00% LT
PROP. PVMT. @ -0.50% LT
EXISTING GROUND ℄
PROP. PVMT. @ -0.50% RT
PROP. TOP OF CURB @ -1.00% RT
-2.00% RT
-2.50% RT
-2.00% RT
PROP. TOP OF CURB RT.
809.62
809.68
809.63
809.60
809.45
809.00
808.83
808.63
808.33
808.23
807.60 (PVMT.)
807.54 (PVMT.)
PROP. TOP OF CURB LT.
809.62
809.68
809.63
809.60
809.45
809.23
809.16
809.08
808.93
808.83
808.20 (PVMT.)
808.14 (PVMT.)
8+00
9+00

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FLYING W
UNIT 2

STREET PLAN AND PROFILE - PORCH LIGHT PT

DATE	04/16/2026
PROJECT NO.	04024-018
DRAWN BY	C7
CHECKED BY	JL/TM

REVISIONS
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8.

4/16/26
TORY DUANE MILLER
135598

CUDE ENGINEERS
TBPELS No. 10048500

C7.02

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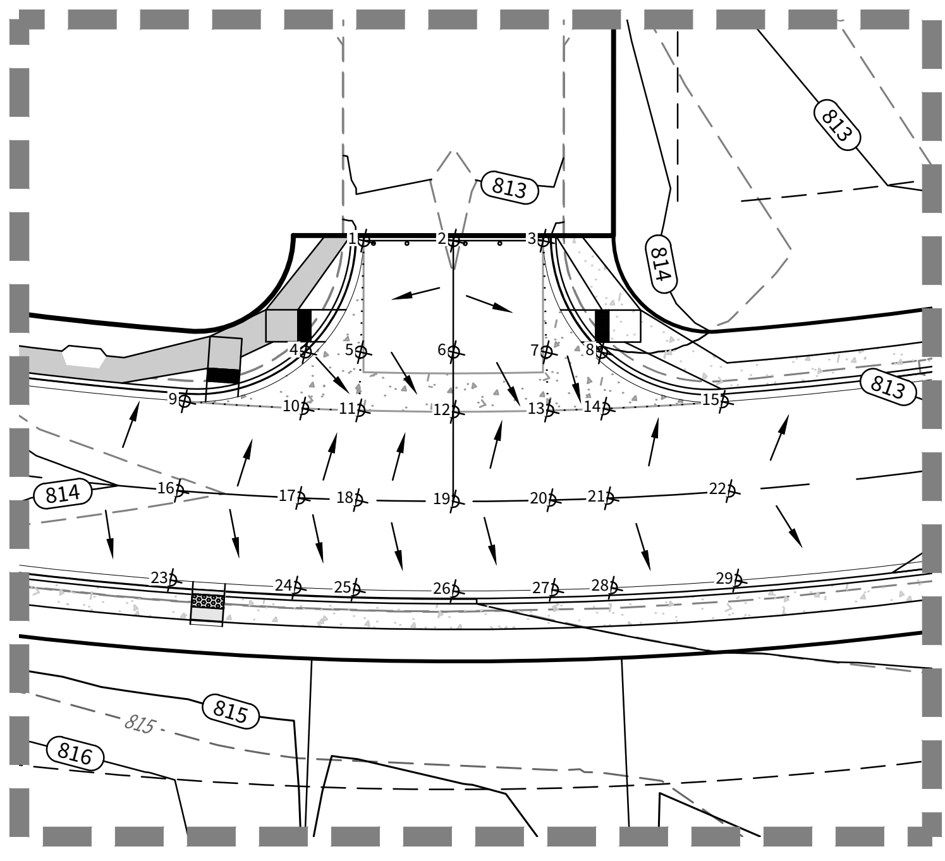
ELEVATIONS:

XXXX.XX PROPOSED TOP OF CONCRETE CURB ELEVATION

XXXX.XX PROPOSED ASPHALT PAVEMENT ELEVATION

KEYNOTES:

1. CONTRACTOR TO INSTALL 5' X 5' SIDEWALK PASSING SPACE WITH HOMEBUILDING
2. CONTRACTOR TO INSTALL SIDEWALK WITH INFRASTRUCTURE
3. BEGIN WASHOUT STA. 7+68.69 PVM'T. ELEV. = 809.45
4. END WASHOUT STA. 9+42.96 PVM'T. ELEV. = 808.48
5. CONTRACTOR TO INSTALL 5' X 5' SIDEWALK PASSING SPACE WITH INFRASTRUCTURE
6. CONTRACTOR TO CONSTRUCT ADA RAMP AT THE TIME OF INFRASTRUCTURE


LUCKENBACH VW
LUCKENBACH VW
813
814
815
816
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29

INTERSECTION DETAIL

SCALE: 1" = 30'

POINT LETTER	ELEVATION	DESCRIPTION
1	813.67	PVM'T.
2	813.94	PVM'T.
3	813.62	PVM'T.
4	813.65	PVM'T.
5	813.55	PVM'T.
6	813.61	PVM'T.
7	813.45	PVM'T.
8	813.41	PVM'T.
9	813.67	PVM'T.
10	813.58	PVM'T.
11	813.53	PVM'T.
12	813.46	PVM'T.
13	813.38	PVM'T.
14	813.34	PVM'T.
15	813.24	PVM'T.

Point Table

POINT LETTER	ELEVATION	DESCRIPTION
16	813.95	PVM'T.
17	813.86	PVM'T.
18	813.81	PVM'T.
19	813.74	PVM'T.
20	813.66	PVM'T.
21	813.62	PVM'T.
22	813.52	PVM'T.
23	813.67	PVM'T.
24	813.58	PVM'T.
25	813.53	PVM'T.
26	813.46	PVM'T.
27	813.38	PVM'T.
28	813.34	PVM'T.
29	813.24	PVM'T.

Point Table

SCALE: 1"=50'
0 50 100

LEGEND

	CROSS GUTTER
	STREET WASHOUT (SEE SHEET C7.D1)
■	SIDEWALK TO BE CONSTRUCTED WITH INFRASTRUCTURE
▨	SIDEWALK TO BE CONSTRUCTED WITH HOME BUILDING
▩	SIDEWALK TO BE INSTALLED WITH THE INFRASTRUCTURE TO ENSURE MANHOLES ARE INSTALLED FLUSH WITH THE SIDEWALK.

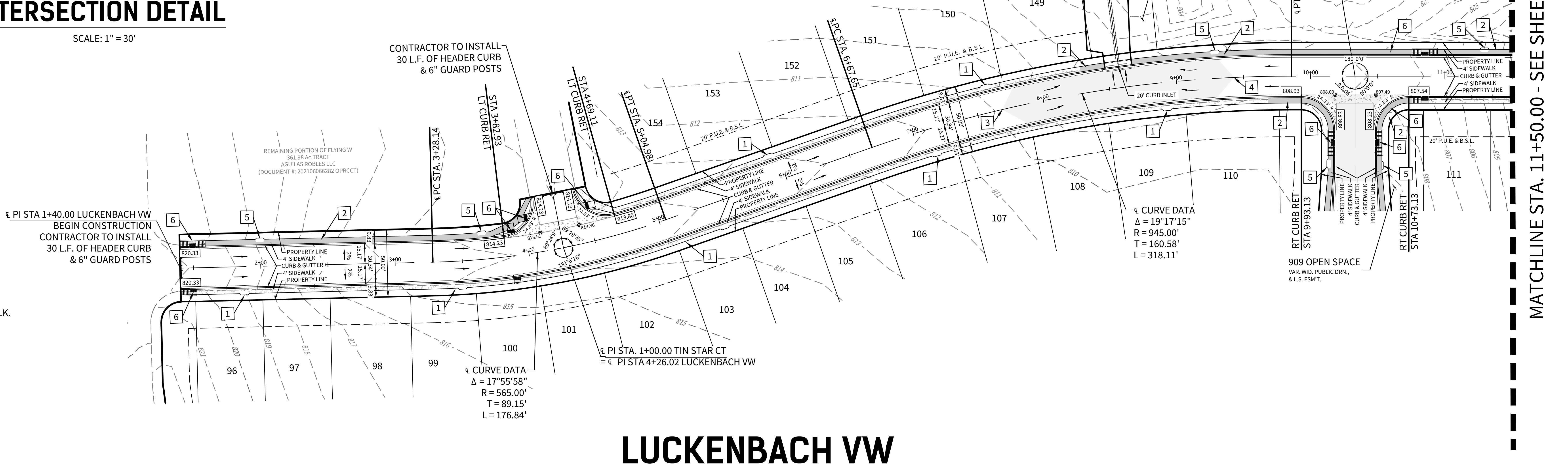
SPEED LIMIT DESIGNATED BY STREET TYPE;

RESIDENTIAL	20 MPH
RESIDENTIAL COLLECTOR	30 MPH
MINOR COLLECTOR	35 MPH

TxDOT TYPE "2" WHEEL CHAIR RAMPS ARE INDICATED THUS " " OR " " UNLESS OTHERWISE NOTED. (SHEET C7.D7) FOR ADA RAMPS AT SIDEWALK INTERSECTIONS

TYPE "10" DIRECTIONAL WHEEL CHAIR RAMPS ARE INDICATED THUS " " OR " " UNLESS OTHERWISE NOTED.

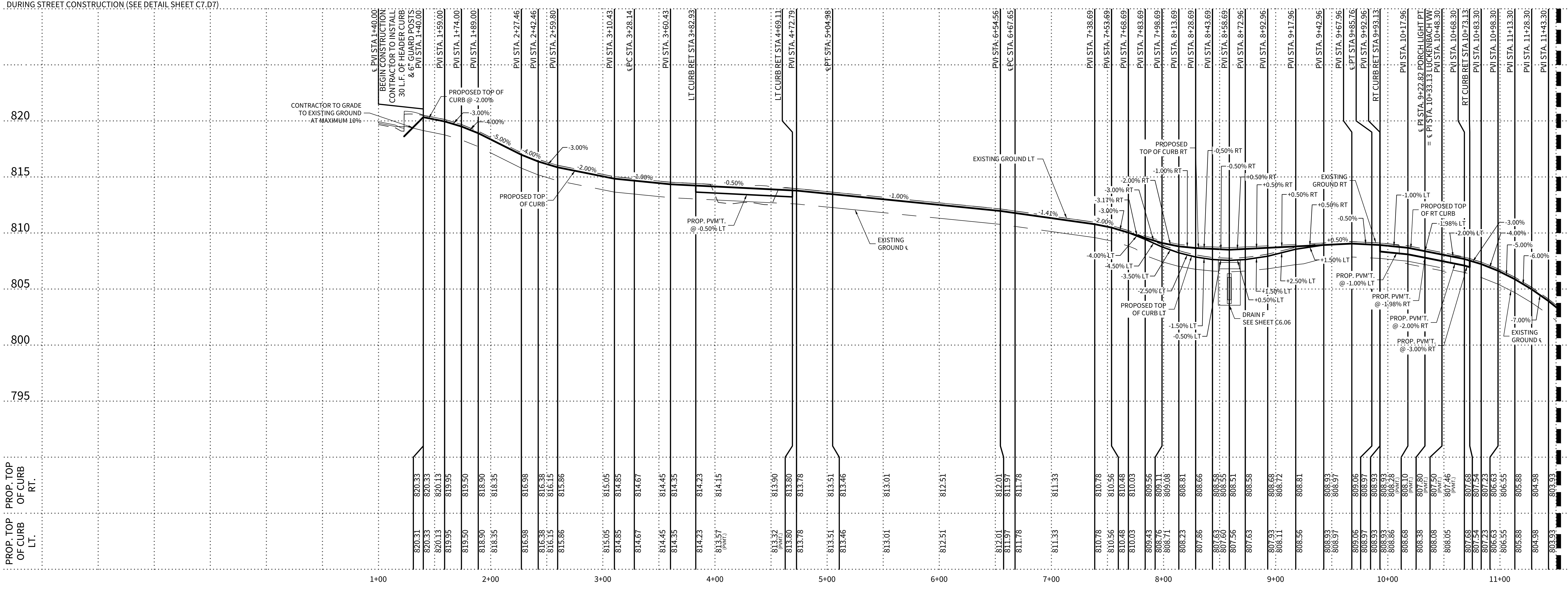
FOR ADA RAMPS AT SIDEWALK INTERSECTIONS . DETECTABLE WARNING PAVER WITH TRUNCATED DOMES ONLY. ALL PEDESTRIAN CROSSING RAMPS TO BE BUILT WITH INFRASTRUCTURE DURING STREET CONSTRUCTION (SEE DETAIL SHEET C7.D7)


℄ PI STA 1+40.00 LUCKENBACH VW
BEGIN CONSTRUCTION
CONTRACTOR TO INSTALL 30 L.F. OF HEADER CURB & 6" GUARD POSTS
CONTRACTOR TO INSTALL 30 L.F. OF HEADER CURB & 6" GUARD POSTS
℄ PC STA. 3+28.14
LT CURB RET STA 3+82.93
LT CURB RET STA 4+69.11
℄ PT STA. 5+04.98
℄ PC STA. 6+67.65
REMAINING PORTION OF FLYING W 361.59 AC. TRACT AGUILAS ROBLES LLC (DOCUMENT #: 20210606282 OPRCCT)
℄ CURVE DATA
Δ = 17°55'58"
R = 565.00'
T = 89.15'
L = 176.84'
℄ PI STA. 1+00.00 TIN STAR CT = ℄ PI STA 4+26.02 LUCKENBACH VW
℄ CURVE DATA
Δ = 19°17'15"
R = 945.00'
T = 160.58'
L = 318.11'
PVM'T. ELEV.: 807.03 OFFSET: 16.00 STA 8+48.85
PVM'T. ELEV.: 807.03 OFFSET: 16.00 STA 8+68.52
℄ PI STA. 9+22.82 PORCH LIGHT PT = ℄ PI STA 10+33.13 PISTACHE LANE
910 OPEN SPACE VAR. WID. PUBLIC DRN., SEW., & L.S. ESM'T.
909 OPEN SPACE VAR. WID. PUBLIC DRN., & L.S. ESM'T.
℄ PT STA. 9+85.76
RT CURB RET STA 9+93.13
RT CURB RET STA 10+73.13
20' CURB INLET
20' P.U.E. & B.S.L.
PROPERTY LINE
4' SIDEWALK
CURB & GUTTER
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
148
149
150
151
152
153
154
MATCHLINE STA. 11+50.00 - SEE SHEET C7.04

LUCKENBACH VW

STA. 1+00.00 TO 11+50.00

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'


℄ PVI STA 1+40.00
BEGIN CONSTRUCTION
CONTRACTOR TO INSTALL 30 L.F. OF HEADER CURB & 6" GUARD POSTS
PVI STA. 1+40.00
PVI STA. 1+59.00
PVI STA. 1+74.00
PVI STA. 1+89.00
PVI STA. 2+27.46
PVI STA. 2+42.46
PVI STA. 2+59.80
PVI STA. 3+10.43
℄ PC STA. 3+28.14
PVI STA. 3+60.43
LT CURB RET STA 3+82.93
LT CURB RET STA 4+69.11
PVI STA. 4+72.79
℄ PT STA. 5+04.98
PVI STA. 6+54.56
℄ PC STA. 6+67.65
PVI STA. 7+38.69
PVI STA. 7+53.69
PVI STA. 7+68.69
PVI STA. 7+83.69
PVI STA. 7+98.69
PVI STA. 8+13.69
PVI STA. 8+28.69
PVI STA. 8+43.69
PVI STA. 8+58.69
PVI STA. 8+72.96
PVI STA. 8+92.96
PVI STA. 9+17.96
PVI STA. 9+42.96
PVI STA. 9+67.96
℄ PT STA 9+85.76
PVI STA. 9+92.96
RT CURB RET STA 9+93.13
PVI STA. 10+17.96
℄ PI STA. 9+22.82 PORCH LIGHT PT = ℄ PI STA. 10+33.13 LUCKENBACH VW
PVI STA. 10+48.30
PVI STA. 10+68.30
RT CURB RET STA 10+73.13
PVI STA. 10+83.30
PVI STA. 10+98.30
PVI STA. 11+13.30
PVI STA. 11+28.30
PVI STA. 11+43.30
CONTRACTOR TO GRADE TO EXISTING GROUND AT MAXIMUM 10%
PROPOSED TOP OF CURB @ -2.00%
-3.00%
-4.00%
-5.00%
-4.00%
-3.00%
-2.00%
-1.00%
-0.50%
-1.00%
-1.41%
PROPOSED TOP OF CURB
PROP. PVM'T. @ -0.50% LT
EXISTING GROUND ℄
EXISTING GROUND LT
PROPOSED TOP OF CURB RT
PROPOSED TOP OF CURB LT
DRAIN F SEE SHEET C6.06
EXISTING GROUND RT
PROP. PVM'T. @ -1.00% LT
PROPOSED TOP OF RT CURB
PROP. PVM'T. @ -1.98% RT
PROP. PVM'T. @ -2.00% RT
PROP. PVM'T. @ -3.00% RT
EXISTING GROUND ℄
MATCHLINE STA. 11+50.00 SEE SHEET C7.04
820
815
810
805
800
795
PROP. TOP OF CURB RT.
820.33 820.33 820.13 819.95 819.50 818.90 818.35 816.98 816.38 816.15 815.86 815.05 814.85 814.67 814.45 814.35 814.23 814.15 813.90 813.80 813.78 813.51 813.46 813.01 812.51 812.01 811.97 811.78 811.33 810.78 810.56 810.48 810.03 809.56 809.11 809.08 808.81 808.66 808.58 808.55 808.51 808.58 808.68 808.72 808.81 808.93 808.97 809.06 808.97 808.93 808.93 808.28 (PVMT.) 808.10 (PVMT.) 807.80 (PVMT.) 807.50 (PVMT.) 807.46 (PVMT.) 807.68 807.54 807.23 806.63 806.55 805.88 804.98 803.93
PROP. TOP OF CURB LT.
820.31 820.33 820.13 819.95 819.50 818.90 818.35 816.98 816.38 816.15 815.86 815.05 814.85 814.67 814.45 814.35 814.23 813.57 (PVMT.) 813.32 (PVMT.) 813.80 813.78 813.51 813.46 813.01 812.51 812.01 811.97 811.78 811.33 810.78 810.56 810.48 810.03 809.43 808.76 808.71 808.23 807.86 807.63 807.60 807.56 807.63 807.93 808.11 808.56 808.93 808.97 809.06 808.97 808.93 808.93 808.86 808.68 808.38 808.08 808.05 807.68 807.54 807.23 806.63 806.55 805.88 804.98 803.93
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
11+00

MATCHLINE STA. 11+50.00 - SEE SHEET C7.04

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San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

STREET PLAN AND PROFILE - LUCKENBACH VW

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
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4/16/26
TORY DUANE MILLER
135598

CUDE ENGINEERS
TBPELS No. 10048500

C7.03

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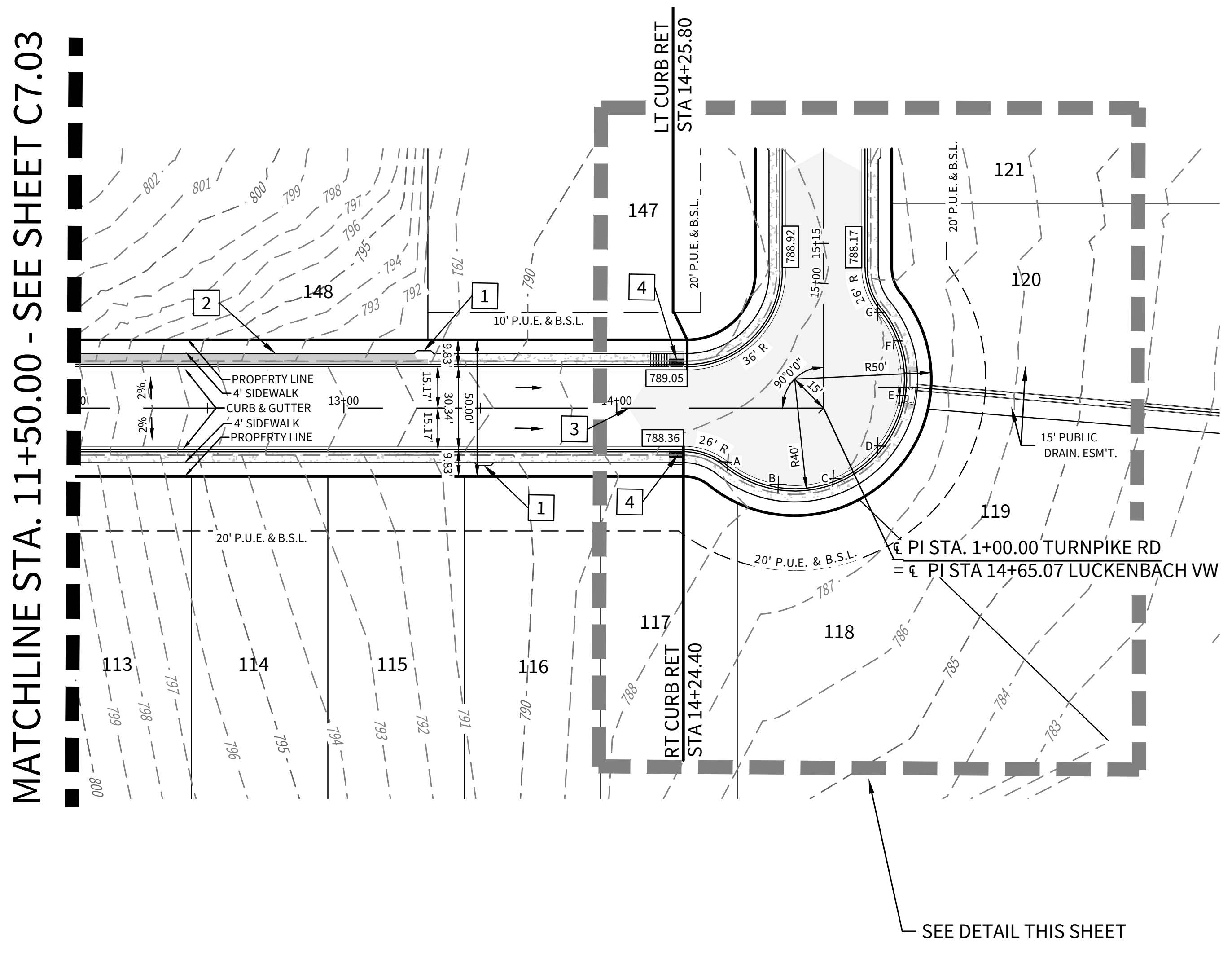
ELEVATIONS:

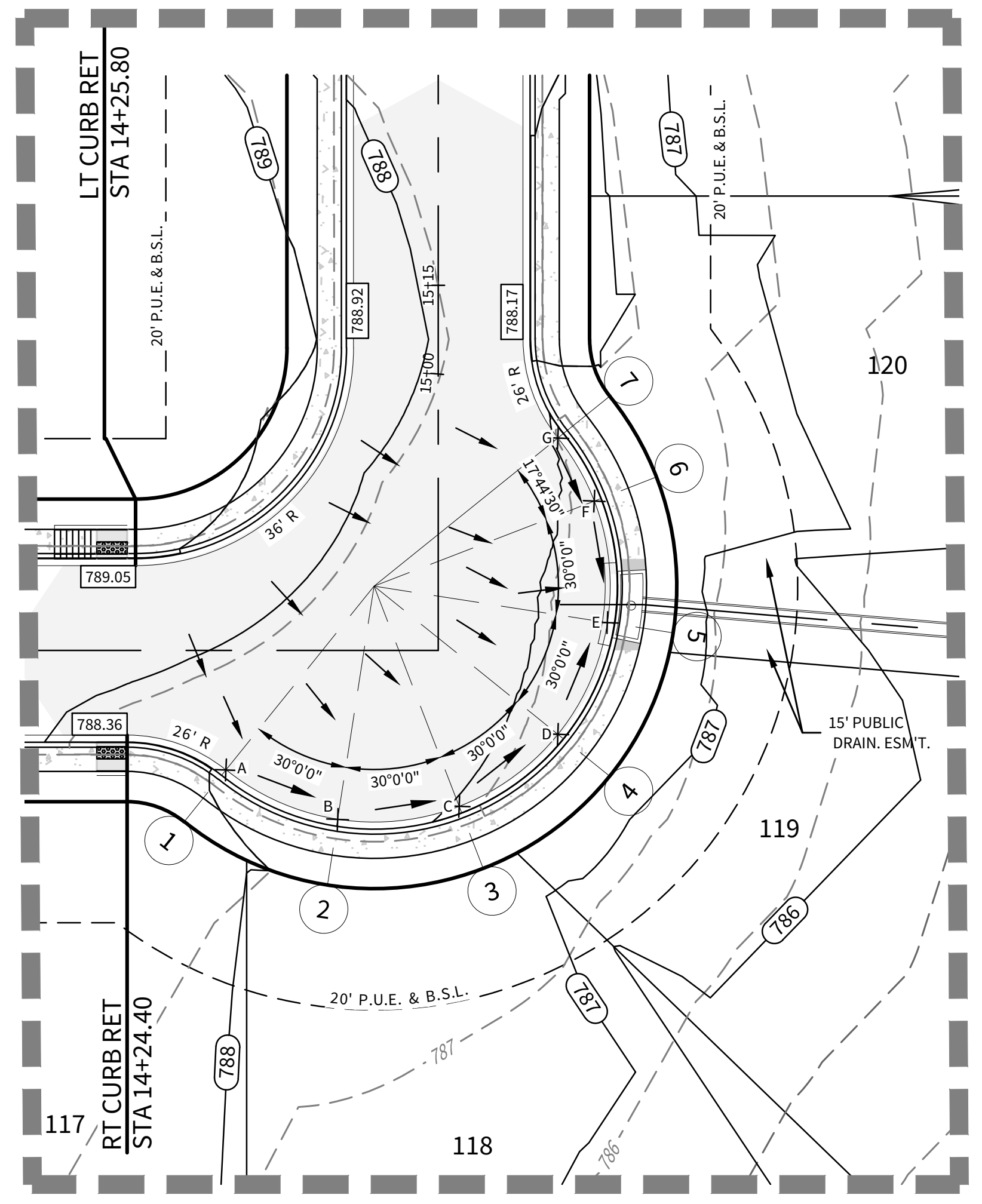
XXXX.XX	PROPOSED TOP OF CONCRETE CURB ELEVATION
XXXX.XX	PROPOSED ASPHALT PAVEMENT ELEVATION

KEYNOTES:

1	CONTRACTOR TO INSTALL 5' X 5' SIDEWALK PASSING SPACE WITH HOMEBUILDING
2	CONTRACTOR TO INSTALL SIDEWALK WITH INFRASTRUCTURE
3	BEGIN WASHOUT STA. 13+78.31 PVM'T. ELEV. = 789.03
4	CONTRACTOR TO CONSTRUCT ADA RAMP AT THE TIME OF INFRASTRUCTURE


MATCHLINE STA. 11+50.00 - SEE SHEET C7.03
LT CURB RET STA 14+25.80
RT CURB RET STA 14+24.40
147
148
121
120
119
118
117
113
114
115
116
PROPERTY LINE
4' SIDEWALK
CURB & GUTTER
4' SIDEWALK
PROPERTY LINE
10' P.U.E. & B.S.L.
20' P.U.E. & B.S.L.
15' PUBLIC DRAIN. ESM'T.
789.05
788.36
PI STA. 1+00.00 TURNPIKE RD
= PI STA 14+65.07 LUCKENBACH VW
SEE DETAIL THIS SHEET

SCALE: 1"=50'
0 50 100


LT CURB RET STA 14+25.80
RT CURB RET STA 14+24.40
20' P.U.E. & B.S.L.
15' PUBLIC DRAIN. ESM'T.
789.05
788.36
120
119
118
117
1
2
3
4
5
6
7

KNUCKLE DETAIL

SCALE: 1" = 30'

POINT	ELEVATION	DESCRIPTION
A(1)	787.41	PVM'T.
B(2)	787.18	PVM'T.
C(3)	786.97	PVM'T.
D(4)	786.77	PVM'T.
E(5)	786.57	PVM'T.
F(6)	786.74	PVM'T.
G(7)	786.92	PVM'T.

LEGEND

▨	CROSS GUTTER
▢	STREET WASHOUT (SEE SHEET C7.D1)
■	SIDEWALK TO BE CONSTRUCTED WITH INFRASTRUCTURE
▒	SIDEWALK TO BE CONSTRUCTED WITH HOME BUILDING
▩	SIDEWALK TO BE INSTALLED WITH THE INFRASTRUCTURE TO ENSURE MANHOLES ARE INSTALLED FLUSH WITH THE SIDEWALK.

SPEED LIMIT DESIGNATED BY STREET TYPE;

RESIDENTIAL	20 MPH
RESIDENTIAL COLLECTOR	30 MPH
MINOR COLLECTOR	35 MPH

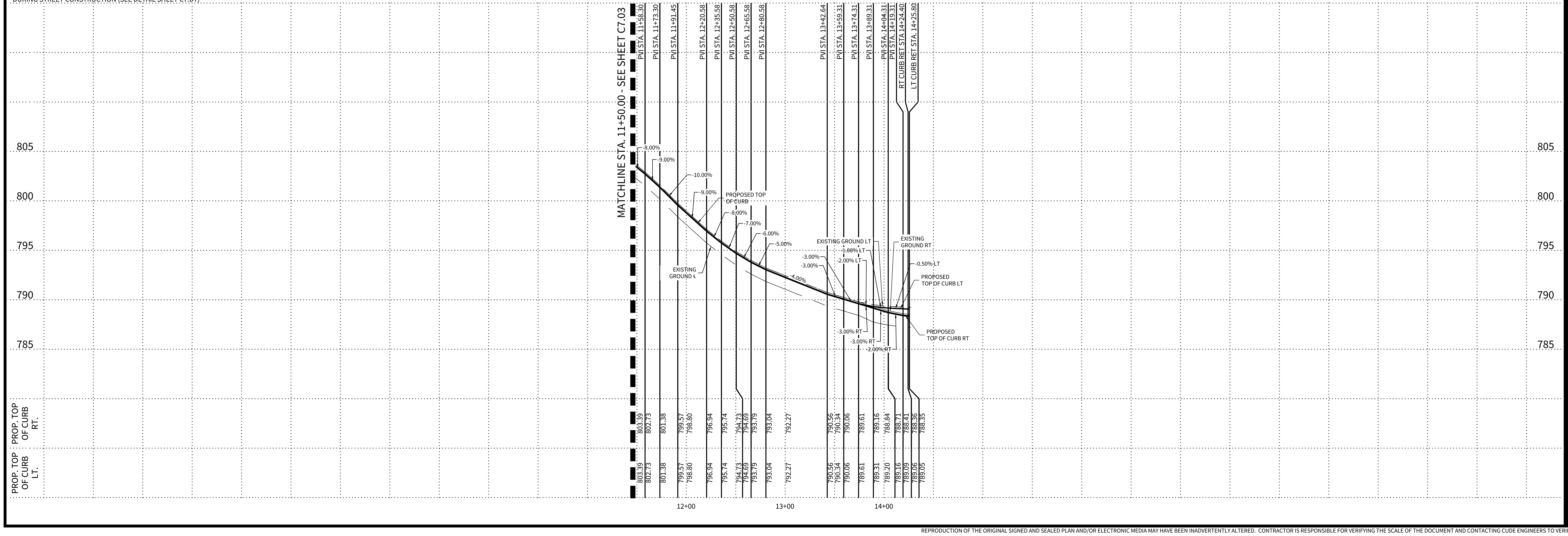
TxDOT TYPE "2" WHEEL CHAIR RAMPS ARE INDICATED THUS " ▥ "
OR " ▥ " UNLESS OTHERWISE NOTED. (SHEET C7.D7)
FOR ADA RAMPS AT SIDEWALK INTERSECTIONS
TYPE "10" DIRECTIONAL WHEEL CHAIR RAMPS ARE INDICATED
THUS " " OR " " UNLESS OTHERWISE NOTED.

FOR ADA RAMPS AT SIDEWALK INTERSECTIONS .
DETECTABLE WARNING PAVER WITH TRUNCATED DOMES ONLY. ALL
PEDESTRIAN CROSSING RAMPS TO BE BUILT WITH INFRASTRUCTURE
DURING STREET CONSTRUCTION (SEE DETAIL SHEET C7.D7)

LUCKENBACH VW

STA. 11+50.00 TO END

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'


MATCHLINE STA. 11+50.00 - SEE SHEET C7.03
PVI STA. 11+58.30
PVI STA. 11+73.30
PVI STA. 11+91.45
PVI STA. 12+20.58
PVI STA. 12+35.58
PVI STA. 12+50.58
PVI STA. 12+65.58
PVI STA. 12+80.58
PVI STA. 13+42.64
PVI STA. 13+59.31
PVI STA. 13+74.31
PVI STA. 13+89.31
PVI STA. 14+04.31
PVI STA. 14+19.31
RT CURB RET STA 14+24.40
LT CURB RET STA. 14+25.80
805
800
795
790
785
-8.00%
-9.00%
-10.00%
-9.00%
PROPOSED TOP OF CURB
-8.00%
-7.00%
-6.00%
-5.00%
EXISTING GROUND ℄
-4.00%
-3.00%
-3.00%
EXISTING GROUND LT
-1.00% LT
-2.00% LT
EXISTING GROUND RT
-0.50% LT
PROPOSED TOP OF CURB LT
PROPOSED TOP OF CURB RT
-3.00% RT
-3.00% RT
-2.00% RT
PROP. TOP OF CURB RT.
803.39 802.73 801.38 799.57 798.80 796.94 795.74 794.73 794.69 793.79 793.04 792.27 790.56 790.34 790.06 789.61 789.16 788.84 788.71 788.41 788.36 788.35
PROP. TOP OF CURB LT.
803.39 802.73 801.38 799.57 798.80 796.94 795.74 794.73 794.69 793.79 793.04 792.27 790.56 790.34 790.06 789.61 789.31 789.20 789.16 789.09 789.06 789.05
12+00
13+00
14+00

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FLYING W
UNIT 2

STREET PLAN AND PROFILE - LUCKENBACH VW

DATE	04/16/2026
PROJECT NO.	04024-018
DRAWN BY	C7
CHECKED BY	JL/TM

REVISIONS
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4/16/26
TORY DUANE MILLER
135598

CUDE ENGINEERS
TBPELS No. 10048500

C7.04

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ELEVATIONS:

XXXX.XX	PROPOSED TOP OF CONCRETE CURB ELEVATION
XXXX.XX	PROPOSED ASPHALT PAVEMENT ELEVATION

KEYNOTES:

1	CONTRACTOR TO CONSTRUCT ADA RAMP WITH INFRASTRUCTURE
2	CONTRACTOR TO INSTALL SIDEWALK WITH INFRASTRUCTURE
3	CONTRACTOR TO INSTALL 8' SIDEWALK WITH INFRASTRUCTURE
4	CONTRACTOR TO INSTALL 5' X 5' SIDEWALK PASSING SPACE WITH INFRASTRUCTURE
5	CONTRACTOR TO INSTALL 5' X 5' SIDEWALK PASSING SPACE WITH HOMEBUILDING
6	BEGIN STREET TRANSITION FROM RESIDENTIAL STREET TO RESIDENTIAL COLLECTOR (SEE POINT AND LINE TABLE) STA. 8+56.34
7	BEGIN STREET TRANSITION FROM RESIDENTIAL STREET TO RESIDENTIAL COLLECTOR (SEE POINT AND LINE TABLE) STA. 9+01.34

Point #	Elevation	Description
A	748.19	PVM'T.
B	747.93	PVM'T.
C	745.98	PVM'T.
D	745.27	PVM'T.

LEGEND

⌴	CROSS GUTTER
▭	STREET WASHOUT (SEE SHEET C7.D1)
■	SIDEWALK TO BE CONSTRUCTED WITH INFRASTRUCTURE
▨	SIDEWALK TO BE CONSTRUCTED WITH HOME BUILDING
▩	SIDEWALK TO BE INSTALLED WITH THE INFRASTRUCTURE TO ENSURE MANHOLES ARE INSTALLED FLUSH WITH THE SIDEWALK.

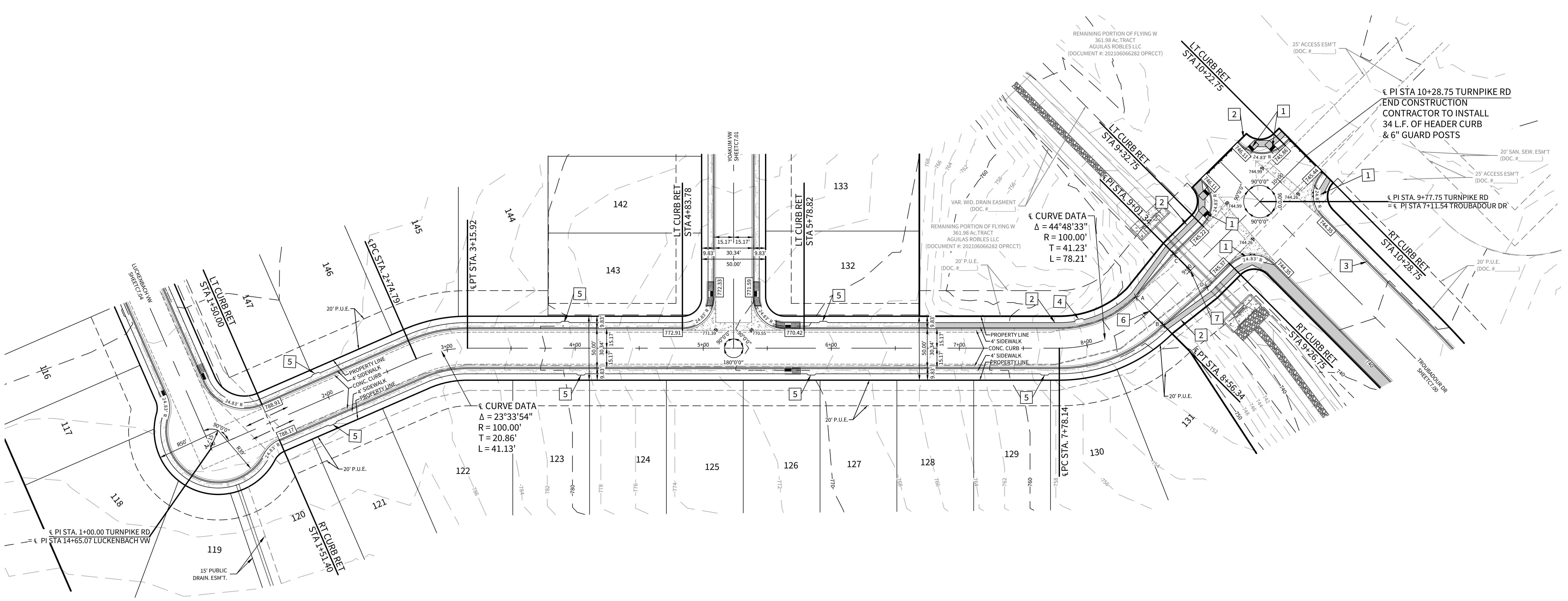
SPEED LIMIT DESIGNATED BY STREET TYPE;

RESIDENTIAL	20 MPH
RESIDENTIAL COLLECTOR	30 MPH
MINOR COLLECTOR	35 MPH

TxDOT TYPE "2" WHEEL CHAIR RAMPS ARE INDICATED THUS " ▥ " OR " ▥ " UNLESS OTHERWISE NOTED. (SHEET C7.D7) FOR ADA RAMPS AT SIDEWALK INTERSECTIONS

TYPE "10" DIRECTIONAL WHEEL CHAIR RAMPS ARE INDICATED THUS " ⬠ " OR " ⬠ " UNLESS OTHERWISE NOTED.

FOR ADA RAMPS AT SIDEWALK INTERSECTIONS . DETECTABLE WARNING PAVER WITH TRUNCATED DOMES ONLY. ALL PEDESTRIAN CROSSING RAMPS TO BE BUILT WITH INFRASTRUCTURE DURING STREET CONSTRUCTION (SEE DETAIL SHEET C7.D7)

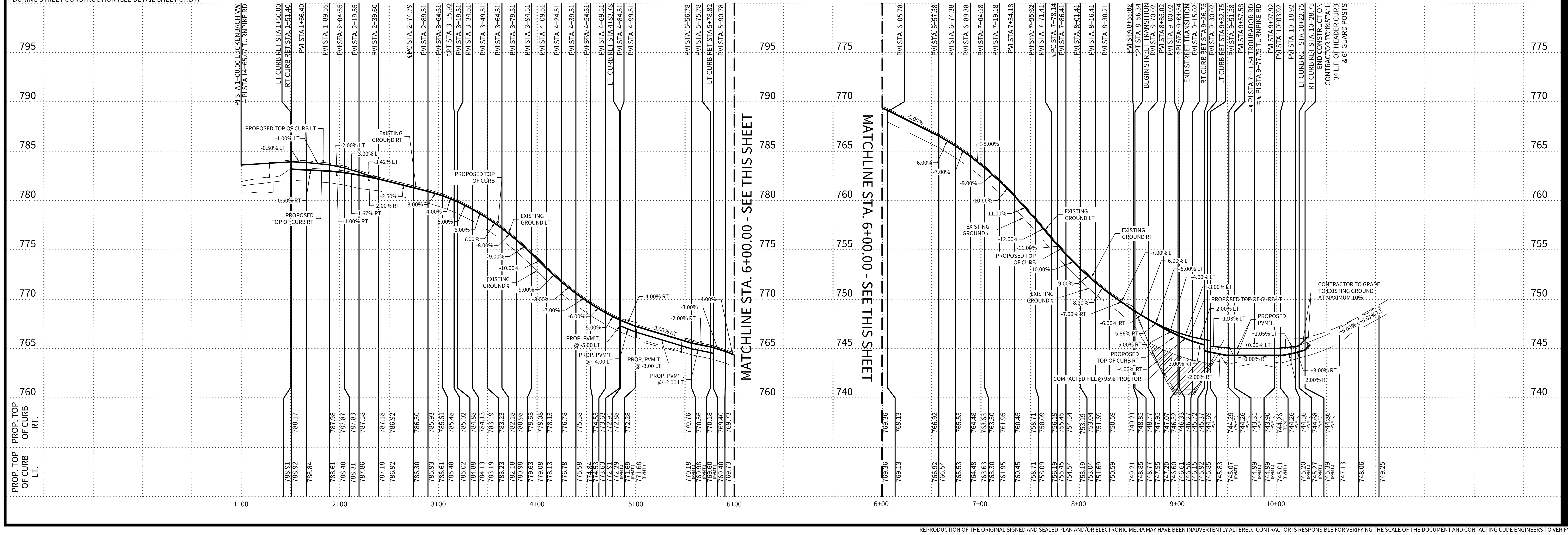


LT CURB RET STA 1+50.00
RT CURB RET STA 1+51.40
℄ PC STA. 2+74.79
℄ PT STA. 3+15.92
LT CURB RET STA 4+83.78
LT CURB RET STA 5+78.82
℄ PC STA. 7+78.14
LT CURB RET STA 9+32.75
℄ PI STA. 9+01.34
RT CURB RET STA 9+26.75
℄ PI STA. 8+56.34
LT CURB RET STA 10+22.75
RT CURB RET STA 10+28.75
℄ CURVE DATA
Δ = 23°33'54"
R = 100.00'
T = 20.86'
L = 41.13'
℄ CURVE DATA
Δ = 44°48'33"
R = 100.00'
T = 41.23'
L = 78.21'
℄ PI STA 10+28.75 TURNPIKE RD
END CONSTRUCTION
CONTRACTOR TO INSTALL
34 L.F. OF HEADER CURB
& 6" GUARD POSTS
℄ PI STA. 9+77.75 TURNPIKE RD
= ℄ PI STA 7+11.54 TROUBADOUR DR
℄ PI STA. 1+00.00 TURNPIKE RD
= ℄ PI STA 14+65.07 LUCKENBACH VW
REMAINING PORTION OF FLYING W
361.98 Ac.TRACT
AGUILAS ROBLES LLC
(DOCUMENT #: 20210066282 OPRCCT)
VAR. WID. DRAIN EASMENT
25' ACCESS ESM'T
20' SAN. SEW. ESM'T
20' P.U.E.
15' PUBLIC DRAIN. ESM'T.
PROPERTY LINE
4' SIDEWALK
CONC. CURB
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
142
143
144
145
146
147

TURNPIKE RD

STA. 1+00.00 TO END

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'



MATCHLINE STA. 6+00.00 - SEE THIS SHEET
MATCHLINE STA. 6+00.00 - SEE THIS SHEET
PROPOSED TOP OF CURB LT
EXISTING GROUND RT
PROPOSED TOP OF CURB RT
PROPOSED TOP OF CURB
EXISTING GROUND LT
EXISTING GROUND ℄
PROP. PVM'T. @ -5.00 LT
PROP. PVM'T. @ -4.00 LT
PROP. PVM'T. @ -3.00 LT
PROP. PVM'T. @ -2.00 LT
CONTRACTOR TO GRADE TO EXISTING GROUND AT MAXIMUM 10%
COMPACTED FILL @ 95% PROCTOR
PROPOSED PVM'T.
PROP. TOP OF CURB RT.
PROP. TOP OF CURB LT.
795
790
785
780
775
770
765
760
755
750
745
740
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00

CUDEENGINEERS.COM

CUDE
EST. 1980
ENGINEERS

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

STREET PLAN AND PROFILE - TURNPIKE RD

DATE	04/16/2026
PROJECT NO.	04024-018
DRAWN BY	C7
CHECKED BY	JL/TM

REVISIONS
1.
2.
3.
4.
5.
6.
7.
8.

4/16/26

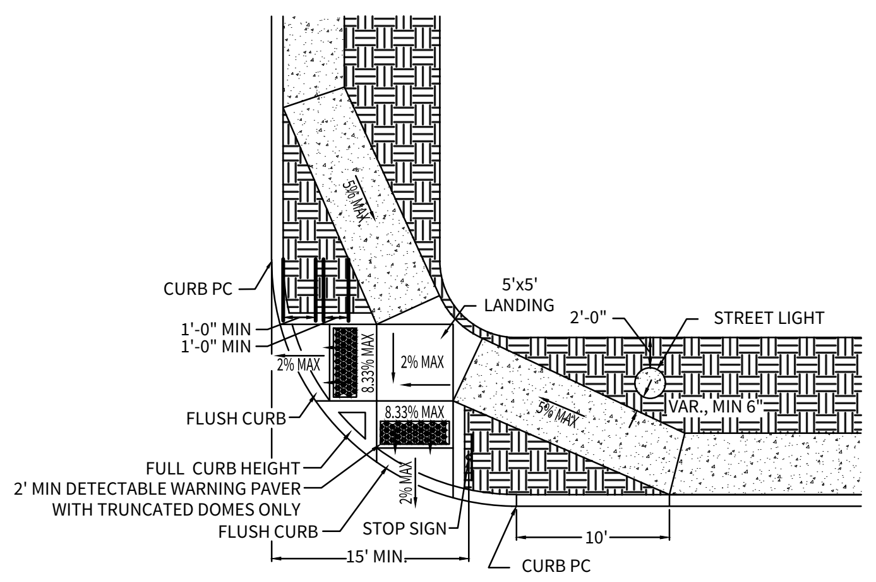
TORY DUANE MILLER
135598

Tory Miller

CUDE ENGINEERS
TBPELS No. 10048500

C7.05

R:\04024\018\2-DWG\4-Plans\C7.05 STREET PLAN AND PROFILE - TURNPIKE RD.dwg 2026/04/16 8:40am sgonzales

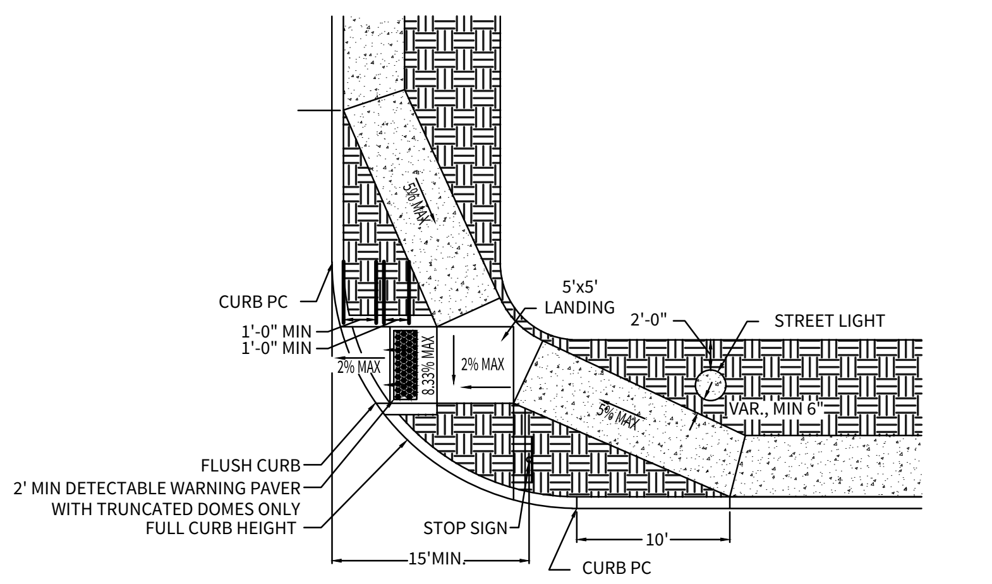

CURB PC
1'-0" MIN
5'x5' LANDING
STREET LIGHT
2% MAX
8.33% MAX
5% MAX
VAR., MIN 6"
FLUSH CURB
FULL CURB HEIGHT
2' MIN DETECTABLE WARNING PAVER WITH TRUNCATED DOMES ONLY
FLUSH CURB
STOP SIGN
10'
15' MIN.
CURB PC

ADA RAMP INTERSECTION LAYOUT DETAIL
(TYPE 10 DIRECTIONAL RAMPS) N.T.S.

NOTES:

1) STREET LIGHTS SHALL BE INSTALLED 2' WITHIN R.O.W. AND A MINIMUM DISTANCE OF 6" FROM THE PROPOSED SIDEWALK, AND A MINIMUM DISTANCE OF 4' FROM FACE OF CURB.

2) FIRE HYDRANTS (AS APPLICABLE) SHALL BE INSTALLED WITHIN THE R.O.W. A MINIMUM OF 1' FROM THE BACK OF THE CURB AND A MINIMUM OF 1' AWAY FROM THE PROPOSED SIDEWALK.

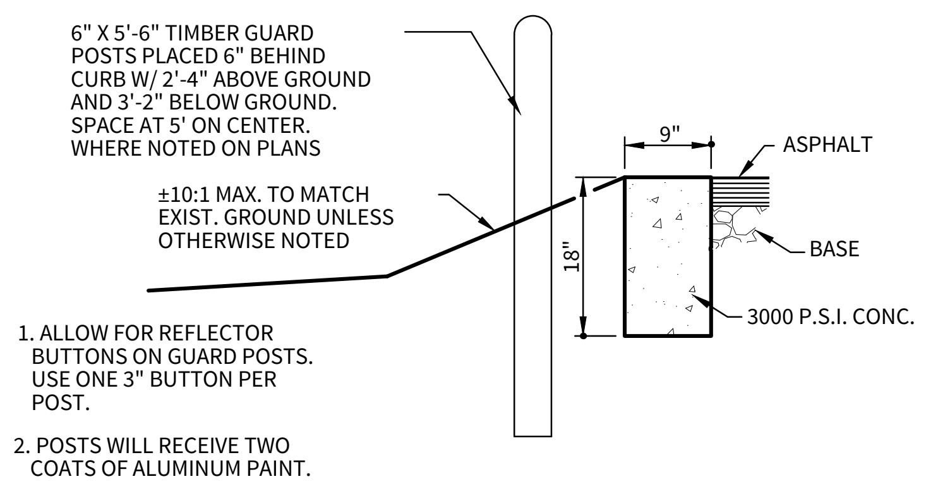

CURB PC
5'x5' LANDING
STREET LIGHT
2% MAX
5% MAX
VAR., MIN 6"
FLUSH CURB
2' MIN DETECTABLE WARNING PAVER WITH TRUNCATED DOMES ONLY
FULL CURB HEIGHT
STOP SIGN
10'
15'MIN.
CURB PC

ADA RAMP INTERSECTION LAYOUT DETAIL
(TYPE 10 DIRECTIONAL RAMPS - SINGLE DIRECTION) N.T.S.

NOTES:

1) STREET LIGHTS SHALL BE INSTALLED 2' WITHIN R.O.W. AND A MINIMUM DISTANCE OF 6" FROM THE PROPOSED SIDEWALK, AND A MINIMUM DISTANCE OF 4' FROM FACE OF CURB.

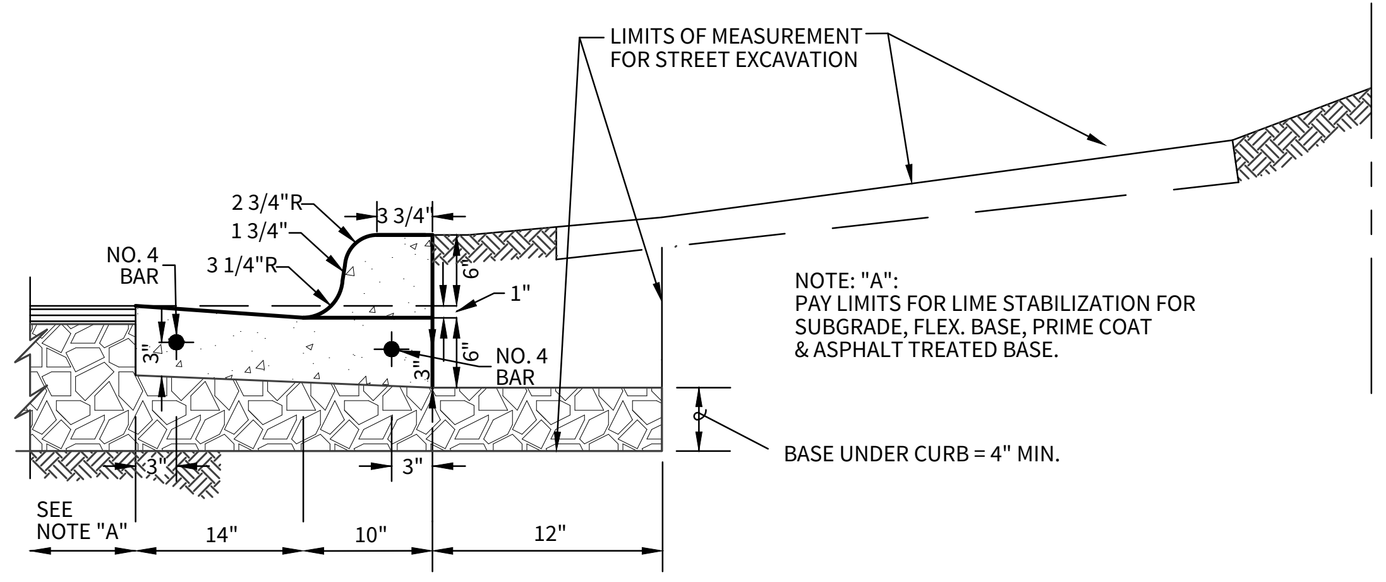
2) FIRE HYDRANTS (AS APPLICABLE) SHALL BE INSTALLED WITHIN THE R.O.W. A MINIMUM OF 1' FROM THE BACK OF THE CURB AND A MINIMUM OF 1' AWAY FROM THE PROPOSED SIDEWALK.


6" X 5'-6" TIMBER GUARD POSTS PLACED 6" BEHIND CURB W/ 2'-4" ABOVE GROUND AND 3'-2" BELOW GROUND. SPACE AT 5' ON CENTER. WHERE NOTED ON PLANS
±10:1 MAX. TO MATCH EXIST. GROUND UNLESS OTHERWISE NOTED
9"
ASPHALT
BASE
18"
3000 P.S.I. CONC.

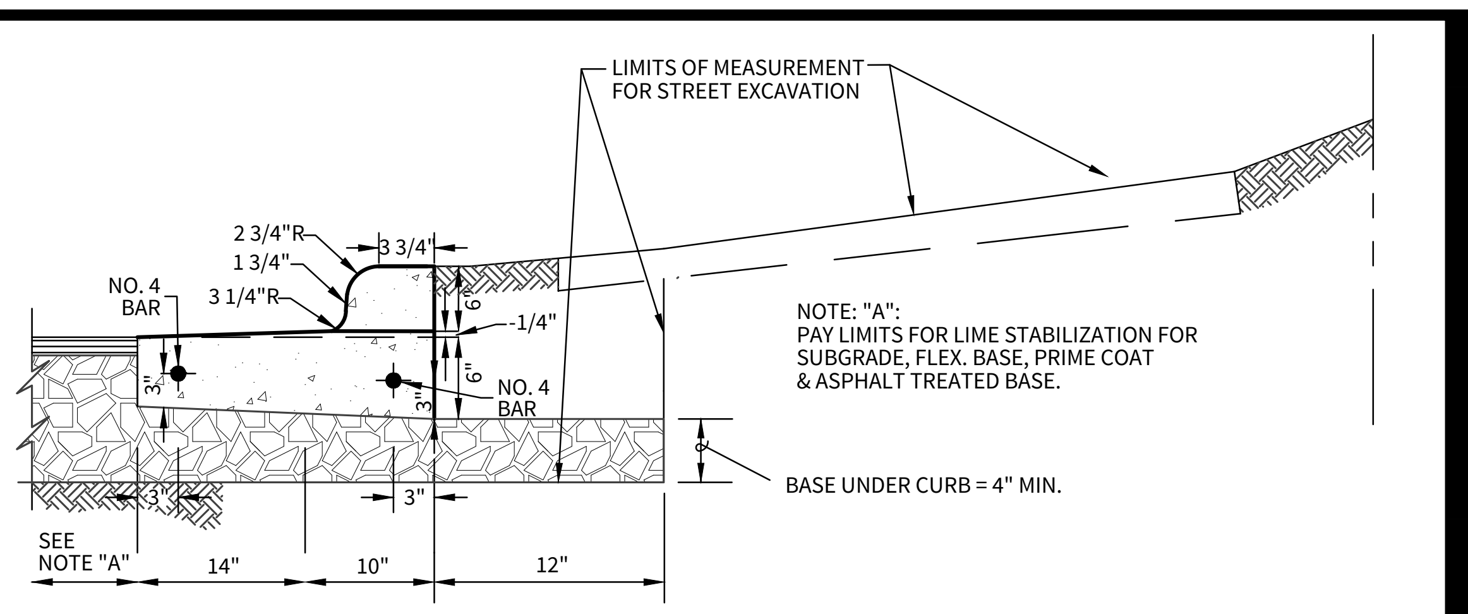
1. ALLOW FOR REFLECTOR BUTTONS ON GUARD POSTS. USE ONE 3" BUTTON PER POST.

2. POSTS WILL RECEIVE TWO COATS OF ALUMINUM PAINT.

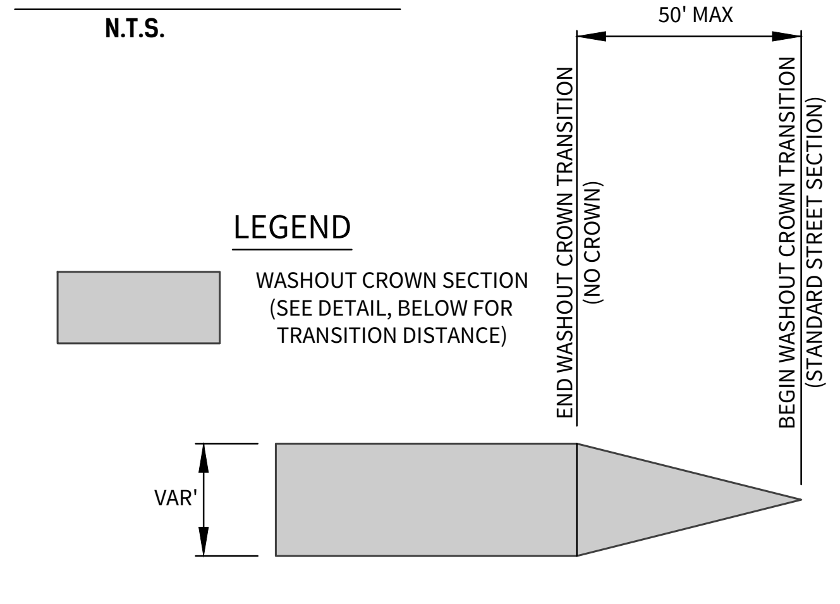
HEADER CURB DETAIL
N.T.S.


LIMITS OF MEASUREMENT FOR STREET EXCAVATION
2 3/4"R
1 3/4"
3 1/4"R
3 3/4
NO. 4 BAR
NO. 4 BAR
1"
NOTE "A": PAY LIMITS FOR LIME STABILIZATION FOR SUBGRADE, FLEX. BASE, PRIME COAT & ASPHALT TREATED BASE.
BASE UNDER CURB = 4" MIN.
SEE NOTE "A"
14"
10"
12"

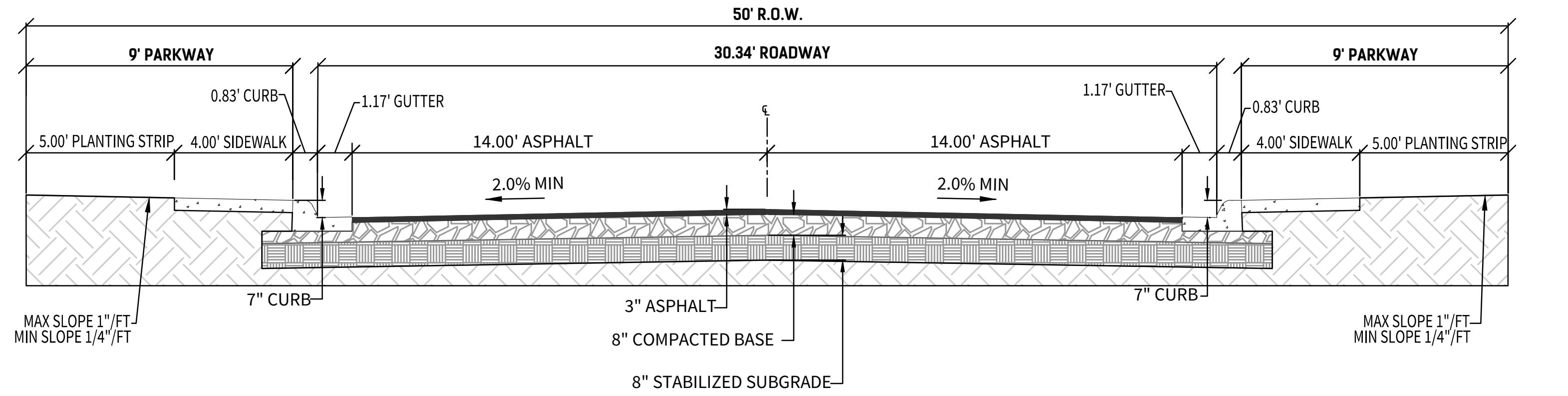
TYPICAL CURB SECTIONS
N.T.S.


LIMITS OF MEASUREMENT FOR STREET EXCAVATION
2 3/4"R
1 3/4"
3 1/4"R
3 3/4
NO. 4 BAR
NO. 4 BAR
1/4"
NOTE "A": PAY LIMITS FOR LIME STABILIZATION FOR SUBGRADE, FLEX. BASE, PRIME COAT & ASPHALT TREATED BASE.
BASE UNDER CURB = 4" MIN.
SEE NOTE "A"
14"
10"
12"

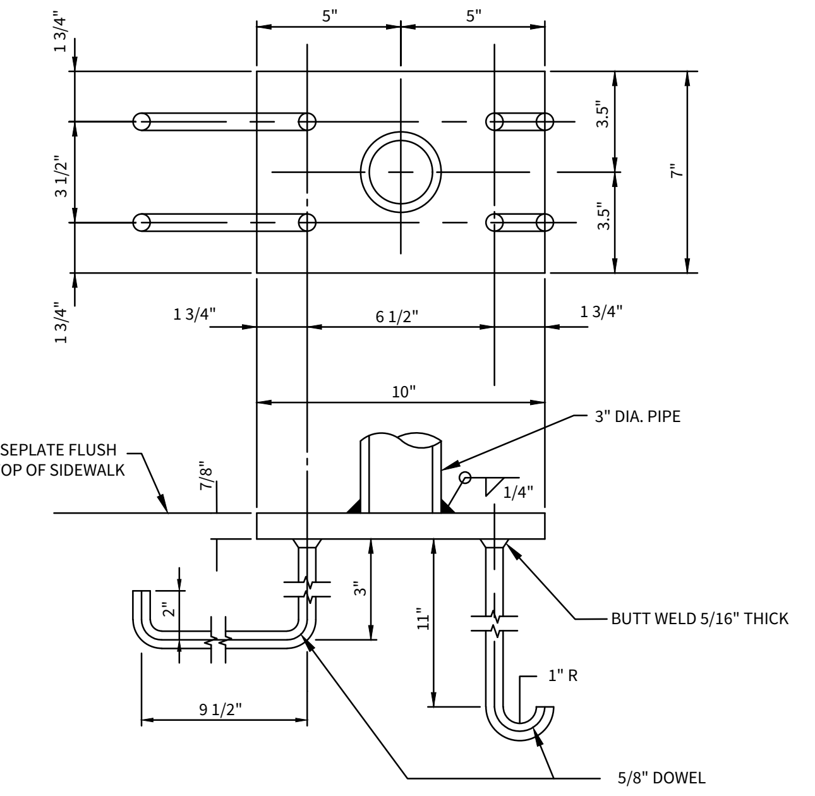
SPILL CURB SECTIONS
N.T.S.


LEGEND
WASHOUT CROWN SECTION (SEE DETAIL, BELOW FOR TRANSITION DISTANCE)
50' MAX
END WASHOUT CROWN TRANSITION (NO CROWN)
BEGIN WASHOUT CROWN TRANSITION (STANDARD STREET SECTION)
VAR'

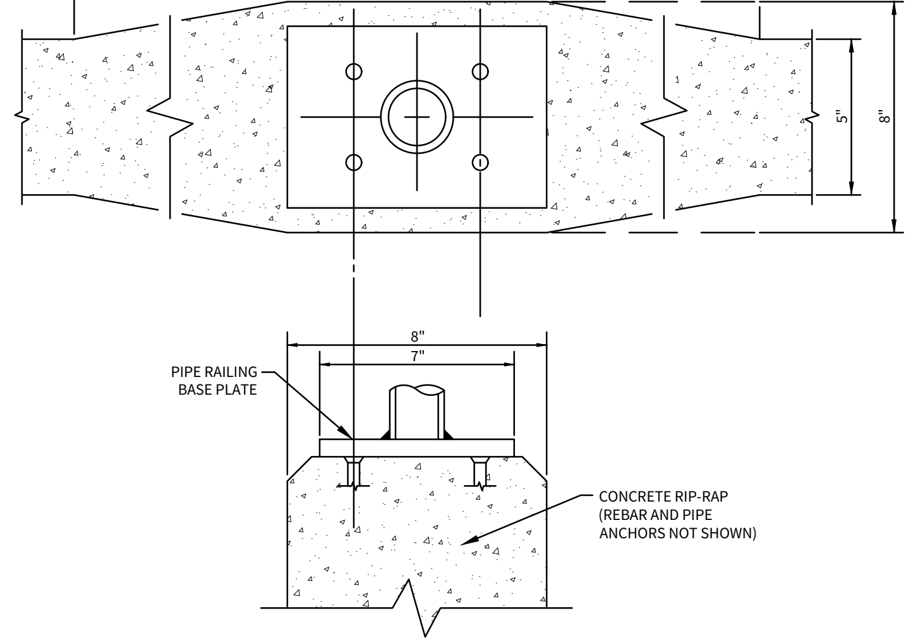
WASHOUT CROWN TRANSITION DETAIL
N.T.S.


50' R.O.W.
9' PARKWAY
30.34' ROADWAY
9' PARKWAY
0.83' CURB
1.17' GUTTER
5.00' PLANTING STRIP
4.00' SIDEWALK
14.00' ASPHALT
14.00' ASPHALT
2.0% MIN
2.0% MIN
MAX SLOPE 1"/FT MIN SLOPE 1/4"/FT
7" CURB
3" ASPHALT
8" COMPACTED BASE
8" STABILIZED SUBGRADE

TYPICAL "RESIDENTIAL" STREET CROSS SECTION
N.T.S.


5"
5"
1 3/4"
3 1/2"
3.5"
7"
6 1/2"
10"
3" DIA. PIPE
SET BASEPLATE FLUSH WITH TOP OF SIDEWALK
1/4"
BUTT WELD 5/16" THICK
1" R
9 1/2"
5/8" DOWEL

PIPE ANCHORAGE DETAILS
N.T.S.

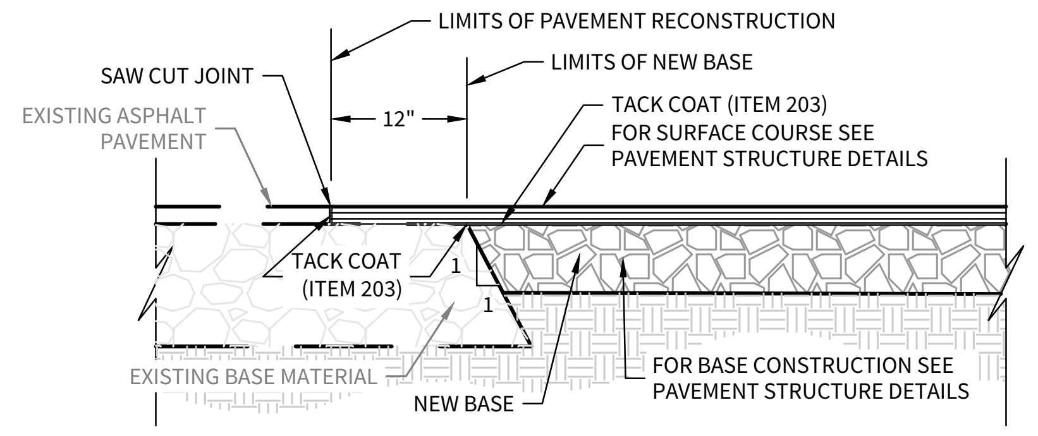

2'
5"
5"
2'
8"
PIPE RAILING BASE PLATE
CONCRETE RIP-RAP (REBAR AND PIPE ANCHORS NOT SHOWN)

CONCRETE RIP-RAP AT PIPE RAILING BASE PLATE DETAIL

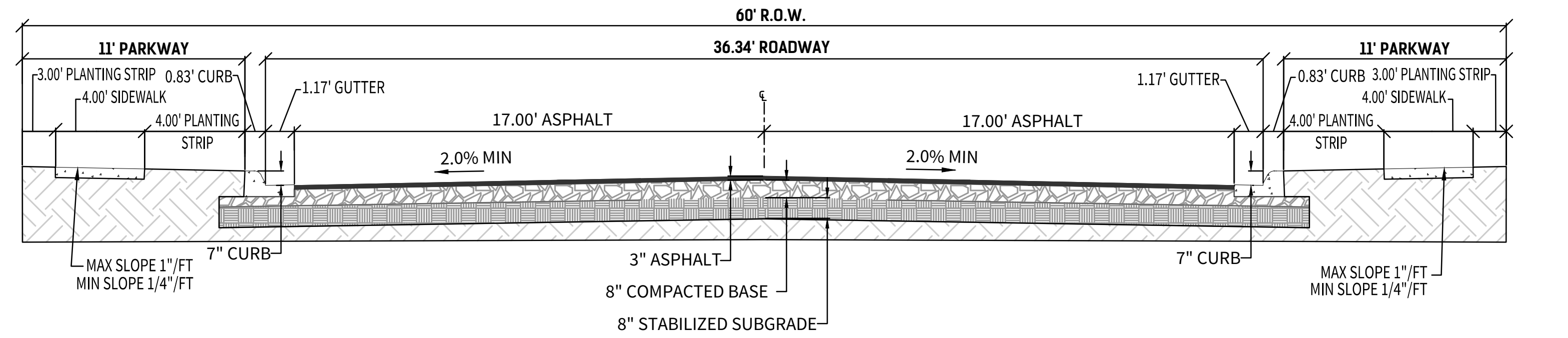
NOTES:

1) CONTRACTOR TO FLARE CONCRETE RIP-RAP TO 8" AT PROPOSED PIPE RAILING BASE PLATE LOCATIONS.

N.T.S.


LIMITS OF PAVEMENT RECONSTRUCTION
SAW CUT JOINT
LIMITS OF NEW BASE
EXISTING ASPHALT PAVEMENT
12"
TACK COAT (ITEM 203) FOR SURFACE COURSE SEE PAVEMENT STRUCTURE DETAILS
TACK COAT (ITEM 203)
EXISTING BASE MATERIAL
NEW BASE
FOR BASE CONSTRUCTION SEE PAVEMENT STRUCTURE DETAILS

PAVEMENT JUNCTION DETAILS
N.T.S.


60' R.O.W.
11' PARKWAY
36.34' ROADWAY
11' PARKWAY
3.00' PLANTING STRIP
0.83' CURB
4.00' SIDEWALK
4.00' PLANTING STRIP
1.17' GUTTER
17.00' ASPHALT
17.00' ASPHALT
2.0% MIN
2.0% MIN
7" CURB
MAX SLOPE 1"/FT MIN SLOPE 1/4"/FT
3" ASPHALT
8" COMPACTED BASE
8" STABILIZED SUBGRADE

TYPICAL "RESIDENTIAL COLLECTOR" STREET CROSS SECTION
N.T.S.

STREET PAVEMENT DESIGN OPTIONS (ECS SOUTHWEST No. 20:1609)

1. IF THE SUBGRADE PLASTICITY INDEX VALUE IS GREATER THAN 20, SUBGRADE STABILIZATION IS REQUIRED.

2. PAVEMENT SECTION REQUIRED IS TO BE DETERMINED BY GEOTECHNICAL ENGINEER ON-SITE.

3. PAVEMENT MATERIALS
   RECOMMENDATIONS REGARDING MATERIAL REQUIREMENTS FOR THE VARIOUS PAVEMENT SECTIONS ARE SUMMARIZED BELOW:

- HOT MIX ASPHALT CONCRETE (HMAC) SURFACE COURSE - THE ASPHALT CONCRETE SURFACE COURSE SHOULD BE PLANT MIXED, HOT LAID TYPE D (FINE GRADED SURFACE) OR TYPE C (COARSE GRADED SURFACE COURSE) MEETING THE SPECIFICATIONS REQUIREMENTS OF TXDOT ITEM 340 AND SPECIFIC CRITERIA FOR THE JOB MIX FORMULA. THE MIX SHOULD BE COMPACTED TO BETWEEN 92 AND 97 PERCENT OF THE MAXIMUM THEORETICAL DENSITY AS ESTABLISHED BY TEX-227-F.

- CRUSHED LIMESTONE BASE COURSE - CRUSHED LIMESTONE BASE SHOULD BE PLACED IN MAXIMUM 6-INCH COMPACTED LIFTS. THE BASE MATERIALS SHOULD BE COMPACTED TO AT LEAST 98 PERCENT OF THE MAXIMUM DRY DENSITY AS ESTABLISHED BY TXDOT TEX-113-E. FLEXIBLE BASE MATERIALS SHOULD BE MOISTURE CONDITIONED TO BETWEEN -2 AND +3 PERCENTAGE POINTS OF THE OPTIMUM MOISTURE CONTENT DURING COMPACTION. FLEXIBLE BASE MATERIALS SHOULD MEET THE REQUIREMENTS SPECIFIED IN 2014 TXDOT STANDARD SPECIFICATION ITEM 247, TYPE A, GRADE 1-2.

- LIME-TREATED SUBGRADE – LIME MIXING AND PLACEMENT SHOULD BE PERFORMED IN ACCORDANCE WITH TXDOT ITEM 260. AFTER PROPER CURING TIME, THE LIME-TREATED SOILS SHOULD BE COMPACTED TO A MINIMUM 95 PERCENT OF THE MAXIMUM DRY DENSITY AS ESTABLISHED BY TXDOT TEX-113-E, AT MOISTURE CONTENTS BETWEEN OPTIMUM AND +4 PERCENTAGE POINTS OF OPTIMUM. SUFFICIENT LIME SHOULD BE MIXED WITH SUBGRADE SOILS TO RESULT IN A SOIL-LIME MIXTURE WITH PH OF AT LEAST 12.4 WHEN TESTED IN ACCORDANCE WITH ASTM D6276 OR TXDOT TEST METHOD TEX-121-E. WE ANTICIPATE THAT APPROXIMATELY 6 TO 8 PERCENT HYDRATED LIME (BY DRY UNIT WEIGHT) IS REQUIRED TO TREAT THE SUBGRADE SOILS. WE RECOMMEND THAT THE SUBGRADE SOILS AT THE PROPOSED FINAL SUBGRADE ELEVATION BE FURTHER EVALUATED FOR SULFATE CONTENT. EXCESSIVE CONCENTRATIONS OF SULFATE IN THE SUBGRADE SOILS CAN RESULT IN POOR PERFORMANCE OF LIME-TREATED SUBGRADE. LIME STABILIZATION SHOULD EXTEND AT LEAST 1 FOOT BEYOND THE EDGE OF THE PLANNED PAVEMENT, WHERE PRACTICAL.

GENERAL FILL:

- GENERAL FILL SHOULD CONSIST OF ON-SITE OR IMPORTED SOILS, PROVIDED THEY MEET THE REQUIREMENTS DESCRIBED BELOW. GENERAL FILL MATERIALS SHOULD BE WITHOUT ORGANICS, CONSTRUCTION DEBRIS, DELETERIOUS MATERIALS, AND SHOULD BE WITHOUT ROCKS LARGER THAN 4 INCHES IN GREATEST DIMENSION. GENERAL FILL SHOULD HAVE A PLASTICITY INDEX OF 30 AND LOWER. PROPOSED GENERAL FILL SHOULD BE EVALUATED AND TESTED BY ECS PRIOR TO PLACEMENT IN THE BELOW.

- ECS RECOMMENDS THAT GENERAL FILL BE PLACED IN HORIZONTAL LOOSE LIFTS OF NOT MORE THAN 8 INCHES IN THICKNESS. LIFT THICKNESS SHOULD BE DECREASED WHEN USING LIGHT COMPACTION EQUIPMENT. GENERAL FILL SHOULD BE COMPACTED TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY AT MOISTURE CONTENTS WITHIN THE RANGE OF OPTIMUM TO +4 PERCENTAGE POINTS OF THE OPTIMUM MOISTURE CONTENT (TEX-114-E).

SELECT FILL:

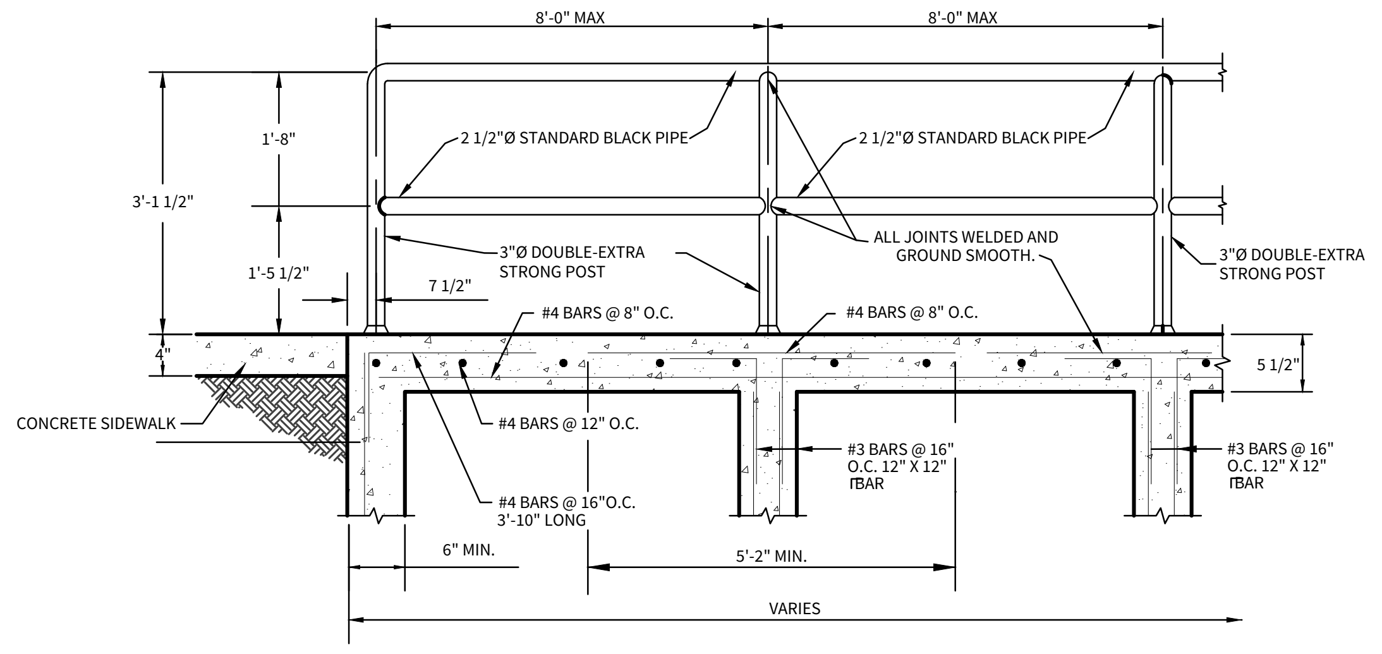
- SELECT FILL MATERIALS SHOULD BE WITHOUT ORGANICS, CONSTRUCTION DEBRIS, DELETERIOUS MATERIALS, AND SHOULD BE WITHOUT ROCKS LARGER THAN 4 INCHES IN GREATEST DIMENSION. SELECT FILL SHOULD HAVE A PLASTICITY INDEX OF BETWEEN 5 AND 20. SELECT FILL SHOULD BE EVALUATED AND TESTED BY ECS PRIOR TO PLACEMENT IN THE FIELD.

- ECS RECOMMENDS THAT SELECT FILL BE PLACED IN HORIZONTAL LOOSE LIFTS OF NOT MORE THAN 8 INCHES IN THICKNESS. SELECT FILL SHOULD BE COMPACTED TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY AT MOISTURE CONTENTS WITHIN THE RANGE OF -1 TO +3 PERCENTAGE POINTS OF THE OPTIMUM MOISTURE CONTENT (TEX-114-E).

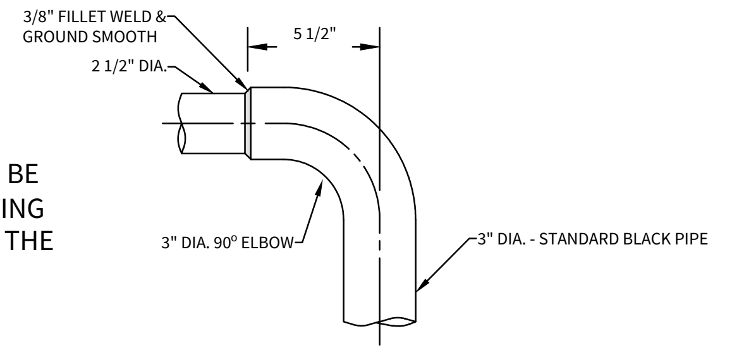
SUBGRADE VERIFICATION:

- AT THE TIME OF CONSTRUCTION, THE FINAL PAVEMENT SUBGRADE SHOULD BE OBSERVED AND VERIFIED BY A REPRESENTATIVE OF INTEC

STREET TYPE	HMAC TYPE "D"	CRUSHED LIMESTONE BASE COURSE THICKNESS	LIME-TREATED SUBGRADE DEPTH OF COMPACTION
RESIDENTIAL	3"	8"	8"
RESIDENTIAL COLLECTOR	3"	8"	8"
MINOR COLLECTOR	4"	9.5"	8"


8'-0" MAX
8'-0" MAX
2 1/2"Ø STANDARD BLACK PIPE
2 1/2"Ø STANDARD BLACK PIPE
3'-1 1/2"
1'-8"
1'-5 1/2"
7 1/2"
3"Ø DOUBLE-EXTRA STRONG POST
ALL JOINTS WELDED AND GROUND SMOOTH.
3"Ø DOUBLE-EXTRA STRONG POST
#4 BARS @ 8" O.C.
#4 BARS @ 8" O.C.
5 1/2"
CONCRETE SIDEWALK
#4 BARS @ 12" O.C.
#3 BARS @ 16" O.C. 12" X 12" FBAR
#3 BARS @ 16" O.C. 12" X 12" FBAR
#4 BARS @ 16" O.C. 3'-10" LONG
6" MIN.
5'-2" MIN.
VARIES

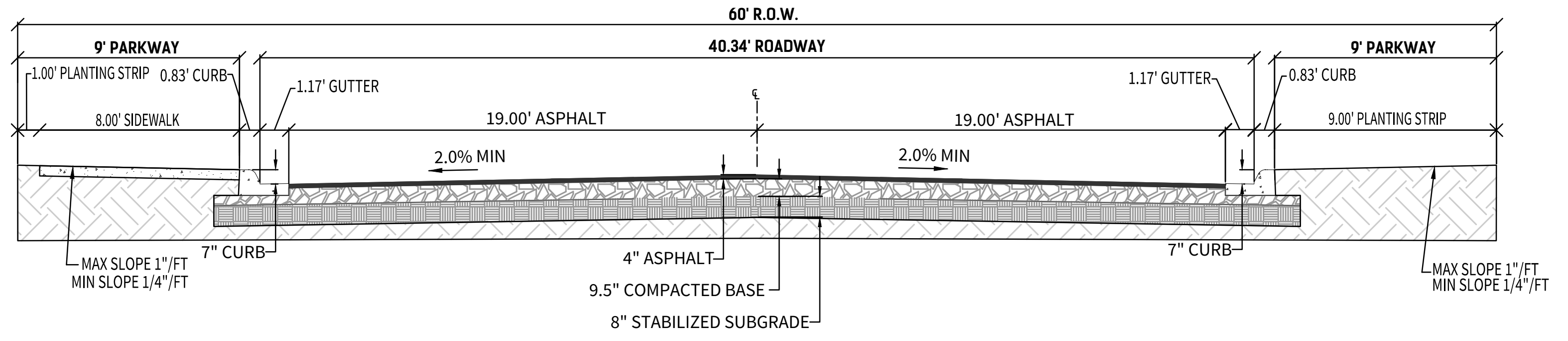
TYPICAL SIDEWALK BRIDGE SECTION AND SIDEWALK PIPE RAILING
N.T.S.


3/8" FILLET WELD & GROUND SMOOTH
2 1/2" DIA.
5 1/2"
3" DIA. 90° ELBOW
3" DIA. - STANDARD BLACK PIPE

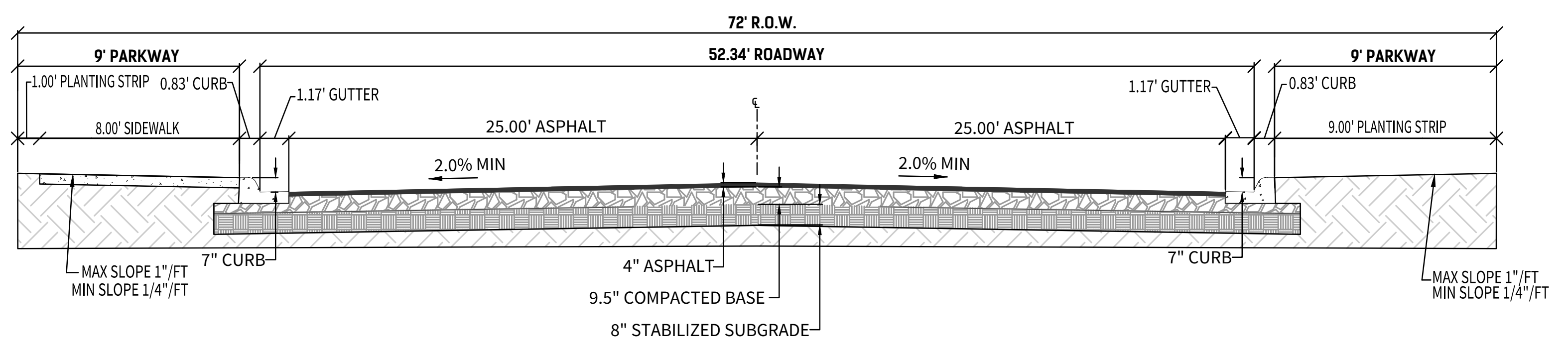
DETAIL OF 90° WELDING ELBOWS

* A NEAT END SECTION, SATISFACTORY TO THE ENGINEER, FROM SUBMITTED SHOP DRAWINGS, MAY BE USED IN LIEU OF THE 90° WELDING ELBOW SHOWN.

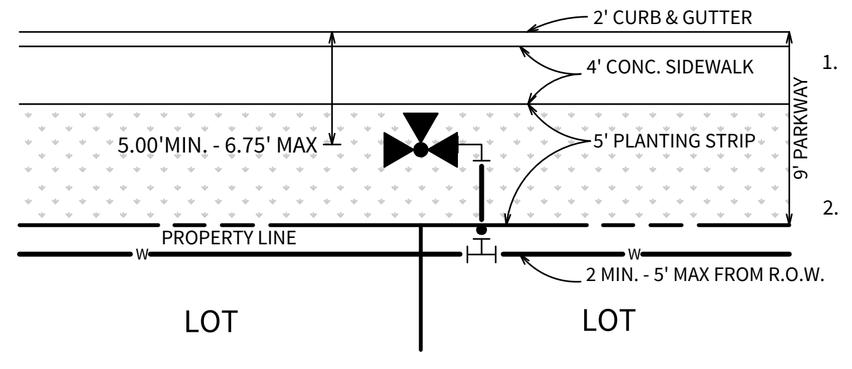
SCALE: 1" = 8"


60' R.O.W.
9' PARKWAY
40.34' ROADWAY
9' PARKWAY
1.00' PLANTING STRIP
0.83' CURB
1.17' GUTTER
8.00' SIDEWALK
19.00' ASPHALT
19.00' ASPHALT
9.00' PLANTING STRIP
2.0% MIN
2.0% MIN
MAX SLOPE 1"/FT MIN SLOPE 1/4"/FT
7" CURB
4" ASPHALT
9.5" COMPACTED BASE
8" STABILIZED SUBGRADE

TYPICAL "MINOR COLLECTOR" STREET CROSS SECTION
N.T.S.


72' R.O.W.
9' PARKWAY
52.34' ROADWAY
9' PARKWAY
1.00' PLANTING STRIP
0.83' CURB
1.17' GUTTER
8.00' SIDEWALK
25.00' ASPHALT
25.00' ASPHALT
9.00' PLANTING STRIP
2.0% MIN
2.0% MIN
MAX SLOPE 1"/FT MIN SLOPE 1/4"/FT
7" CURB
4" ASPHALT
9.5" COMPACTED BASE
8" STABILIZED SUBGRADE

TYPICAL 72' "MINOR COLLECTOR" STREET CROSS SECTION
N.T.S.

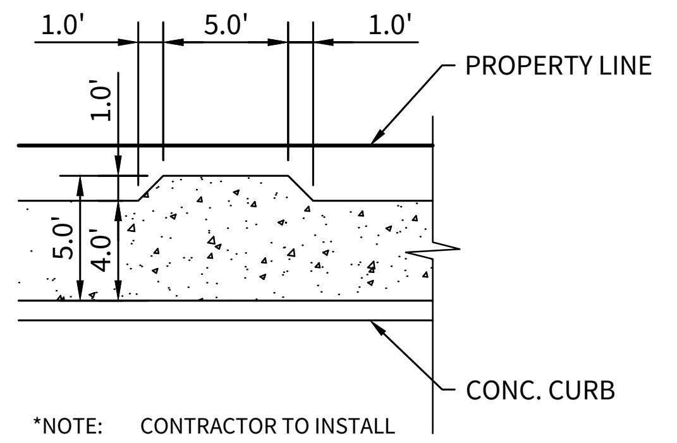

2' CURB & GUTTER
4' CONC. SIDEWALK
5.00'MIN. - 6.75' MAX
5' PLANTING STRIP
9' PARKWAY
PROPERTY LINE
2 MIN. - 5' MAX FROM R.O.W.
LOT
LOT

NOTE:

1. EXCLUSIVE OF THE TEE, PAYMENT FOR THE FIRE HYDRANT SHALL INCLUDE ALL FITTINGS, 6" D.I. PIPE AND 6" GATE VALVE & BOX.

2. FIRE HYDRANT TO BE INSTALLED OUTSIDE OF THE LIMITS OF ALL PROPOSED SIDEWALKS.

TYPICAL FIRE HYDRANT DETAIL (4' SIDEWALK / 50' R.O.W.)
N.T.S.


1.0'
5.0'
1.0'
PROPERTY LINE
1.0'
5.0'
4.0'
CONC. CURB

*NOTE: CONTRACTOR TO INSTALL AT A 200' MAXIMUM INTERVALS IN 4' SIDEWALKS

5'x5' SIDEWALK PASSING LANE
N.T.S.

GENERAL NOTES

THE LOCATIONS AND DEPTHS OF ALL EXISTING UTILITIES, INCLUDING SERVICE LATERALS AND DRAINAGE STRUCTURES SHOWN ON THE PLANS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION AND DEPTHS OF UNDERGROUND UTILITIES AT LEAST 48 HOURS PRIOR TO CONSTRUCTION WHETHER SHOWN ON PLANS OR NOT, AND TO PROTECT THE SAME DURING CONSTRUCTION.

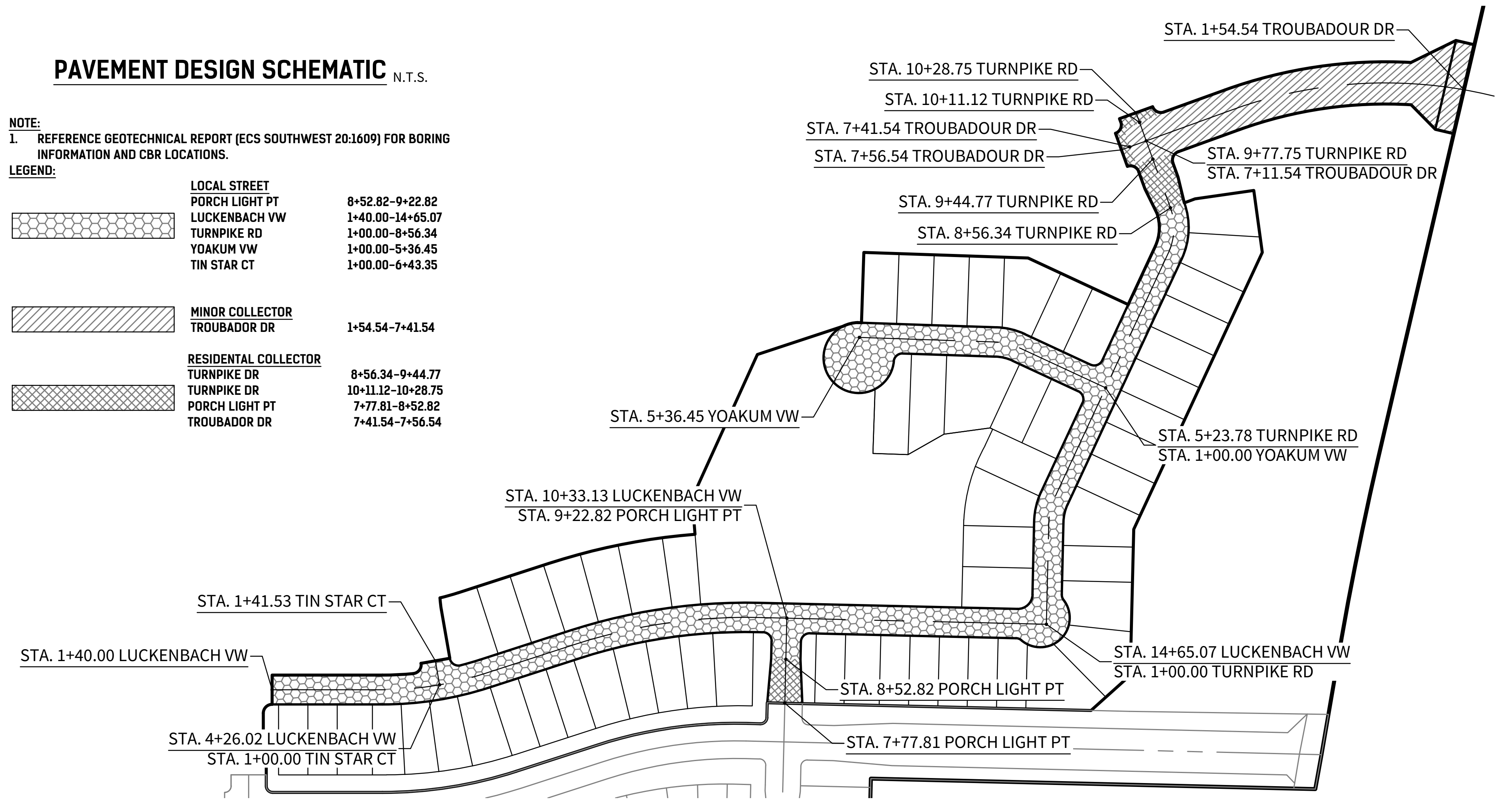
CRYSTAL CLEAR SPECIAL UTILITY DISTRICT	830-372-1031
TEXAS STATE WIDE ONE CALL LOCATOR	1-800-545-6005

PAVEMENT DESIGN SCHEMATIC N.T.S.

NOTE:
1. REFERENCE GEOTECHNICAL REPORT (ECS SOUTHWEST 20:1609) FOR BORING INFORMATION AND CBR LOCATIONS.

LEGEND:

⬡	**LOCAL STREET**	
	PORCH LIGHT PT	8+52.82–9+22.82
	LUCKENBACH VW	1+40.00–14+65.07
	TURNPIKE RD	1+00.00–8+56.34
	YOAKUM VW	1+00.00–5+36.45
	TIN STAR CT	1+00.00–6+43.35
▨	**MINOR COLLECTOR**	
	TROUBADOR DR	1+54.54–7+41.54
▩	**RESIDENTAL COLLECTOR**	
	TURNPIKE DR	8+56.34–9+44.77
	TURNPIKE DR	10+11.12–10+28.75
	PORCH LIGHT PT	7+77.81–8+52.82
	TROUBADOR DR	7+41.54–7+56.54


STA. 1+54.54 TROUBADOUR DR
STA. 10+28.75 TURNPIKE RD
STA. 10+11.12 TURNPIKE RD
STA. 7+41.54 TROUBADOUR DR
STA. 7+56.54 TROUBADOUR DR
STA. 9+77.75 TURNPIKE RD
STA. 7+11.54 TROUBADOUR DR
STA. 9+44.77 TURNPIKE RD
STA. 8+56.34 TURNPIKE RD
STA. 5+36.45 YOAKUM VW
STA. 5+23.78 TURNPIKE RD
STA. 1+00.00 YOAKUM VW
STA. 10+33.13 LUCKENBACH VW
STA. 9+22.82 PORCH LIGHT PT
STA. 1+41.53 TIN STAR CT
STA. 1+40.00 LUCKENBACH VW
STA. 14+65.07 LUCKENBACH VW
STA. 1+00.00 TURNPIKE RD
STA. 8+52.82 PORCH LIGHT PT
STA. 4+26.02 LUCKENBACH VW
STA. 1+00.00 TIN STAR CT
STA. 7+77.81 PORCH LIGHT PT

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San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

STANDARD STREET DETAILS

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
1.
2.
3.
4.
5.
6.
7.
8.

4/16/26
TORY DUANE MILLER
135598

CUDE ENGINEERS
TBPELS No. 10048500

C7.D1

R:\04024\018\2-DWG\4-Plans\C7.D1 STANDARD STREET DETAILS.dwg 2026/04/16 8:40am sgonzales

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SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

Post Type
- FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
- TWT = Thin-Walled Tubing (see SMD(TWT))
- 10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
- S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

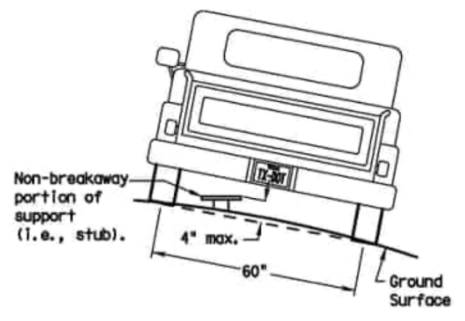
Number of Posts (1 or 2)

Anchor Type
- UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
- UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
- WS = Wedge Anchor Steel - (see SMD(TWT))
- WP = Wedge Anchor Plastic (see SMD(TWT))
- SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
- SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation
- P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
- T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
- U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))

IF REQUIRED
- 1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
- BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
- WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
- EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

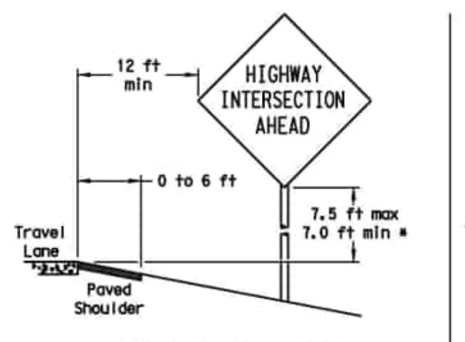
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT


Non-breakaway portion of support (i.e., stub).
4" max.
60"
Ground Surface

To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

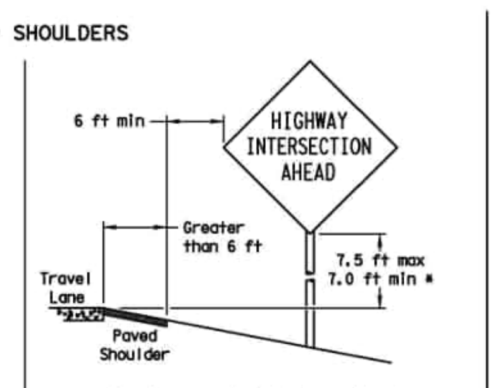
SIGN LOCATION

PAVED SHOULDERS


12 ft min
0 to 6 ft
HIGHWAY INTERSECTION AHEAD
7.5 ft max
7.0 ft min *
Travel Lane
Paved Shoulder

LESS THAN 6 FT. WIDE

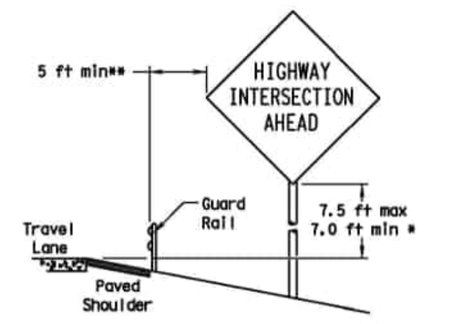
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.


6 ft min
Greater than 6 ft
HIGHWAY INTERSECTION AHEAD
7.5 ft max
7.0 ft min *
Travel Lane
Paved Shoulder

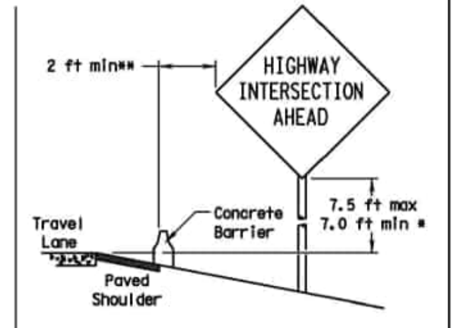
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

BEHIND BARRIER


5 ft min**
HIGHWAY INTERSECTION AHEAD
Guard Rail
7.5 ft max
7.0 ft min *
Travel Lane
Paved Shoulder

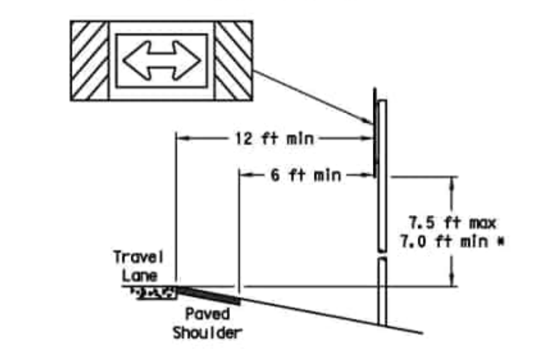
BEHIND GUARDRAIL


2 ft min**
HIGHWAY INTERSECTION AHEAD
Concrete Barrier
7.5 ft max
7.0 ft min *
Travel Lane
Paved Shoulder

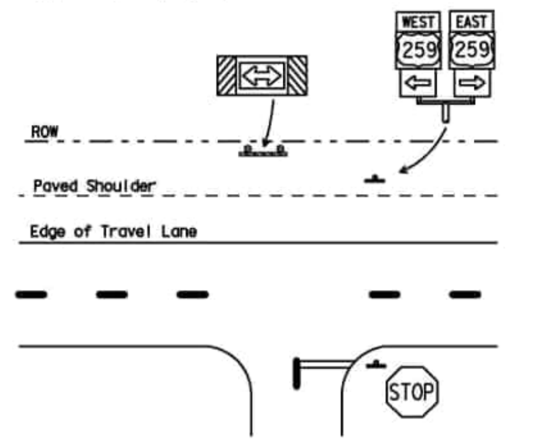
BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

T-INTERSECTION


12 ft min
6 ft min
7.5 ft max
7.0 ft min *
Travel Lane
Paved Shoulder

When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.


WEST 259
EAST 259
ROW
Paved Shoulder
Edge of Travel Lane
STOP

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

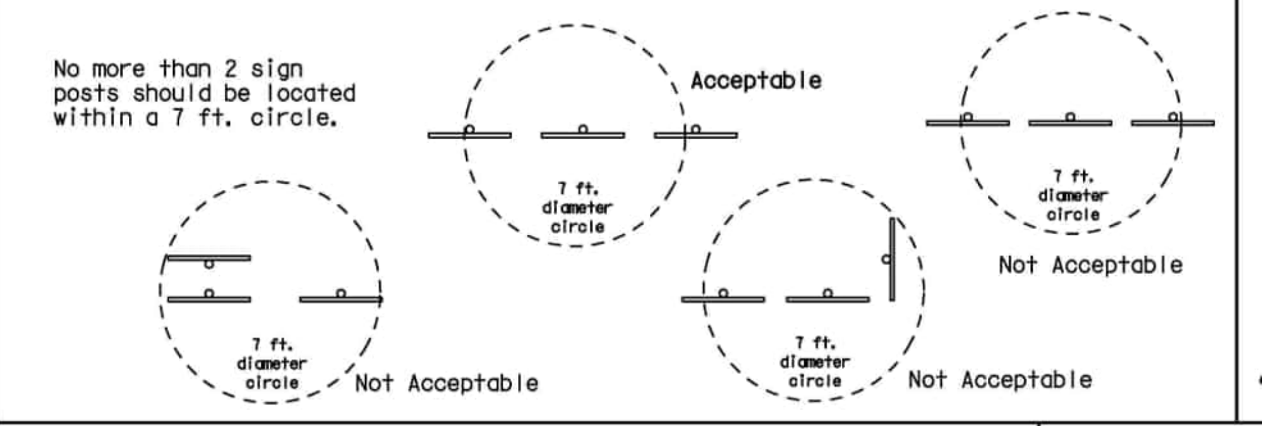
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

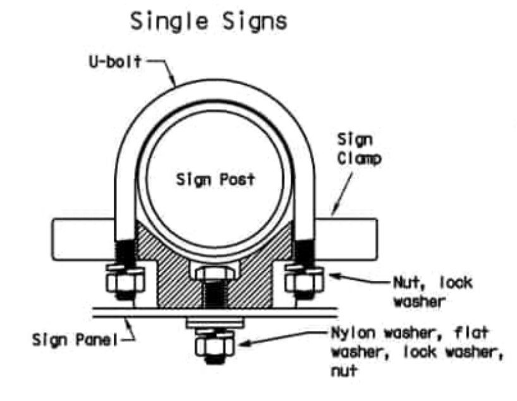
See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

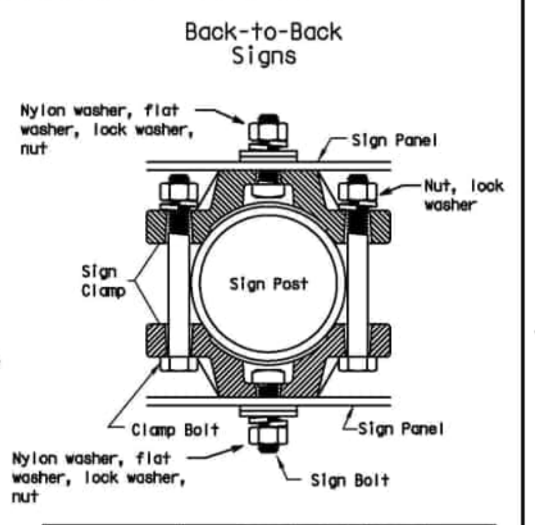
The website address is:
http://www.txdot.gov/publications/traffic.htm

No more than 2 sign posts should be located within a 7 ft. circle.


Acceptable
7 ft. diameter circle
Not Acceptable
7 ft. diameter circle
Not Acceptable
7 ft. diameter circle
Not Acceptable

TYPICAL SIGN ATTACHMENT DETAIL


Single Signs
U-bolt
Sign Post
Sign Clamp
Nut, lock washer
Sign Panel
Nylon washer, flat washer, lock washer, nut


Back-to-Back Signs
Nylon washer, flat washer, lock washer, nut
Sign Panel
Nut, lock washer
Sign Clamp
Sign Post
Clamp Bolt
Sign Panel
Nylon washer, flat washer, lock washer, nut
Sign Bolt

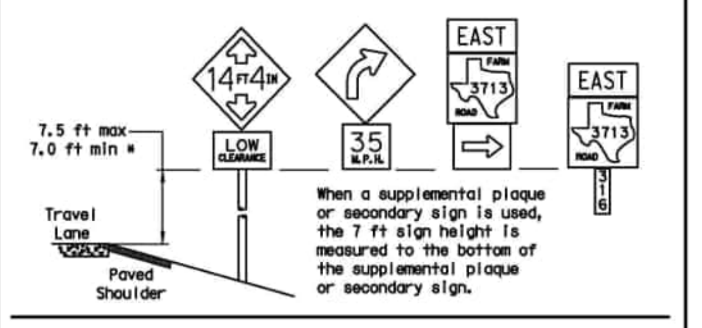
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

Sign clamps may be either the specific size clamp or the universal clamp.

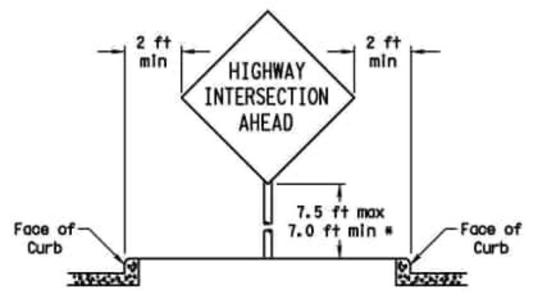
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES


7.5 ft max
7.0 ft min *
14 FT 4 IN
LOW CLEARANCE
35 M.P.H.
EAST
FARM ROAD 3713
EAST
FARM ROAD 3713
Travel Lane
Paved Shoulder

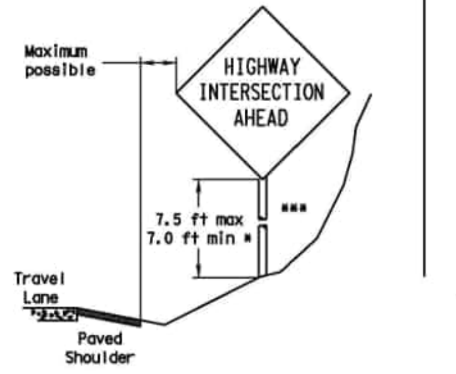
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND


2 ft min
2 ft min
HIGHWAY INTERSECTION AHEAD
7.5 ft max
7.0 ft min *
Face of Curb
Face of Curb

RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)


Maximum possible
HIGHWAY INTERSECTION AHEAD
7.5 ft max
7.0 ft min *
***
Travel Lane
Paved Shoulder

Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
GENERAL NOTES & DETAILS

SMD(GEN)-08

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9-08 REVISIONS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
CONT	SECT	JOB	HIGHWAY	
DIST	COUNTY	SHEET NO.		

26A

DATE:
FILE:

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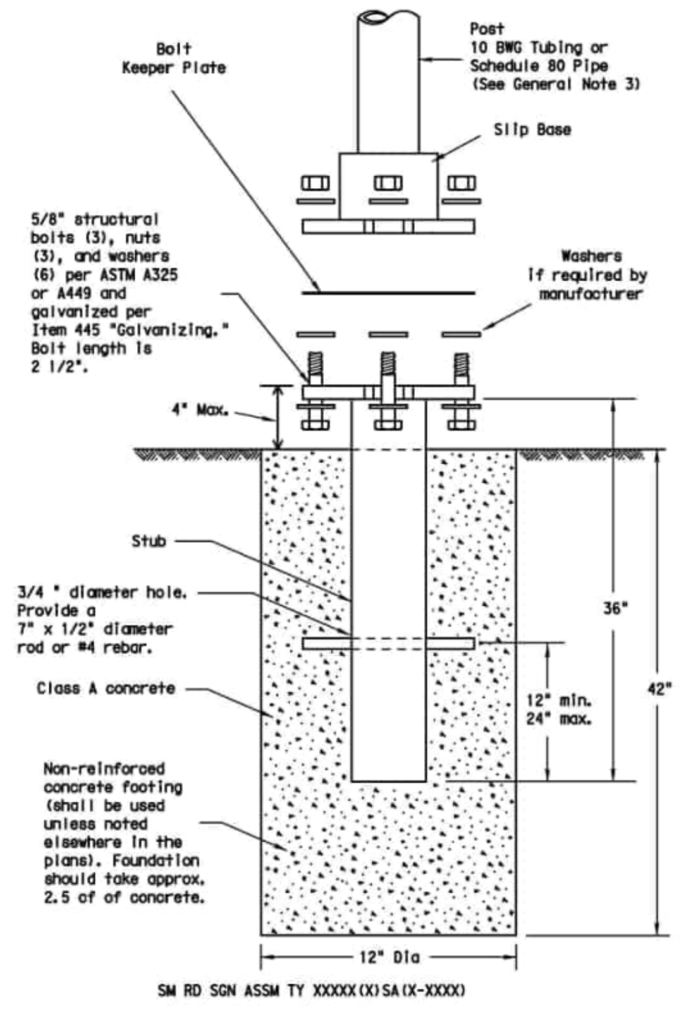
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS


Post
10 BWG Tubing or Schedule 80 Pipe (See General Note 3)
Bolt Keeper Plate
Slip Base
5/8" structural bolts (3), nuts (3), and washers (6) per ASTM A325 or A449 and galvanized per Item 445 "Galvanizing." Bolt length is 2 1/2".
Washers if required by manufacturer
4" Max.
Stub
3/4 " diameter hole. Provide a 7" x 1/2" diameter rod or #4 rebar.
Class A concrete
36"
42"
12" min.
24" max.
Non-reinforced concrete footing (shall be used unless noted elsewhere in the plans). Foundation should take approx. 2.5 of of concrete.
12" Dia
SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

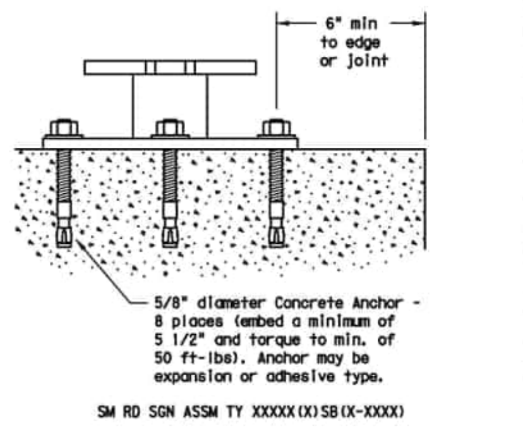
1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
     0.134" nominal wall thickness
     Seamless or electric-resistance welded steel tubing or pipe
     Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
     Other steels may be used if they meet the following:
       55,000 PSI minimum yield strength
       70,000 PSI minimum tensile strength
       20% minimum elongation in 2"
     Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
     Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
     Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
   Schedule 80 Pipe (2.875" outside diameter)
     0.276" nominal wall thickness
     Steel tubing per ASTM A500 Gr C
     Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
       46,000 PSI minimum yield strength
       62,000 PSI minimum tensile strength
       21% minimum elongation in 2"
     Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
     Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
     Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is:
   http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR


6" min to edge or joint
5/8" diameter Concrete Anchor - 8 places (embed a minimum of 5 1/2" and torque to min. of 50 ft-lbs). Anchor may be expansion or adhesive type.
SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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9-08 REVISIONS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
CONT	SECT	JOB	HIGHWAY	
DIST	COUNTY	SHEET NO.		

26B

DATE:
FILE:

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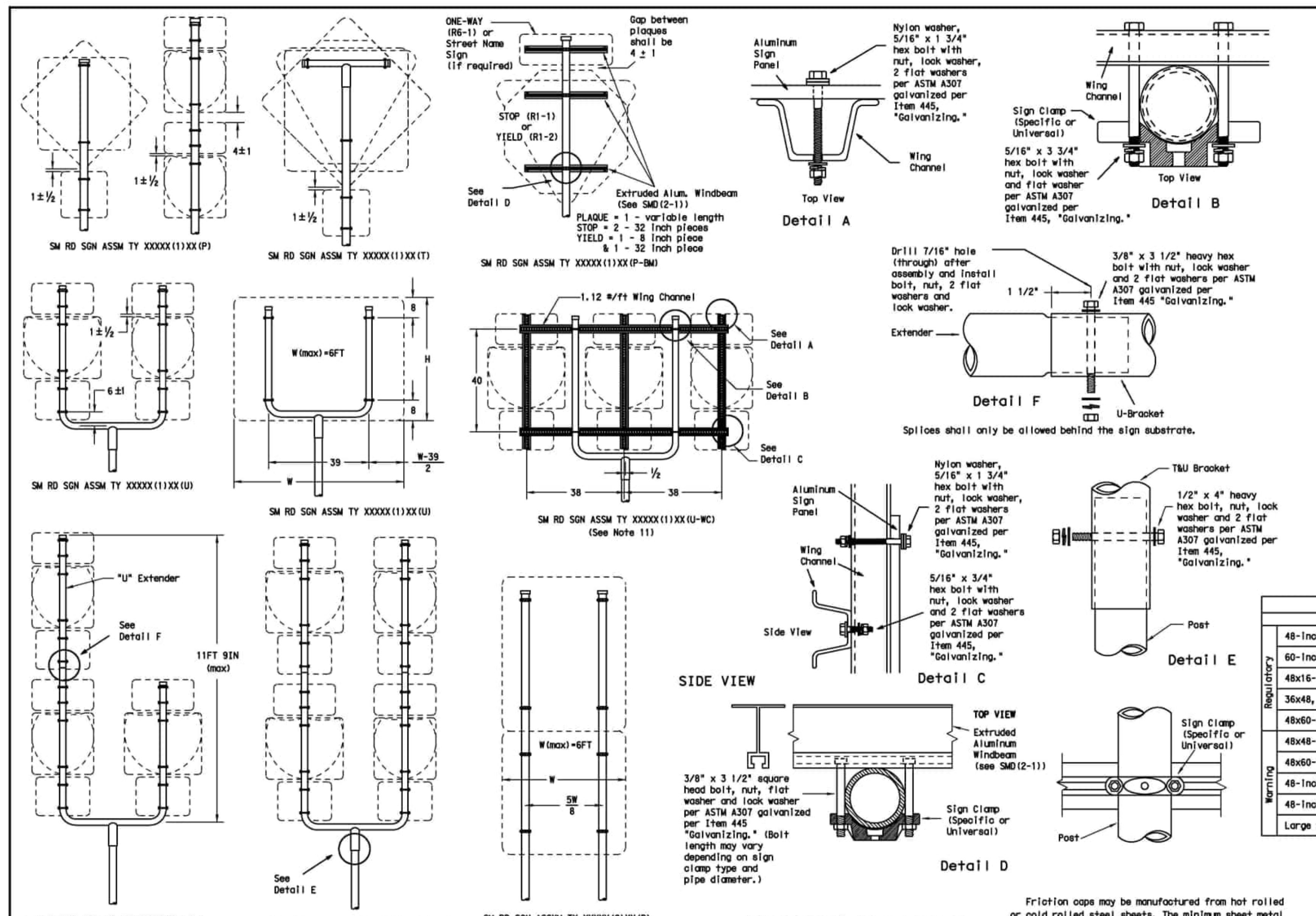
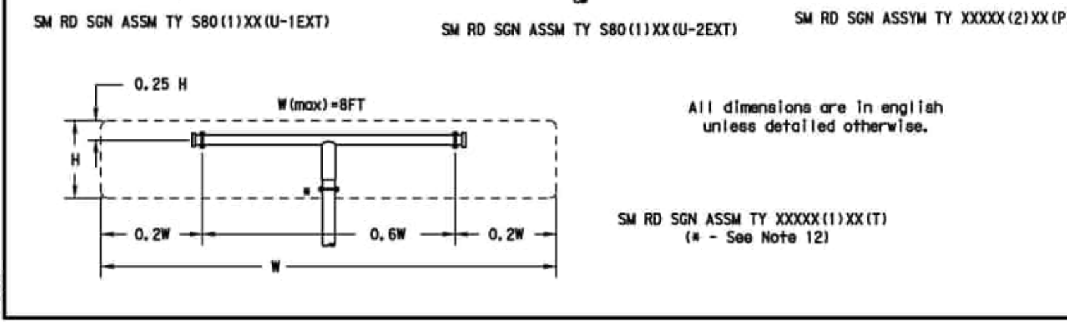
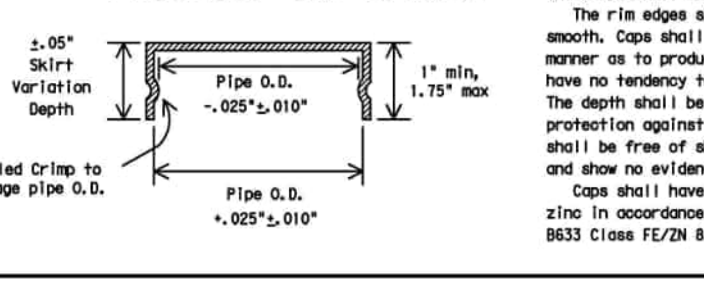

SM RD SGN ASSM TY XXXXX(1)XX(P)
SM RD SGN ASSM TY XXXXX(1)XX(T)
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)
SM RD SGN ASSM TY XXXXX(1)XX(U)
SM RD SGN ASSM TY XXXXX(1)XX(U-WC) (See Note 11)
SM RD SGN ASSM TY S80(1)XX(U-1EXT)
SM RD SGN ASSM TY S80(1)XX(U-2EXT)
SM RD SGN ASSM TY XXXXX(2)XX(P)
ONE-WAY (R6-1) or Street Name Sign (if required)
STOP (R1-1) or YIELD (R1-2)
Gap between plaques shall be 4 ± 1
Extruded Alum. Windbeam (See SMD(2-1))
1.12 #/ft Wing Channel
"U" Extender
See Detail A
See Detail B
See Detail C
See Detail D
See Detail E
See Detail F
Detail A
Detail B
Detail C
Detail D
Detail E
Detail F
SIDE VIEW
TOP VIEW
Nylon washer, 5/16" x 1 3/4" hex bolt with nut, lock washer, 2 flat washers per ASTM A307 galvanized per Item 445, "Galvanizing."
5/16" x 3/4" hex bolt with nut, lock washer and 2 flat washers per ASTM A307 galvanized per Item 445, "Galvanizing."
1/2" x 4" heavy hex bolt, nut, lock washer and 2 flat washers per ASTM A307 galvanized per Item 445, "Galvanizing."
3/8" x 3 1/2" square head bolt, nut, flat washer and lock washer per ASTM A307 galvanized per Item 445 "Galvanizing." (Bolt length may vary depending on sign clamp type and pipe diameter.)
3/8" x 3 1/2" heavy hex bolt with nut, lock washer and 2 flat washers per ASTM A307 galvanized per Item 445, "Galvanizing."
Drill 7/16" hole (through) after assembly and install bolt, nut, 2 flat washers and lock washer.
Extruded Aluminum Windbeam (see SMD(2-1))
Sign Clamp (Specific or Universal)
Aluminum Sign Panel
Wing Channel
T&U Bracket
Post
Extender
U-Bracket
Splices shall only be allowed behind the sign substrate.


0.25 W
W(max)=6FT
0.2W
0.6W
0.2W
SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL


±.05" Skirt Variation Depth
Pipe O.D. -.025"±.010"
1" min, 1.75" max
Rolled Crimp to engage pipe O.D.
Pipe O.D. +.025"±.010"

Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

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9-08 REVISIONS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
CONT	SECT	JOB	HIGHWAY	
DIST	COUNTY	SHEET NO.		

26C

DATE:
FILE:

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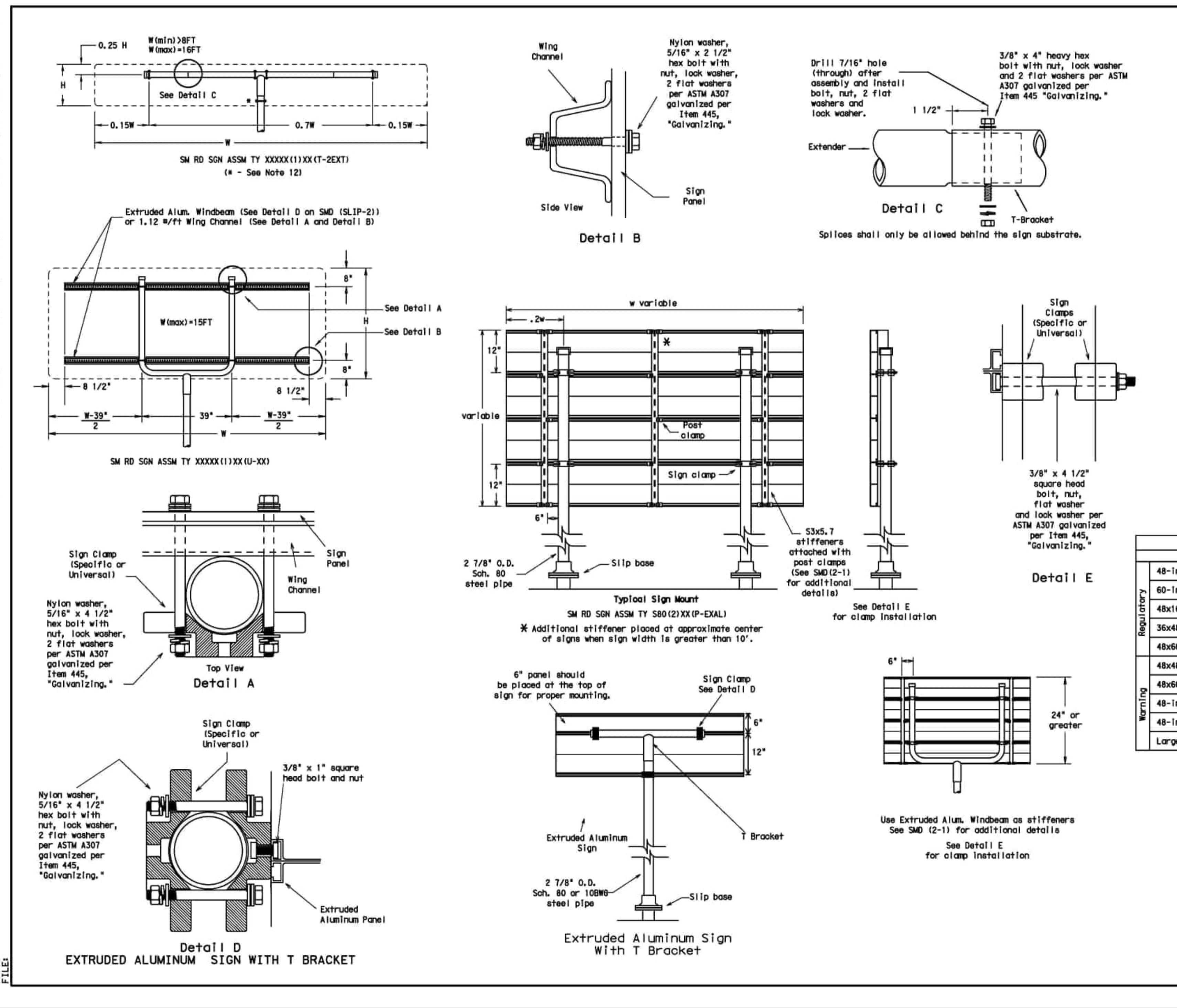
W(min)=8FT
W(max)=16FT
0.25 H
See Detail C
0.15W
0.7W
0.15W
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)
Extruded Alum. Windbeam (See Detail D on SMD(SLIP-2)) or 1.12 #/ft Wing Channel (See Detail A and Detail B)
W(max)=15FT
See Detail A
See Detail B
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)
Wing Channel
Side View
Detail A
Detail B
Detail C
Detail D
Detail E
Sign Clamp (Specific or Universal)
Sign Panel
Top View
Nylon washer, 5/16" x 2 1/2" hex bolt with nut, lock washer, 2 flat washers per ASTM A307 galvanized per Item 445, "Galvanizing."
Drill 7/16" hole (through) after assembly and install bolt, nut, 2 flat washers and lock washer.
Extender
T-Bracket
3/8" x 4" heavy hex bolt with nut, lock washer and 2 flat washers per Item 445 "Galvanizing."
Splices shall only be allowed behind the sign substrate.
W variable
Post clamp
Sign clamp
S3x5.7 stiffeners attached with post clamps (See SMD(2-1) for additional details)
Slip base
2 7/8" O.D. Sch. 80 steel pipe
Typical Sign Mount
SM RD SGN ASSM TY S80(2)XX(P-EXAL)
* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.
See Detail E for clamp installation
3/8" x 4 1/2" square head bolt, nut, flat washer and lock washer per ASTM A307 galvanized per Item 445, "Galvanizing."
6" panel should be placed at the top of sign for proper mounting.
24" or greater
Use Extruded Alum. Windbeam as stiffeners See SMD (2-1) for additional details
See Detail E for clamp installation
Extruded Aluminum Sign
T Bracket
2 7/8" O.D. Sch. 80 or 10BWG steel pipe
Extruded Aluminum Sign With T Bracket
3/8" x 1" square head bolt and nut
Extruded Aluminum Panel
EXTRUDED ALUMINUM SIGN WITH T BRACKET

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

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ENGINEERS

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
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UNIT 2

SMALL ROADSIDE GENERAL NOTES & DETAILS

DATE
04/16/2026

PROJECT NO.
04024-018

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C7

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JL/TM

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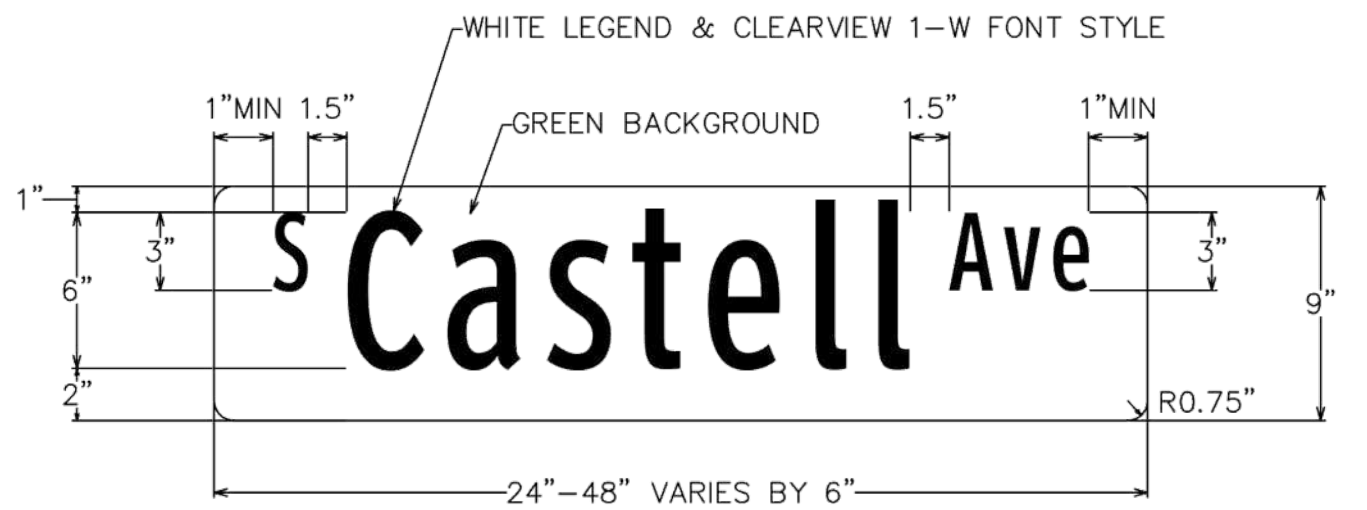
TBPELS No. 10048500

C7.D2

STREET SIGN DETAIL - GROUND MOUNT


WHITE LEGEND & CLEARVIEW 1-W FONT STYLE
GREEN BACKGROUND
1"MIN
1.5"
1.5"
1"MIN
1"
3"
6"
2"
3"
9"
S Castell Ave
R0.75"
24"-48" VARIES BY 6"

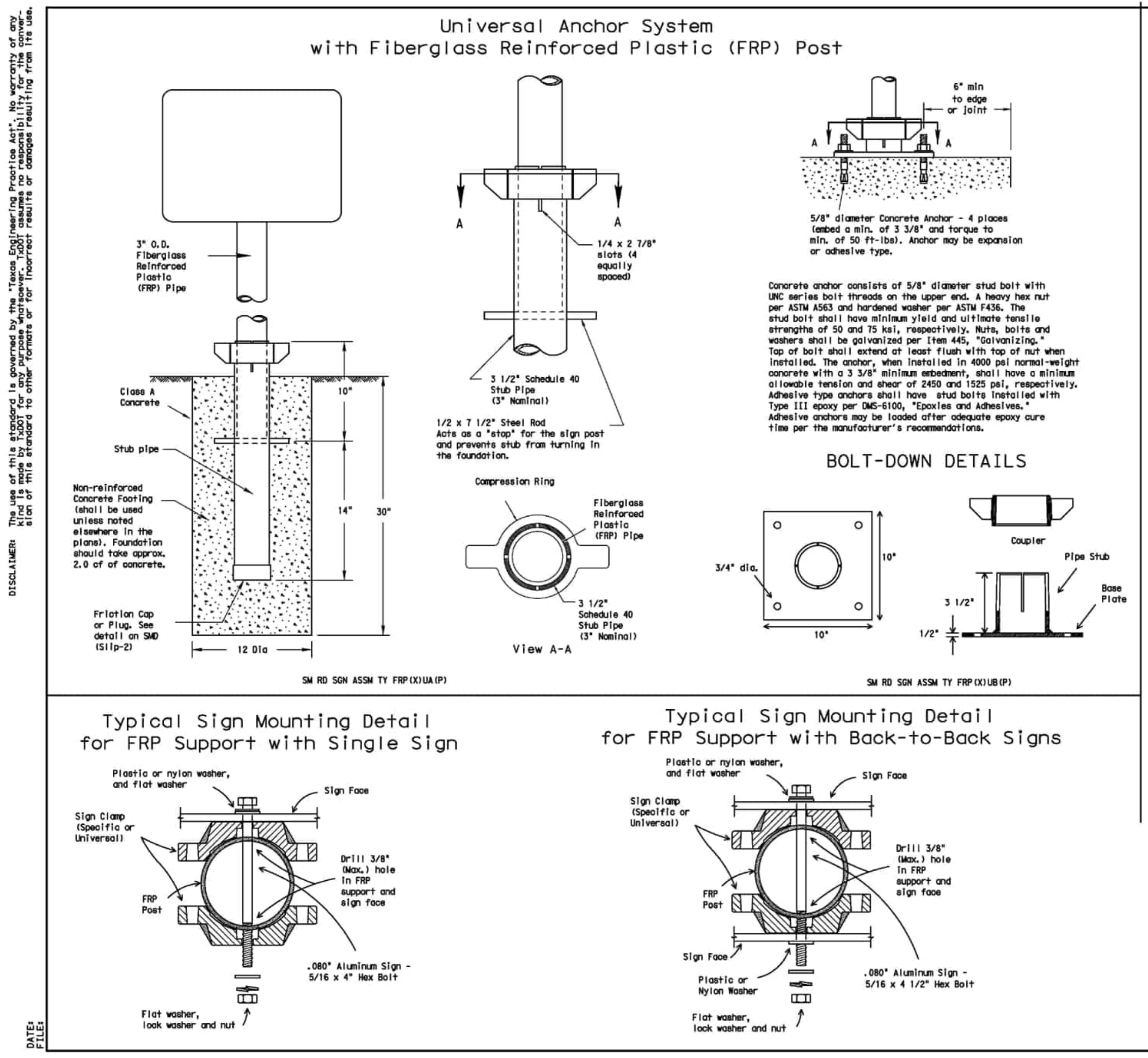
Height	9"
Length	24" min 48" max 6" increments in length
Thickness	0.080"
Substrate	Flat aluminum sheeting with ¾" radius circular fillets at corners conforming to the requirements of ASTM B 209, Alloys 6061–T–6, or 5052–H38.
Sign Face Materials	Green film over High Intensity Prismatic sheeting
Legend	Legends shall be Clearview 1–W font style. Reduced spacing between the letters or words should not be used as a means of reducing the overall size of a street name sign unless approved by the City Traffic Engineer.
Color	White legend on green background

Notes:

1. Street name signs shall be double sided when center mounted on top of sign post. Only one street name sign should be installed on top of sign post with STOP or YIELD sign.
2. When two sets of street name signs are required (e.g. at "T" intersections), one double-sided street name sign shall be mounted on sign post. The sign assembly shall meet minimum height requirements as required in the Texas Manual on Uniform Traffic Control Devices (TMUTCD). When required, DEAD END (W14-1a) or NO OUTLET (W14-2a) signs shall also be mounted on the sign post.
3. Street name signs greater than 36" long and center mounted on top of sign post shall be mounted on post top bracket with 12" slot. All other street name signs center mounted on top of sign post shall be mounted on post top bracket with 5 ¼" slot.
4. Street name signs mounted on sign post shall be mounted with double-sided round pole brackets. Two holes should be punched in the center of the 9" street name sign blank 1" from edge of the blank with 7"spacing between holes.
5. The lettering for names of streets shall be composed of a combination of lower-case letters with initial upper-case letters. Acceptable abbreviations per TMUTCD may be used except for the street name itself.
6. Red background (red film over High Intensity Prismatic) should be used for private street name signs.

Street Sign Detail - Ground Mount			City of New Braunfels	ENGINEERING DIVISION 424 S. CASTELL AVE. NEW BRAUNFELS, TEXAS 78130 PHONE: 830 221 4020 FAX: 830 626 3600
ISSUE DATE: February 2013	DWG. NO: ST-024	SCALE: N.T.S.		
DRAWN BY: RAS	CONTACT: GF	SHEET: 1 OF 1		

P:\2010 ENGINEERING-AUTOCAD\DETAILS\NB-PUBLIC WORKS DETAILS\NB-UNAPPROVED DETAILS-2013\ST-2013.024 STREET SIGN DETAIL - GROUND MOUNT.DWG


Universal Anchor System
with Fiberglass Reinforced Plastic (FRP) Post
3" O.D. Fiberglass Reinforced Plastic (FRP) Pipe
Class A Concrete
Stub pipe
Non-reinforced Concrete Footing (shall be used unless noted elsewhere in the plans). Foundation should take approx. 2.0 cf of concrete.
Friction Cap or Plug. See detail on SMD (Slip-2)
10"
14"
30"
12" Dia
SM RD SGN ASSM TY FRP(X)UA(P)
A
A
1/4 x 2 7/8" slots (4 equally spaced)
3 1/2" Schedule 40 Stub Pipe (3" Nominal)
1/2 x 7 1/2" Steel Rod Acts as a "stop" for the sign post and prevents stub from turning in the foundation.
Compression Ring
Fiberglass Reinforced Plastic (FRP) Pipe
3 1/2" Schedule 40 Stub Pipe (3" Nominal)
View A-A
6" min to edge or joint
5/8" diameter Concrete Anchor - 4 places (embed a min. of 3 3/8" and torque to min. of 50 ft-lbs). Anchor may be expansion or adhesive type.
BOLT-DOWN DETAILS
3/4" dia.
10"
10"
Coupler
Pipe Stub
Base Plate
3 1/2"
1/2"
SM RD SGN ASSM TY FRP(X)UB(P)
Typical Sign Mounting Detail
for FRP Support with Single Sign
Typical Sign Mounting Detail
for FRP Support with Back-to-Back Signs
Plastic or nylon washer, and flat washer
Sign Face
Sign Clamp (Specific or Universal)
FRP Post
Drill 3/8" (max.) hole in FRP support and sign face
.080" Aluminum Sign - 5/16 x 4" Hex Bolt
.080" Aluminum Sign - 5/16 x 4 1/2" Hex Bolt
Plastic or Nylon Washer
Flat washer, lock washer and nut

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.

GENERAL NOTES:

1. FRP sign supports for a single type sign support may be used for signs up to and including 16 square feet. Dual post installation may be used for signs up to and including 32 square feet.
2. All nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing."
3. See the Traffic Operations Division website for detailed drawings of sign clamps. The website address is: http://www.txdot.gov/publications/traffic.htm

FRP POST REQUIREMENTS

1. Materials shall conform to the requirements of Departmental Material Specification DMS-4410 and will be furnished in a yellow or gray color as specified elsewhere in the plans.
2. Thickness of FRP sign support is 0.125" + 0.031", - 0.0".
3. FRP sign supports are prequalified by the Traffic Operations Division. Prequalification procedures are obtained by writing:

   Texas Department of Transportation
   Traffic Operations Division
   125 East 11th Street
   Austin, Texas 78701-2483

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURES

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Insert base post in foundation hole to depths shown and fill hole with concrete. Cut base post from bottom and ensure a minimum of 18" embedment if installed in solid rock.
4. Level and plumb the base post with coupler using a torpedo level and let concrete set a minimum of 4 days, unless otherwise directed by Engineer. Bottom of base post slots shall be above the concrete footing.
5. Attach sign to FRP post.
6. Insert sign post into base post. Lower until the post comes to rest on the steel rod.
7. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
8. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

BOLT DOWN SIGN SUPPORT

1. Position base plate with coupler on existing concrete.
2. Drill holes into concrete and insert the 5/8" diameter bolts with wedge anchors, and tighten nuts.
3. Attach sign to FRP post.
4. Insert bottom of sign post into pipe stub.
5. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
6. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
UNIVERSAL ANCHOR SYSTEM
WITH FRP POST
SMD(FRP)-08

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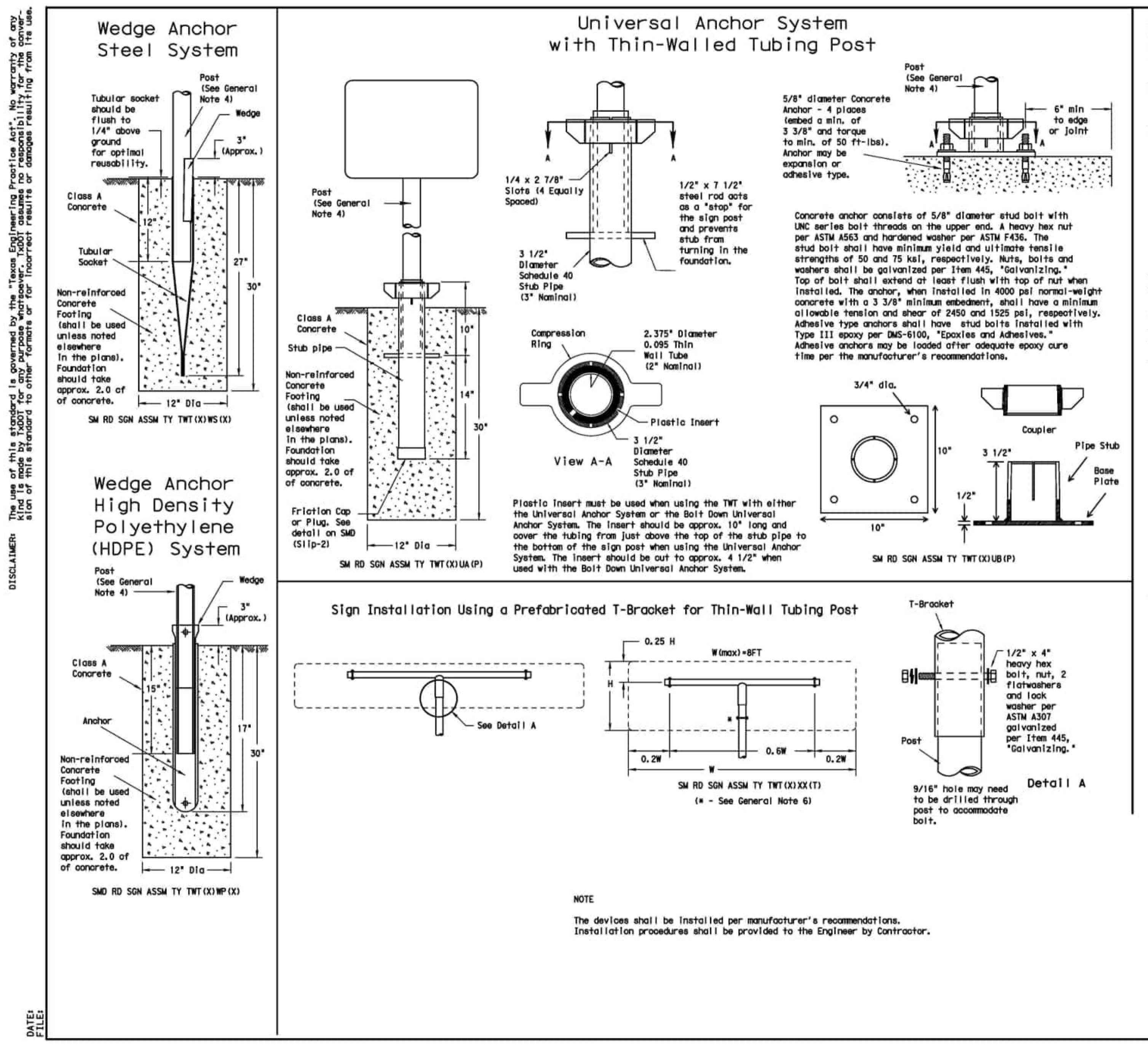
Wedge Anchor
Steel System
Tubular socket should be flush to 1/4" above ground for optimal reusability.
Post (See General Note 4)
Wedge
3" (Approx.)
Class A Concrete
Tubular Socket
27"
30"
12" Dia
SM RD SGN ASSM TY TWT(X)WS(X)
Wedge Anchor
High Density
Polyethylene
(HDPE) System
Anchor
17"
30"
12" Dia
SMD RD SGN ASSM TY TWT(X)WP(X)
Universal Anchor System
with Thin-Walled Tubing Post
Post (See General Note 4)
Stub pipe
Friction Cap or Plug. See detail on SMD (Slip-2)
1/4 x 2 7/8" Slots (4 Equally Spaced)
3 1/2" Diameter Schedule 40 Stub Pipe (3" Nominal)
1/2" x 7 1/2" steel rod acts as a "stop" for the sign post and prevents stub from turning in the foundation.
Compression Ring
2.375" Diameter 0.095 Thin Wall Tube (2" Nominal)
Plastic Insert
3 1/2" Diameter Schedule 40 Stub Pipe (3" Nominal)
View A-A
SM RD SGN ASSM TY TWT(X)UA(P)
5/8" diameter Concrete Anchor - 4 places (embed a min. of 3 3/8" and torque to min. of 50 ft-lbs). Anchor may be expansion or adhesive type.
6" min to edge or joint
3/4" dia.
10"
10"
Coupler
Pipe Stub
Base Plate
3 1/2"
1/2"
SM RD SGN ASSM TY TWT(X)UB(P)
Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post
W(max)=8FT
See Detail A
0.2W
0.6W
0.2W
SM RD SGN ASSM TY TWT(X)XX(T)
(* - See General Note 6)
T-Bracket
1/2" x 4" heavy hex bolt, nut, 2 flatwashers and lock washer per ASTM A307 galvanized per Item 445, "Galvanizing."
Post
9/16" hole may need to be drilled through post to accommodate bolt.
Detail A

Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.

NOTE

The devices shall be installed per manufacturer's recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   - 13 BWG Tubing (2.375" outside diameter) (TWT)
     - 0.095" nominal wall thickness
     - Seamless or electric-resistance welded steel tubing
     - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
     - Other steels may be used if they meet the following:
       - 55,000 PSI minimum yield strength
       - 70,000 PSI minimum tensile strength
       - 18% minimum elongation in 2"
     - Wall thickness (uncoated) shall be within the range of .083" to .099"
     - Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
     - Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: http://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
WEDGE & UNIVERSAL ANCHOR
WITH THIN WALL TUBING POST
SMD(TWT)-08

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FLYING W
UNIT 2

TXDOT SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS

DATE
04/16/2026

PROJECT NO.
04024-018

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TBPELS No. 10048500

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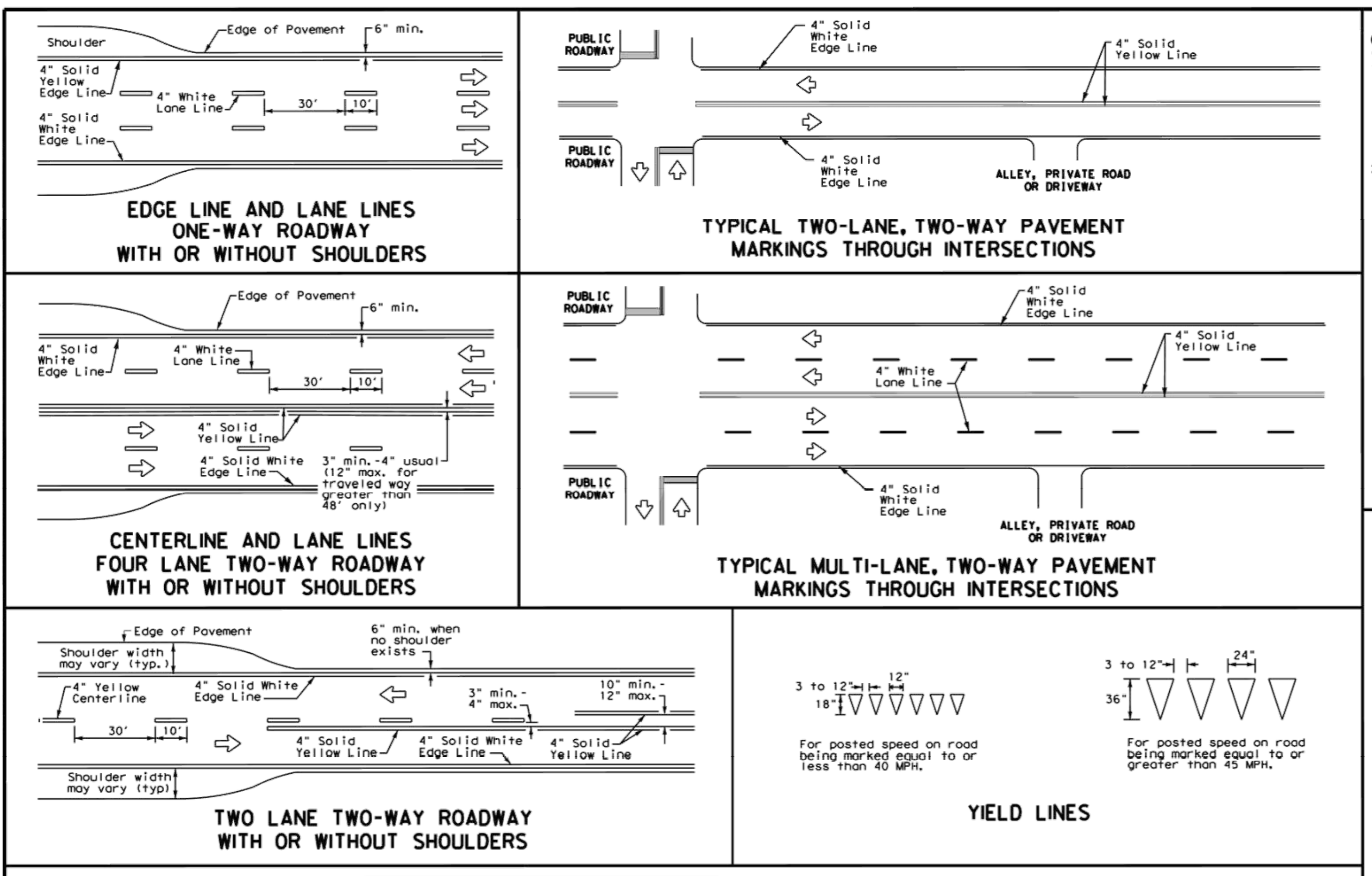

Shoulder
Edge of Pavement
6" min.
4" Solid Yellow Edge Line
4" White Lane Line
4" Solid White Edge Line
30'
10'
PUBLIC ROADWAY
4" Solid White Edge Line
4" Solid Yellow Line
ALLEY, PRIVATE ROAD OR DRIVEWAY
4" Solid Yellow Line
3" min. 4" usual 12" max. for traveled way greater than 48' only
Shoulder width may vary (typ.)
4" Yellow Centerline
4" Solid White Edge Line
3" min. 4" max.
10" min. 12" max.
3 to 12"
12"
18"
24"
36"
For posted speed on road being marked equal to or less than 40 MPH.
For posted speed on road being marked equal to or greater than 45 MPH.

EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS

TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

YIELD LINES

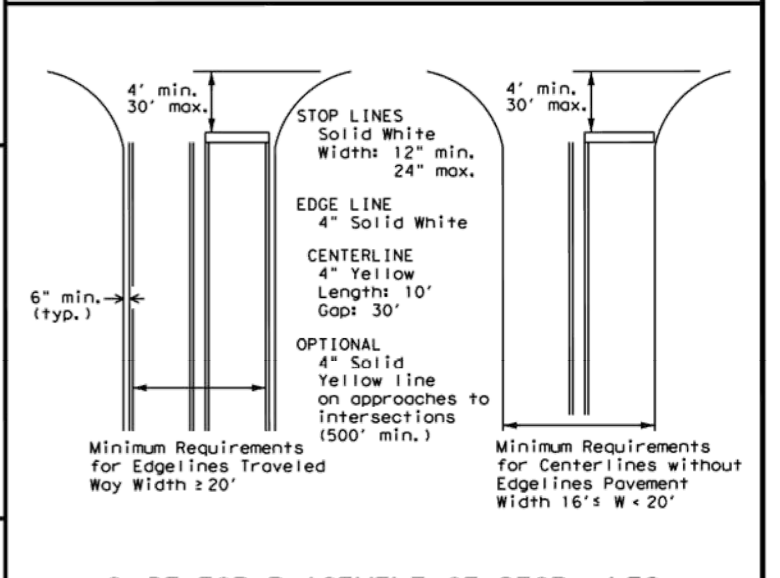
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

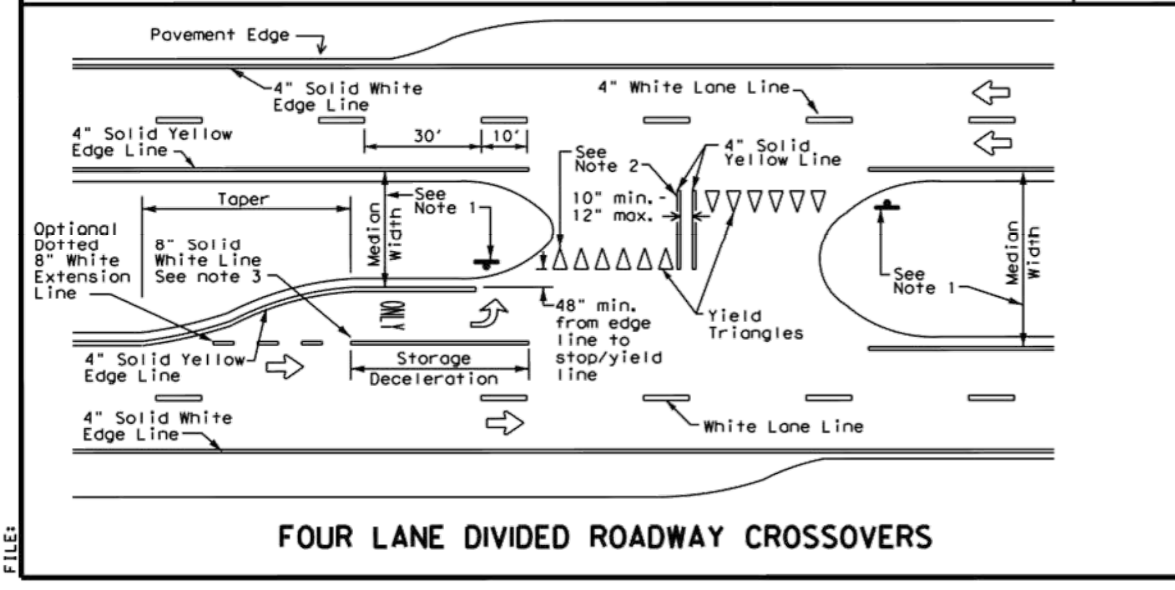
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.


4' min. 30' max.
STOP LINES Solid White Width: 12" min. 24" max.
EDGE LINE 4" Solid White
CENTERLINE 4" Yellow Lengths 10' Gap: 30'
OPTIONAL 4" Solid Yellow line on approaches to intersections (500' min.)
6" min. (typ.)
Minimum Requirements for Edgelines Traveled Way Width ≥ 20'
Minimum Requirements for Centerlines without Edgelines Pavement Width 16' ≤ W < 20'

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways


Pavement Edge
4" Solid White Edge Line
4" White Lane Line
4" Solid Yellow Edge Line
30'
10'
See Note 2
4" Solid Yellow Line
10" min. 12" max.
Taper
See Note 1
Median Width
Optional Dotted 8" White Extension Line
8" Solid White Lane Line See note 3
48" min. from edge line to stop/yield line
Yield Triangles
Storage
Deceleration
4" Solid Yellow Edge Line
4" Solid White Edge Line
White Lane Line

FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

Texas Department of Transportation
Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 5-00 2-12 8-00 6-20	DIST	COUNTY		SHEET NO.

22A

DATE:
FILE:

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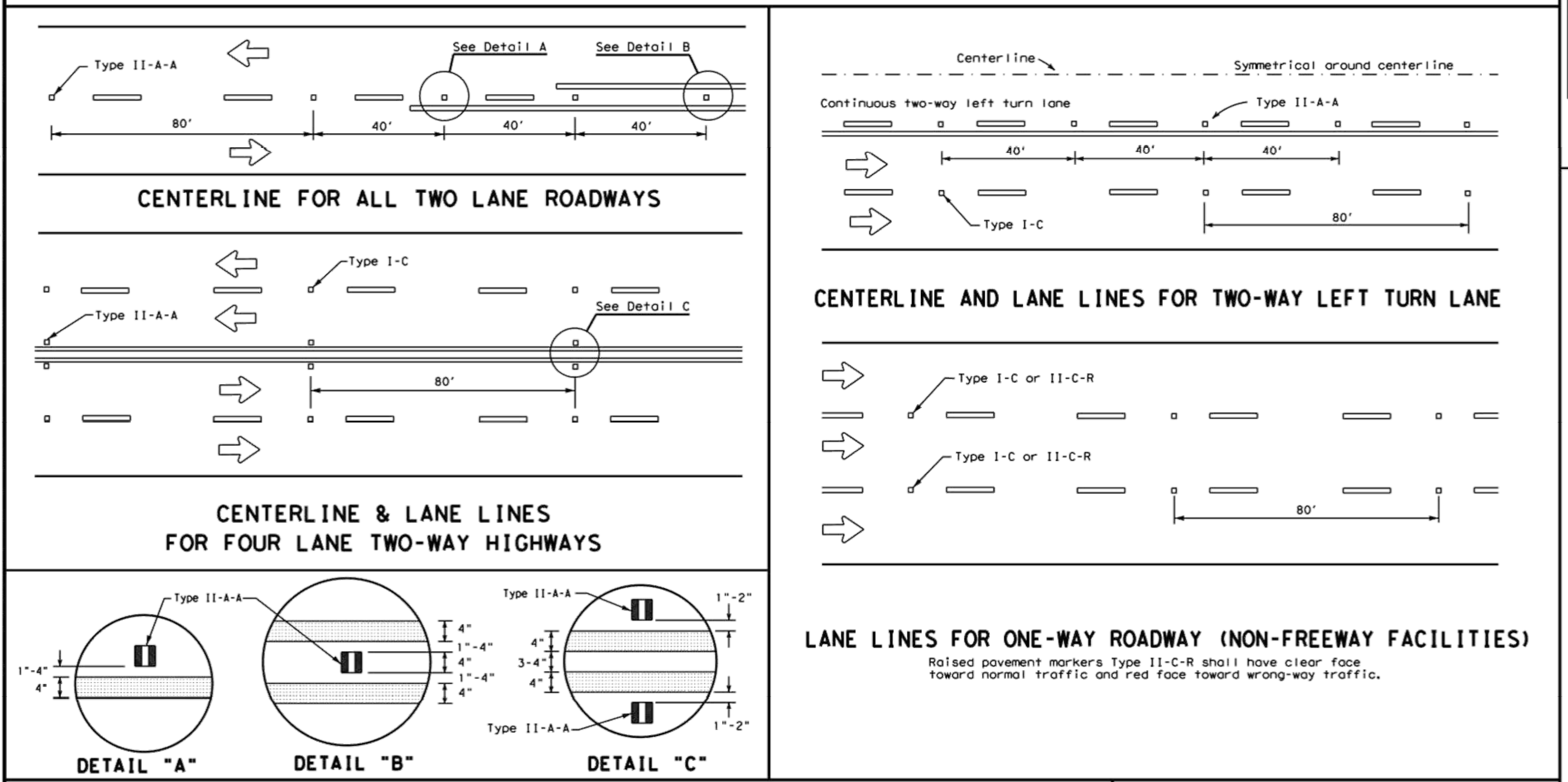
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE


Type II-A-A
See Detail A
See Detail B
80'
40'
40'
40'
Type I-C
See Detail C
80'
Centerline
Symmetrical around centerline
Continuous two-way left turn lane
Type II-A-A
40'
40'
40'
Type I-C
80'
Type I-C or II-C-R
Type I-C or II-C-R
80'
Type II-A-A
1"-4"
4"
4"
1"-4"
4"
1"-4"
4"
3-4"
4"
1"-2"
Type II-A-A

CENTERLINE FOR ALL TWO LANE ROADWAYS

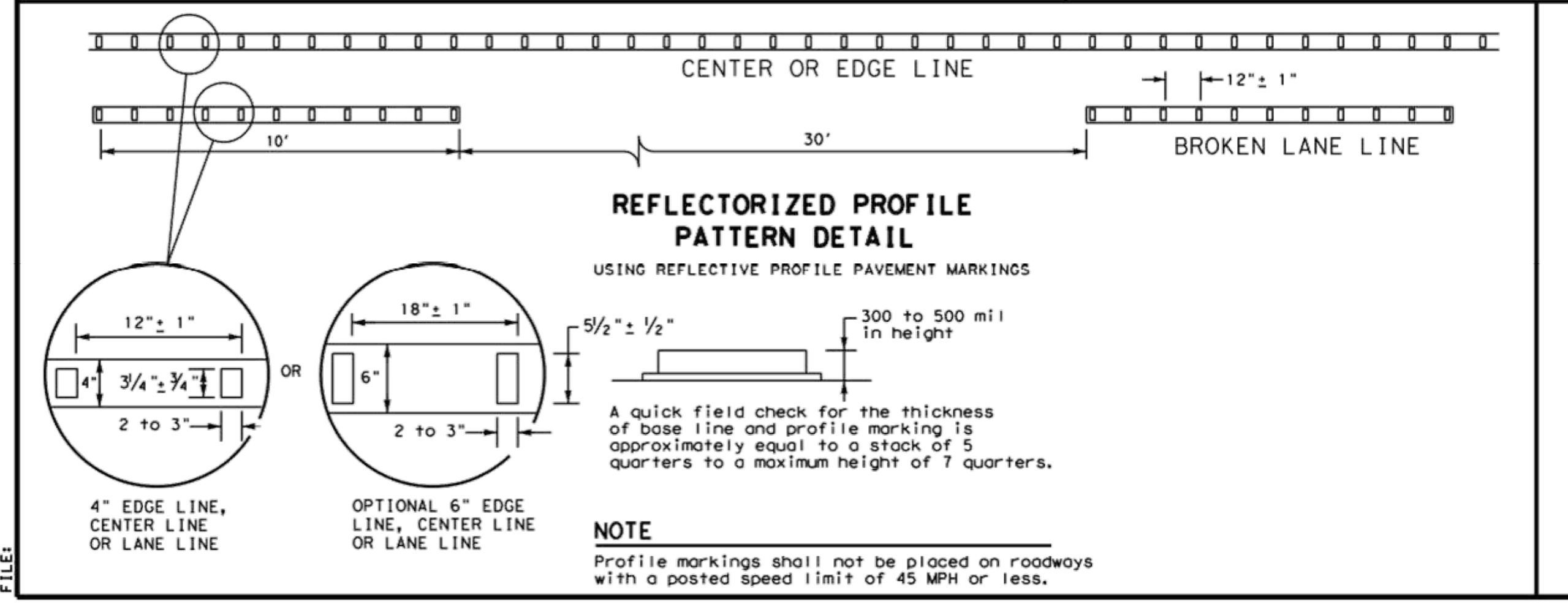
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS

CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE

LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

DETAIL "A" DETAIL "B" DETAIL "C"


CENTER OR EDGE LINE
12" ± 1"
10'
30'
BROKEN LANE LINE
12" ± 1"
4"
3¼" ± ¾"
2 to 3"
OR
18" ± 1"
6"
2 to 3"
5½" ± ½"
300 to 500 mil in height
4" EDGE LINE, CENTER LINE OR LANE LINE
OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTE

Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

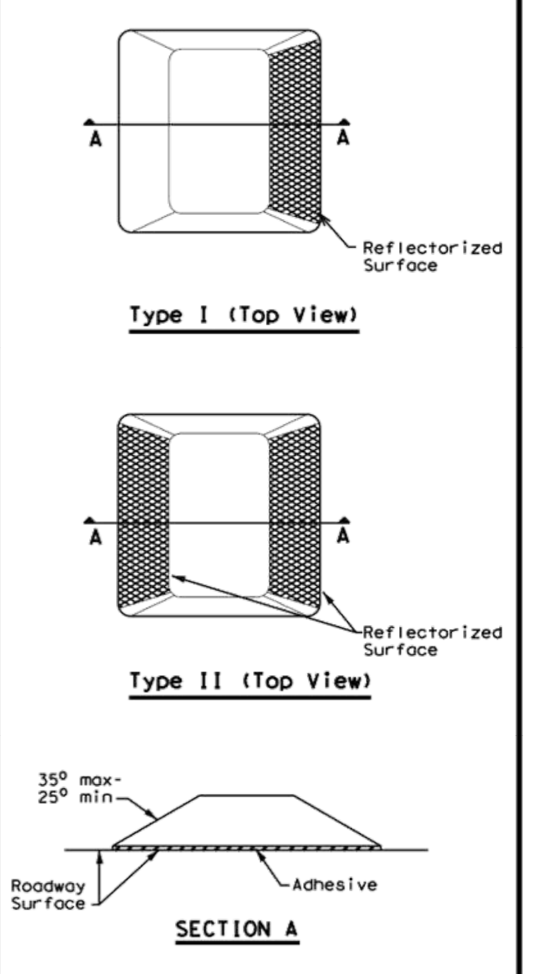
GENERAL NOTES

1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.

2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.


A
A
Reflectorized Surface
Type I (Top View)
A
A
Reflectorized Surface
Type II (Top View)
35° max- 25° min
Roadway Surface
Adhesive
SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation
Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS

PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
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REVISIONS 4-92 2-10 5-00 2-12 8-00 6-20	DIST	COUNTY		SHEET NO.

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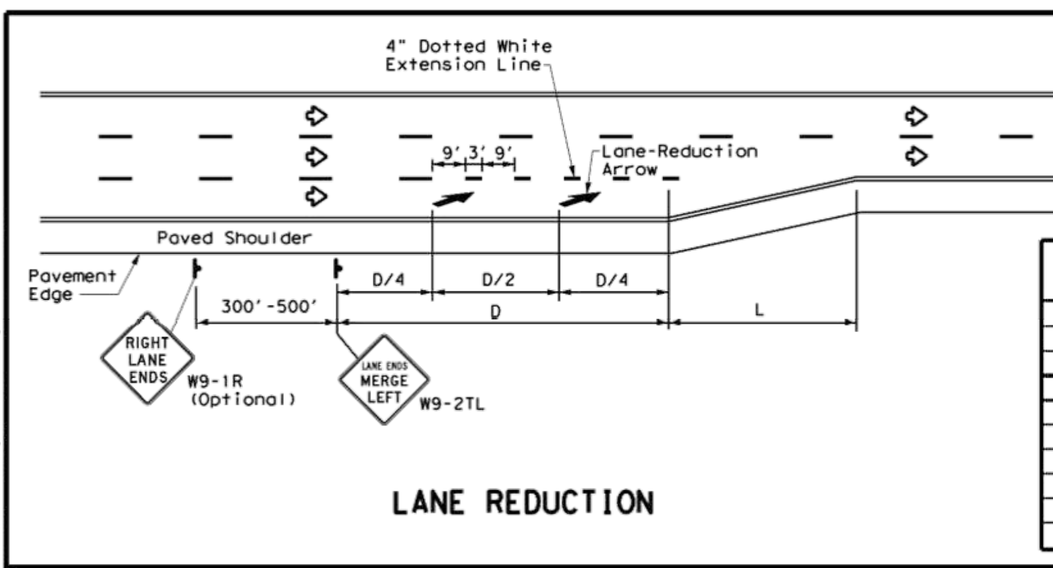

4" Dotted White Extension Line
Lane-Reduction Arrow
9' 3' 9'
Paved Shoulder
Pavement Edge
300'-500'
D/4
D/2
D/4
D
L
RIGHT LANE ENDS W9-1R (Optional)
LANE ENDS MERGE LEFT W9-2TL

LANE REDUCTION

Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

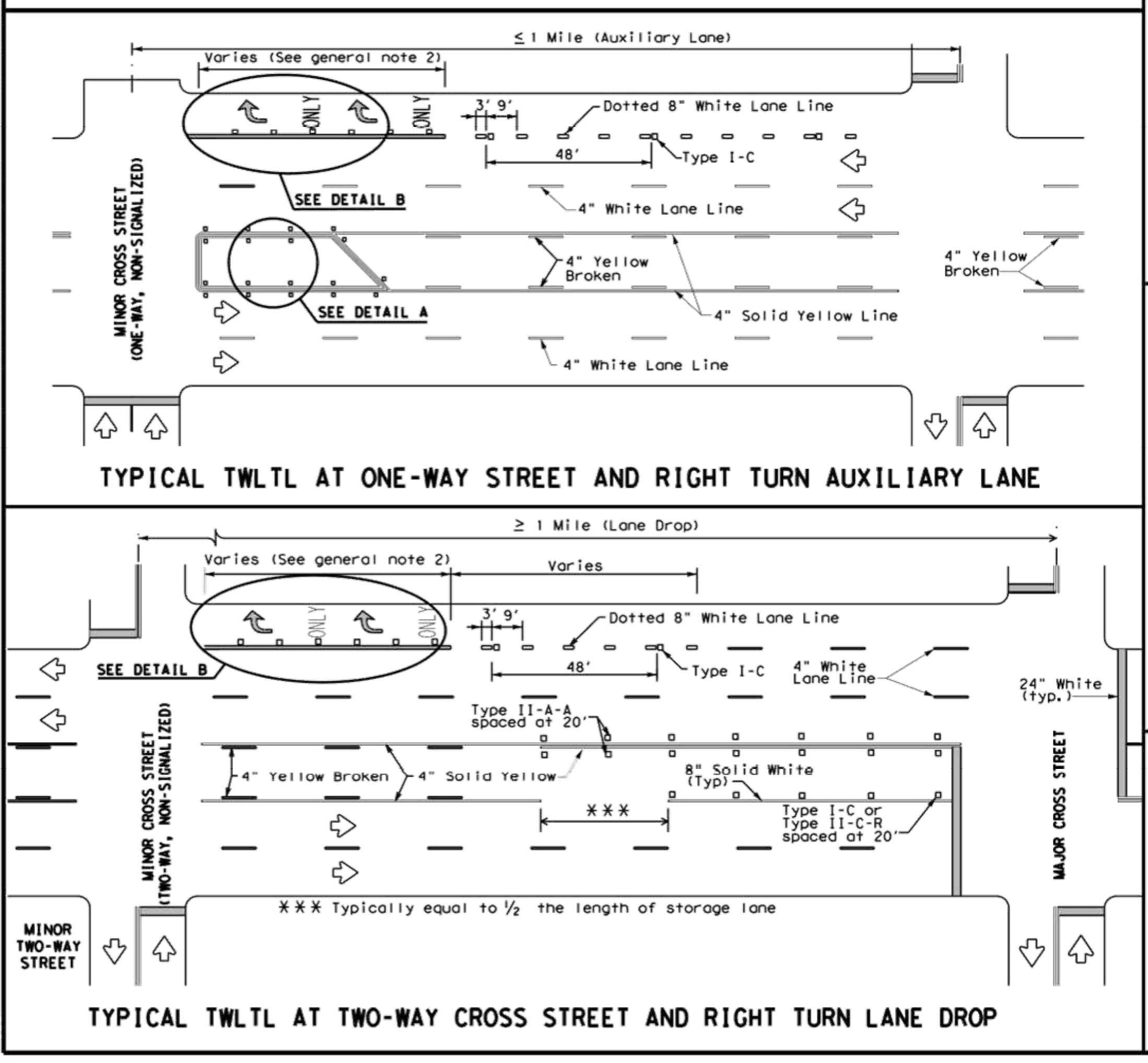
NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.

2. On divided highways, an additional W9-1R "RIGHT LANE ENDS" sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.

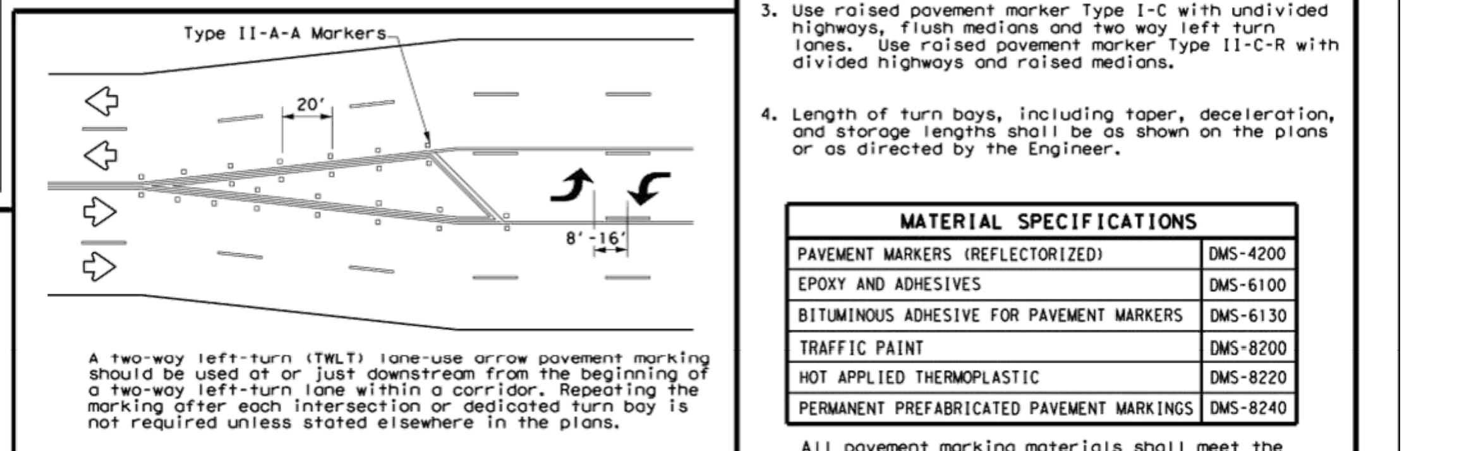
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.

4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.


≤ 1 Mile (Auxiliary Lane)
Varies (See general note 2)
3' 9'
Dotted 8" White Lane Line
48'
Type I-C
SEE DETAIL B
4" White Lane Line
4" Yellow Broken
4" Solid Yellow Line
4" Yellow Broken
SEE DETAIL A
4" White Lane Line
MINOR CROSS STREET (ONE-WAY, NON-SIGNALIZED)
≥ 1 Mile (Lane Drop)
Varies (See general note 2)
Varies
3' 9'
Dotted 8" White Lane Line
48'
Type I-C
4" White Lane Line
24" White (typ.)
SEE DETAIL B
Type II-A-A spaced at 20'
4" Yellow Broken
4" Solid Yellow
8" Solid White (Typ)
Type I-C or Type II-C-R spaced at 20'
MINOR CROSS STREET (TWO-WAY, NON-SIGNALIZED)
MAJOR CROSS STREET
MINOR TWO-WAY STREET
✱✱✱ Typically equal to ½ the length of storage lane

TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE

TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP


Type II-A-A Markers
20'
8'-16'

A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.

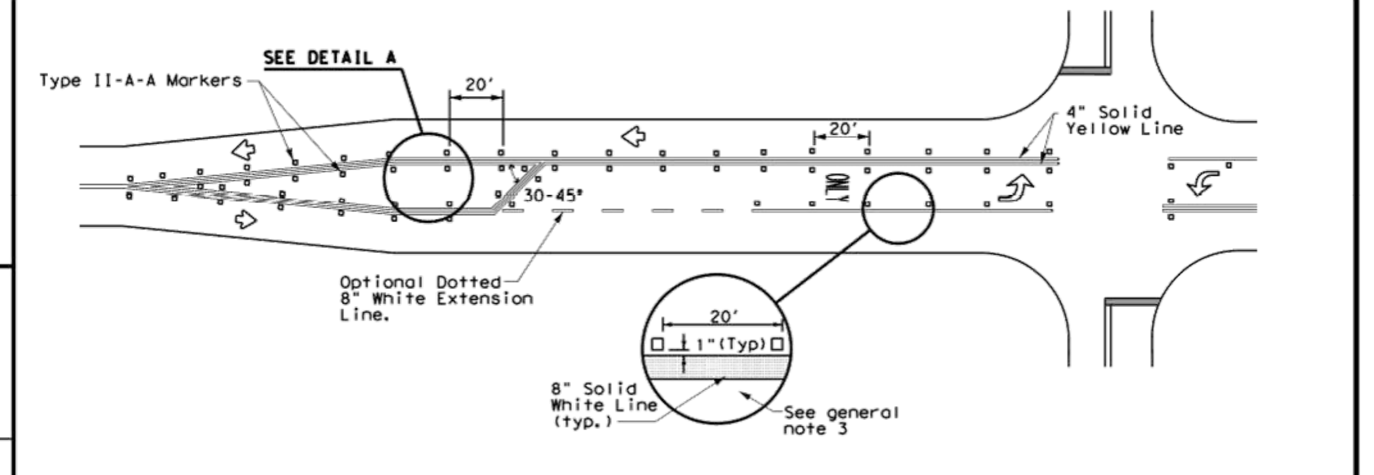
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.

3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

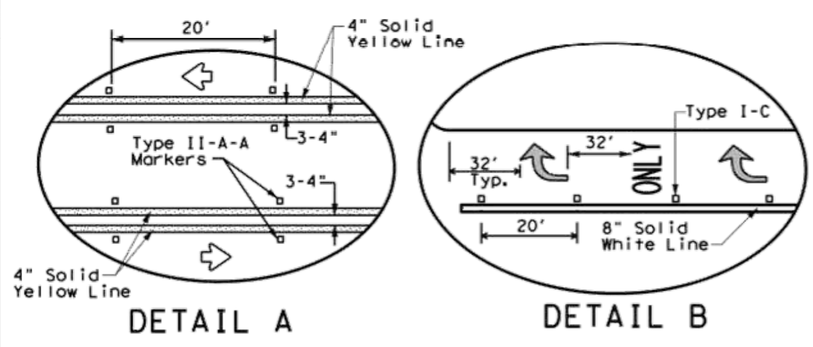
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.


Type II-A-A Markers
SEE DETAIL A
20'
20'
4" Solid Yellow Line
30-45°
Optional Dotted 8" White Extension Line
8" Solid White Line (typ.)
20'
1" (Typ)
See general note 3

TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS


20'
4" Solid Yellow Line
Type II-A-A Markers
3-4"
3-4"
4" Solid Yellow Line
20'
Type I-C
32'
12'
ONLY
20'
8" Solid White Line

DETAIL A DETAIL B

Texas Department of Transportation
Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-20

FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
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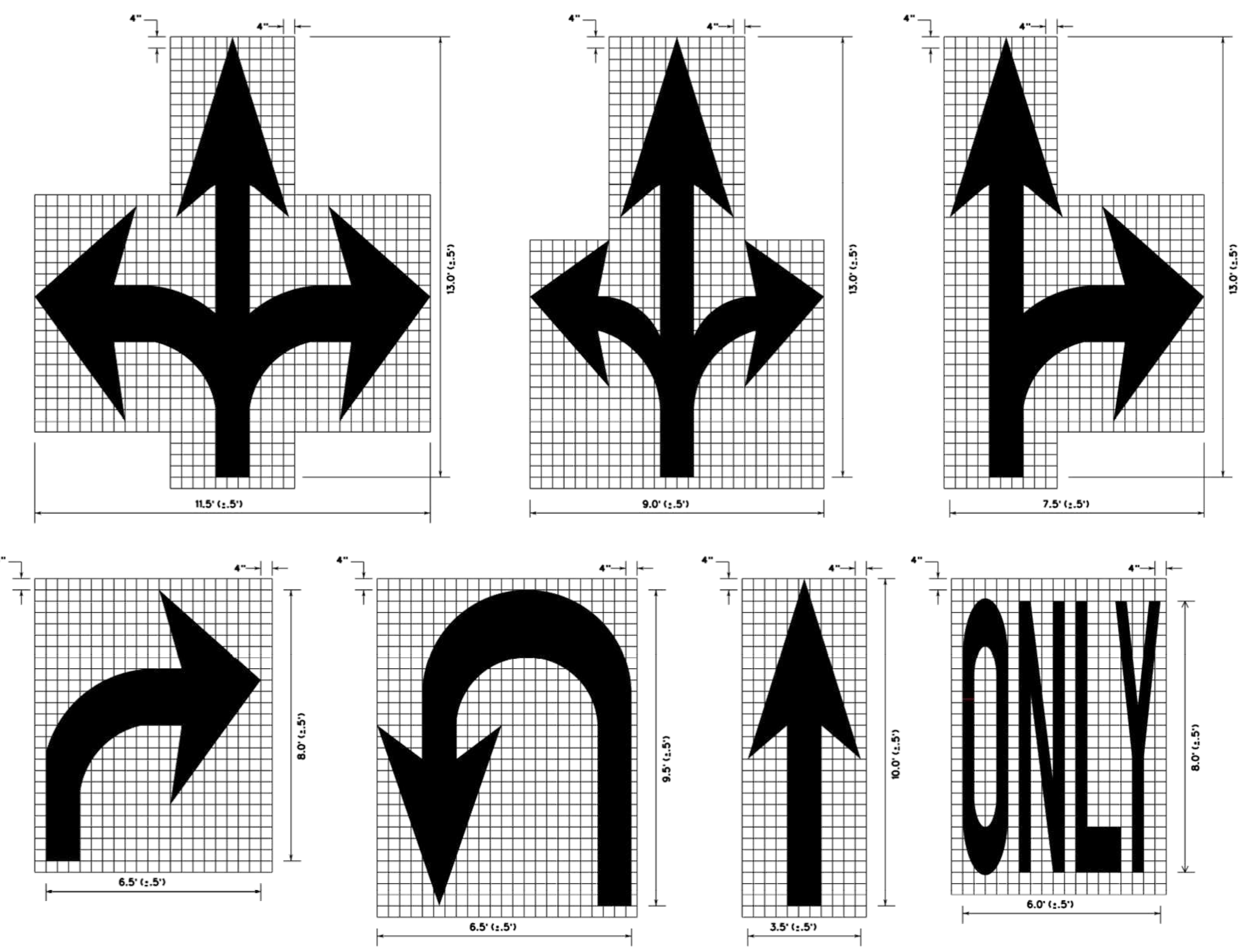
REVISIONS 5-00 2-10 8-00 2-12 3-03 6-20	DIST	COUNTY		SHEET NO.

22C

DATE:
FILE:


4"
13.0' (±.5')
11.5' (±.5')
13.0' (±.5')
9.0' (±.5')
13.0' (±.5')
7.5' (±.5')
8.0' (±.5')
6.5' (±.5')
9.5' (±.5')
6.5' (±.5')
10.0' (±.5')
3.5' (±.5')
ONLY
8.0' (±.5')
6.0' (±.5')

NOTES:

1. MINIMUM 8 FOOT WHITE MARKINGS SHALL BE USED, UNLESS OTHERWISE NOTED. IF MESSAGE CONSISTS OF MORE THAN ONE WORD, IT SHOULD BE PLACED WITH FIRST WORD NEAREST THE DRIVER.
2. THESE DETAILS ARE STANDARD SIZE FOR NORMAL INSTALLATION: SIZES MAY BE REDUCED APPROXIMATELY ONE-THIRD DEPENDING ON CONDITIONS.
3. THE LONGITUDINAL SPACE BETWEEN MARKINGS SHOULD BE 30 FEET.
4. MARKINGS CONSIDERED APPROPRIATE FOR USE WHEN WARRANTED INCLUDE THE FOLLOWING:
   - A. REGULATORY
     - STOP
     - RIGHT (LEFT) TURN ONLY
     - 25 MPH
     - SYMBOL ARROWS
   - B. WARNING
     - STOP AHEAD
     - SIGNAL AHEAD
     - SCHOOL
     - SCHOOL X-ING
     - PED X-ING
     - R X R (SEE RCPM DETAIL)
     - OTHER WORDS OR SYMBOLS MAY BE NECESSARY UNDER CERTAIN CONDITIONS
5. UNCONTROLLED USE OF PAVEMENT MARKINGS CAN RESULT IN DRIVER CONFUSION. WORD AND SYMBOL MARKINGS SHOULD BE NO MORE THAN THREE LINES.
6. THE WORD "STOP" SHALL NOT BE USED ON THE PAVEMENT UNLESS ACCOMPANIED BY A STOP LINE AND STOP SIGN. THE WORD "STOP" SHALL NOT BE PLACED ON THE PAVEMENT IN ADVANCE TO A STOP LINE, UNLESS EVERY VEHICLE IS REQUIRED TO STOP AT ALL TIMES.
7. PAVEMENT MARKINGS SHOULD GENERALLY BE NO MORE THAN ONE LANE IN WIDTH, WITH SCHOOL MESSAGES BEING THE EXCEPTION. FOR DETAILS OF SCHOOL AND SCHOOL CROSSING PAVEMENT MARKINGS, REFER TO PART VII OF THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".
8. SPACING BETWEEN LETTERS SHOULD BE APPROXIMATELY 4 INCHES. THE WIDTH OF LETTERS MAY VARY DEPENDING ON THE WIDTH OF THE TRAVEL LANES.
9. LANE-USE ARROW MARKINGS MAY BE USED TO CONVEY EITHER GUIDANCE OR MANDATORY MESSAGES. ARROWS USED TO CONVEY A MANDATORY MOVEMENT MUST BE ACCOMPANIED BY STANDARD SIGNS AND THE PAVEMENT MARKING WORD "ONLY".
10. PAVEMENT MARKINGS ARE TO BE LOCATED AS SPECIFIED ELSEWHERE IN THE PLANS.

SEPTEMBER 2009

CITY OF SAN ANTONIO
DEPARTMENT OF PUBLIC WORKS

TRAFFIC ENGINEERING STANDARDS
STANDARD PAVEMENT MARKINGS
(ARROWS)
SHEET 3 OF 16

___% SUBMITTAL	PROJECT NO.:		DATE:
DRWN. BY: LAN	DSGN. BY: C.R.V.	CHKD. BY: M.E.	SHEET NO.: ___OF___

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San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

TXDOT PAVEMENT MARKING DETAILS

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
1.
2.
3.
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8.

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TBPELS No. 10048500

C7.D4

R:\04024\018\2-DWG\4-Plans\C7.D4 TXDOT PAVEMENT MARKING DETAILS.dwg 2026/04/16 8:40am sgonzales

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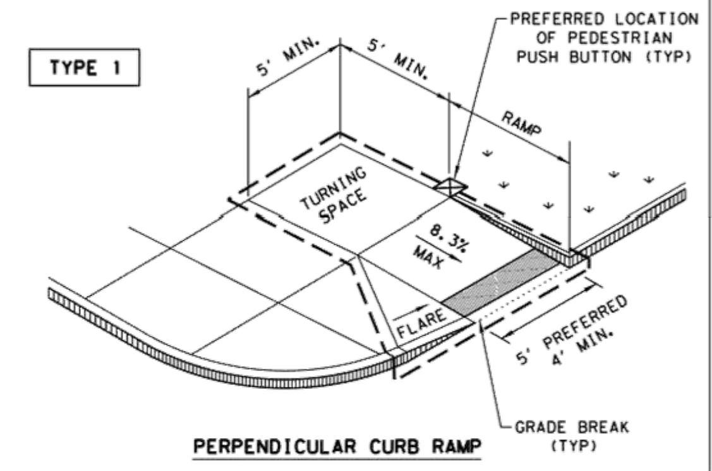
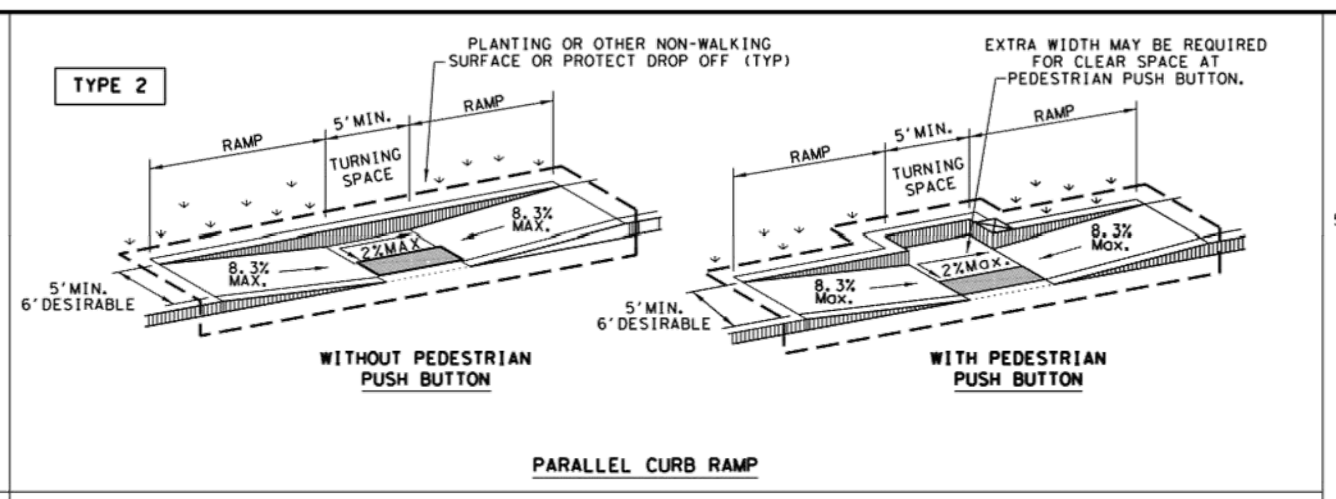
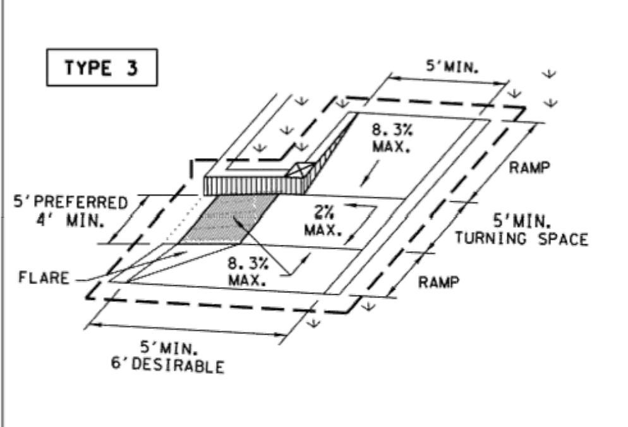
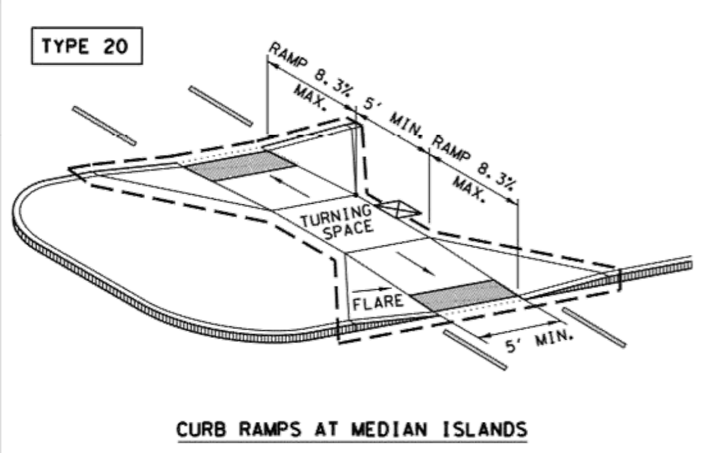

TYPE 1
PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (TYP)
5' MIN.
RAMP
TURNING SPACE
8.3% MAX.
FLARE
5' PREFERRED 4' MIN.
GRADE BREAK (TYP)

PERPENDICULAR CURB RAMP

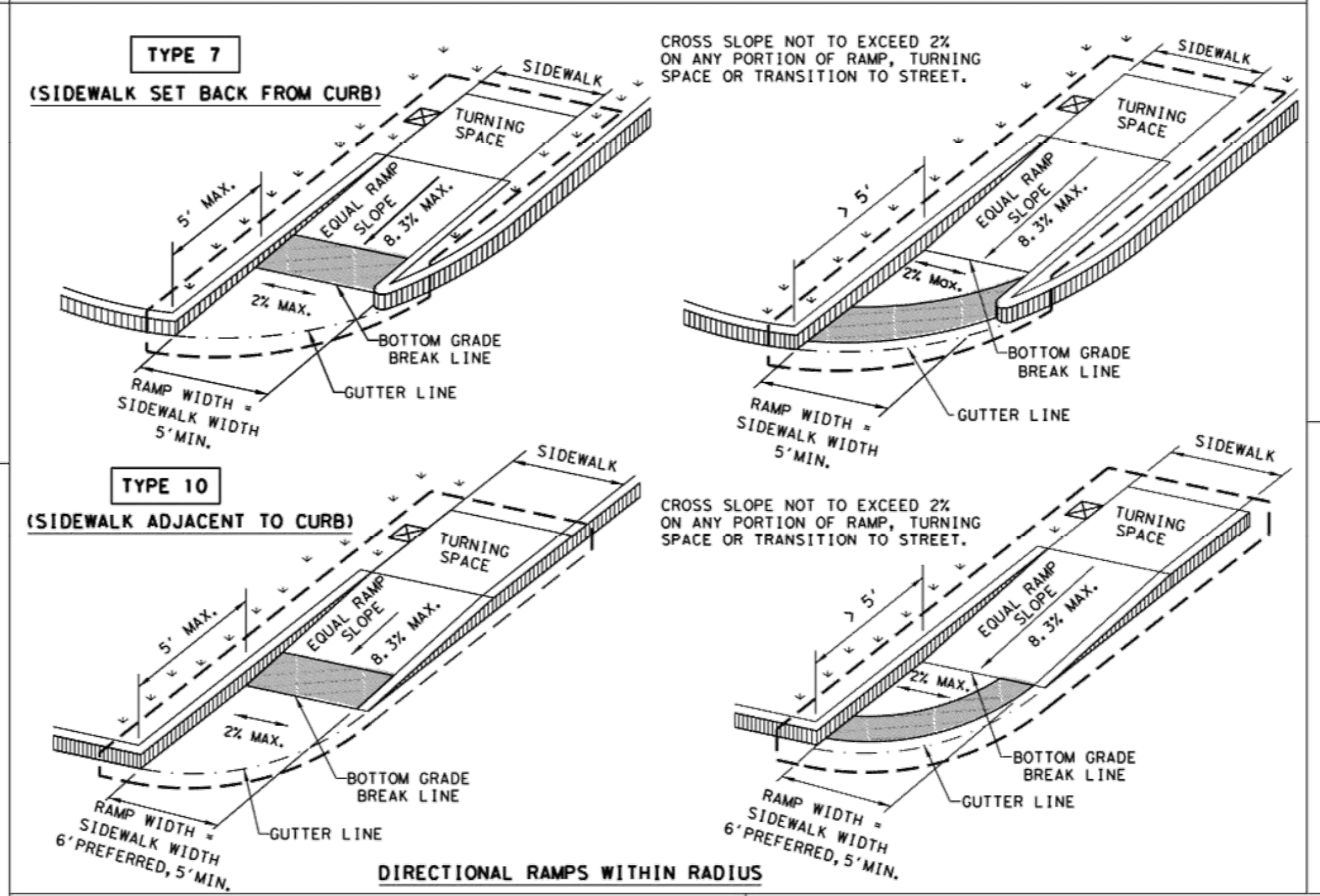

TYPE 2
PLANTING OR OTHER NON-WALKING SURFACE OR PROTECT DROP OFF (TYP)
EXTRA WIDTH MAY BE REQUIRED FOR CLEAR SPACE AT PEDESTRIAN PUSH BUTTON.
5' MIN.
RAMP
TURNING SPACE
8.3% MAX.
5' MIN. 6' DESIRABLE
WITHOUT PEDESTRIAN PUSH BUTTON
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

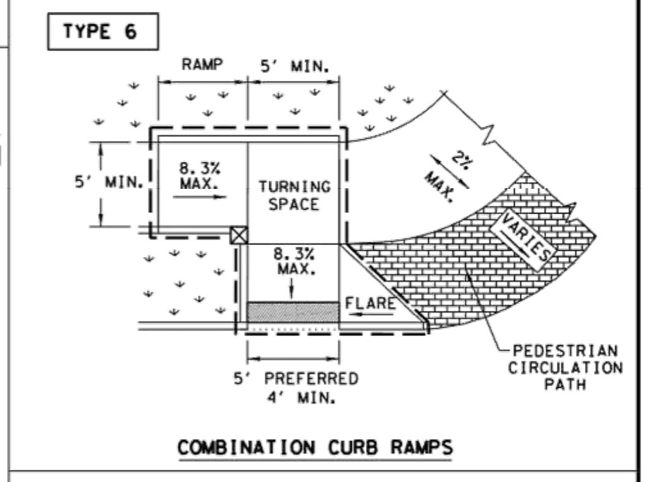

TYPE 3
5' MIN.
8.3% MAX.
RAMP
5' PREFERRED 4' MIN.
2% MAX.
5' MIN. TURNING SPACE
FLARE
5' MIN. 6' DESIRABLE


TYPE 20
RAMP 8.3% MAX.
TURNING SPACE
FLARE
5' MIN.

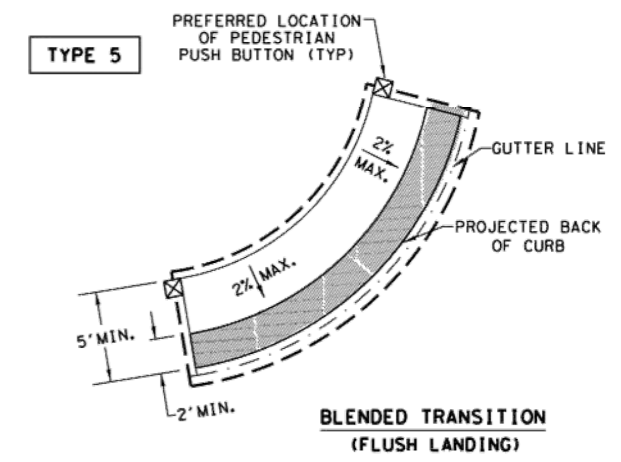
CURB RAMPS AT MEDIAN ISLANDS


TYPE 7
(SIDEWALK SET BACK FROM CURB)
CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.
TYPE 10
(SIDEWALK ADJACENT TO CURB)
CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.
SIDEWALK
TURNING SPACE
EQUAL RAMP SLOPE 8.3% MAX.
5' MIN.
2% MAX.
BOTTOM GRADE BREAK LINE
GUTTER LINE
RAMP WIDTH = SIDEWALK WIDTH 6' PREFERRED, 5' MIN.

DIRECTIONAL RAMPS WITHIN RADIUS

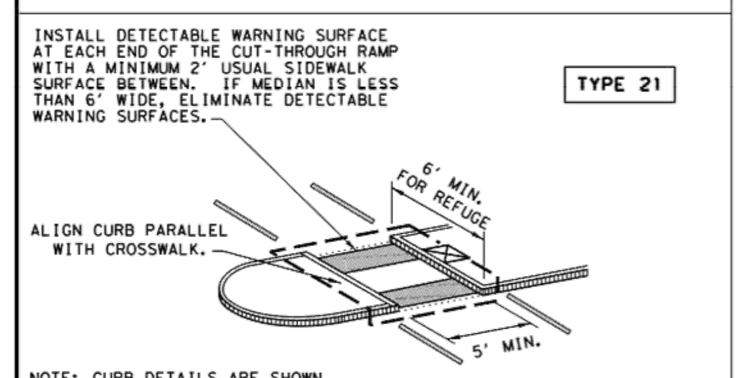

TYPE 6
RAMP
5' MIN.
8.3% MAX.
TURNING SPACE
2%
FLARE
5' PREFERRED 4' MIN.
PEDESTRIAN CIRCULATION PATH

COMBINATION CURB RAMPS

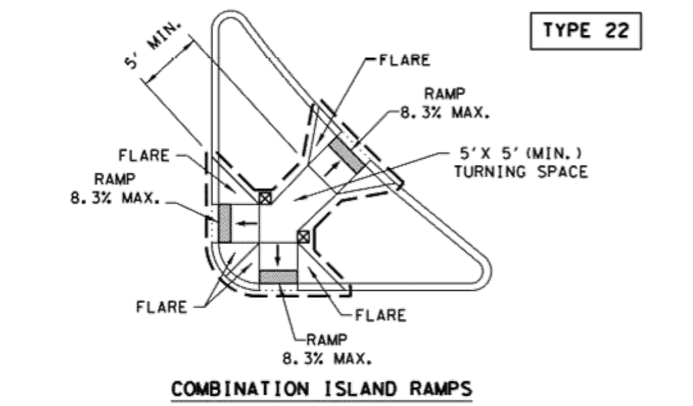

TYPE 5
PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (TYP)
GUTTER LINE
PROJECTED BACK OF CURB
2% MAX.
5' MIN.
2' MIN.

BLENDED TRANSITION
(FLUSH LANDING)

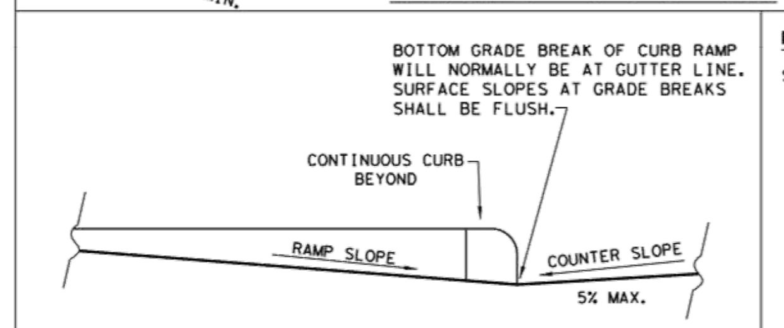
INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.


TYPE 21
ALIGN CURB PARALLEL WITH CROSSWALK.
6' MIN. FOR REFUGE
5' MIN.

NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.


TYPE 22
FLARE
RAMP 8.3% MAX.
5' X 5' (MIN.) TURNING SPACE

COMBINATION ISLAND RAMPS


BOTTOM GRADE BREAK OF CURB RAMP WILL NORMALLY BE AT GUTTER LINE. SURFACE SLOPES AT GRADE BREAKS SHALL BE FLUSH.
CONTINUOUS CURB BEYOND
RAMP SLOPE
COUNTER SLOPE
5% MAX.

TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.	⩔ ⩔ ⩔	GUTTER LINE	— · —
DETECTABLE WARNING SURFACE	▨	GRADE BREAK	········
DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.	☒	RAMP LIMITS OF PAYMENT	— —

SHEET 1 OF 4

Texas Department of Transportation
Design Division Standard

PEDESTRIAN FACILITIES
CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.

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DATE:
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GENERAL NOTES

CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
5. Turning Spaces shall be 5'x 5' minimum. Cross slope shall be maximum 2%.
6. Clear space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
18. Existing features that comply with applicalble standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

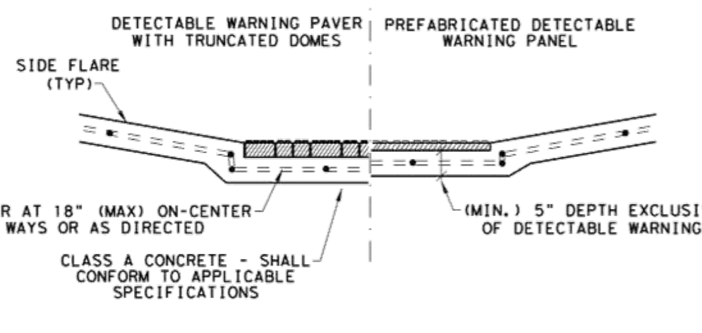
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

DETECTABLE WARNING PAVERS (IF USED)

25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

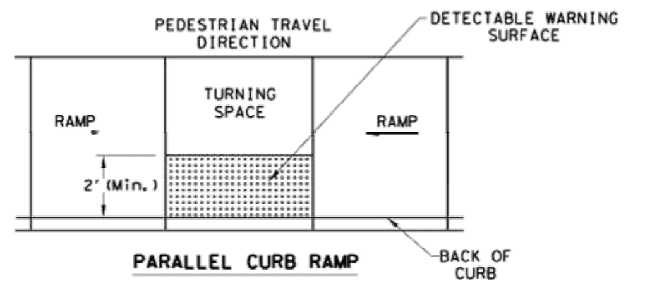
SIDEWALKS

27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
34. Sidewalk details are shown elsewhere in the plans.

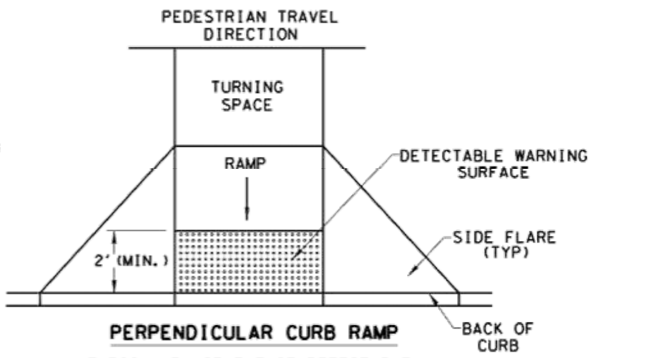

DETECTABLE WARNING PAVER WITH TRUNCATED DOMES
PREFABRICATED DETECTABLE WARNING PANEL
SIDE FLARE (TYP)
NO. 3 REBAR AT 18" (MAX) ON-CENTER BOTH WAYS OR AS DIRECTED
CLASS A CONCRETE - SHALL CONFORM TO APPLICABLE SPECIFICATIONS
(MIN.) 5" DEPTH EXCLUSIVE OF DETECTABLE WARNING

SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

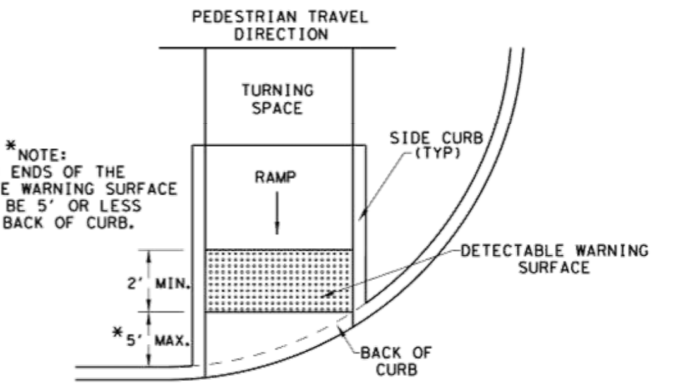
DETECTABLE WARNING SURFACE DETAILS


PEDESTRIAN TRAVEL DIRECTION
DETECTABLE WARNING SURFACE
RAMP
TURNING SPACE
RAMP
2' (Min.)
BACK OF CURB

PARALLEL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.


PEDESTRIAN TRAVEL DIRECTION
TURNING SPACE
RAMP
DETECTABLE WARNING SURFACE
SIDE FLARE (TYP)
2' (MIN.)
BACK OF CURB

PERPENDICULAR CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.


PEDESTRIAN TRAVEL DIRECTION
TURNING SPACE
SIDE CURB (TYP)
RAMP
DETECTABLE WARNING SURFACE
2' MIN.
*5' MAX.
BACK OF CURB

*NOTE:
BOTH ENDS OF THE DETECTABLE WARNING SURFACE SHALL BE 5' OR LESS FROM BACK OF CURB.

DIRECTIONAL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.

SHEET 2 OF 4

Texas Department of Transportation
Design Division Standard

PEDESTRIAN FACILITIES
CURB RAMPS

PED-18

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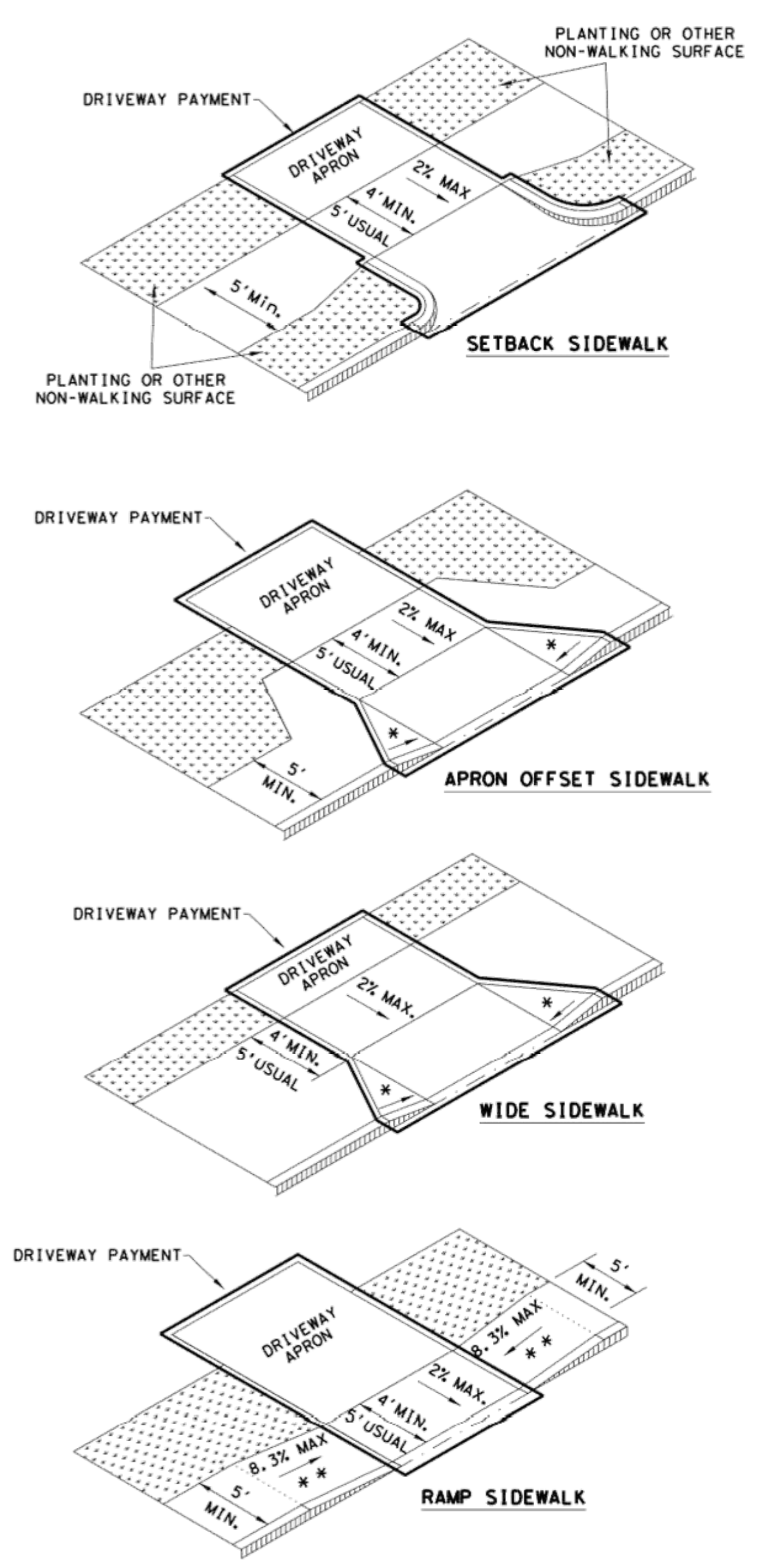
SIDEWALK TREATMENT AT DRIVEWAYS


PLANTING OR OTHER NON-WALKING SURFACE
DRIVEWAY PAVEMENT
DRIVEWAY APRON
2% MAX
4' MIN.
5' USUAL
5' MIN.
PLANTING OR OTHER NON-WALKING SURFACE
8.3% MAX
*
* *

SETBACK SIDEWALK

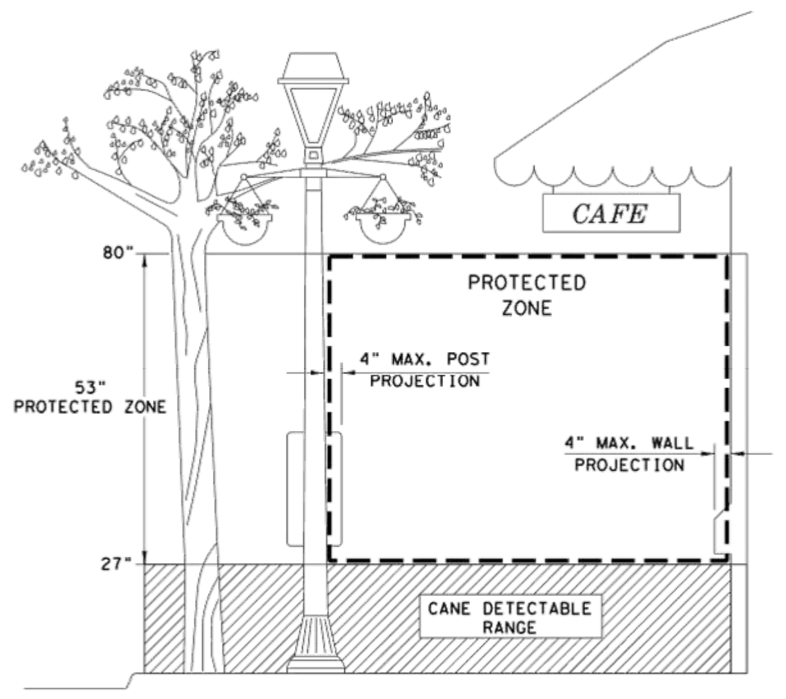
APRON OFFSET SIDEWALK

WIDE SIDEWALK

RAMP SIDEWALK

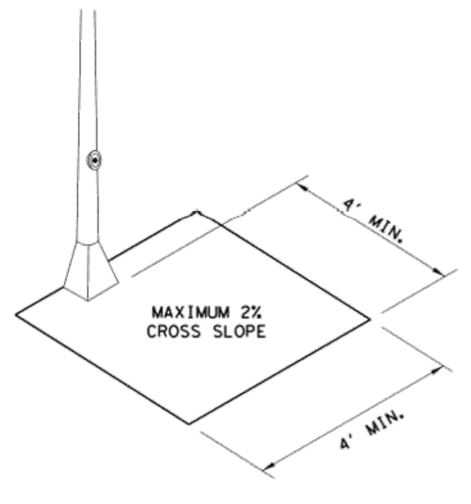
NOTES:
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.

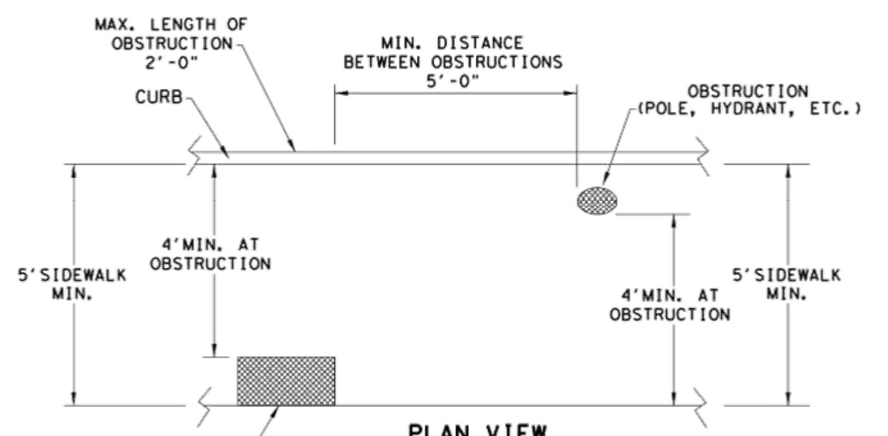

CAFE
PROTECTED ZONE
80"
53" PROTECTED ZONE
27"
4" MAX. POST PROJECTION
4" MAX. WALL PROJECTION
CANE DETECTABLE RANGE

PROTECTED ZONE

NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.

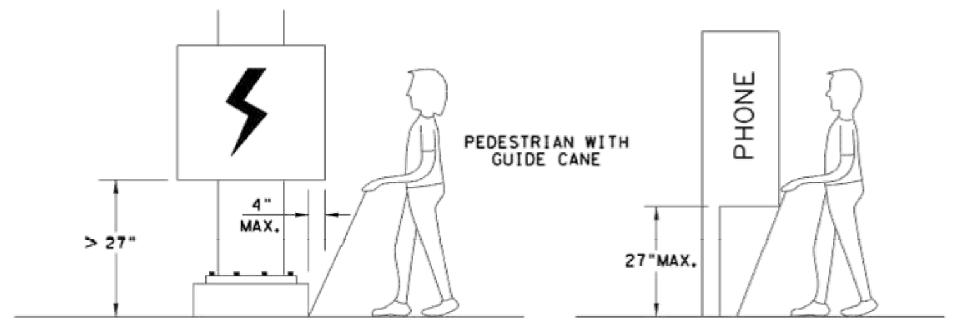

MAXIMUM 2% CROSS SLOPE
4' MIN.
4' MIN.

CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON


MAX. LENGTH OF OBSTRUCTION 2'-0"
MIN. DISTANCE BETWEEN OBSTRUCTIONS 5'-0"
OBSTRUCTION (POLE, HYDRANT, ETC.)
CURB
4' MIN. AT OBSTRUCTION
5' SIDEWALK MIN.
OBSTRUCTION (CONTROLLER CABINET, MAILBOX, ETC.)

PLAN VIEW
PLACEMENT OF STREET FIXTURES

NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.


PHONE
PEDESTRIAN WITH GUIDE CANE
> 27"
4" MAX.
27" MAX.

WHEN AN OBSTRUCTION OF A HEIGHT GREATER THAN 27" FROM THE SURFACE WOULD CREATE A PROTRUSION OF MORE THAN 4" INTO THE PEDESTRIAN CIRCULATION AREA, CONSTRUCT ADDITIONAL CURB OR FOUNDATION AT THE BOTTOM TO PROVIDE A MAXIMUM 4" OVERHANG.

PROTRUDING OBJECTS OF A HEIGHT ≤27" ARE DETECTABLE BY CANE AND DO NOT REQUIRE ADDITIONAL TREATMENT.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

SHEET 3 OF 4

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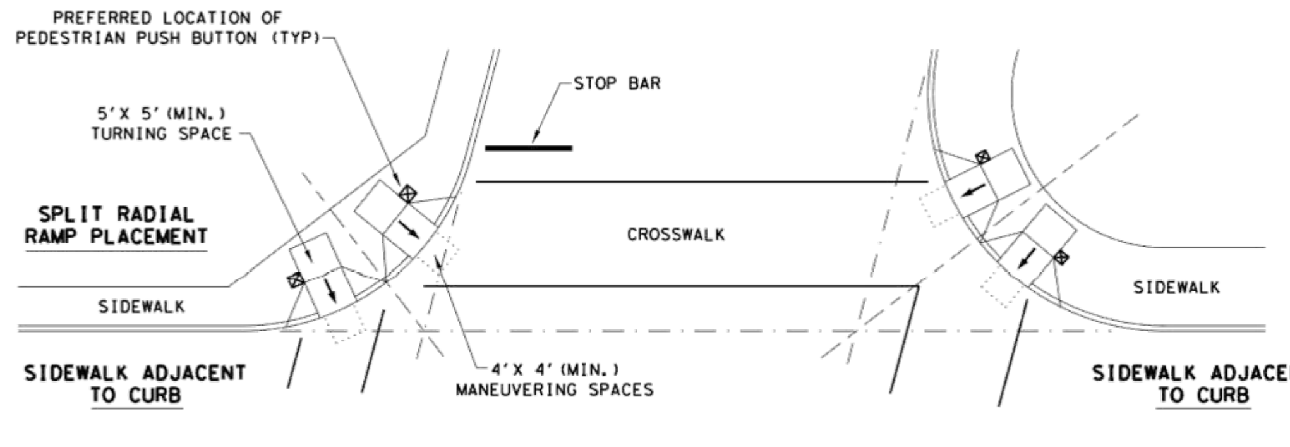
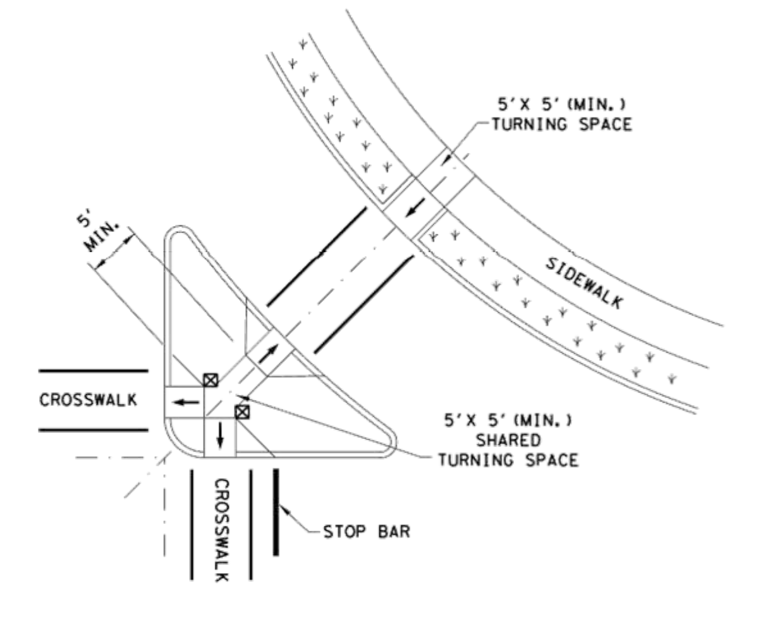
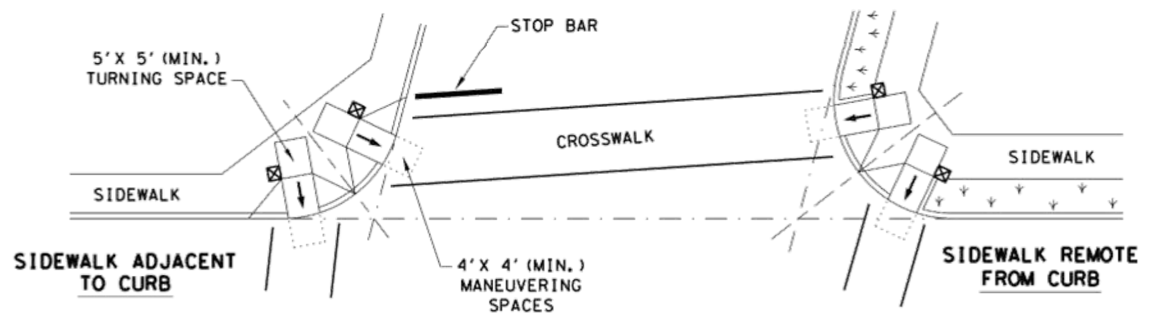
TYPICAL CROSSING LAYOUTS
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS


PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (TYP)
STOP BAR
5'X 5' (MIN.) TURNING SPACE
SPLIT RADIAL RAMP PLACEMENT
CROSSWALK
SIDEWALK
4'X 4' (MIN.) MANEUVERING SPACES
SIDEWALK ADJACENT TO CURB
SIDEWALK ADJACENT TO CURB

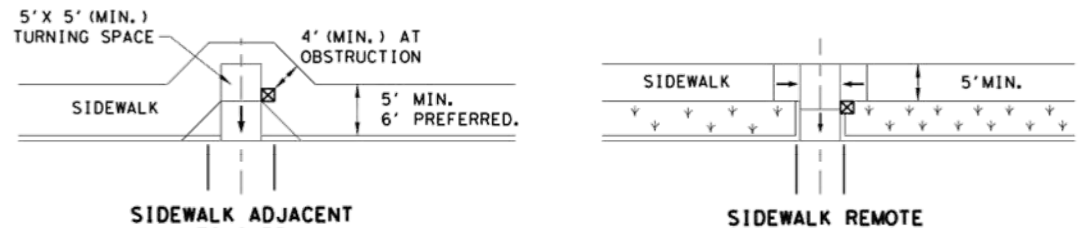
SKEWED INTERSECTION WITH "LARGE" RADIUS


5'X 5' (MIN.) TURNING SPACE
SIDEWALK
5' MIN.
CROSSWALK
5'X 5' (MIN.) SHARED TURNING SPACE
CROSSWALK
STOP BAR

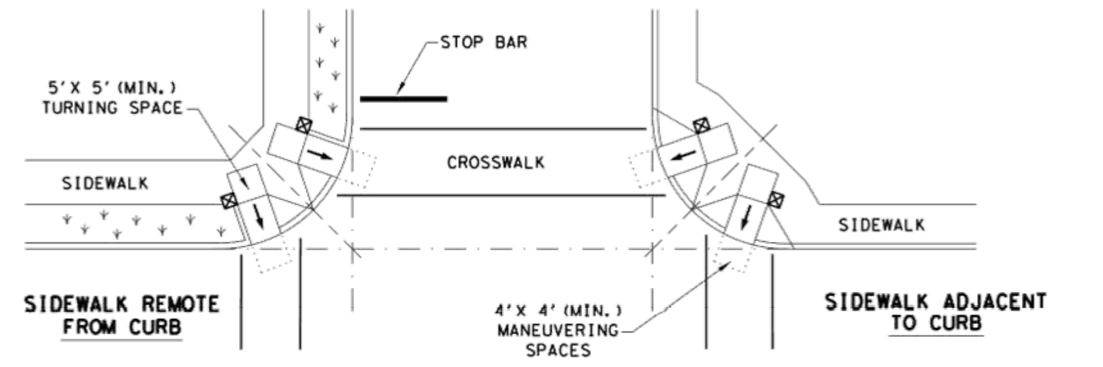
AT INTERSECTION
W/FREE RIGHT TURN & ISLAND


STOP BAR
5'X 5' (MIN.) TURNING SPACE
CROSSWALK
SIDEWALK
SIDEWALK ADJACENT TO CURB
4'X 4' (MIN.) MANEUVERING SPACES
SIDEWALK REMOTE FROM CURB

SKEWED INTERSECTION WITH "SMALL" RADIUS


5'X 5' (MIN.) TURNING SPACE
4' (MIN.) AT OBSTRUCTION
SIDEWALK
5' MIN. 6' PREFERRED.
SIDEWALK ADJACENT TO CURB
SIDEWALK
5' MIN.
SIDEWALK REMOTE FROM CURB

MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS


STOP BAR
5'X 5' (MIN.) TURNING SPACE
SIDEWALK
CROSSWALK
SIDEWALK REMOTE FROM CURB
4'X 4' (MIN.) MANEUVERING SPACES
SIDEWALK ADJACENT TO CURB

NORMAL INTERSECTION WITH "SMALL" RADIUS

LEGEND:

SHOWS DOWNWARD SLOPE.	→
DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE).	☒
DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.	⩔ ⩔ ⩔

SHEET 4 OF 4

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PEDESTRIAN FACILITIES
CURB RAMPS

PED-18

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CUDEENGINEERS.COM

CUDE ENGINEERS EST. 1980

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

TXDOT PEDESTRIAN FACILITIES DETAILS CURB RAMPS

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
1.
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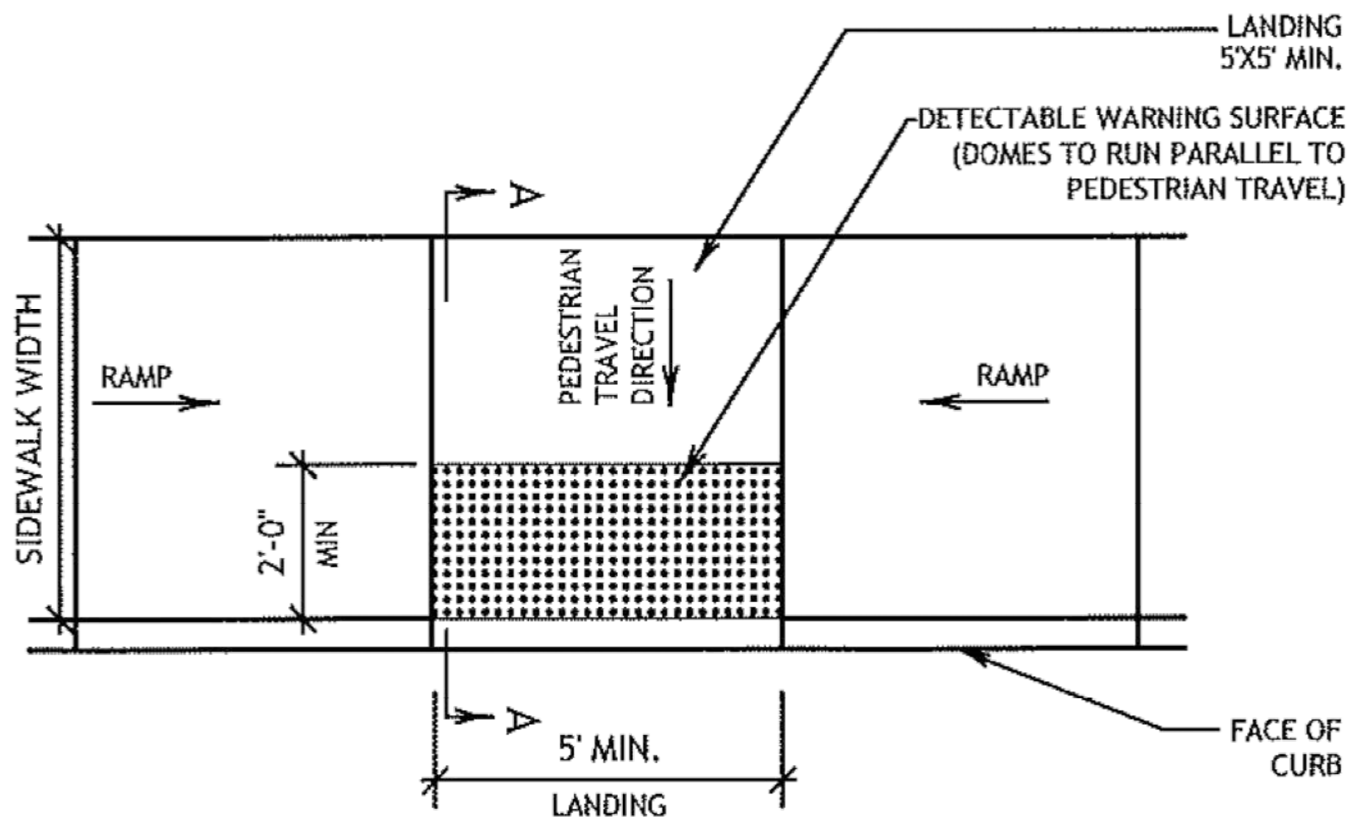
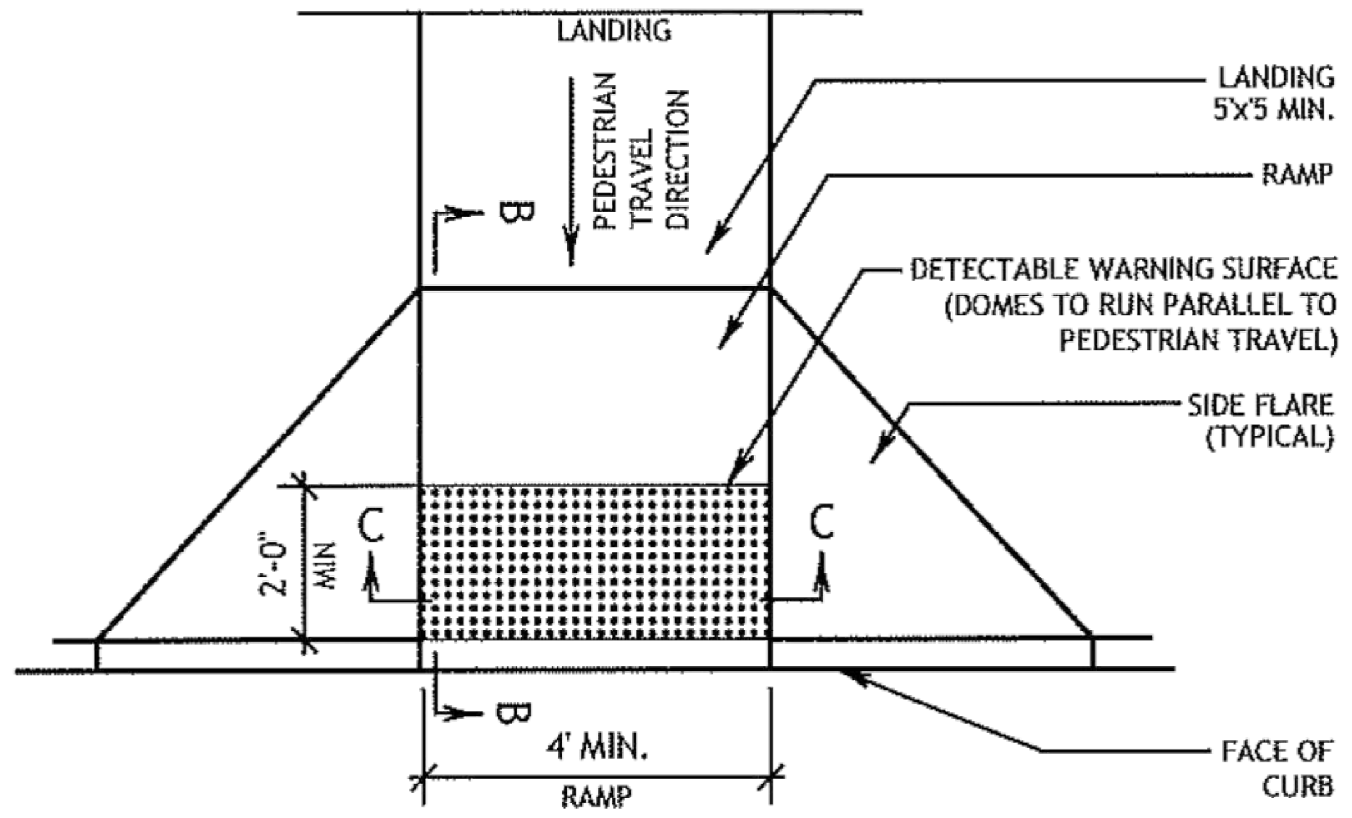
TBPELS No. 10048500

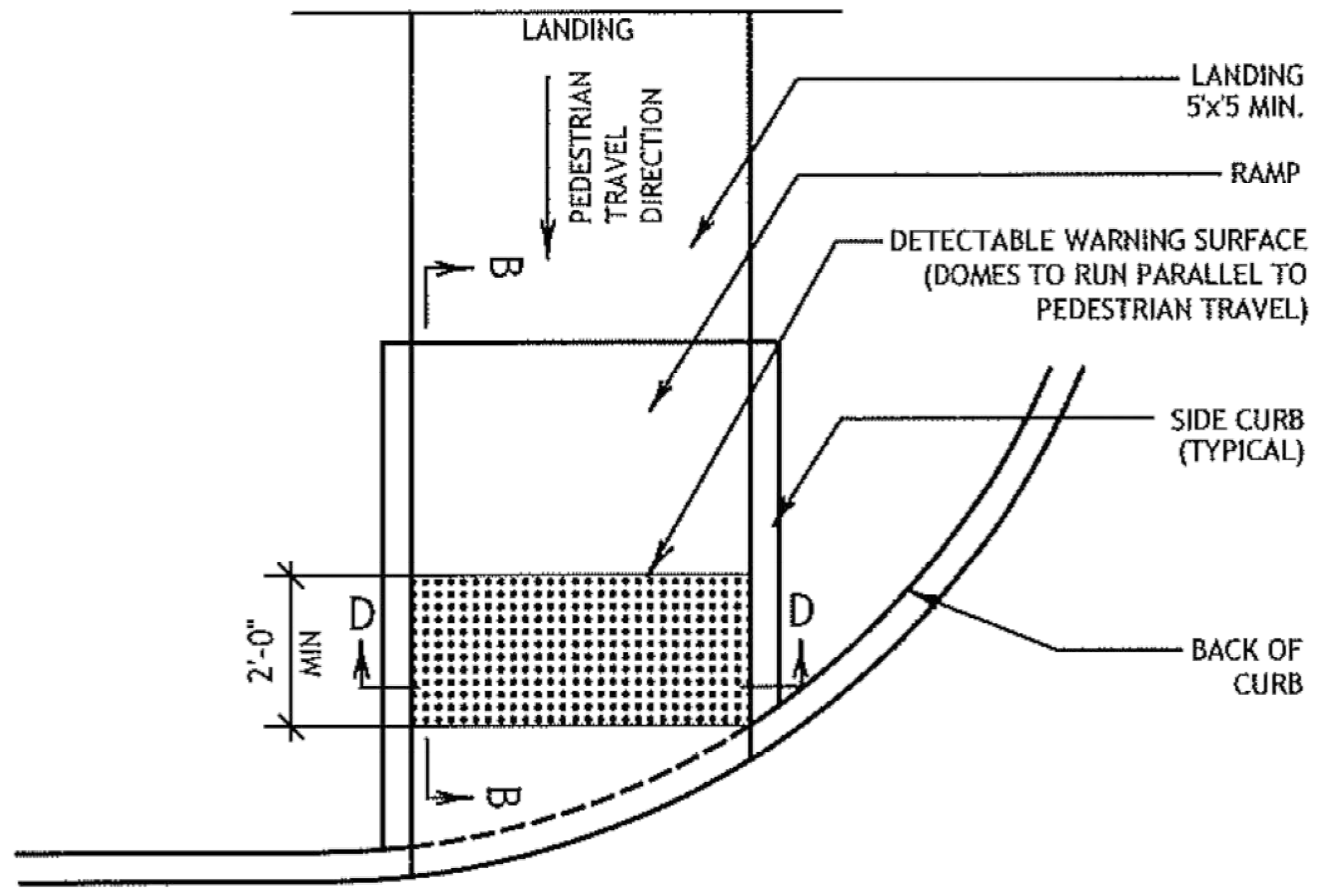
C7.D5


LANDING
5'X5' MIN.
DETECTABLE WARNING SURFACE
(DOMES TO RUN PARALLEL TO
PEDESTRIAN TRAVEL)
A
SIDEWALK WIDTH
RAMP
PEDESTRIAN
TRAVEL
DIRECTION
RAMP
2'-0"
MIN
A
5' MIN.
LANDING
FACE OF
CURB

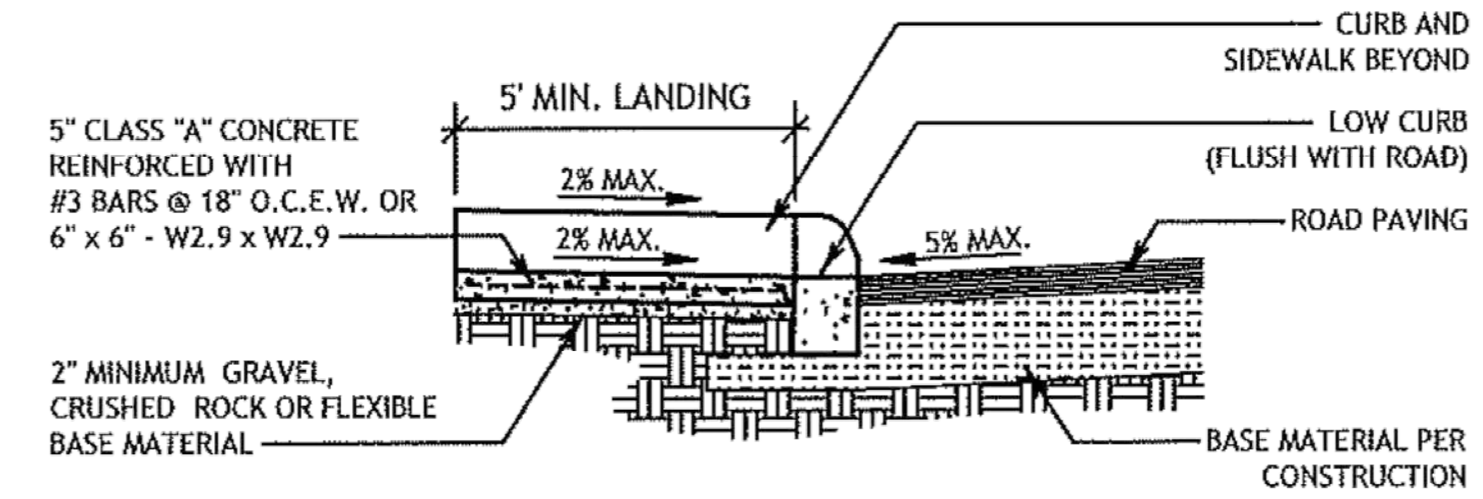
TYPICAL PLACEMENT OF DETECTABLE WARNING
SURFACE ON LANDING FOR PARALLEL CURB RAMP.


LANDING
PEDESTRIAN
TRAVEL
DIRECTION
B
LANDING
5'x'5 MIN.
RAMP
DETECTABLE WARNING SURFACE
(DOMES TO RUN PARALLEL TO
PEDESTRIAN TRAVEL)
SIDE FLARE
(TYPICAL)
2'-0"
MIN
C
C
B
4' MIN.
RAMP
FACE OF
CURB

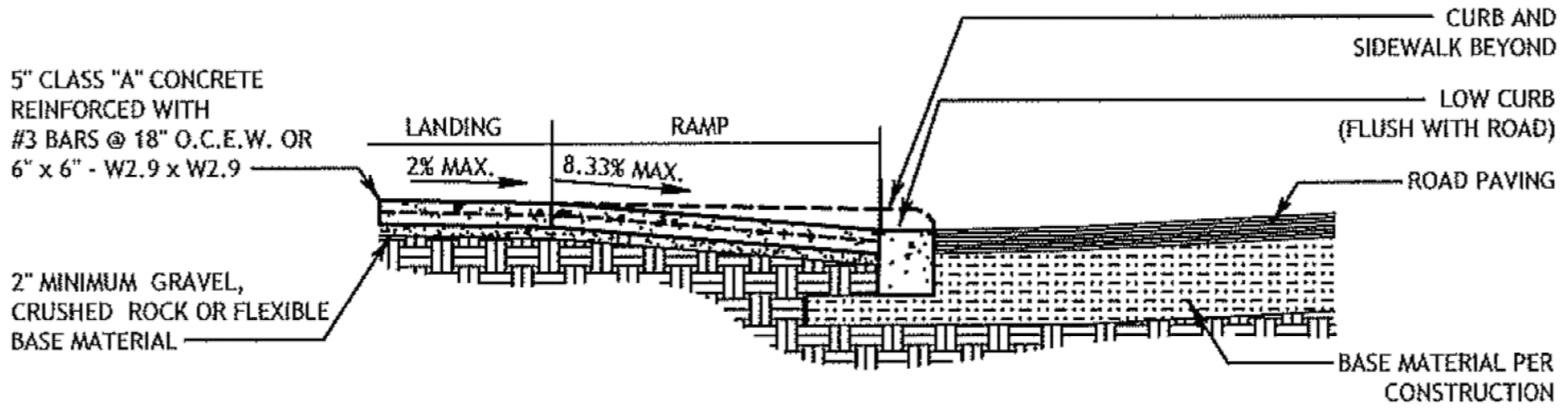
TYPICAL PLACEMENT OF DETECTABLE WARNING
SURFACE FOR PERPENDICULAR CURB RAMP.


LANDING
PEDESTRIAN
TRAVEL
DIRECTION
LANDING
5'x'5 MIN.
RAMP
B
DETECTABLE WARNING SURFACE
(DOMES TO RUN PARALLEL TO
PEDESTRIAN TRAVEL)
SIDE CURB
(TYPICAL)
2'-0"
MIN
D
D
BACK OF
CURB
B

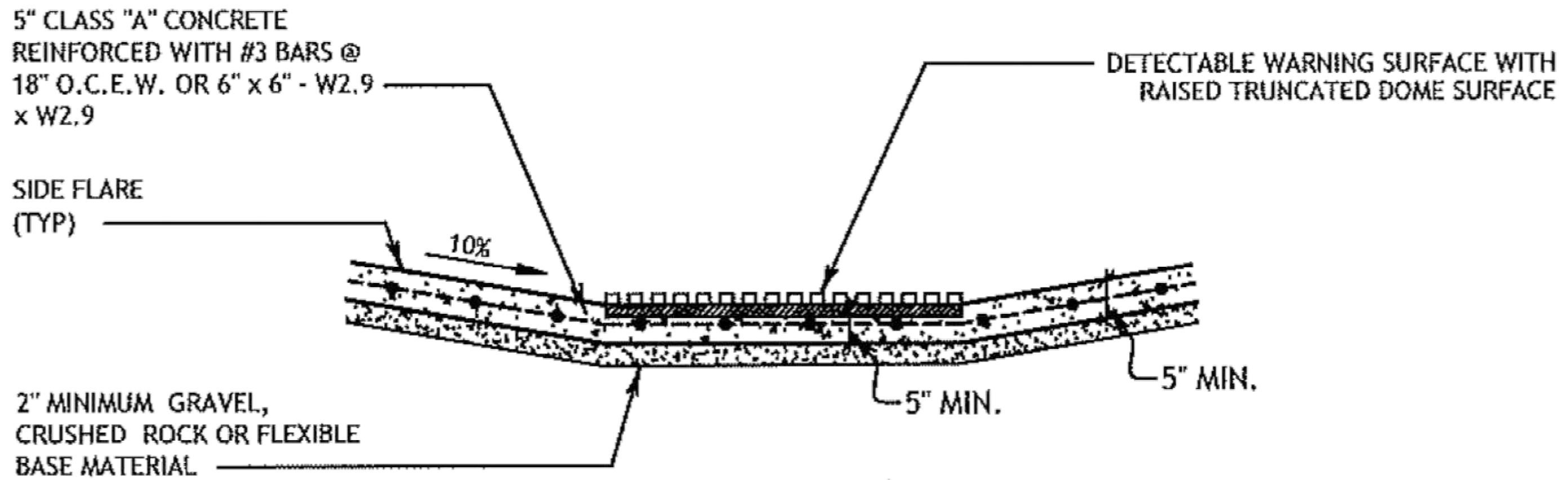
TYPICAL PLACEMENT OF DETECTABLE WARNING
SURFACE ON SLOPING RAMP RUN FOR DIRECTIONAL CURB RAMP.


CURB AND
SIDEWALK BEYOND
5' MIN. LANDING
5" CLASS "A" CONCRETE
REINFORCED WITH
#3 BARS @ 18" O.C.E.W. OR
6" x 6" - W2.9 x W2.9
2% MAX.
2% MAX.
LOW CURB
(FLUSH WITH ROAD)
5% MAX.
ROAD PAVING
2" MINIMUM GRAVEL,
CRUSHED ROCK OR FLEXIBLE
BASE MATERIAL
BASE MATERIAL PER
CONSTRUCTION
PLANS

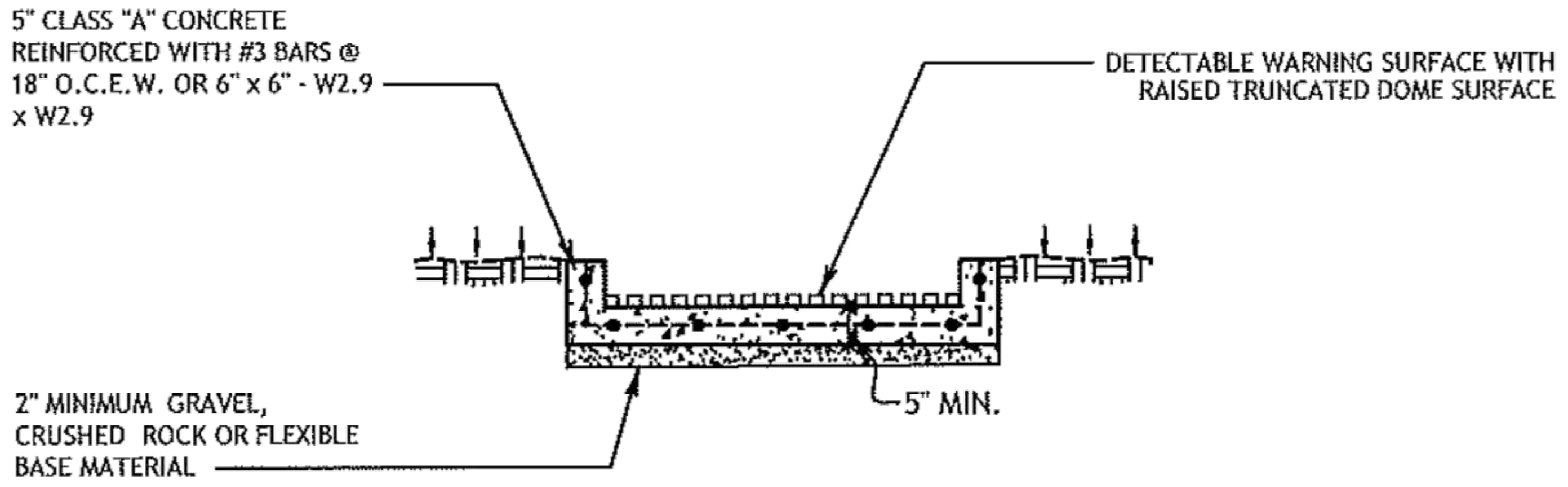
SECTION A-A


CURB AND
SIDEWALK BEYOND
5" CLASS "A" CONCRETE
REINFORCED WITH
#3 BARS @ 18" O.C.E.W. OR
6" x 6" - W2.9 x W2.9
LANDING
RAMP
2% MAX.
8.33% MAX.
LOW CURB
(FLUSH WITH ROAD)
ROAD PAVING
2" MINIMUM GRAVEL,
CRUSHED ROCK OR FLEXIBLE
BASE MATERIAL
BASE MATERIAL PER
CONSTRUCTION
PLANS

SECTION B-B


5" CLASS "A" CONCRETE
REINFORCED WITH #3 BARS @
18" O.C.E.W. OR 6" x 6" - W2.9
x W2.9
DETECTABLE WARNING SURFACE WITH
RAISED TRUNCATED DOME SURFACE
SIDE FLARE
(TYP)
10%
5" MIN.
5" MIN.
2" MINIMUM GRAVEL,
CRUSHED ROCK OR FLEXIBLE
BASE MATERIAL

SECTION C-C


5" CLASS "A" CONCRETE
REINFORCED WITH #3 BARS @
18" O.C.E.W. OR 6" x 6" - W2.9
x W2.9
DETECTABLE WARNING SURFACE WITH
RAISED TRUNCATED DOME SURFACE
5" MIN.
2" MINIMUM GRAVEL,
CRUSHED ROCK OR FLEXIBLE
BASE MATERIAL

SECTION D-D

CURB RAMP NOTES

1. ALL SLOPES ARE MAXIMUM ALLOWABLE. THE LEAST POSSIBLE SLOPE THAT WILL STILL DRAIN PROPERLY SHOULD BE USED. ADJUST CURB RAMP LENGTH OR GRADE OF APPROACH SIDEWALKS AS DIRECTED.
2. THESE DETAILS ARE FOR REFERENCE ONLY. ACTUAL LOCATIONS OF CURB RAMPS ARE TO BE SHOWN ON THE CONSTRUCTION PLANS. ALL ACCESSIBLE WALK WAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS SET FORTH IN THE AMERICAN'S WITH DISABILITIES ACT (ADA) AND TEXAS ACCESSIBILITY STANDARDS (TAS). CITY ENGINEER OR BUILDING OFFICIAL MAY ADJUST LOCATIONS FOR SAFETY OR UTILITY CLEARANCE.
3. THE MINIMUM STANDARD SIDEWALKS SHALL BE PROVIDED IN ACCORDANCE WITH SECTION 118-49 OF THE NEW BRAUNFELS CODE OF ORDINANCES.
4. ALL LANDINGS WHERE REQUIRED SHALL BE 5'X 5' (60"X60") MINIMUM WITH A MAXIMUM 2% SLOPE IN ANY DIRECTION.
5. RAMP LENGTHS SHALL BE SUFFICIENT TO MAINTAIN A MAXIMUM SLOPE OF 8.33% (1V:12H). MAXIMUM ALLOWABLE CROSS SLOPE ON SIDEWALK AND CURB RAMP SURFACES IS 2% (1V:50H).
6. SIDEWALK GRADES SHALL NOT EXCEED THE GRADE ESTABLISHED FOR THE ADJACENT ROADWAY, ANY SIDEWALK CONSTRUCTION THAT DEVIATES FROM THE GRADE OF THE NATURAL GRADE OF THE ROADWAY TO CREATE A GRADE STEEPER THAN THE EXISTING ROADWAY WILL REQUIRE RAMPS, HANDRAILS, AND LANDINGS IN ACCORDANCE WITH CURRENT ADA AND TAS REQUIREMENTS.
7. PROVIDE FLARED RAMP SIDES WITH A MAXIMUM SLOPE OF 10% (1V:10H) MEASURED ALONG THE CURB LINE. CURB RETURNS MAY BE USED IN-LIEU OF SIDE FLARES IN AREAS NOT NORMALLY WALKED ACROSS BY PEDESTRIANS, BECAUSE THE ADJACENT SURFACE IS VEGETATION OR OTHER NON-WALKING SURFACE OR WHERE THE SIDE APPROACH IS SUBSTANTIALLY OBSTRUCTED.
8. MANEUVERING SPACE AT THE BOTTOM OF CURB RAMPS SHALL BE A MINIMUM OF 4'X 4' (48"X48") WHOLLY CONTAINED WITHIN THE CROSSWALK AND WHOLLY OUTSIDE THE PARALLEL VEHICULAR TRAVEL PATH.
9. CROSSWALK DIMENSIONS, CROSSWALK MARKINGS AND STOP BAR LOCATIONS SHALL BE AS SHOWN ELSEWHERE IN THE PLANS. AT INTERSECTIONS WHERE CROSSWALK MARKINGS ARE NOT REQUIRED, CURB RAMPS SHALL BE ALIGNED WITH THEORETICAL CROSSWALKS, OR AS DIRECTED BY THE CITY ENGINEER OR BUILDING OFFICIAL.
10. EXISTING FEATURES THAT COMPLY WITH CURRENT TAS REQUIREMENTS MAY REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS.
11. HANDRAILS ARE NOT REQUIRED ON CURB RAMPS. PROVIDE CURB RAMPS WHEREVER AN ACCESSIBLE ROUTE CROSSES (PENETRATES) A CURB.
12. SEPARATE CURB RAMP AND LANDINGS FROM ADJACENT SIDEWALK AND ANY OTHER ELEMENTS WITH PRE-MOLD OR BOARD JOINT OF 1/2" UNLESS OTHERWISE DIRECTED BY THE CITY ENGINEER OR BUILDING OFFICIAL.
13. PROVIDE A SMOOTH TRANSITION WHERE THE CURB RAMPS CONNECT TO THE STREET.
14. THE CHANGE OF GRADE BETWEEN ADJACENT SURFACES SHALL BE LESS THAN 11%. THE CHANGE OF GRADE SHALL BE DEFINED AS THE ALGEBRAIC DIFFERENCE OF THE ADJACENT SURFACE SLOPES. IN THE CASE OF A STREET ACCESS RAMP DESIGNED AT THE 8.33% MAXIMUM SLOPE, THE ADJACENT PAVEMENT CROSS SLOPE SHALL BE LESS THAN 2.67% (I.E. 8.33-(-2.67)=11). IN ADDITION, THE ADJACENT PAVEMENT CROSS SLOPE SHALL BE LESS THAN OR EQUAL TO 5%.
15. IF THE CHANGE OF GRADE BETWEEN ADJACENT SURFACES IS GREATER THAN OR EQUAL TO 11%, A LEVELING STRIP, 2 FEET IN LENGTH, SHALL BE PROVIDED TO TRANSITION THE ADJACENT SURFACES.
16. ADA RAMP SHALL BE CONSTRUCTED WITH 5" CLASS "A" CONCRETE WITH 2" MINIMUM GRAVEL,CRUSHED ROCK OR FLEXIBLE BASE MATERIAL. REINFORCING STEEL SHALL BE #3 BARS AT 18" O.C.E.W. OR 6"x6" - W2.9 X W2.9 WIRE MESH.
17. THE EXTENTS OF ADA COMPLIANCE IN ALTERATIONS SHALL BE WITHIN THE LIMITS, BOUNDARIES OR SCOPE OF A PLANNED PROJECT AND AS DETERMINED BY THE CITY BUILDING OFFICIAL.

DETECTABLE WARNING NOTES

1. CURB RAMPS OR LANDINGS ABUTTING THE CROSSWALK MUST HAVE A DETECTABLE WARNING SURFACE THAT CONSISTS OF RAISED TRUNCATED DOMES COMPLYING WITH SECTION 705 OF THE TEXAS ACCESSIBILITY STANDARDS (TAS). THE SURFACE MUST CONTRAST VISUALLY WITH ADJOINING SURFACES, INCLUDING SIDE FLARES. FURNISH DARK BROWN OR DARK RED DETECTABLE WARNING SURFACE ADJACENT TO UNCOLORED CONCRETE, UNLESS SPECIFIED ELSEWHERE IN THE PLANS.
2. DETECTABLE WARNING SURFACES MUST BE SLIP RESISTANT AND NOT ALLOW WATER TO ACCUMULATE.
3. ALIGN TRUNCATED DOMES IN THE DIRECTION OF PEDESTRIAN TRAVEL WHEN ENTERING THE STREET.
4. DETECTABLE WARNING SURFACES SHALL BE A MINIMUM OF 24" IN DEPTH IN THE DIRECTION OF PEDESTRIAN TRAVEL, AND EXTEND THE FULL WIDTH OF THE CURB RAMP OR LANDING WHERE THE PEDESTRIAN ACCESS ROUTE ENTERS THE STREET.
5. DETECTABLE WARNING SURFACES SHALL BE LOCATED SO THAT THE EDGE NEAREST THE CURB LINE IS AT THE BACK OF CURB. ALIGN THE ROWS OF DOMES TO BE PERPENDICULAR TO THE GRADE BREAK BETWEEN THE RAMP RUN AND THE STREET. DETECTABLE WARNING SURFACES MAY BE CURVED ALONG THE CORNER RADIUS.
6. DETECTABLE WARNING MATERIALS MUST MEET TXDOT DEPARTMENTAL MATERIALS SPECIFICATION DMS 4350 AND BE LISTED ON THE MATERIAL PRODUCER LIST. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
7. DETECTABLE WARNING PAVERS SHALL NOT BE PERMITTED WITHOUT THE APPROVAL BY THE PUBLIC WORKS DEPARTMENT.

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by the City of New Braunfels for any purpose whatsoever.

City of
New Braunfels

ENGINEERING DIVISION
550 LANDA STREET
NEW BRAUNFELS, TEXAS 78130
PHONE: 830 221 4020
FAX: 830 626 3600

CURB RAMP STANDARDS

APPROVED DATE: 05/18/2017	DWG. NO.: ST-019	SCALE: AS NOTED
DRAWN BY: RC	CONTACT: GF	SHEET: 1 OF 1

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ENGINEERS

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

WHEELCHAIR RAMPS STANDARDS

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
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TBPELS No. 10048500

C7.D6

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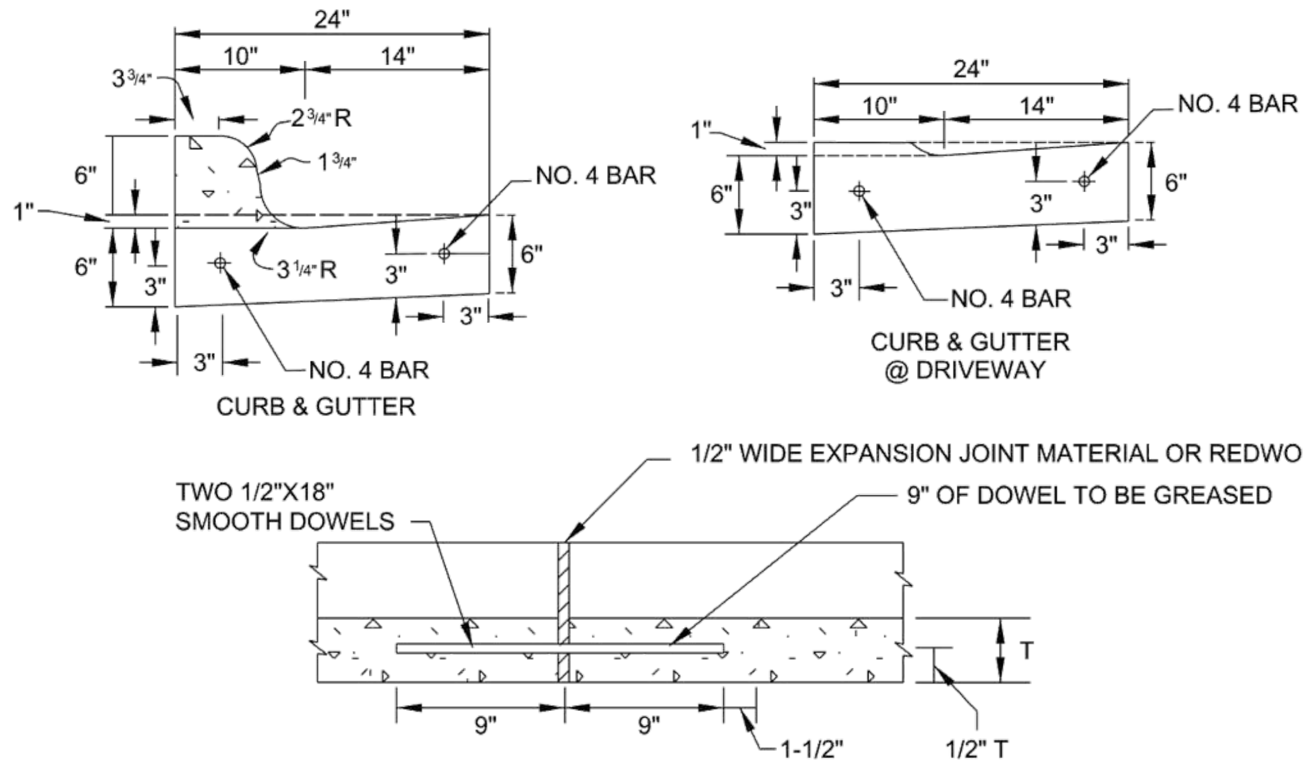
CURB AND GUTTER


24"
10"
14"
3 3/4"
2 3/4" R
1 3/4"
6"
1"
6"
3"
3 1/4" R
3"
NO. 4 BAR
6"
3"
3"
NO. 4 BAR
CURB & GUTTER
24"
10"
14"
1"
NO. 4 BAR
6"
3"
3"
6"
3"
3"
NO. 4 BAR
CURB & GUTTER
@ DRIVEWAY
1/2" WIDE EXPANSION JOINT MATERIAL OR REDWOOD
TWO 1/2"X18"
SMOOTH DOWELS
9" OF DOWEL TO BE GREASED
T
9"
9"
1-1/2"
1/2" T

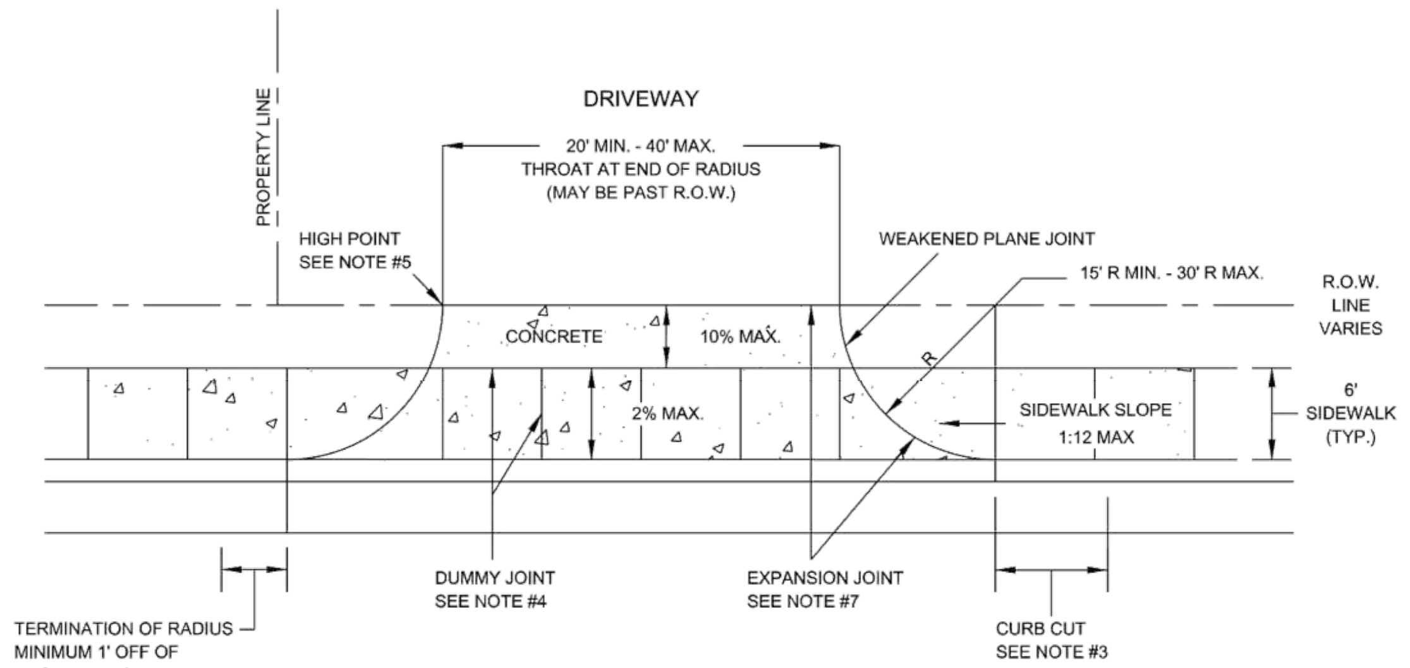
LONGITUDINAL SECTION THRU CURB AND GUTTER
SHOWING TYPICAL EXPANSION JOINT DETAILS.
REINFORCING STEEL SHALL NOT CROSS EXPANSION JOINTS.
STEEL SHALL BE TERMINATED 3" (+ OR -) 1" FROM FACE OF THE JOINT.

NOTES:

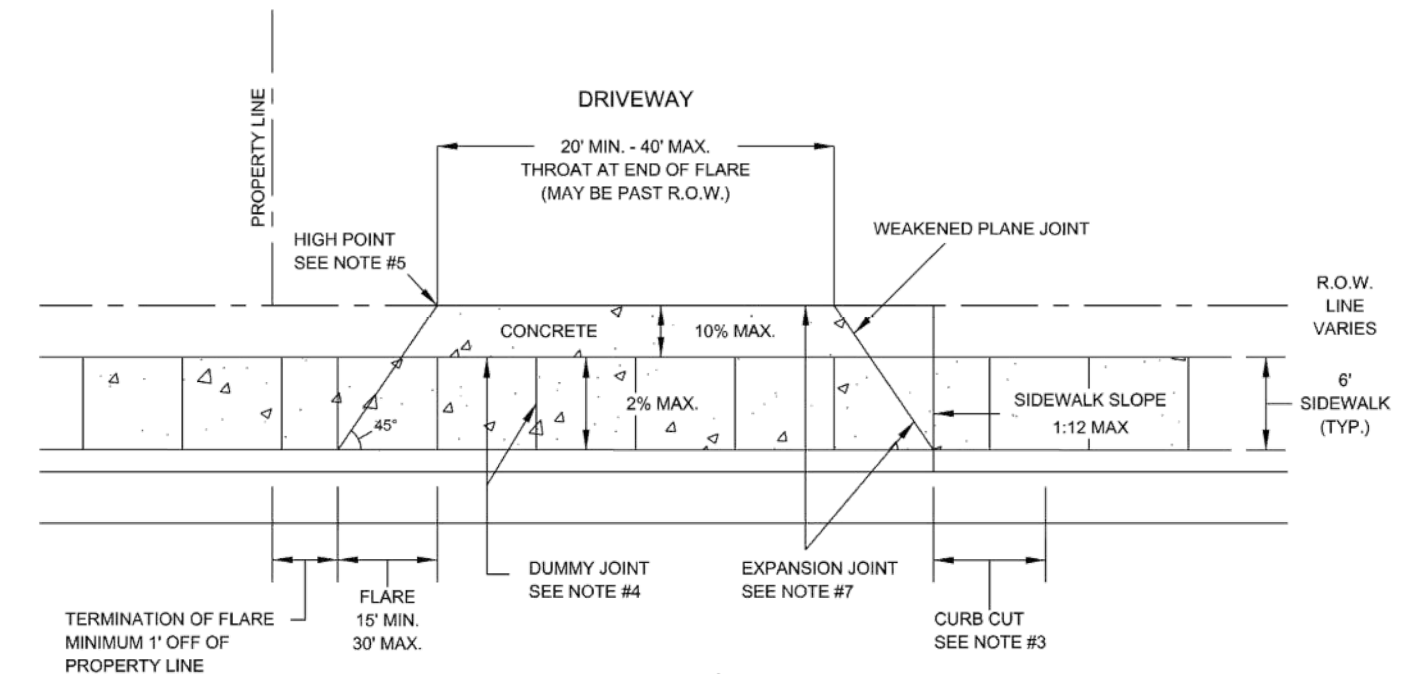
1. REINFORCING BARS SHALL BE LAPPED A MINIMUM OF 18".
2. CURB AND GUTTER SHALL HAVE FORMED TOOLED OR SAWED CONTRACTION JOINTS AT ± 10'. THE DEPTH OF THESE JOINTS SHALL BE SUFFICIENT TO ENSURE CRACKING AT THE JOINTS.
3. CURB OR CURB AND GUTTER SHALL HAVE EXPANSION JOINTS AT POINTS OF CURVATURE, AT INTERVALS NO GREATER THAN 100' AND AT ALL ADJACENT STRUCTURES.
4. UNLESS OTHERWISE SHOWN, TRANSITIONS BETWEEN CURBS OR CURBS AND GUTTER OF DIFFERING CROSS SECTION SHALL BE ACCOMPLISHED OVER A 10' LENGTH OR AS APPROVED BY THE CITY ENGINEER.
5. ALL CONCRETE TO BE CLASS "A" 3000 PSI CONCRETE.
6. ALL EXPOSED CONCRETE SURFACES TO BE BRUSHED SMOOTH AND UNIFORM.

DATE APPROVED: 07/2008	DWG. NO: ST-013	SCALE: N.T.S.	City of New Braunfels ENGINEERING DEPARTMENT
DRAWN BY: RAS	SHEET: 1 OF 1		
FILENAME: CURB & GUTTER			

DRIVEWAY APRON
(COMMERCIAL - MULTIFAMILY - INDUSTRIAL)
(RADIAL/FLARED)


PROPERTY LINE
DRIVEWAY
20' MIN. - 40' MAX.
THROAT AT END OF RADIUS
(MAY BE PAST R.O.W.)
HIGH POINT
SEE NOTE #5
WEAKENED PLANE JOINT
15' R MIN. - 30' R MAX.
R.O.W.
LINE
VARIES
CONCRETE
10% MAX.
R
2% MAX.
SIDEWALK SLOPE
1:12 MAX
6'
SIDEWALK
(TYP.)
DUMMY JOINT
SEE NOTE #4
EXPANSION JOINT
SEE NOTE #7
CURB CUT
SEE NOTE #3
TERMINATION OF RADIUS
MINIMUM 1' OFF OF
PROPERTY LINE

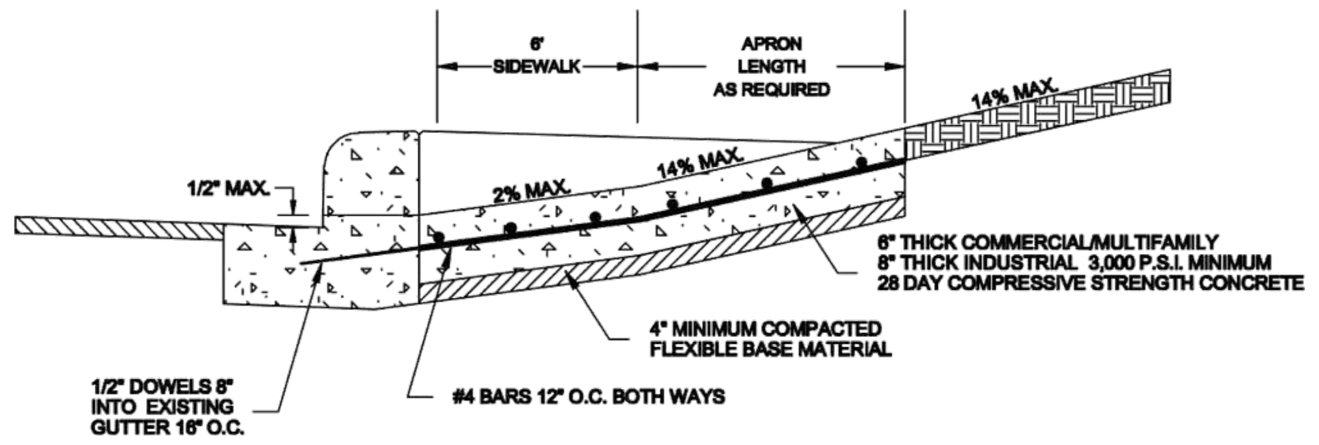
RADIUS PLAN VIEW


PROPERTY LINE
DRIVEWAY
20' MIN. - 40' MAX.
THROAT AT END OF FLARE
(MAY BE PAST R.O.W.)
HIGH POINT
SEE NOTE #5
WEAKENED PLANE JOINT
R.O.W.
LINE
VARIES
CONCRETE
10% MAX.
2% MAX.
45°
SIDEWALK SLOPE
1:12 MAX
6'
SIDEWALK
(TYP.)
DUMMY JOINT
SEE NOTE #4
EXPANSION JOINT
SEE NOTE #7
CURB CUT
SEE NOTE #3
TERMINATION OF FLARE
MINIMUM 1' OFF OF
PROPERTY LINE
FLARE
15' MIN.
30' MAX.

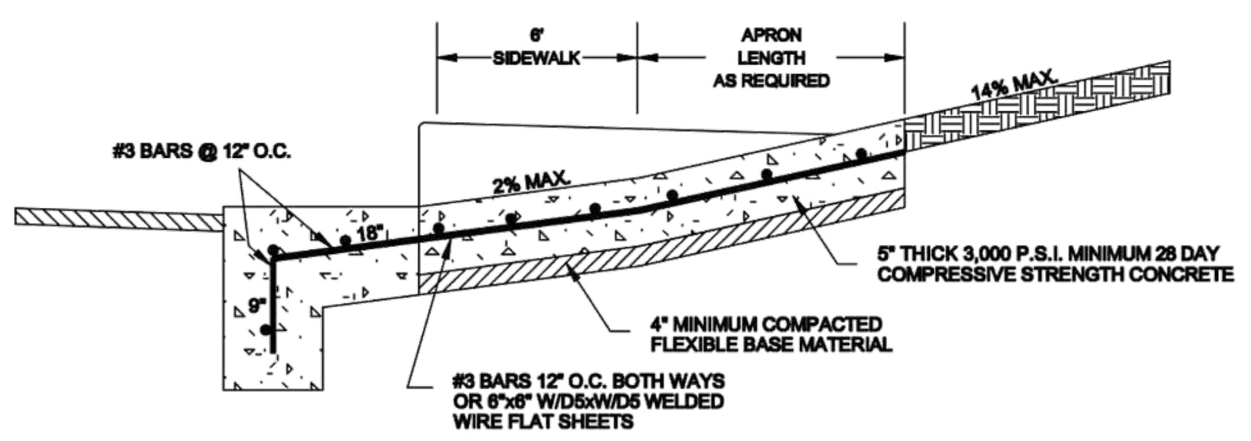
FLARE PLAN VIEW

DATE APPROVED: 07/2008	DWG. NO: ST-015.1	SCALE: N.T.S.	City of New Braunfels ENGINEERING DEPARTMENT
DRAWN BY: RAS	SHEET: 1 OF 2		
FILENAME: DRIVEWAY (COMMERCIAL - MULTIFAMILY - INDUSTRIAL)			

DRIVEWAY APRON
(COMMERCIAL - MULTIFAMILY - INDUSTRIAL)


6'
SIDEWALK
APRON
LENGTH
AS REQUIRED
14% MAX.
1/2" MAX.
2% MAX.
14% MAX.
6" THICK COMMERCIAL/MULTIFAMILY
8" THICK INDUSTRIAL 3,000 P.S.I. MINIMUM
28 DAY COMPRESSIVE STRENGTH CONCRETE
4" MINIMUM COMPACTED
FLEXIBLE BASE MATERIAL
1/2" DOWELS 8"
INTO EXISTING
GUTTER 16" O.C.
#4 BARS 12" O.C. BOTH WAYS

STRUCTURAL SECTION


6'
SIDEWALK
APRON
LENGTH
AS REQUIRED
14% MAX.
#3 BARS @ 12" O.C.
2% MAX.
18"
9"
5" THICK 3,000 P.S.I. MINIMUM 28 DAY
COMPRESSIVE STRENGTH CONCRETE
4" MINIMUM COMPACTED
FLEXIBLE BASE MATERIAL
#3 BARS 12" O.C. BOTH WAYS
OR 6"x6" W/D5xW/D5 WELDED
WIRE FLAT SHEETS

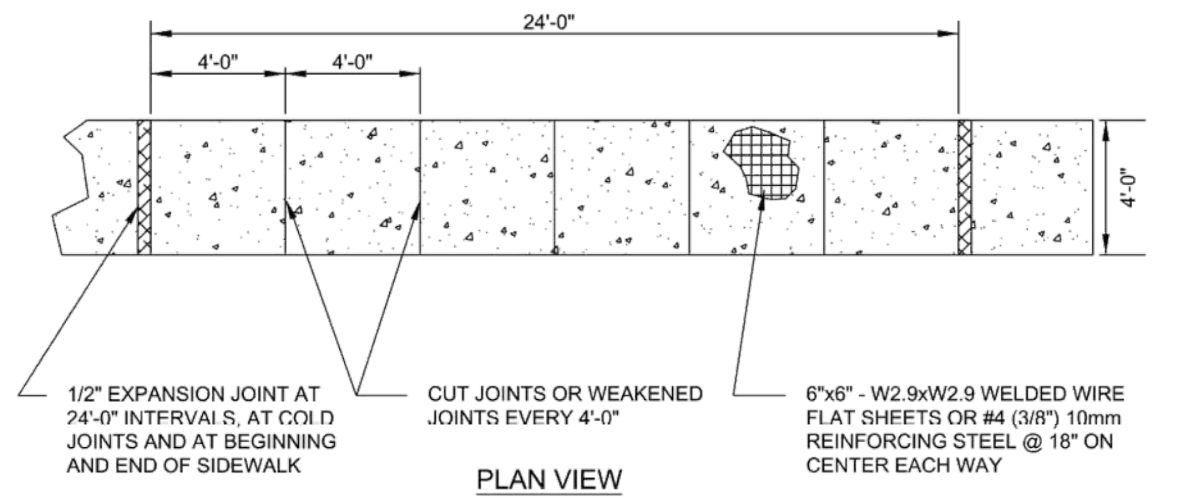
NO EXISTING CURB STRUCTURAL SECTION

NOTES:

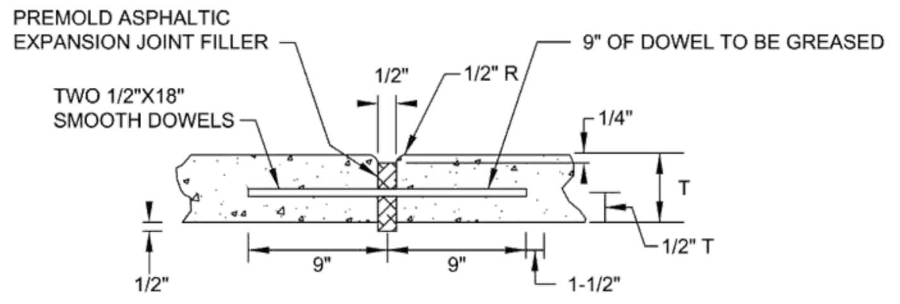
1. WHERE GUTTER DOES NOT EXIST DRIVEWAY APRON SHALL EXTEND TO EDGE OF ASPHALT AND SHALL HAVE A MINIMUM 6" WIDE 1' DEEP GRADE BEAM MONOLITHIC AND REINFORCED SIMILAR TO APRON.
2. PLACEMENT OF SIDEWALK SHOWN IS TYPICAL; HOWEVER, ALTERNATIVE SIDEWALK PLACEMENT COMMON TO DRIVEWAY APRON WILL BE CONSIDERED PROVIDED CROSS SLOPE OF SIDEWALK IS NO GREATER THAN 2%.
3. CURB CUT LENGTH NO GREATER THAN AS REQUIRED TO MATCH SLOPE OF ADJACENT SIDEWALK.
4. DUMMY JOINTS TO BE PROVIDED AT MINIMUM 4-FT. INTERVALS PERPENDICULAR TO THE CURB LINE WITHIN THE SIDEWALK AREA AND PARALLEL TO THE SIDEWALK AREA.
5. PROVIDE A MINIMUM 7" HIGH POINT. HIGH POINT HEIGHT SHALL BE MEASURED FROM THE GUTTER FLOW LINE TO THE DRIVEWAY APRON. NOTE HIGH POINT MAY OCCUR OUTSIDE OF ROW.
6. DRIVEWAY THROAT TRANSITION MAY OCCUR OUTSIDE OF ROW.
7. PROVIDE EXPANSION JOINTS AT ALL SIDEWALK AND DRIVEWAY THROAT JOINTS. EXPANSION JOINTS SHALL BE PLACED USING 1/2" ASPHALTIC MATERIAL WITH 1/2" DOWELS 16" O.C.
8. ALL SIDEWALK AND DRIVEWAY CONSTRUCTION SHALL MEET A.D.A. SPECIFICATIONS.

DATE APPROVED: 7/08	DWG. NO: ST-015.2	SCALE: N.T.S.	City of New Braunfels ENGINEERING DEPARTMENT
DRAWN BY: RAS	SHEET: 2 OF 2		
FILENAME: DRIVEWAY (Commercial - Multifamily - Industrial)			
P:\CURRENT NEW BRAUNFELS DETAILS\2008\			

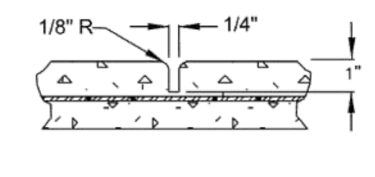
SIDEWALK
(RESIDENTIAL)


24'-0"
4'-0"
4'-0"
4'-0"
1/2" EXPANSION JOINT AT
24'-0" INTERVALS, AT COLD
JOINTS AND AT BEGINNING
AND END OF SIDEWALK
CUT JOINTS OR WEAKENED
JOINTS EVERY 4'-0"
6"x6" - W2.9xW2.9 WELDED WIRE
FLAT SHEETS OR #4 (3/8") 10mm
REINFORCING STEEL @ 18" ON
CENTER EACH WAY

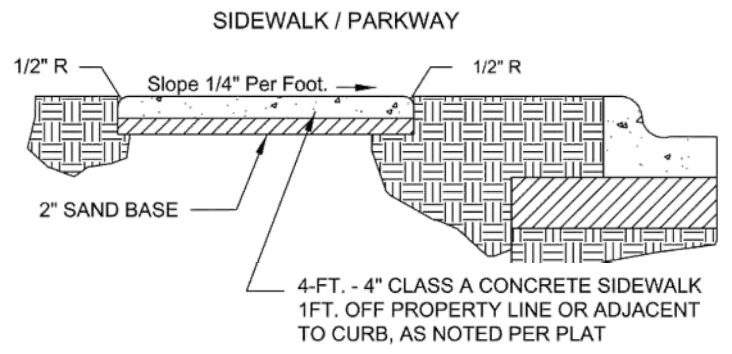
PLAN VIEW


PREMOLD ASPHALTIC
EXPANSION JOINT FILLER
9" OF DOWEL TO BE GREASED
1/2"
1/2" R
TWO 1/2"X18"
SMOOTH DOWELS
1/4"
T
1/2"
9"
9"
1/2" T
1-1/2"

EXPANSION JOINT



WEAKENED PLANE JOINT


SIDEWALK / PARKWAY
1/2" R
Slope 1/4" Per Foot.
1/2" R
2" SAND BASE
4-FT. - 4" CLASS A CONCRETE SIDEWALK
1FT. OFF PROPERTY LINE OR ADJACENT
TO CURB, AS NOTED PER PLAT

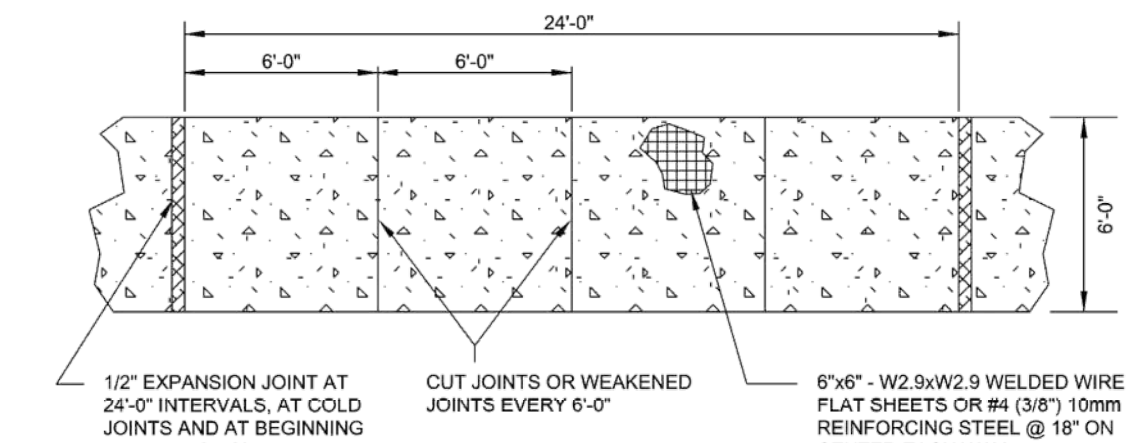
TYPICAL SECTION

NOTES:

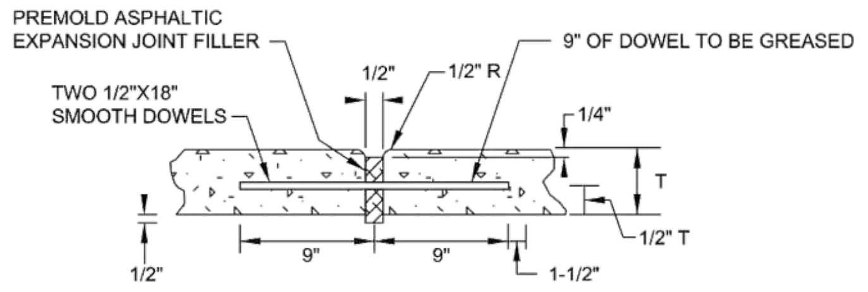
1. EXPANSION JOINTS ARE TO BE USED BETWEEN CONCRETE DRIVEWAY AND SIDEWALK.
2. SCORED JOINTS DENOTE SIDEWALK ACROSS THE DRIVEWAY AND ARE TO BE PLACED AT LEAST 1/3 rd. THROUGH THE SLAB THICKNESS.
3. ALL SIDEWALK AND DRIVEWAY CONSTRUCTION SHALL MEET A.D.A. SPECIFICATIONS.

DATE APPROVED: 07/2008	DWG. NO: ST-016	SCALE: N.T.S.	City of New Braunfels ENGINEERING DEPARTMENT
DRAWN BY: RAS	SHEET: 1 OF 1		
FILENAME: SIDEWALK (RESIDENTIAL)			

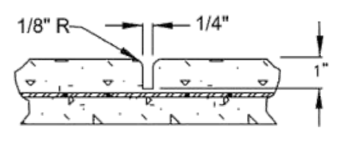
SIDEWALK
(COMMERCIAL - INDUSTRIAL)


24'-0"
6'-0"
6'-0"
6'-0"
1/2" EXPANSION JOINT AT
24'-0" INTERVALS, AT COLD
JOINTS AND AT BEGINNING
AND END OF SIDEWALK
CUT JOINTS OR WEAKENED
JOINTS EVERY 6'-0"
6"x6" - W2.9xW2.9 WELDED WIRE
FLAT SHEETS OR #4 (3/8") 10mm
REINFORCING STEEL @ 18" ON
CENTER EACH WAY

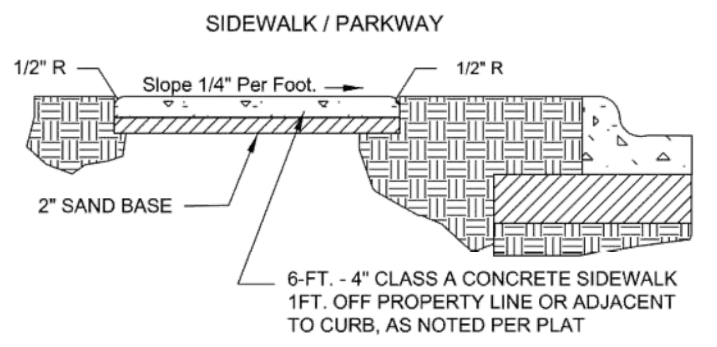
PLAN VIEW


PREMOLD ASPHALTIC
EXPANSION JOINT FILLER
9" OF DOWEL TO BE GREASED
1/2"
1/2" R
TWO 1/2"X18"
SMOOTH DOWELS
1/4"
T
1/2"
9"
9"
1/2" T
1-1/2"

EXPANSION JOINT



WEAKENED PLANE JOINT


SIDEWALK / PARKWAY
1/2" R
Slope 1/4" Per Foot.
1/2" R
2" SAND BASE
6-FT. - 4" CLASS A CONCRETE SIDEWALK
1FT. OFF PROPERTY LINE OR ADJACENT
TO CURB, AS NOTED PER PLAT

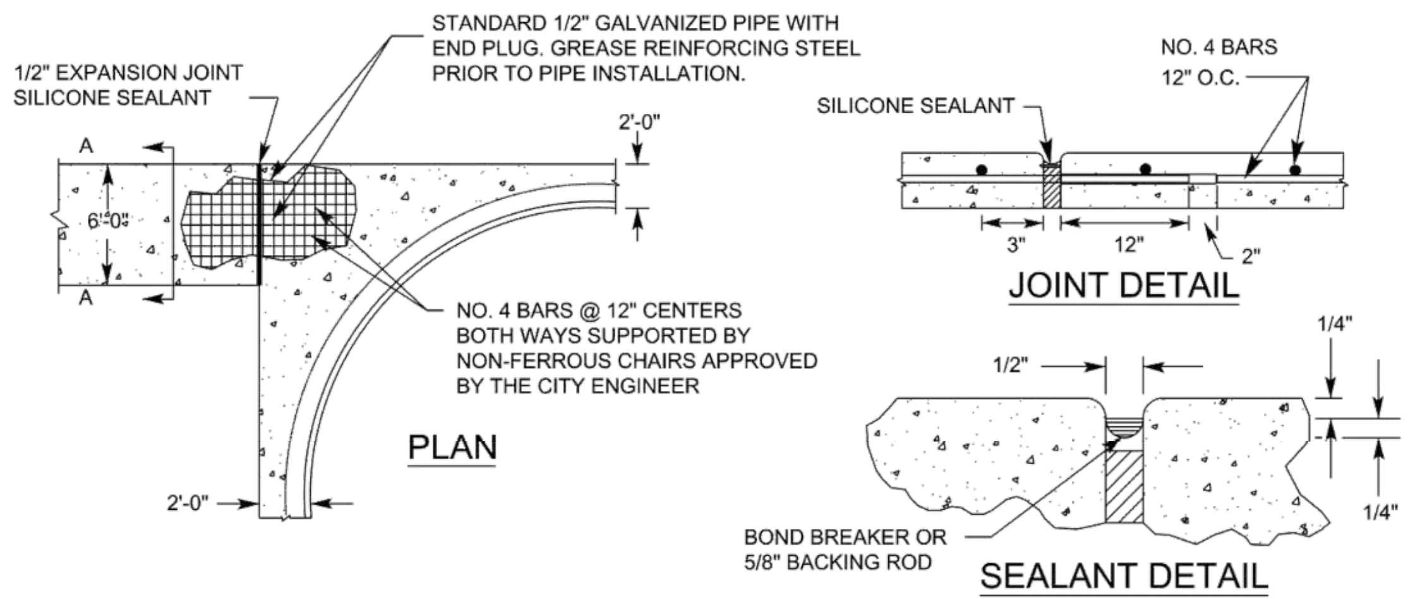
TYPICAL SECTION

NOTES:

1. EXPANSION JOINTS ARE TO BE USED BETWEEN CONCRETE DRIVEWAY AND SIDEWALK.
2. SCORED JOINTS DENOTE SIDEWALK ACROSS THE DRIVEWAY AND ARE TO BE PLACED AT LEAST 1/3 rd. THROUGH THE SLAB THICKNESS.
3. ALL SIDEWALK AND DRIVEWAY CONSTRUCTION SHALL MEET A.D.A. SPECIFICATIONS.

DATE APPROVED: 07/2008	DWG. NO: ST-017	SCALE: N.T.S.	City of New Braunfels ENGINEERING DEPARTMENT
DRAWN BY: RAS	SHEET: 1 OF 1		
FILENAME: SIDEWALK (COMMERCIAL - INDUSTRIAL)			

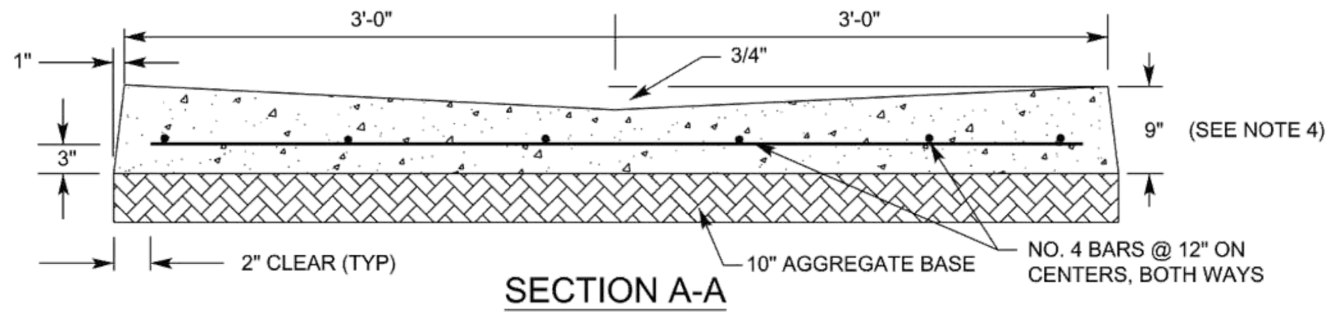
CROSS GUTTER


STANDARD 1/2" GALVANIZED PIPE WITH
END PLUG. GREASE REINFORCING STEEL
PRIOR TO PIPE INSTALLATION.
1/2" EXPANSION JOINT
SILICONE SEALANT
A
6'-0"
A
2'-0"
NO. 4 BARS @ 12" CENTERS
BOTH WAYS SUPPORTED BY
NON-FERROUS CHAIRS APPROVED
BY THE CITY ENGINEER
2'-0"
NO. 4 BARS
12" O.C.
SILICONE SEALANT
3"
12"
2"
1/2"
1/4"
1/4"
BOND BREAKER OR
5/8" BACKING ROD

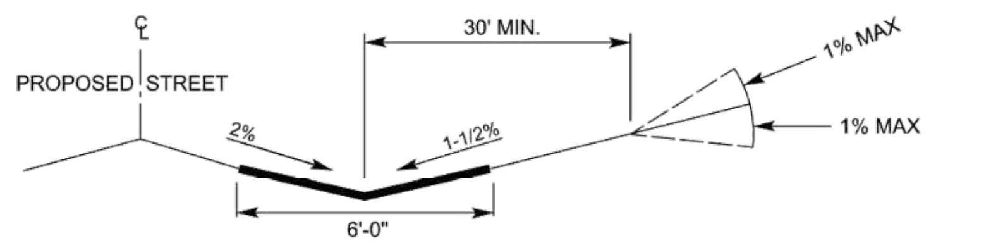
PLAN

JOINT DETAIL

SEALANT DETAIL


3'-0"
3'-0"
1"
3/4"
3"
9" (SEE NOTE 4)
2" CLEAR (TYP)
10" AGGREGATE BASE
NO. 4 BARS @ 12" ON
CENTERS, BOTH WAYS

SECTION A-A


℄
PROPOSED STREET
30' MIN.
1% MAX
1% MAX
2%
1-1/2%
6'-0"

TYPICAL PROFILE AT LOCAL RESIDENTIAL STREET INTERSECTION

NOTES:

1. ALL CONCRETE SHALL BE CLASS "A" 3,000 PSI.
2. FINISHED ASPHALT CONCRETE SURFACE TO BE FLUSH WITH CROSS GUTTER LIP.
3. CONSTRUCTION OF CROSS GUTTER IS NOT ALLOWED ACROSS MAJOR COLLECTOR OR ARTERIAL STREETS.
4. ADJACENT SPANDREL SHALL BE 9" THICK CLASS "A" 3,000 PSI CONCRETE.

DATE APPROVED: 07/2008	DWG. NO: ST-020	SCALE: N.T.S.	City of New Braunfels ENGINEERING DEPARTMENT
DRAWN BY: RAS	SHEET: 1 OF 1		
FILENAME: CROSS GUTTER			

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ENGINEERS

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
P:(210) 681.2951 F: (210) 523.7112

**FLYING W
UNIT 2**

CITY OF NEW BRAUNFELS STANDARD DETAILS

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
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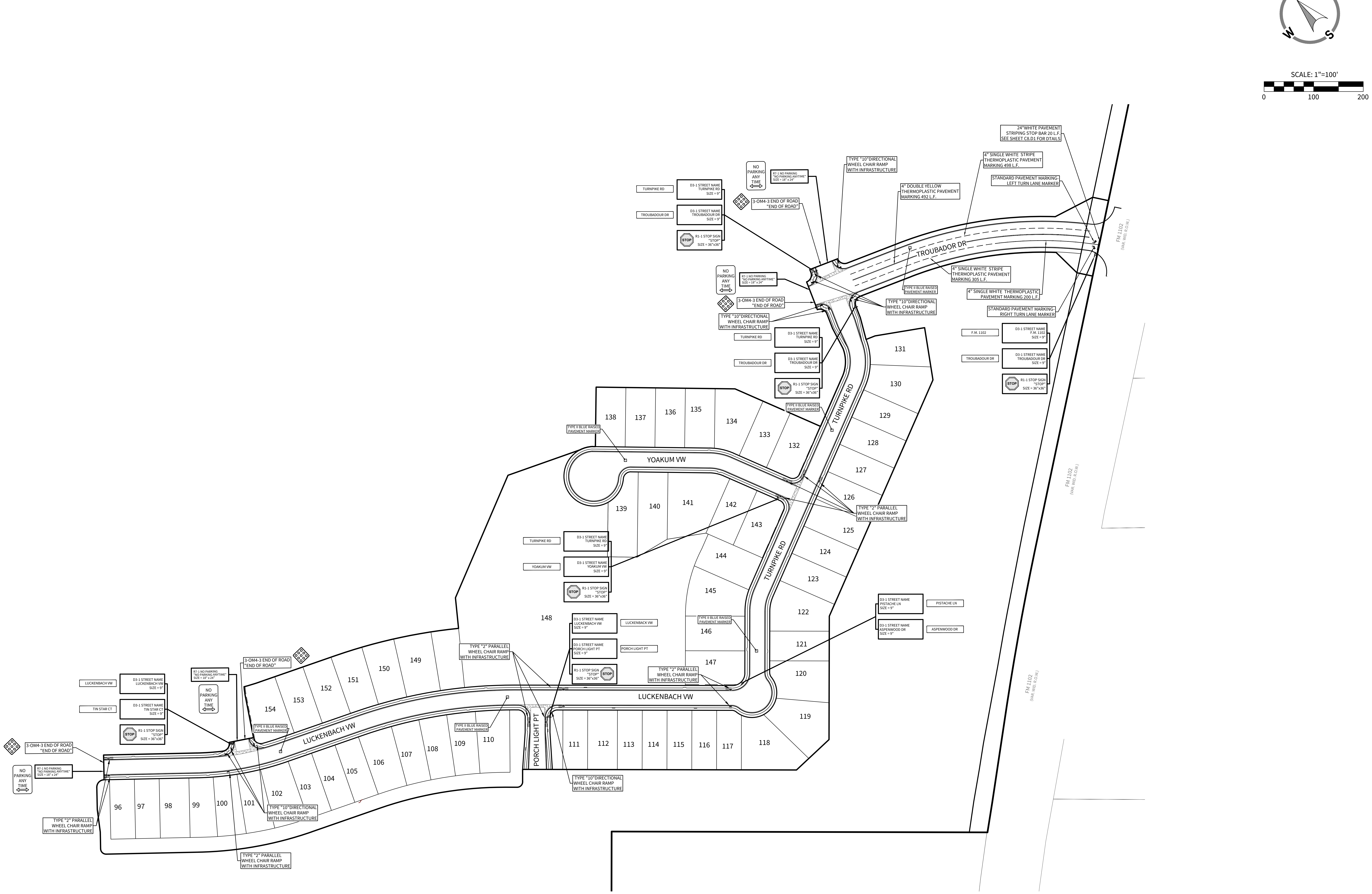
CUDE ENGINEERS
TBPELS No. 10048500

C7.D7

R:\04024\018\2-DWG\4-Plans\C7.D8 CITY OF NEW BRAUNFELS STANDARD DETAILS.dwg 2026/04/16 8:40am sgonzales


N
E
S
W
SCALE: 1"=100'
0
100
200
TROUBADOR DR
TURNPIKE RD
YOAKUM VW
LUCKENBACH VW
PORCH LIGHT PT
FM 1102
24"WHITE PAVEMENT STRIPING STOP BAR 20 L.F. SEE SHEET C8.D1 FOR DTAILS
4" SINGLE WHITE STRIPE THERMOPLASTIC PAVEMENT MARKING 498 L.F.
STANDARD PAVEMENT MARKING- LEFT TURN LANE MARKER
TYPE "10"DIRECTIONAL WHEEL CHAIR RAMP WITH INFRASTRUCTURE
4" DOUBLE YELLOW THERMOPLASTIC PAVEMENT MARKING 492 L.F.
4" SINGLE WHITE STRIPE THERMOPLASTIC PAVEMENT MARKING 305 L.F.
4" SINGLE WHITE THERMOPLASTIC PAVEMENT MARKING 200 L.F.
STANDARD PAVEMENT MARKING- RIGHT TURN LANE MARKER
TYPE II BLUE RAISED PAVEMENT MARKER
NO PARKING ANY TIME
R7-1 NO PARKING "NO PARKING ANYTIME" SIZE = 18" x 24"
3-OM4-3 END OF ROAD "END OF ROAD"
TURNPIKE RD
D3-1 STREET NAME TURNPIKE RD SIZE = 9"
TROUBADOUR DR
D3-1 STREET NAME TROUBADOUR DR SIZE = 9"
STOP
R1-1 STOP SIGN "STOP" SIZE = 36"x36"
F.M. 1102
D3-1 STREET NAME F.M. 1102 SIZE = 9"
YOAKUM VW
D3-1 STREET NAME YOAKUM VW SIZE = 9"
LUCKENBACK VW
D3-1 STREET NAME LUCKENBACK VW SIZE = 9"
PORCH LIGHT PT
D3-1 STREET NAME PORCH LIGHT PT SIZE = 9"
PISTACHE LN
D3-1 STREET NAME PISTACHE LN SIZE = 9"
ASPENWOOD DR
D3-1 STREET NAME ASPENWOOD DR SIZE = 9"
LUCKENBACH VW
D3-1 STREET NAME LUCKENBACH VW SIZE = 9"
TIN STAR CT
D3-1 STREET NAME TIN STAR CT SIZE = 9"
TYPE "2" PARALLEL WHEEL CHAIR RAMP WITH INFRASTRUCTURE
96
97
98
99
100
101
102
103
104
105
106
107
108
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1. ALL PAVEMENT MARKINGS SHALL BE THERMOPLASTICS AS PER TXDOT ITEM NO. 666.
2. COMAL COUNTY WILL INSTALL COUNTY ROAD SIGNS AND INVOICE THE OWNER. THE CONTRACTOR IS TO INSTALL PAVEMENT MARKINGS. ALL ROAD SIGNS AND PAVEMENT MARKINGS SHALL BE INSTALLED IN ACCORDANCE WITH THE APPROVED ENGINEERING PLANS. THE COUNTY WILL INSPECT ALL SIGNS AT FINAL INSPECTION.
3. THE CONTRACTOR SHALL INSTALL ALL PAVEMENT MARKINGS IN ACCORDANCE WITH APPROVED ENGINEERING PLANS. THE CONTRACTOR SHALL NOTIFY THE COUNTY AT LEAST 24 HOURS PRIOR TO THE INSTALLATION OF ALL SEALER AND FINAL MARKINGS. THE COUNTY WILL INSPECT ALL MARKINGS AT FINAL APPLICATION.

CUDEENGINEERS.COM

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ENGINEERS

4122 Pond Hill Road, Suite 101
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P:(210) 681.2951 F: (210) 523.7112

FLYING W
UNIT 2

TRAFFIC SIGNANGE PLAN

DATE
04/16/2026

PROJECT NO.
04024-018

DRAWN BY
C7

CHECKED BY
JL/TM

REVISIONS
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4/16/26
TORY DUANE MILLER
135598

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