## CIVIL PLANS


- C0.00 GENERAL NOTES
- C1.00 STORMWATER POLLUTION PREVENTION PLAN
- C2.00 OVERALL GRADING PLAN
- C3.00 CCUSD GENERAL NOTES
- C3.01 UTILITY LAYOUT PLAN
- C4.00 OVERALL SANITARY SEWER PLAN
- C4.01 SANITARY SEWER PLAN & PROFILE – LINE Q
- C4.02 SANITARY SEWER PLAN & PROFILE – LINE R
- C4.03 SANITARY SEWER PLAN & PROFILE – LINE S
- C4.04 SANITARY SEWER PLAN & PROFILE – LINE S
- C4.05 SANITARY SEWER PLAN & PROFILE – LINE T
- C4.D1 SANITARY SEWER STANDARD DETAILS
- C5.00 WATER DISTRIBUTION PLAN
- C5.D1 WATER DISTRIBUTION STANDARD DETAILS
- C6.00 ULTIMATE MASTER DRAINAGE PLAN
- C6.01 ULTIMATE MASTER DRAINAGE PLAN
- C6.02 DRAINAGE PLAN & PROFILE – DRAIN "M"
- C6.03 DRAINAGE PLAN & PROFILE – DRAIN "N" & "O"
- C6.04 DRAINAGE PLAN & PROFILE – DRAIN "P"
- C6.05 DETENTION POND PLAN – POND 3
- C6.06 DETENTION POND PLAN – POND 3
- C6.D1 CONCRETE RIP-RAP & MISC. DRAINAGE DETAILS
- C6.D2 TYPE C CURB INLET CAST IN PLACE DRAINAGE DETAILS
- C6.D3 TYPE C CURB INLET PRECAST DRAINAGE DETAILS
- C7.00 STREET PLAN & PROFILE – ENGLISH OAKS
- C7.01 STREET PLAN & PROFILE – ENGLISH OAKS
- C7.02 STREET PLAN & PROFILE – ANACAHUITA WAY
- C7.03 STREET PLAN & PROFILE – ANACAHUITA WAY
- C7.04 STREET PLAN & PROFILE – FILBERT CIRCLE
- C7.05 STREET PLAN & PROFILE – CHINQUAPIN WAY
- C7.06 STREET PLAN & PROFILE – HEMLOCK LANE
- C7.D1 STANDARD STREET DETAILS
- C7.D2 SMALL ROADSIDE GENERAL NOTES & DETAILS
- C7.D3 TXDOT SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS
- C7.D4 TYPICAL PAVEMENT MARKING DETAILS
- C7.D5 TYPICAL CONCRETE DRIVEWAY DETAILS
- C7.D6 TXDOT PEDESTRIAN FACILITIES DETAILS CURB RAMPS
- C7.D7 WHEELCHAIR RAMPS STANDARDS
- C7.D8 CITY OF NEW BRAUNFELS STANDARDS
- C8.00 TRAFFIC SIGNAGE PLAN


- THIS SUBDIVISION IS LOCATED WITHIN THE EDWARDS AQUIFER TRANSITION ZONE
- 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.
- GAS UTILITIES ARE NOT INCLUDED IN THE CIVIL CONSTRUCTION PLANS. FINAL GAS UTILITY DESIGN SHALL BE APPROVED BY THE CITY FOR ANY WORK WITHIN PUBLIC RIGHT-OF-WAY.
- ALL RESPONSIBILITY FOR THE ADEQUACY OF THESE PLANS REMAINS WITH THE ENGINEER OF RECORD. IN ACCEPTING THESE PLANS, THE CITY OF NEW BRAUNFELS MUST RELY UPON THE ADEQUACY OF THE WORK OF THE ENGINEER OF RECORD.
- IF CONSTRUCTION HAS NOT COMMENCED WITHIN ONE-YEAR OF CITY APPROVAL FOR CONSTRUCTION INSPECTION, THAT APPROVAL IS NO LONGER VALID.
- DEVELOPMENT CATEGORY (TYPE 3) SINGLE FAMILY RESIDENTIAL

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CONSTRUCTION DOCUMENTS FOR

# FLYING W SUBDIVISION UNIT 3

BEING A TOTAL OF 23.53 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

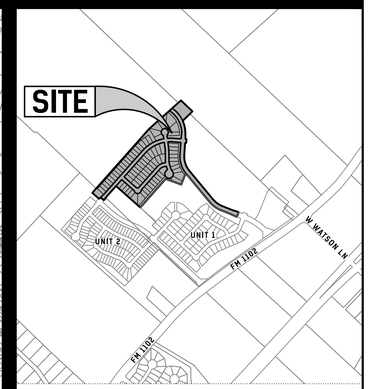


## VICINITY MAP
N.T.S.


EST. 1980 CUDE ENGINEERS

SAN ANTONIO | AUSTIN | SAN MARCOS

4122 POND HILL ROAD, SUITE 101
SAN ANTONIO, TEXAS 78231
P:(210) 681.2951 F:(210) 523.7112
TBPE FIRM NO. 455
TBPLS FIRM NO. 10048500
SBE CERTIFIED FIRM


## LOCATION MAP
SCALE: 1" = 1000'

TRIOAK DEVELOPMENT

**DEVELOPER:**
TRIOAK DEVELOPMENT L.L.C.
CONTACT PERSON:
4634 94TH STREET LUBBOCK, TX 78424
TEL:
FAX:

N W E S

MDP NUMBER: MP23-0118

PLAT NUMBER:

PROJECT NUMBER: 04024.004

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

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

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

P:\04024\DWG_LIMS 7.DWG\C0.00 OVERALL COVER SHEET.dwg 2/24/2024 12:42pm hlowry


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# CONSTRUCTION PLAN NOTES

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 CITY OF SAN ANTONIO 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 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:
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 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 UTILITY 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"XS" 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:
THE CONTRACTOR SHALL FURNISH AND INSTALL ALL REGULATORY AND WARNING SIGNS AND SIGN MOUNTS IN ACCORDANCE WITH APPROVED ENGINEERING PLANS. COMAL COUNTY TO INSTALL ALL STREET SIGNAGE WITHIN THE SUBDIVISION AND BILL THE DEVELOPER. 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 TWENTY-FOUR (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

1
2


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**FLYING W UNIT 3**

GENERAL NOTES

**DATE**
03/26/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

**REVISIONS**
1. 05/17/23 - REVISED GEN. CONS. PLAN NOTES, ADDED SEQ. OF CONS. NOTES
2. 03/20/24 - REVISED GEN. CONS. PLAN NOTES
3.
4.
5.
6.
7.
8.

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

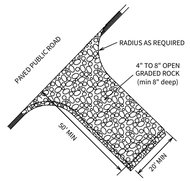
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P:\04024\04024_UNIT 3\SWG\GS01 CITY OF BOERNE\1 GENERAL NOTES.dwg 2024/03/20 2:14:45pm hvane


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

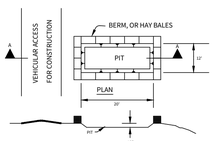
- PROPERTY LINE
- EXISTING CONTOURS — 930 —
- BMP ITEM NUMBER [1]
- TEMPORARY CONSTRUCTION ENTRANCE/EXIT
- ROCK BERM
- SILT FENCE
- FLOW ARROW
- STAGING AREA
- CONCRETE WASHOUT PIT
- LIMITS OF DISTURBANCE




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.

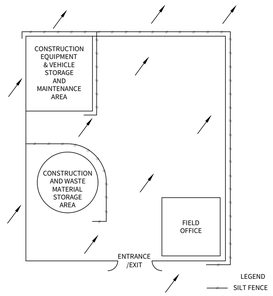
### 1 TEMPORARY CONSTRUCTION ENTRANCE/EXIT
N.T.S.



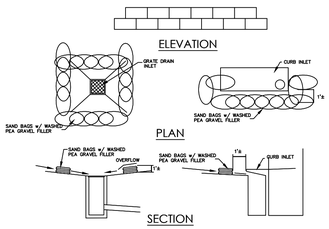

GENERAL NOTES:

- 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.




### 4 TYP. CONSTRUCTION STAGING AREA
N.T.S.




BAGGED GRAVEL INLET FILTER NOTES

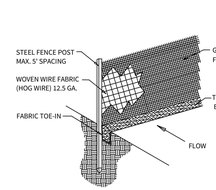
1. THE GRAVEL BAG MATERIAL SHOULD BE POLYPROPYLENE, POLYETHYLENE, POLYAMIDE OR COTTON BURLAP WOVEN FABRIC, MINIMUM UNIT WEIGHT 4 OZ/YD 2 , MULLEN BURST STRENGTH EXCEEDING 300 PSI AND ULTRAVIOLET STABILITY EXCEEDING 70 PERCENT.
2. THE BAG LENGTH SHOULD BE 24 INCHES, WIDTH SHOULD BE 18 INCHES AND THICKNESS 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.

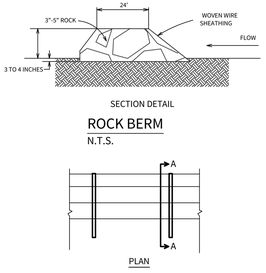
NOTES:

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

1



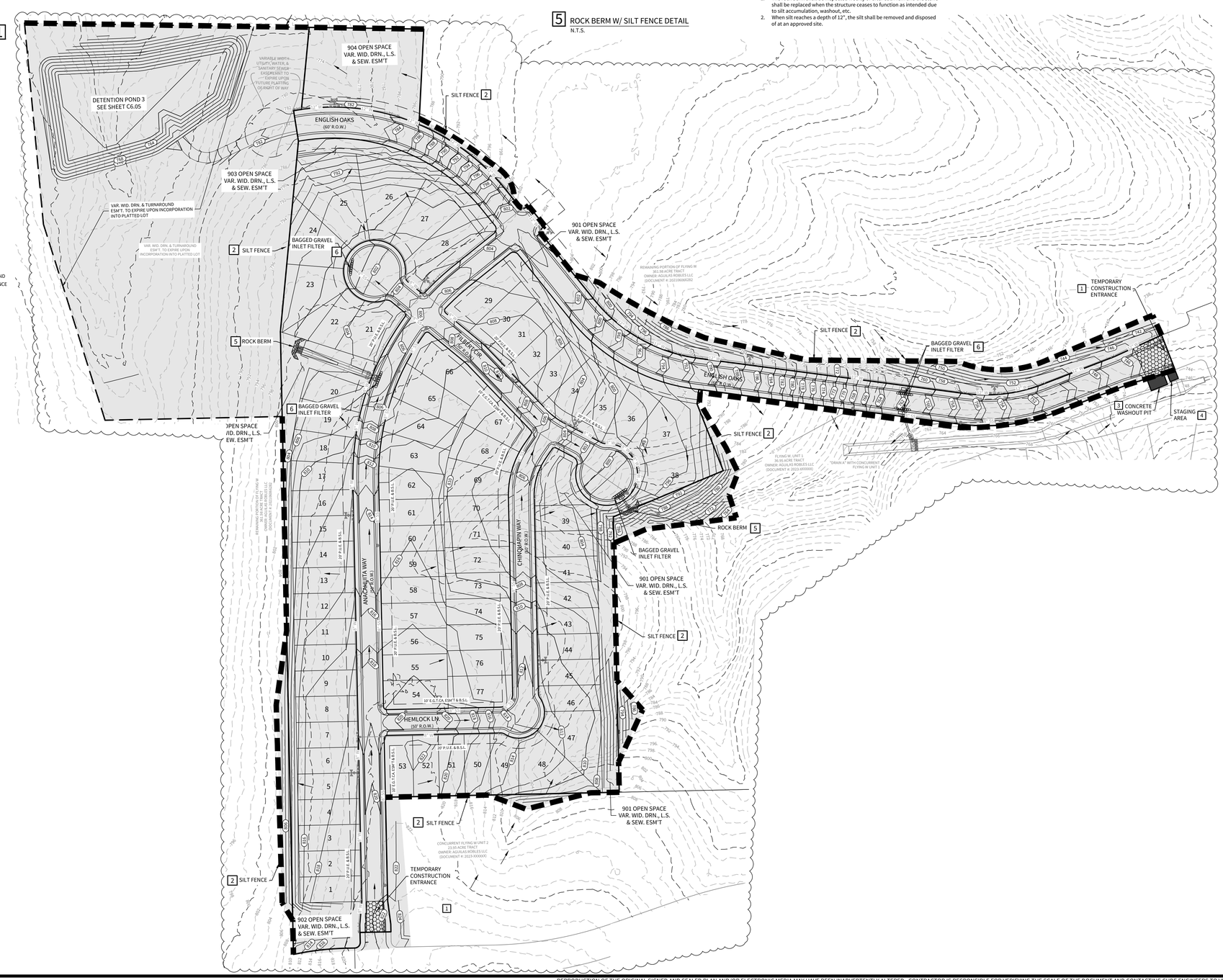

### 2 STANDARD SILT FENCE
N.T.S.




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.





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# FLYING W UNIT 3

STORM WATER POLLUTION PREVENTION PLAN

**DATE**
03/26/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

**REVISIONS**
1. 05/24/23 - TDPES STABILIZATION NOTE ADDED, ADDED PROP. GRADING.
2.
3.
4.
5.
6.
7.
8.

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

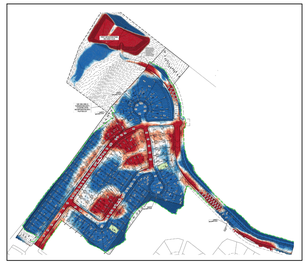
CUDE ENGINEERS
TBPELS No. 10048500

**C1.00**


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 |
| DIRECTION OF FLOW | |
| LIMITS OF GRADING | |
| BUILDING SETBACK | |
| E.G.T.CA. EASEMENT | |
| BUILDING PAD (70'-75') | |



**CUT/FILL MAP**
N.T.S.

## 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.

6. DEPTH AND MIXING OF FILL LAYERS
THE SELECTED FILL MATERIAL SHALL BE PLACED IN LEVEL, UNIFORM LAYERS WHICH, WHEN COMPACTED, SHALL HAVE A DENSITY CONFORMING TO THAT STIPULATED ABOVE. EACH LAYER SHALL BE THOROUGHLY MIXED DURING THE SPREADING TO ENSURE UNIFORMITY OF MATERIAL IN EACH LAYER. COMPACTED LAYER THICKNESS MAY VARY DEPENDING ON THE COMPACTION EQUIPMENT OF DEMONSTRATED CAPABILITY. THE MAXIMUM LOOSE DEPTH FOR ANY MATERIAL SHALL NOT EXCEED TWELVE INCHES (12"). FOR TESTING REQUIREMENTS OF FILL MATERIAL, SEE DENSITY TESTING.

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.

13. STRIPPING OF VEGETATION
STRIPPING OF VEGETATION FROM PROJECT SITES SHALL BE PHASED SO AS TO EXPOSE THE MINIMUM AMOUNT OF AREA TO SOIL EROSION FOR THE SHORTEST POSSIBLE PERIOD OF TIME PER THE NEW BRAUNFELS DRAINAGE AND EROSION CONTROL DESIGN MANUAL SEC. 12.2(N).

| Elevations Table | | | |
|---|---|---|---|
| Number | Minimum Elevation | Maximum Elevation | Color |
| 1 | -9999999 | -1.5 | |
| 2 | -1.5 | -1 | |
| 3 | -1 | -0.5 | |
| 4 | -0.5 | -0.25 | |
| 5 | -0.25 | 0.25 | |
| 6 | 0.25 | 0.5 | |
| 7 | 0.5 | 1 | |
| 8 | 1 | 1.5 | |
| 9 | 1.5 | 9999999 | |

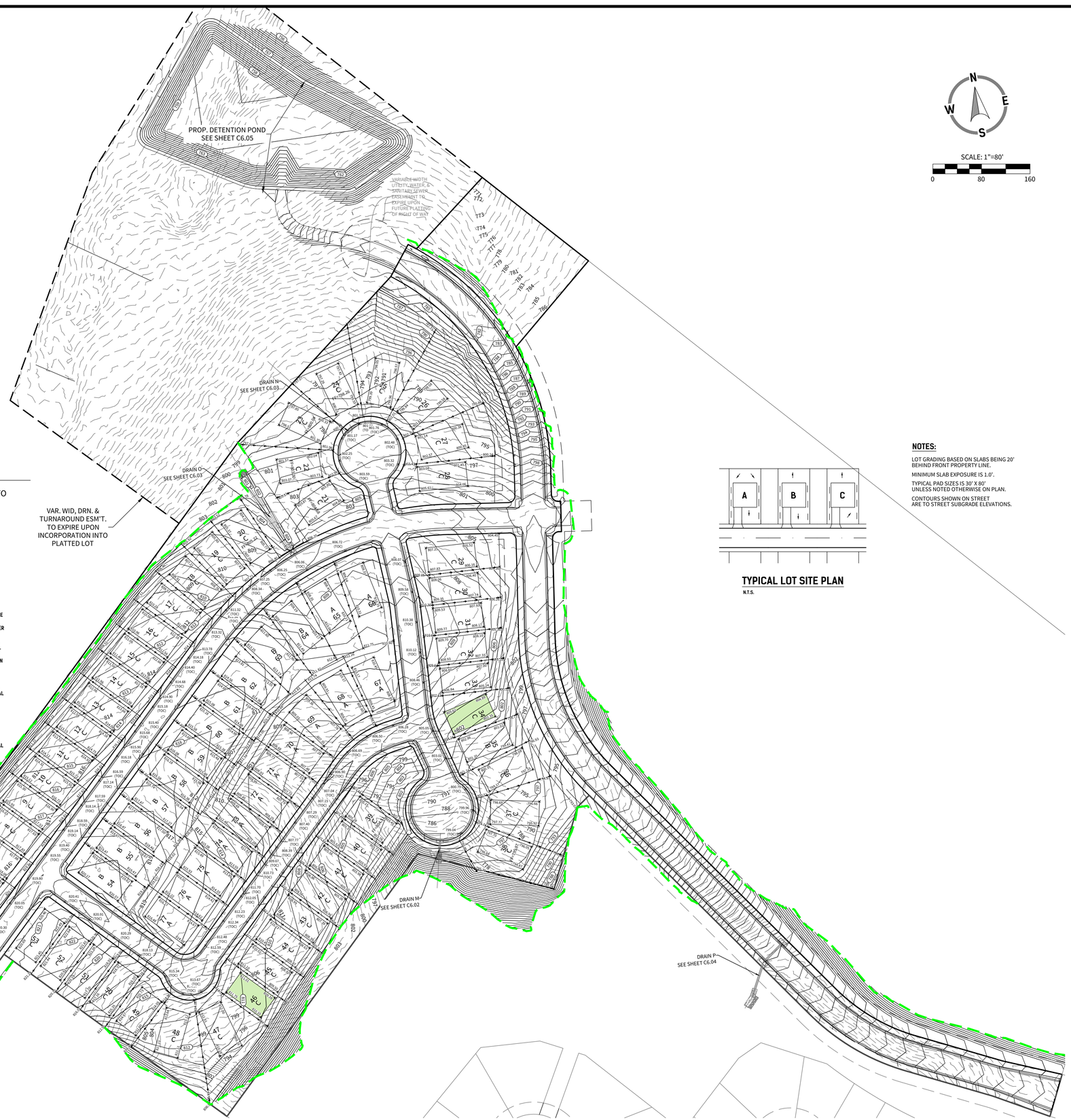
| UNIT 3 CUT/FILL | |
|---|---|
| CUT | 35,762.45 CY |
| FILL | 107,060.22 CY |
| NET (FILL) | 71,297.77 CY |

**BENCHMARK** **BM-1**

BENCHMARK TO BE SET BY ENGINEER PRIOR TO CONSTRUCTION.

## NOTE:

1. **ENSURE ALL DRIVEWAY APPROACHES ARE BUILT IN GENERAL ACCORDANCE WITH A.D.A. SPECIFICATIONS. NO VALVES, HYDRANTS, CLEANOUTS, ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.**
2. **ALL UTILITIES TO BE CONSTRUCTED PRIOR TO STREETS.**
3. **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.**
4. **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.**







**TYPICAL LOT SITE PLAN**
N.T.S.




SCALE: 1"=80'
0 80 160

## 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 SUBGRADE ELEVATIONS.


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# FLYING W UNIT 3

OVERALL GRADING PLAN

DATE
03/26/2024

PROJECT NO.
04024-004

DRAWN BY
CG/AM/JG/WDS

CHECKED BY
JC/AL

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

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

**C2.00**


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C:\04024\04024_UNIT 3\DWG\C2.00 GRADING PLAN.dwg, 2024/03/27 1:24:40 pm, Ryan Tolsma

| Line | Contrubuting Area to MH | Contributing LUE's | Average Dry Weather Flow (gpd) | Peak Dry Weather Flow (PDFW) (gpd) | Acres | Infiltration/Inflow (gpd) | Peak Wet Weather Flow (PWWF) (gpd) | Peak Wet Weather Flow (cfs) | Slope | Pipe Size I.D. (in) | Velocity @ PWWF Capacity (fps) | 100% of Design Q (full flow-min. slope) (cfs) | Capacity (full flow-design. Slope) (gpd) | 65% of Design Capacity (gpd) | PDWF Qfull (Not to exceed 65%) (gpd) | PDWF % FULL | 85% of Design Capacity (gpd) | PWWF Qfull (Not to exceed 85%) (gpd) | PWWF % FULL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Line Q | MH NO. Q-5 to MH NO. Q-4 | 8 | 1920 | 4800 | 0.10 | 30 | 4830 | 0.01 | 1.03% | 8 " | 0.021 | 1.23 | 794,780 | 516,607 | 4800 | 0.60% | 675,562.94 | 4,830.00 | 0.61% |
| | MH NO. Q-4 to MH NO. Q-3 | 19 | 4560 | 11400 | 0.20 | 60 | 11460 | 0.02 | 1.03% | 8 " | 0.051 | 1.23 | 794,780 | 516,607 | 11400 | 1.43% | 675,562.94 | 11,460.00 | 1.44% |
| | MH NO. Q-3 to MH NO. Q-2 | 26 | 6240 | 15600 | 0.30 | 90 | 15690 | 0.02 | 4.83% | 8 " | 0.070 | 2.66 | 1,721,083 | 1,118,704 | 15600 | 0.91% | 1,462,920.65 | 15,690.00 | 0.91% |
| | MH NO. Q-2 to MH NO. Q-1 | 32 | 7680 | 19200 | 0.40 | 120 | 19320 | 0.03 | 2.68% | 8 " | 0.086 | 1.98 | 1,282,023 | 833,315 | 19200 | 1.50% | 1,089,719.19 | 19,320.00 | 1.51% |
| | MH NO. Q-1 to MH NO. S-7 | 33 | 7920 | 19800 | 0.50 | 150 | 19950 | 0.03 | 6.53% | 8 " | 0.088 | 3.10 | 2,001,174 | 1,300,763 | 19800 | 0.99% | 1,700,997.97 | 19,950.00 | 1.00% |
| Line T | MH NO. T-4 to MH NO. T-3 | 4 | 960 | 2400 | 0.10 | 30 | 2430 | 0.00 | 3.31% | 8 " | 0.011 | 2.20 | 1,424,762 | 926,095 | 2400 | 0.17% | 1,211,047.56 | 2,430.00 | 0.17% |
| | MH NO. T-3 to MH NO. T-2 | 6 | 1440 | 3600 | 0.20 | 60 | 3660 | 0.01 | 1.62% | 8 " | 0.016 | 1.54 | 996,749 | 647,887 | 3600 | 0.36% | 847,236.60 | 3,660.00 | 0.37% |
| | MH NO. T-2 to MH NO. T-1 | 24 | 5760 | 14400 | 0.30 | 90 | 14490 | 0.02 | 7.19% | 8 " | 0.064 | 3.25 | 2,099,872 | 1,364,916 | 14400 | 0.69% | 1,784,890.79 | 14,490.00 | 0.69% |
| | MH NO. T-1 to MH NO. S-5 | 26 | 6240 | 15600 | 0.40 | 120 | 15720 | 0.02 | 107.19% | 8 " | 0.070 | 12.54 | 8,107,845 | 5,270,099 | 15600 | 0.19% | 6,891,667.86 | 15,720.00 | 0.19% |
| Line S | MH NO. S-7 to MH NO. S-6 | 42 | 10080 | 25200 | 0.80 | 240 | 25440 | 0.04 | 0.40% | 8 " | 0.113 | 0.77 | 495,289 | 321,938 | 25200 | 5.09% | 420,995.25 | 25,440.00 | 5.14% |
| | MH NO. S-6 to MH NO. S-5 | 46 | 11040 | 27600 | 0.90 | 270 | 27870 | 0.04 | 0.40% | 8 " | 0.124 | 0.77 | 495,289 | 321,938 | 27600 | 5.57% | 420,995.25 | 27,870.00 | 5.63% |
| | MH NO. S-5 to MH NO. S-4 | 75 | 18000 | 45000 | 1.40 | 420 | 45420 | 0.07 | 0.40% | 8 " | 0.201 | 0.77 | 495,289 | 321,938 | 45000 | 9.09% | 420,995.25 | 45,420.00 | 9.17% |
| | MH NO. S-4 to MH NO. S-3 | 77 | 18480 | 46200 | 1.51 | 452.31 | 46652.31 | 0.07 | 100.40% | 8 " | 0.207 | 12.14 | 7,846,846 | 5,100,450 | 46200 | 0.59% | 6,669,819.17 | 46,652.31 | 0.59% |
| | MH NO. S-3 to MH NO. S-2 | 77 | 18480 | 46200 | 1.61 | 482.31 | 46682.31 | 0.07 | 200.40% | 8 " | 0.207 | 17.15 | 11,086,058 | 7,205,938 | 46200 | 0.42% | 9,423,149.08 | 46,682.31 | 0.42% |
| | MH NO. S-2 to MH NO. S-1 | 77 | 18480 | 46200 | 1.71 | 512.31 | 46712.31 | 0.07 | 300.40% | 8 " | 0.207 | 21.00 | 13,573,075 | 8,822,499 | 46200 | 0.34% | 11,537,113.57 | 46,712.31 | 0.34% |
| | MH NO. S-1 to MH NO. I-1 | 77 | 18480 | 46200 | 1.81 | 542.31 | 46742.31 | 0.07 | 400.40% | 8 " | 0.207 | 24.25 | 15,670,228 | 10,185,648 | 46200 | 0.29% | 13,319,693.70 | 46,742.31 | 0.30% |
| Line R | MH NO. R-2 to MH NO. R-1 | 8 | 1920 | 4800 | 0.10 | 30 | 4830 | 0.01 | 2.42% | 8 " | 0.021 | 1.88 | 1,218,249 | 791,862 | 4800 | 0.39% | 1,035,511.40 | 4,830.00 | 0.40% |
| | MH NO. R-1 to MH NO. S-7 | 8 | 1920 | 4800 | 0.20 | 60 | 4860 | 0.01 | 102.42% | 8 " | 0.022 | 12.26 | 7,925,390 | 5,151,504 | 4800 | 0.06% | 6,736,581.82 | 4,860.00 | 0.06% |

## 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 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

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FLYING W UNIT 3

CCSUD GENERAL NOTES

DATE
03/26/2024
PROJECT NO.
04024-004
DRAWN BY
CG/AM/JG/WDS
CHECKED BY
JC/AL

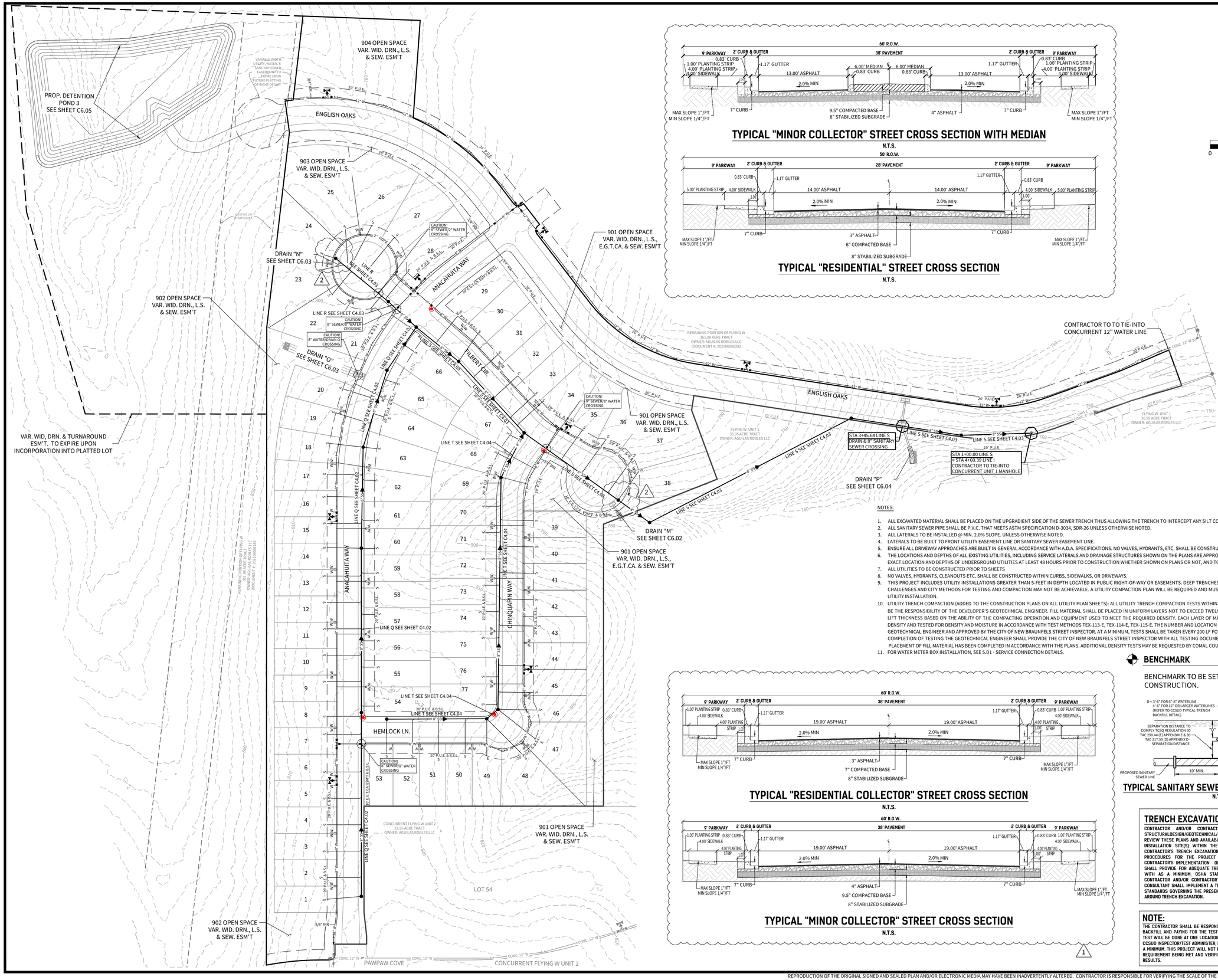
REVISIONS
1 2 3 4 5 6 7 8

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024
CUDE ENGINEERS
TBPELS No. 10048500

C3.00

P:\AM\ASHA, LINIT 3 (WW)\01_CSD\CCSUD GENERAL NOTES.dwg 2024/03/28 12:50pm hsaxe

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.









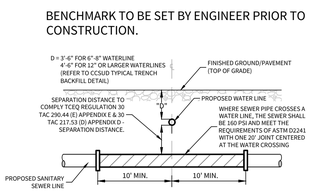

NOTES:

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 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 COMAL COUNTY.
11. FOR WATER METER BOX INSTALLATION, SEE S.D.1 - SERVICE CONNECTION DETAILS.




**BENCHMARK** **BM-1**

BENCHMARK TO BE SET BY ENGINEER PRIOR TO CONSTRUCTION.




**TYPICAL SANITARY SEWER/ WATER CROSSING DETAIL**
N.T.S.

## 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.**

## 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.**

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# FLYING W UNIT 3

UTILITY LAYOUT PLAN

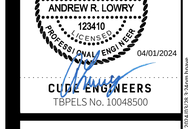
**DATE**
03/28/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

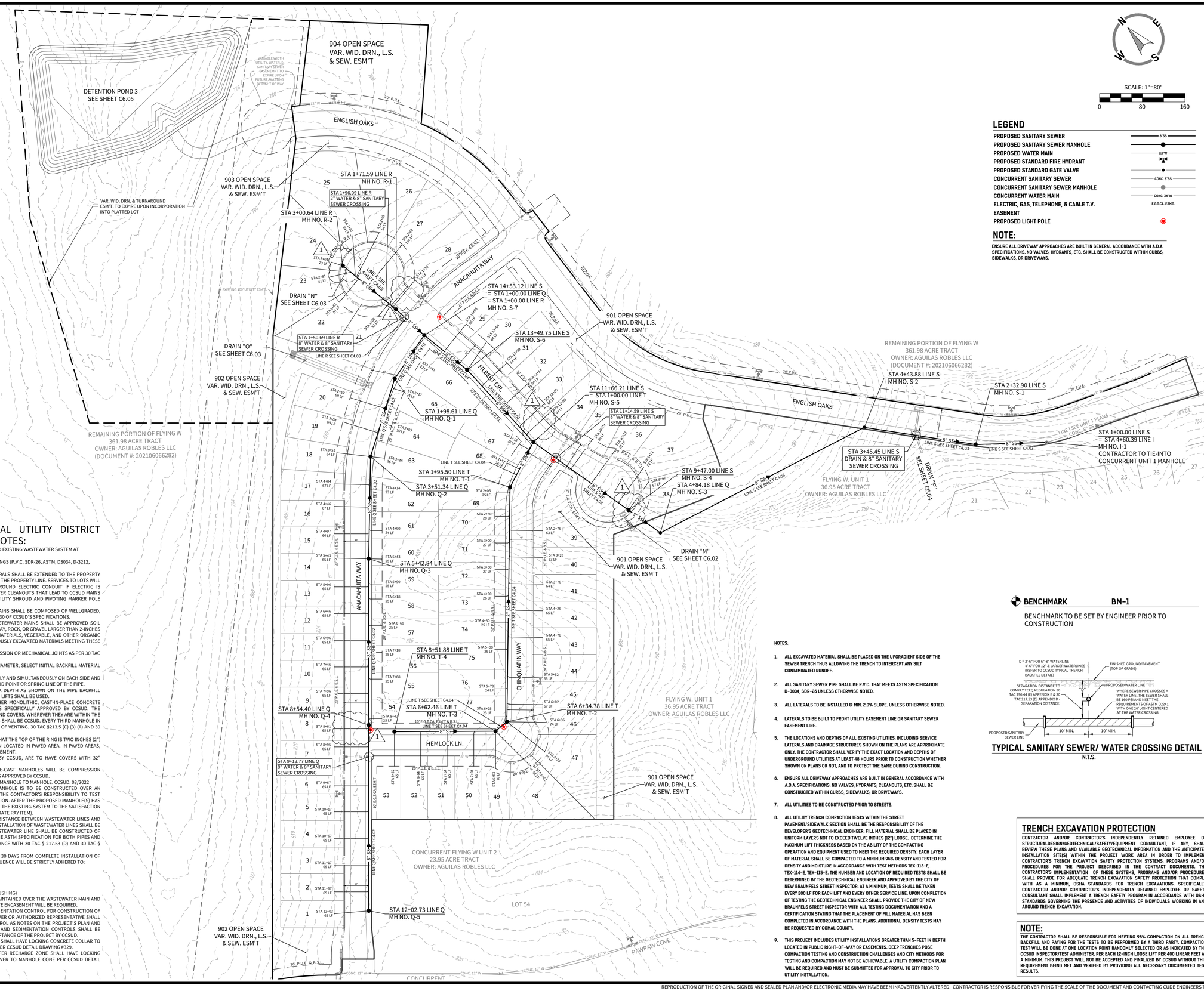
**REVISIONS**
1. 05/24/23 - REVISED STRT X-SECTIONS, REVISED STRT LAYOUT & ADDED TYP LOTS.
2. 09/25/24 - MANHOLES MOVED TO OUTSIDE OF PAVEMENT
3.
4.
5.
6.
7.
8.




CUDE ENGINEERS
TBPELS No. 10048500

**C3.01**

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SCALE: 1"=80'

0 80 160

## LEGEND

| | |
|---|---|
| PROPOSED SANITARY SEWER | P"SS |
| PROPOSED SANITARY SEWER MANHOLE | |
| PROPOSED WATER MAIN | XX"W |
| PROPOSED STANDARD FIRE HYDRANT | |
| PROPOSED STANDARD GATE VALVE | |
| CONCURRENT SANITARY SEWER | CONC. 8"SS |
| CONCURRENT SANITARY SEWER MANHOLE | |
| CONCURRENT WATER MAIN | CONC. XX"W |
| ELECTRIC, GAS, TELEPHONE, & CABLE T.V. | E.G.T.C.A. ESMT. |
| EASEMENT | |
| PROPOSED LIGHT POLE | |

## 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.

## 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).
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   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 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.

**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. 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.
6. ENSURE ALL DRIVEWAY APPROACHES ARE BUILT IN GENERAL ACCORDANCE WITH A.D.A. SPECIFICATIONS. NO VALVES, HYDRANTS, CLEANOUTS, ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.
7. ALL UTILITIES TO BE CONSTRUCTED PRIOR TO STREETS.
8. 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 COMAL COUNTY.
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.

**BENCHMARK** **BM-1**

BENCHMARK TO BE SET BY ENGINEER PRIOR TO CONSTRUCTION




**TYPICAL SANITARY SEWER/ WATER CROSSING DETAIL**

**N.T.S.**

## TRENCH EXCAVATION PROTECTION

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## 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.


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# FLYING W UNIT 3

OVERALL SANITARY SEWER PLAN

**DATE**
03/26/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

**REVISIONS**
1. 03/26/24 - MANHOLES MOVED TO OUTSIDE OF PAVEMENT, LATERALS ADJUSTED AROUND INTERSECTIONS



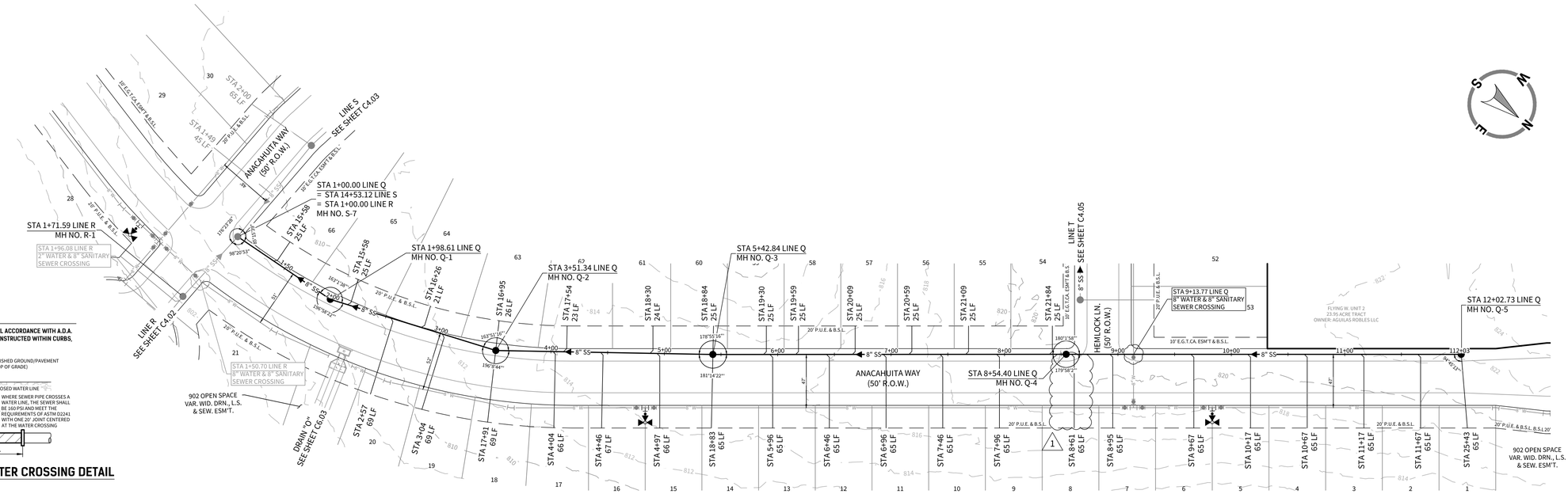

CUDE ENGINEERS
TBPELS No. 10048500

**C4.00**


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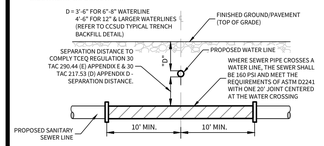


P:\04024\CIVIL_UNIT 3\04024_C4.00 OVERALL SEWER.DWG Plotted on 3/26/2024 2:56pm by Adam




## 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.**




## TYPICAL SANITARY SEWER/ WATER CROSSING DETAIL

N.T.S.

## NOTES:

1. CONTRACTOR TO MAINTAIN A MINIMUM 2' VERTICAL SEPARATION DISTANCE BETWEEN OF THE BOTTOM EXISTING WATER MAIN AND TOP OF PROPOSED SANITARY SEWER MAIN AT WATER AND SANITARY SEWER CROSSINGS.
2. ALL LATERALS SHALL BE INSTALLED AT A MINIMUM 2.0% SLOPE UNLESS OTHERWISE NOTED.

## TRENCH EXCAVATION PROTECTION

CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURALDESIGN/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.

# LINE Q

STA. 1+00.00 TO END

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

## LEGEND

| | |
|---|---|
| PROPERTY LINE | |
| PROPOSED SEWER LINE | 8"SS |
| PROPOSED MANHOLE | |
| CONCURRENT SEWER LINE | 8"SS |
| CONCURRENT MANHOLE | |
| ELECTRIC, GAS, TELEPHONE, & CABLE T.V. EASEMENT | E.G.T.C.A. ESMT. |


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CUDE ENGINEERS

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
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**FLYING W**
**UNIT 3**

SANITARY SEWER PLAN & PROFILE - LINE Q

**DATE**
03/28/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

**REVISIONS**
1. 03/26/24 - MANHOLES MOVED TO OUTSIDE OF PAVEMENT, LATERALS ADJUSTED AROUND INTERSECTIONS
2. 3. 4. 5. 6. 7. 8.

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

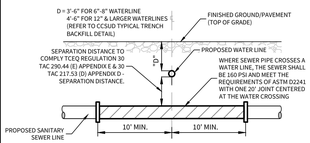
P:\04024\SHOP_UNIT 3\SHEETS\03 SANITARY SEWER PLAN & PROFILE - LINE Q.dwg 2024/03/28 3:03pm jhowe

**C4.01**


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

- PROPERTY LINE
- PROPOSED SEWER LINE — 8"SS
- PROPOSED MANHOLE
- CONCURRENT SEWER LINE — 8"SS
- CONCURRENT MANHOLE
- ELECTRIC, GAS, TELEPHONE, & CABLE T.V. EASEMENT — E.G.T.C.A. ESMT.




### TYPICAL SANITARY SEWER/ WATER CROSSING DETAIL

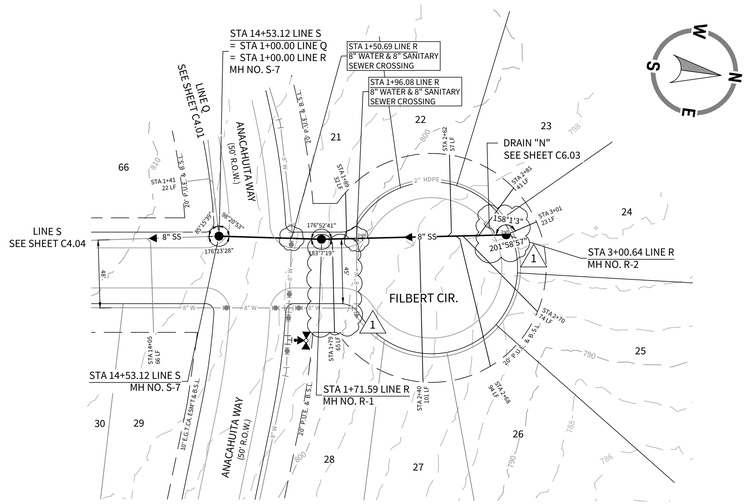
N.T.S.

## NOTES:

1. CONTRACTOR TO MAINTAIN A MINIMUM 2' VERTICAL SEPARATION DISTANCE BETWEEN OF THE BOTTOM EXISTING WATER MAIN AND TOP OF PROPOSED SANITARY SEWER MAIN AT WATER AND SANITARY SEWER CROSSINGS.
2. ALL LATERALS SHALL BE INSTALLED AT A MINIMUM 2.0% SLOPE UNLESS OTHERWISE NOTED.

### TRENCH EXCAVATION PROTECTION

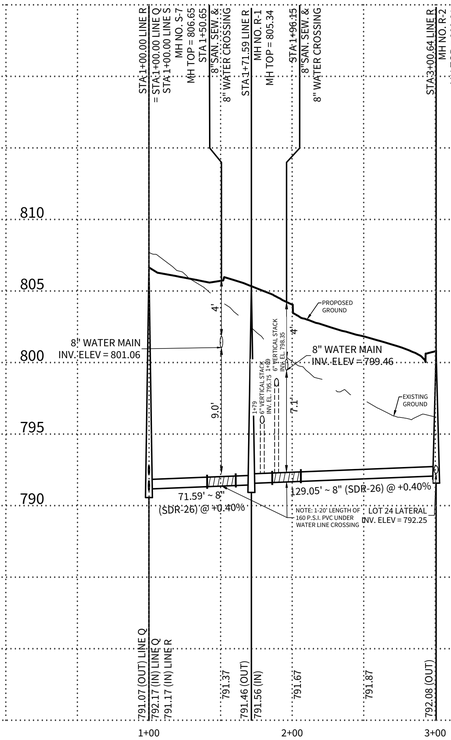
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# LINE R

STA. 1+00.00 TO END

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





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**FLYING W UNIT 3**

SANITARY SEWER PLAN & PROFILE - LINE R

**DATE**
03/28/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

**REVISIONS**
1. 03/26/24 - MANHOLES MOVED TO OUTSIDE OF PAVEMENT, LATERALS ADJUSTED AROUND INTERSECTIONS
2.
3.
4.
5.
6.
7.
8.

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

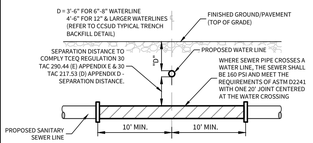
CUDE ENGINEERS
TBPELS No. 10048500

**C4.02**


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

- PROPERTY LINE
- PROPOSED SEWER LINE — 8"SS
- PROPOSED MANHOLE
- CONCURRENT SEWER LINE — 8"SS
- CONCURRENT MANHOLE
- ELECTRIC, GAS, TELEPHONE, & CABLE T.V. EASEMENT — E.G.T.C.A. ESMT.




### TYPICAL SANITARY SEWER/ WATER CROSSING DETAIL

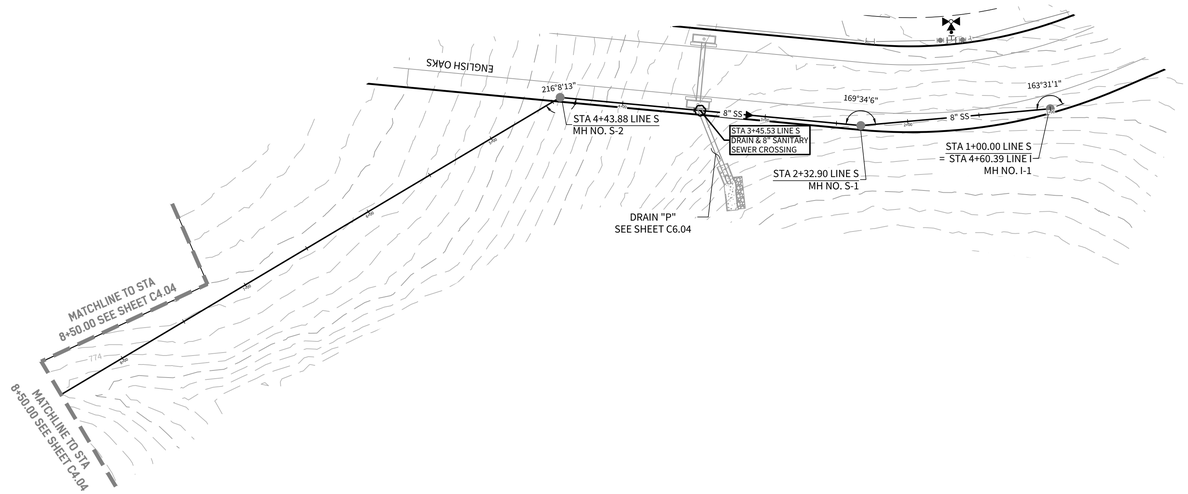
N.T.S.

### NOTES:

1. CONTRACTOR TO MAINTAIN A MINIMUM 2' VERTICAL SEPARATION DISTANCE BETWEEN OF THE BOTTOM EXISTING WATER MAIN AND TOP OF PROPOSED SANITARY SEWER MAIN AT WATER AND SANITARY SEWER CROSSINGS.
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### TRENCH EXCAVATION PROTECTION

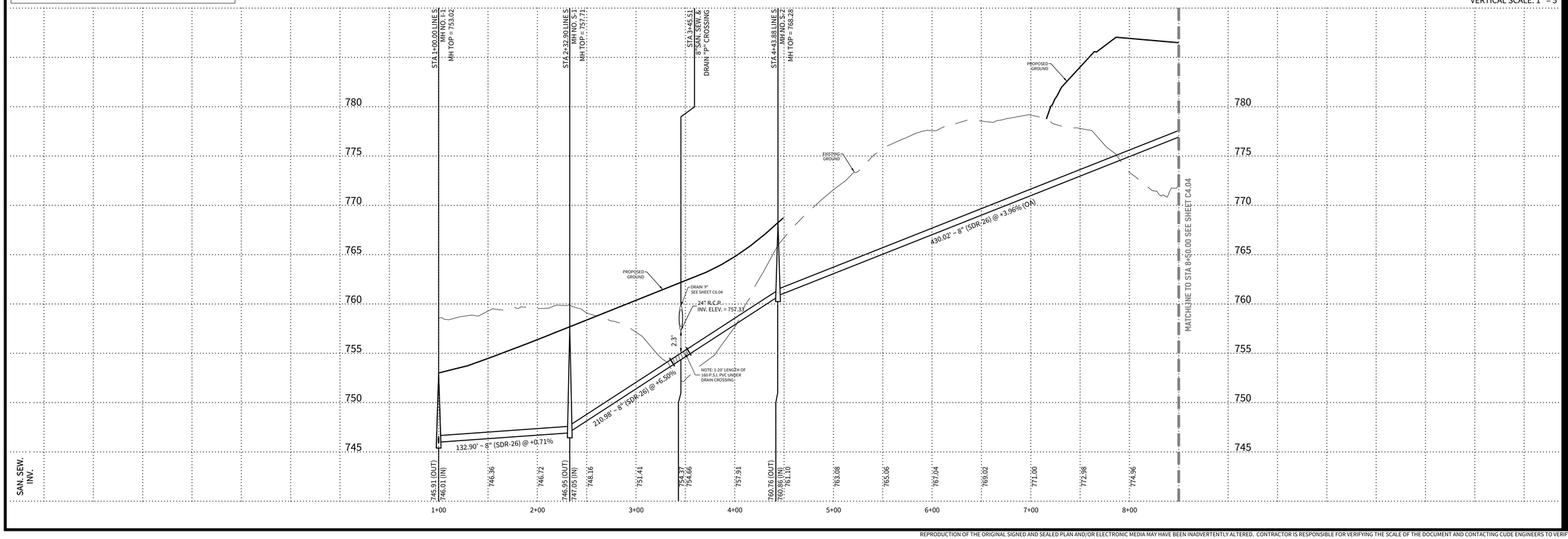
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# LINE S

STA. 1+00.00 TO END

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





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**FLYING W UNIT 3**

SANITARY SEWER PLAN & PROFILE - LINE S

**DATE**
03/26/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

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

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

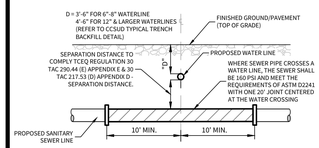
P:\04024\DWG_UNIT 3\DWG\CAD\SS\04 SANITARY SEWER PLANS & PROFILE - LINE R & LINE S.dwg 2024.03.28 3:53pm mark

**C4.03**


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## LEGEND

- PROPERTY LINE
- PROPOSED SEWER LINE — 8"SS
- PROPOSED MANHOLE
- CONCURRENT SEWER LINE — 8"SS
- CONCURRENT MANHOLE
- ELECTRIC, GAS, TELEPHONE, & CABLE T.V. EASEMENT — E.G.T.C.A. ESMT.




### TYPICAL SANITARY SEWER/ WATER CROSSING DETAIL

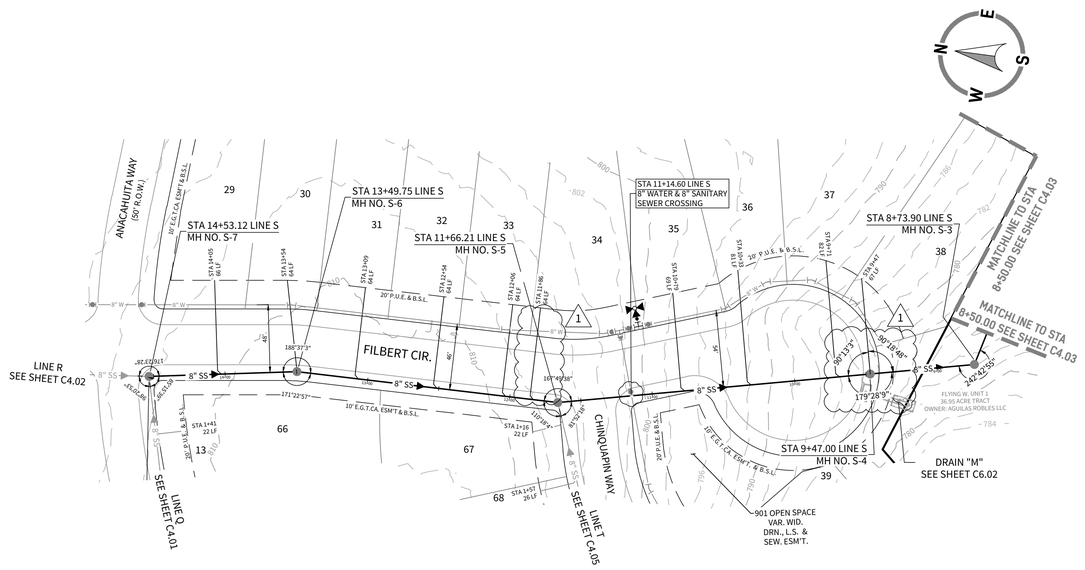
N.T.S.

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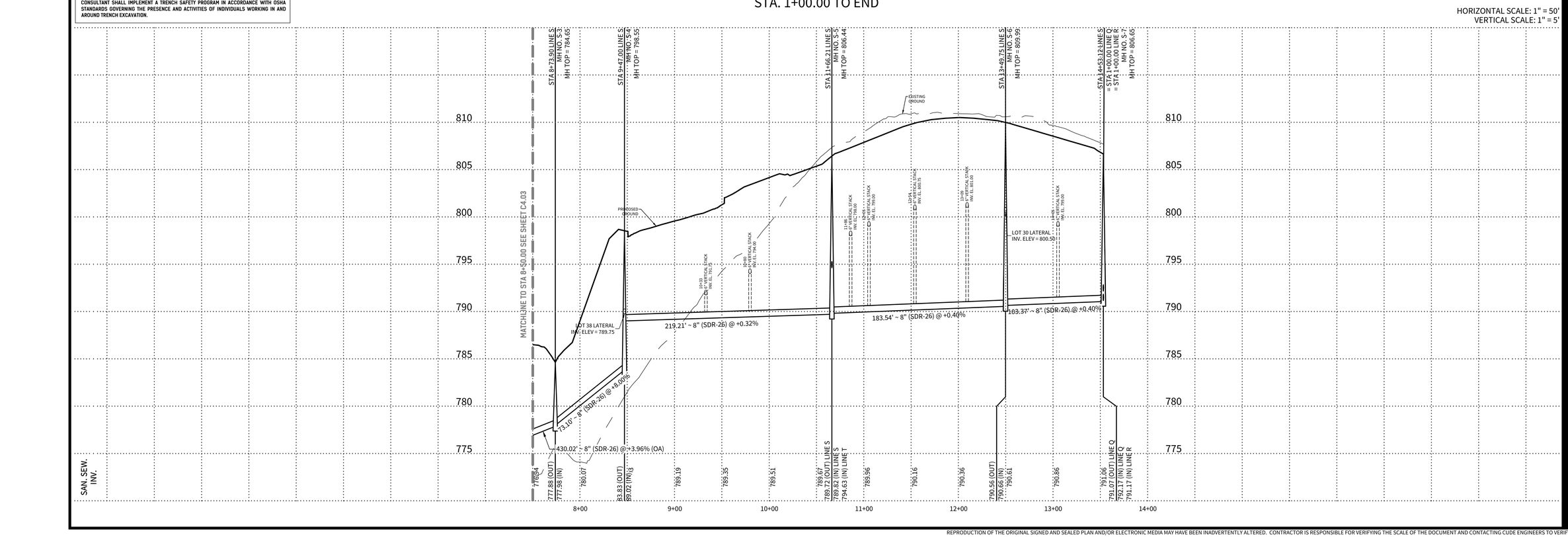
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# LINE S

STA. 1+00.00 TO END

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





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**FLYING W UNIT 3**

SANITARY SEWER PLAN & PROFILE - LINE S

**DATE**
03/29/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

**REVISIONS**
1. 03/26/24 - MANHOLES MOVED TO OUTSIDE OF PAVEMENT, LATERALS ADJUSTED AROUND INTERSECTIONS
2.
3.
4.
5.
6.
7.
8.

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

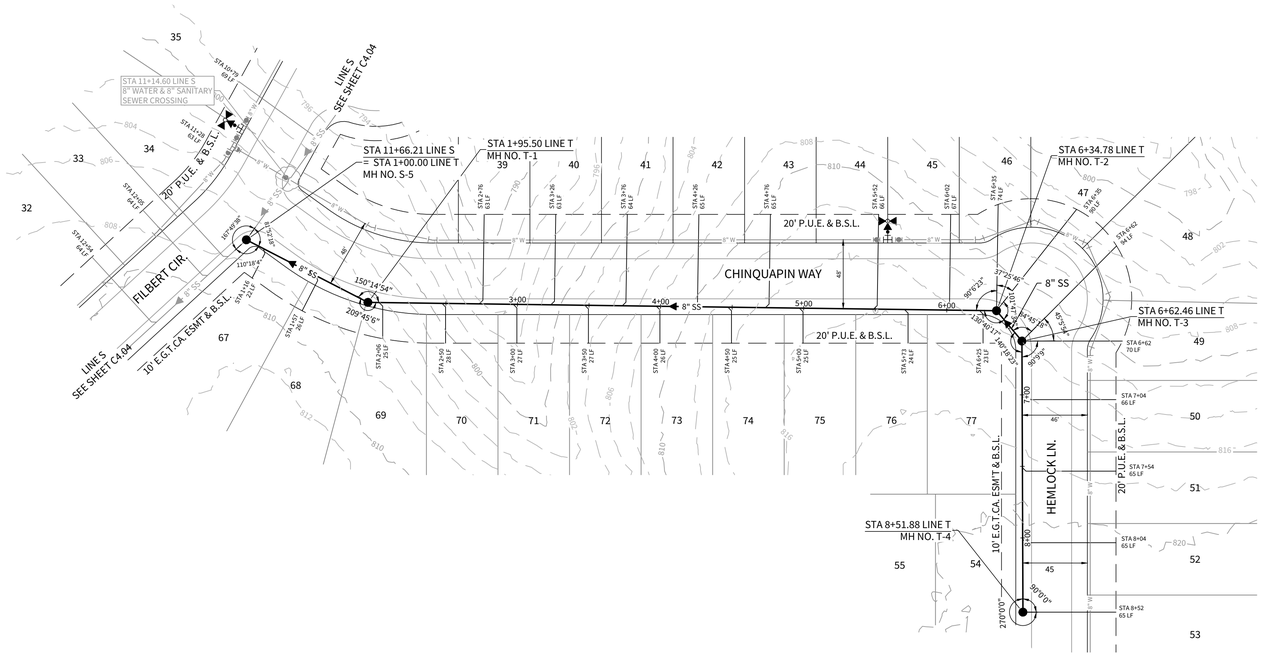
CUDE ENGINEERS
TBPELS No. 10048500

**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.

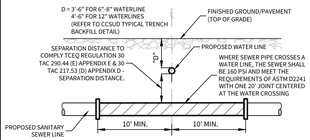
## LEGEND

- PROPERTY LINE
- PROPOSED SEWER LINE — 8"SS
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- CONCURRENT SEWER LINE — 8"SS
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- ELECTRIC, GAS, TELEPHONE, & CABLE T.V. EASEMENT — E.G.T.C.A. ESMT.




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## TYPICAL SANITARY SEWER/ WATER CROSSING DETAIL

N.T.S.

## NOTES:

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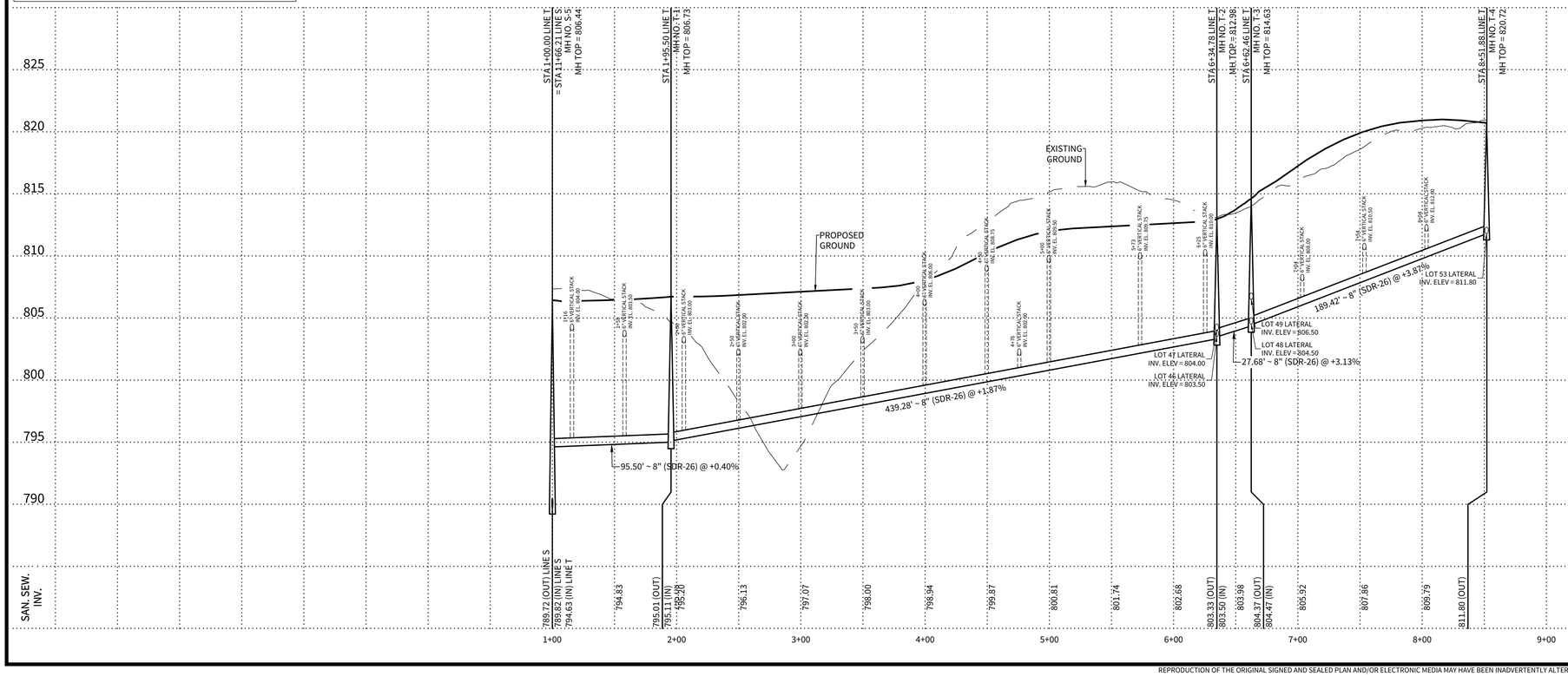
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# LINE T

STA. 1+00.00 TO END

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





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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 3**

SANITARY SEWER PLAN & PROFILE - LINE T

**DATE**
03/26/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

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

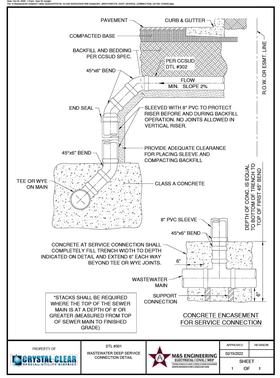
STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

**C4.05**

P:\2024\04024_UNIT 3\ENGR\CAD\SANITARY SEWER PLAN & PROFILE - LINE T.dwg 2024/03/26 1:09pm jhuvar


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.

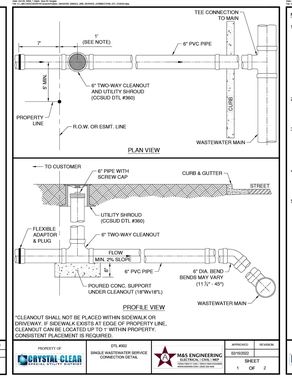



PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT

DTL #301 WASTEWATER DEEP SERVICE CONNECTION DETAIL

M&S ENGINEERING ELECTRICAL CONS., INC.

APPROVED 02/15/2022 — SHEET 1 OF 1

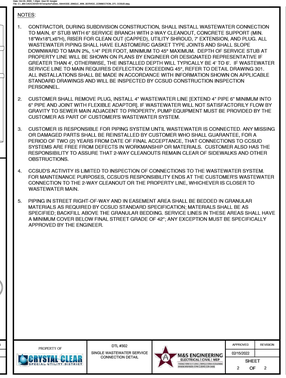



PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT

DTL #302 SINGLE WASTEWATER SERVICE CONNECTION DETAIL

M&S ENGINEERING ELECTRICAL CONS., INC.

APPROVED 02/15/2022 — SHEET 2 OF 2



NOTES:

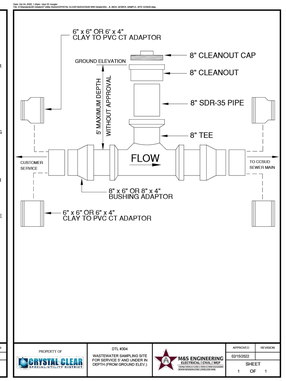
1. CONTRACTOR, DURING SUBDIVISION CONSTRUCTION, SHALL INSTALL WASTEWATER CONNECTION TO MAIN, 6" STUB WITH 6" SERVICE BRANCH WITH 2-WAY CLEANOUT, CONCRETE SUPPORT, SWR-16*W-PS (4"x4"x16"), RISER FOR CLEAN OUT CAPPED), UTILITY SHROUD, 7' EXTENSION, AND PLUG. ALL WASTEWATER PIPING SHALL HAVE ELASTOMERIC 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 BASED ON THE DEPTH OF THE MAIN AT THE POINT OF CONNECTION. DEPTH OF SERVICE LINE TO MAIN REQUIRED 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) WITH 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 SYSTEM ARE FREE OF TILE 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 CRYSTAL CLEAR SPECIAL UTILITY DISTRICT

DTL #302 SINGLE WASTEWATER SERVICE CONNECTION DETAIL

M&S ENGINEERING ELECTRICAL CONS., INC.

APPROVED 02/15/2022 — SHEET 1 OF 1

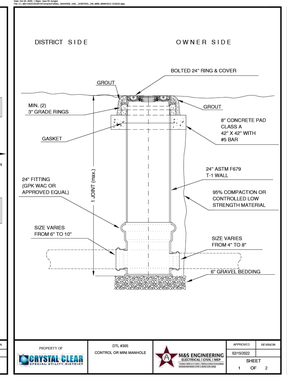



PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT

DTL #304 WASTEWATER SAMPLING SITE (SHALLOW MANHOLE WITH DEPTH FROM GROUND 6-20')

M&S ENGINEERING ELECTRICAL CONS., INC.

APPROVED 02/15/2022 — SHEET 1 OF 1

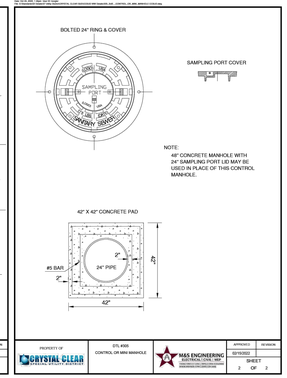



PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT

DTL #305 CONTROL OR MINI MANHOLE

M&S ENGINEERING ELECTRICAL CONS., INC.

APPROVED 02/15/2022 — SHEET 1 OF 2

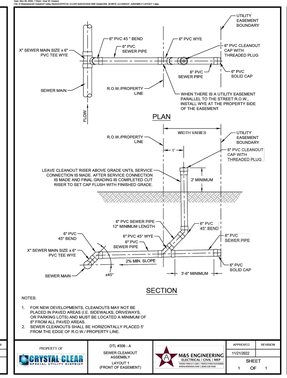



PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT

DTL #305 CONTROL OR MINI MANHOLE

M&S ENGINEERING ELECTRICAL CONS., INC.

APPROVED 02/15/2022 — SHEET 2 OF 2

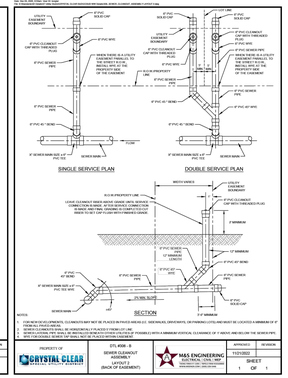



PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT

DTL #306 - A SEWER CLEANOUT ASSEMBLY LAYOUT 1 (BACK OF EASEMENT)

M&S ENGINEERING ELECTRICAL CONS., INC.

APPROVED 11/21/2022 — SHEET 1 OF 1




PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT

DTL #306 - B SEWER CLEANOUT ASSEMBLY LAYOUT 2

M&S ENGINEERING ELECTRICAL CONS., INC.

APPROVED 11/21/2022 — SHEET 1 OF 1




PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT

DTL #307 SECURITY POST FOR SEWER MONITORING EQUIPMENT

M&S ENGINEERING ELECTRICAL CONS., INC.

APPROVED 02/15/2022 — SHEET 1 OF 1




PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT

DTL #310 CONCRETE ENCASEMENT

M&S ENGINEERING ELECTRICAL CONS., INC.

APPROVED 02/15/2022 — SHEET 1 OF 1




PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT

DTL #309 MANHOLE INVERT PLAN

M&S ENGINEERING ELECTRICAL CONS., INC.

APPROVED 02/15/2022 — SHEET 1 OF 2

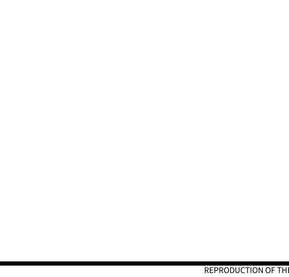



PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT

DTL #320 STANDARD MANHOLE FLOOR PLAN

M&S ENGINEERING ELECTRICAL CONS., INC.

APPROVED 02/15/2022 — SHEET 2 OF 2




PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT

DTL #322 NEW MANHOLE CONSTRUCTION AROUND MANHOLE ADJUSTMENT

M&S ENGINEERING ELECTRICAL CONS., INC.

APPROVED 02/15/2022 — SHEET 1 OF 1




PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT

DTL #324 WASTEWATER MANHOLE OR DROP INLET ON CAST IN PLACE BASE

M&S ENGINEERING ELECTRICAL CONS., INC.

APPROVED 02/15/2022 — SHEET 1 OF 1




PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT

DTL #325 WASTEWATER MANHOLE ON PRECAST BASE

M&S ENGINEERING ELECTRICAL CONS., INC.

APPROVED 02/15/2022 — SHEET 1 OF 1

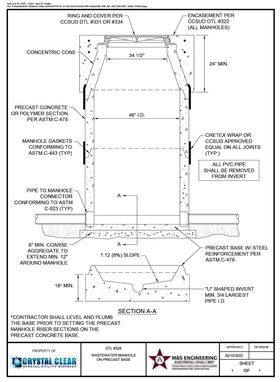



PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT

DTL #325 WASTEWATER MANHOLE ON PRECAST BASE

M&S ENGINEERING ELECTRICAL CONS., INC.

APPROVED 02/15/2022 — SHEET 1 OF 1

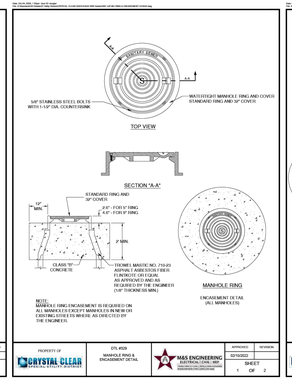


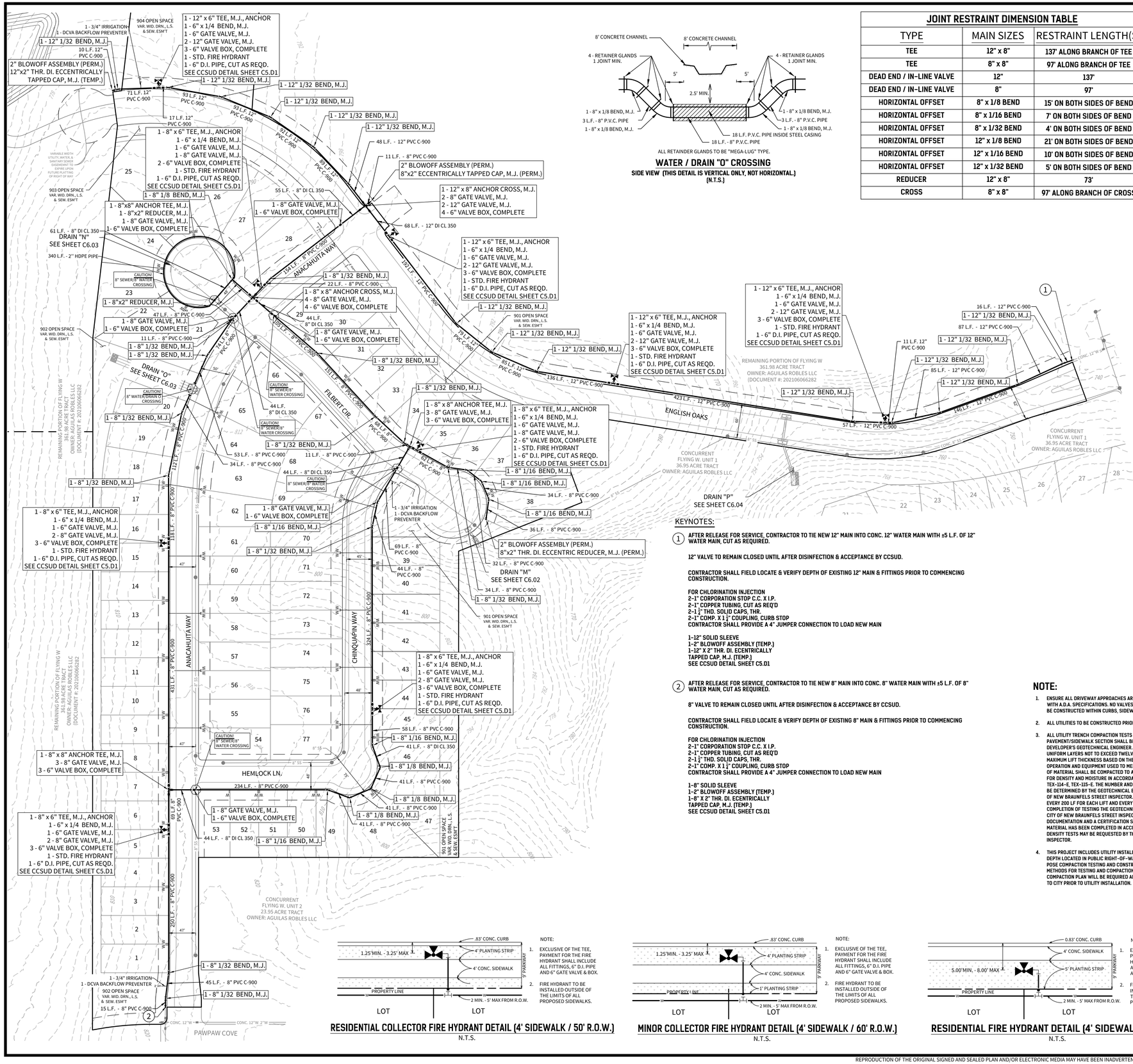

PROPERTY OF CRYSTAL CLEAR SPECIAL UTILITY DISTRICT

DTL #326 SHALLOW MANHOLE ON PRECAST BASE

M&S ENGINEERING ELECTRICAL CONS., INC.

APPROVED 02/15/2022 — 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.
MANHOLE GASKETS CONFORMING TO ASTM C-443 (TYP)
48" I.D.
PRECAST CONCRETE OR POLYMER SECTION PER ASTM C-478
BRING CONCRETE 6" ABOVE PIPE
WYE MUST BE USED, TEE IS NOT ACCEPTABLE
CRETEX WRAP OR CCSUD APPROVED EQUAL ON ALL JOINTS (TYP.)
PRECAST BASE W/ STEEL REINFORCEMENT PER ASTM C-478
4" MIN. (TYP)
3" MIN. 8" MAX
12" MIN.
1:12 (8%) SLOPE
8" MIN. COARSE AGGREGATE TO EXTEND MIN. 12" AROUND MANHOLE
CLASS A CONCRETE
"U" SHAPED INVERT MIN. 3/4 LARGEST PIPE I.D.
4" MIN.
FILL ANNULAR SPACE W/ NON-SHRINK GROUT
GROUTED INVERT W/ OFFSET TO PROVIDE FLOWLINE OF PIPE
PIPE TO MANHOLE CONNECTOR CONFORMING TO ASTM C-923 (TYP)
4" MIN.
PIPE TO MANHOLE CONNECTOR CONFORMING TO ASTM C-923 (TYP)







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

## WATER / DRAIN "O" CROSSING

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

## JOINT RESTRAINT DIMENSION TABLE

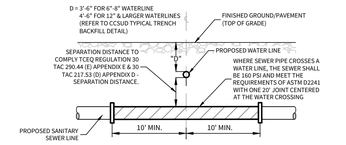
| TYPE | MAIN SIZES | RESTRAINT LENGTH(S) |
|---|---|---|
| TEE | 12" x 8" | 137' ALONG BRANCH OF TEE |
| TEE | 8" x 8" | 97' ALONG BRANCH OF TEE |
| DEAD END / IN-LINE VALVE | 12" | 137' |
| DEAD END / IN-LINE VALVE | 8" | 97' |
| HORIZONTAL OFFSET | 8" x 1/8 BEND | 15' ON BOTH SIDES OF BEND |
| HORIZONTAL OFFSET | 8" x 1/16 BEND | 7' ON BOTH SIDES OF BEND |
| HORIZONTAL OFFSET | 8" x 1/32 BEND | 4' ON BOTH SIDES OF BEND |
| HORIZONTAL OFFSET | 12" x 1/8 BEND | 21' ON BOTH SIDES OF BEND |
| HORIZONTAL OFFSET | 12" x 1/16 BEND | 10' ON BOTH SIDES OF BEND |
| HORIZONTAL OFFSET | 12" x 1/32 BEND | 5' ON BOTH SIDES OF BEND |
| REDUCER | 12" x 8" | 73' |
| CROSS | 8" x 8" | 97' ALONG BRANCH OF CROSS |

SCALE: 1"=80'

80 10 0 80

## LEGEND

- PROPOSED 3/4" SINGLE WATER SERVICE — 3/4"
- PROPOSED 3/4" DUAL WATER SERVICE — 3/4" 3/4"
- PROPOSED 3/4" IRRIGATION WITH 5/8" METER — 1" IRR
- PROPOSED SANITARY SEWER — 8"SS
- PROPOSED SANITARY SEWER MANHOLE
- EXISTING WATER MAIN — XX"W
- PROPOSED WATER MAIN — XXX L.F. - XX" PVC C-900
- PROPOSED STANDARD FIRE HYDRANT
- PROPOSED STANDARD GATE VALVE
- ELECTRIC, GAS, TELEPHONE, & CABLE T.V. EASEMENT — E.G.T.C.A. ESM'T.




## TYPICAL SANITARY SEWER/ WATER CROSSING DETAIL

**N.T.S.**

## SHEET NOTES:

1. ALL 8" & 12" PVC SHALL BE C-900 CLASS 235 DR 18.
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.
   C. LIQUID CHLORINE, SODIUM HYPOCHLORITE OR CALCIUM HYPOCHLORITE SHALL BE USED IN ACCORDANCE WITH AWWA C652 AND AWWA 653.
   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 4 FEET ON ALL 8" AND 12" MAINS

## KEYNOTES:

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

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

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

**FOR CHLORINATION INJECTION**
**2-1" CORPORATION STOP C.C. X I.P.**
**2-1" COPPER TUBING, CUT AS REQ'D**
**2-1½" THD. SOLID CAPS, THR.**
**2-1" COMP. X 1½" 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**

(2) **AFTER RELEASE FOR SERVICE, CONTRACTOR TO TIE NEW 8" MAIN INTO CONC. 8" WATER MAIN WITH ±5 L.F. OF 8" WATER MAIN, CUT AS REQUIRED.**

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

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

**FOR CHLORINATION INJECTION**
**2-1" CORPORATION STOP C.C. X I.P.**
**2-1" COPPER TUBING, CUT AS REQ'D**
**2-1½" THD. SOLID CAPS, THR.**
**2-1" COMP. X 1½" COUPLING, CURB STOP**
**CONTRACTOR SHALL PROVIDE A 4" JUMPER CONNECTION TO LOAD NEW MAIN**

**1-8" SOLID SLEEVE**
**1-2" BLOWOFF ASSEMBLY (TEMP.)**
**1-8" X 2" THR. DI. ECENTRICALLY TAPPED CAP, M.J. (TEMP.)**
**SEE CCSUD DETAIL SHEET C5.D1**

## NOTE:

1. ENSURE ALL DRIVEWAY APPROACHES ARE BUILT IN GENERAL ACCORDANCE WITH A.D.A. SPECIFICATIONS. NO VALVES, HYDRANTS, CLEANOUTS, ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.
2. ALL UTILITIES TO BE CONSTRUCTED PRIOR TO STREETS.
3. 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.
4. 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.

## CCSUD NOTE:

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 CASS 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.

## CAUTION!

**THE CONTRACTOR SHALL BE AWARE THAT UNDERGROUND UTILITY LINES EXIST ALONG STREET X. 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.**




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 / 50' R.O.W.)

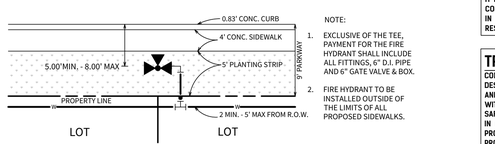
N.T.S.




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 (4' SIDEWALK / 60' R.O.W.)

N.T.S.




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.


CUDEENGINEERS.COM

CUDE ENGINEERS

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


**FLYING W UNIT 3**

WATER DISTRIBUTION PLAN

**DATE**
03/26/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

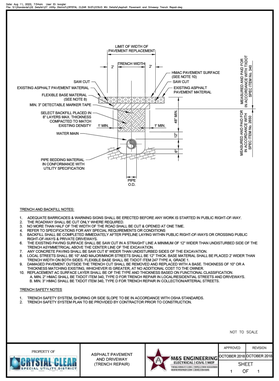
REVISIONS
1. 2. 3. 4. 5. 6. 7. 8.

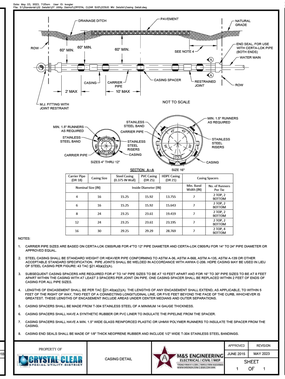
STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

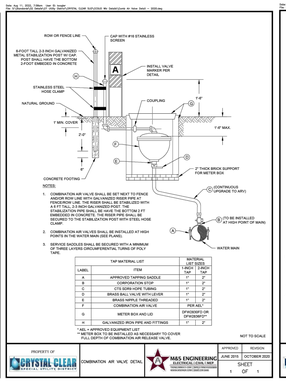
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TBPELS No. 10048500

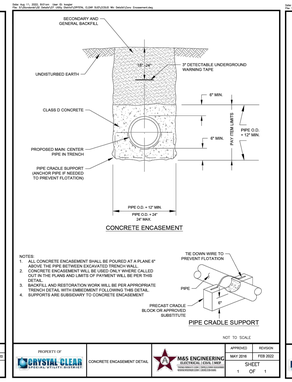
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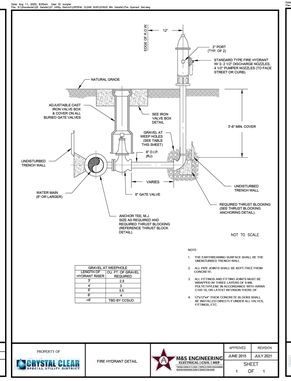

REPRODUCTION OF THE ORIGINAL SIGNED AND SEALED PLAN AND/OR ELECTRONIC MEDIA MAY HAVE BEEN INADVERTENTLY ALTERED. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE SCALE OF THE DOCUMENT AND CONTACTING CUDE ENGINEERS TO VERIFY DISCREPANCIES PRIOR TO CONSTRUCTION.

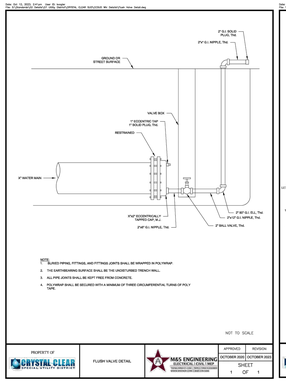

LIMIT OF WIDTH OF PAVEMENT REPLACEMENT
TRENCH WIDTH
SAW CUT
EXISTING ASPHALT PAVEMENT MATERIAL
FLEXIBLE BASE MATERIAL AS NOTED
MIN. 3" DETECTABLE MARKER TAPE
SELECT BACKFILL PLACED IN 6" LAYERS MAX. THICKNESS COMPACTED TO MATCH EXISTING DENSITY
WATER MAIN
MAX. PAVEMENT SURFACE (SEE NOTE 3)
SAW CUT
EXISTING ASPHALT PAVEMENT MATERIAL
MIN. 12"
MAX. 48"
MIN. 6"
PIPE BEDDING MATERIAL AS SPECIFIED IN UTILITY SPECIFICATION
O.D.
MIN. 6" MIN. 12" FOR PVC PIPE
TRENCH WIDTH AT TOP OF PIPE SHALL BE THE MINIMUM WIDTH NECESSARY FOR PROPER PLACEMENT AND COMPACTION OF BEDDING MATERIAL
NOT TO SCALE

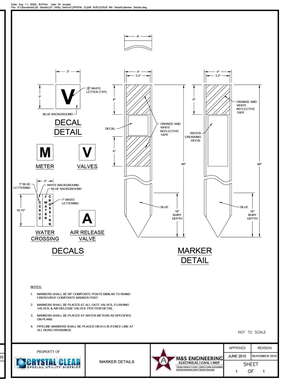

DRAINAGE DITCH
PAVEMENT
NATURAL GRADE
ROW
60' MIN.
60' MIN.
SEE NOTE 4
END SEAL FOR USE WITH CASING SPACER (WITH GAS)
WATER MAIN
CASING
CARRIER PIPE
CASING SPACER
RESTRAINED JOINT
ROW
2" MAX
10" MAX
ALL FITTING WITH JOINT RESTRAINT
NOT TO SCALE
MIN. 1/2" RUNNERS AS REQUIRED
STAINLESS STEEL BAND
STAINLESS STEEL WIDTH
CARRIER PIPE
STAINLESS STEEL RISERS
CASING
SIZES 8" THRU 12"
SIZE 16"
SECTION A-A
Carrier Pipe (CP) Size
Casing Size (I.D.+/-6.0mm)
Shell (I.D.+/-6.0mm)
Casing Spacers
Nominal Size (IN)
Inside Diameter (IN)
Min. Band Width (IN)
No. of Runners Required
8
16
15.25
15.62
13.750
2
2 FOR 3 BOTTOM
10
18
17.25
17.62
15.850
2
2 FOR 3 BOTTOM
12
24
23.25
23.62
19.433
2
2 FOR 3 BOTTOM
16
30
29.25
29.25
26.500
2
2 FOR 3 BOTTOM
NOTES:
1. CARRIER PIPE SIZES ARE BASED ON CENTA-CAB DIMSPUR FOR 4"TO 12" PIPE DIAMETER AND CENTA-CAB CRISPAL FOR 14" TO 24" PIPE DIAMETER OR APPROVED EQUAL.
2. STEEL CASING SHALL BE STANDARD WEIGHT OR HEAVIER PIPE CONFORMING TO ASTM A-36, ASTM A-409, ASTM A-135, ASTM A-139 OR OTHER ACCEPTABLE STANDARD SPECIFICATION. PIPE JOINTS SHALL BE WELDED IN ACCORDANCE WITH AWWA C206. PIPE CASING MAY BE USED IN LIEU OF STEEL CASING.
3. SUBSEQUENT CASING SPACERS ARE REQUIRED FOR 4" TO 14" PIPE SIZES TO BE AT 10 FEET APART AND FOR 16" TO 20" PIPE SIZES TO BE AT 8 FEET APART WITHIN THE CASING WITH AT LEAST 1 SPACER PER JOINT OF PIPE. SEE DETAIL SHEET FOR LENGTH OF CASING FOR ALL PIPE SIZES.
4. LENGTHS OF ENCASEMENT SHALL BE PER THE DOT-ROADSIDE. THE LENGTHS OF ANY ENCASEMENT SHALL EXTEND, AS APPLICABLE, TO WITHIN 5 FEET OF THE EDGE OF PAVEMENT, TO WITHIN 5 FEET OF THE TOP OF THE BACK SLOPE OF THE DITCH, OR TO WITHIN 5 FEET OF THE TOP OF THE CURB, WHICHEVER IS GREATER. THESE LENGTHS OF ENCASEMENT INCLUDE AREAS UNDER CENTER medians AND OUTER SHOULDERS.
5. CASING SPACERS SHALL BE MADE FROM T-304 STAINLESS STEEL OF A MINIMUM 14 GAUGE THICKNESS.
6. CASING SPACERS SHALL HAVE A SYNTHETIC RUBBER OR PVC LINER TO INSULATE THE PIPELINE FROM THE SHIVER.
7. CASING SPACERS SHALL HAVE A MIN. 1.5" WIDE GLASS REINFORCED PLASTIC OR LONG PVC RUNNER TO INSULATE THE SPACER FROM THE CASING.
8. CASING END SEALS SHALL BE MADE OF 1/4" THICK NEOPRENE RUBBER AND INCLUDE 1/2" WIDE T-304 STAINLESS STEEL BANDING.
NOT TO SCALE


ROW OR FENCE LINE
CAP WITH #10 STAINLESS SCREW
8-FOOT TALL 2.5 INCH GALVANIZED METAL STABILIZATION POST W/ CAP. POST SHALL HAVE THE BOTTOM 2-FOOT EMBEDDED IN CONCRETE
A
INSTALL VALVE MARKER PER DETAIL
STAINLESS STEEL HOSE CLAMP
COUPLING
NATURAL GROUND
1'-6" MIN. COVER
2'-0"
1'-6" MAX
2" THICK BRICK SUPPORT FOR METER BOX
CONCRETE FOOTING
CONTINUOUS (UPGRADE TO 4FU)
TO BE INSTALLED AT HIGH POINT OF MAIN.
WATER MAIN
NOTES:
1. COMBINATION AIR VALVE SHALL BE SET NEXT TO FENCE LINE/OR ROW LINE WITH GALVANIZED RISER PIPE AT FENCE/ROW LINE. THE RISER SHALL BE STABILIZED WITH 8-FOOT TALL 2.5 INCH GALVANIZED METAL STABILIZATION PIPE SHALL BE MARK THE BOTTOM 2 FT EMBEDDED IN CONCRETE. THE RISER PIPE SHALL BE ATTACHED TO THE STABILIZATION POST WITH STEEL HOSE CLAMP.
2. COMBINATION AIR VALVES SHALL BE INSTALLED AT HIGH POINTS IN THE WATER MAIN (SEE PLANS).
3. SERVICE SADDLES SHALL BE SECURED WITH A MINIMUM OF TWO STAINLESS STEEL CIRCUMFERENTIAL TURNS OF POLY TAPE.
T.M. Rouse
TAP MATERIAL LIST
LABEL
ITEM
MATERIAL LIST (SEE NOTE 3)
A
APPROVED TAPPING SADDLE
B
CORPORATION STOP
C
CTS SDR9 HDPE TUBING
D
BRASS BALL VALVE WITH LEVER
E
BRASS NIPPLE THREADED
F
COMBINATION AIR VALVE
G
METER BOX AND LID
H
GALVANIZED IRON PIPE AND PIPE FITTINGS
* ALL 4" APPROVED EQUIPMENT LIST
** 4" TAP SIZE MAY BE USED IF NECESSARY TO COVER FULL WIDTH OF COMBINATION AIR RELEASE VALVE.
NOT TO SCALE


SECONDARY AND GENERAL BACKFILL
UNDISTURBED EARTH
3" DETECTABLE UNDERGROUND WARNING TAPE
CLASS D CONCRETE
PROPOSED MAIN CENTER PIPE IN TRENCH
PIPE CRADLE SUPPORT (ANCHOR PIPE IF NEEDED TO PREVENT FLOTATION)
PIPE O.D. + 12" MIN.
PIPE O.D. + 24" OR MAX.
CONCRETE ENCASEMENT
NOTES:
1. ALL CONCRETE ENCASEMENT SHALL BE POURED AT A PLANE 6" ABOVE THE TOP OF THE EXCAVATED TRENCH WALL.
2. CONCRETE ENCASEMENT WILL BE USED ONLY WHERE CALLED FOR ON THE PLANS AND LIMITS OF PAYMENT WILL BE PER THIS DETAIL.
3. BACKFILL AND RESTORATION WORK WILL BE PER APPROPRIATE ITEMS AS SHOWN ELSEWHERE IN THE PLANS AND SPECS.
4. SUPPORTS ARE SUBSIDIARY TO CONCRETE ENCASEMENT.
TIE DOWN WIRE TO PREVENT FLOTATION
PIPE
PRECAST CRADLE - BLOCK OR APPROVED SUBSTITUTE
PIPE CRADLE SUPPORT
NOT TO SCALE


EXISTING 6" - 12"
3" POINT (TYP. OF 3)
STANDARD TYPE FIRE HYDRANT WITH 5" STORZ CONNECTION & 4-2½" PUMPER NOZZLES (TO FACE STREET OR CURB)
P.I.V.S. APPLE TIN
ADJUSTABLE CAST IRON VALVE BOX WITH LOCKING LID FOR BURIED GATE VALVES
NATURAL GRADE
SEE IRON VALVE BOX DETAIL
GRAVEL AT HEIGHTS AS SHOWN (SEE TABLE THIS SHEET)
PVC C900 DR18 (PC 150)
6" GATE VALVE
VARIES
6" MIN.
PVC C900 DR18 (PC 150)
2'-6" MIN. COVER
UNDISTURBED TRENCH WALL
WATER MAIN (8" OR LARGER)
ANCHOR TEE W./ MECHANICAL JOINT RESTRAINED THRUST BLOCKING (REFERENCE THRUST BLOCK DETAIL)
REQUIRED THRUST BLOCKING (SEE THRUST BLOCKING ANCHORING DETAIL)
GRAVEL AT HEIGHTS
"L" DIMENSION
"H" DIMENSION
<12"
12"
>12"
NOT TO SCALE
NOTE:
1. THE 5-WAY FIRE HYDRANT SHALL BE THE CLOW MEDALLION.
2. ALL PIPE JOINTS SHALL BE MJ PIPE FROM THE MAIN TO THE HYDRANT.
3. ALL FITTINGS AND PIPE USED SHALL BE RESTRICTED OR TIMED LOCKED BY SIME.
4. ALL PIPE SHALL BE CLASS 350 DUCTILE IRON PIPE (PC 150).
5. THE 5-WAY FIRE HYDRANT SHALL BE EQUIPPED WITH A 5" STORZ CONNECTION WITH A 4" PUMPER NOZZLE (TO FACE STREET OR CURB).


GROUND OR STREET SURFACE
VALVE BOX
6" ASSENTRIC VAP 'O' RUB PLUG TYP.
RESTRAINED
P.I.V.S. APPLE TIN
PVC C900 DR18 (PC 150)
2'-6" MIN. COVER
2'-6" ALL THE
2'-6" P.I.V.S. APPLE TIN
2" BALL VALVE TIN
6" METER MAIN
NOTE
BURIED PIPING, FITTINGS, AND FITTINGS JOINTS SHALL BE WRAPPED IN POLYWRAP.
1. THE EARTHENWORKS SURFACE SHALL BE THE UNDISTURBED TRENCH WALL.
2. ALL PIPE JOINTS SHALL BE KEPT FREE FROM DIRT AND MOISTURE.
3. ALL FITTINGS AND PIPE USED SHALL BE RESTRICTED OR TIMED LOCKED BY SIME.
4. POLYWRAP SHALL BE UTILIZED WITH A MINIMUM OF THREE CIRCUMFERENTIAL TURNS OF POLY TAPE.
NOT TO SCALE


DECAL DETAIL
V
BLUE BACKGROUND
M
METER
V
VALVES
WATER CROSSING
A
AIR RELEASE VALVE
DECALS
MARKER DETAIL
NOTES:
1. MARKERS SHALL BE OF 3 MATERIALS: POSTS SHALL BE TO BEING FACTORY COMPOSITE MANUFACTURED.
2. MARKERS SHALL BE PLACED AT ALL GATE VALVES, FLUSHING VALVES, & AIR RELEASE VALVES, PER DETECTION.
3. MARKERS SHALL BE PLACED AT WATER METERS AS SPECIFIED ON PLANS.
4. PIPELINE MARKERS SHALL BE PLACED ONE BLUE MARKER AT ALL BLOWOFF ASSEMBLIES.
NOT TO SCALE


CROSS-SECTION
2' MIN.
WOVEN WIRE SHEATHING
10' MIN.
ISOMETRIC
WOVEN WIRE SHEATHING
GENERAL NOTES
1. ONLY ONE TYPE OF DOUBLE HOOK A-TWO DIAMETER FOR EITHER PIPE OR CONDITIONS. USE OPPOSITE DOUBLE HOOK TO MEET DIAMETER FOR OTHER CONDITIONS.
2. THIS DOUBLE HOOK SHALL BE SECURED WITH A WOVEN WIRE SHEATHING HAVING MINIMUM 2 INCH OPENING AND MINIMUM WIRE DIAMETER OF 0.148 INCH.
3. THE DOUBLE HOOK SHALL BE INSPECTED WEEKLY OR AFTER EACH RAIN, AND THE STORM DRAIN INLET WHERE DOUBLE HOOK AND WOVEN WIRE SHEATHING ARE INSTALLED. ANY DEBRIS LAYING ON THE DOUBLE HOOK SHALL BE REMOVED. IF THE DOUBLE HOOK IS NOT ACCESSIBLE DUE TO A RECOGNIZABLE HAZARD, THE INSPECTION SHALL BE CONDUCTED FROM THE CHANNEL LEVEL.
4. IF THE DOUBLE HOOK IS FOUND TO BE DAMAGED OR DISPLACED, THE WORK SHALL BE DONE TO RESTORE THE DOUBLE HOOK TO ITS ORIGINAL CONDITION. IF THE DOUBLE HOOK IS NOT ACCESSIBLE DUE TO A RECOGNIZABLE HAZARD, THE REPAIR SHALL BE SCHEDULED AS SOON AS POSSIBLE.
5. IF A INSPECTION SHALL BE MADE ON OR NEAR SEPARATE SOURCE BEFORE SHOWING SILT SHALL BE REMOVED WHEN ACCUMULATION REACHES 6 INCHES.
6. WHEN THE SITE IS COMPLETELY STABILIZED, THE STORM AND ACCUMULATED SILT SHALL BE REMOVED AND DISPOSED OF IN AN APPROVED MANNER.
NOT TO SCALE


SEE SECTION B-B FOR DETAILS (DETAIL BELOW)
LOT LINE
SINGLE METER SERVICE - STOP AND ADAPTER WITH 90° CORPORATION STOP
TWO METER SERVICE - STOP AND ADAPTER WITH 90° CORPORATION STOP
LOT LINE
SEE SECTION B-B FOR DETAILS (DETAIL BELOW)
CORPORATION STOP
ROADWAY
SHORT SERVICE DETAIL
LONG SERVICE DETAIL
WATER DISTRIBUTION MAIN
90° BEND OR TEE
SEE NOTE 2
SEE NOTE 3
SEE NOTE 4
SEE NOTE 5
SEE NOTE 6
SEE NOTE 7
SEE NOTE 8
SEE NOTE 9
SEE NOTE 10
SEE NOTE 11
SEE NOTE 12
SEE NOTE 13
SEE NOTE 14
SEE NOTE

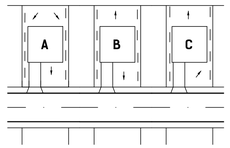
## LEGEND

- SITE BOUNDARY
- DRAINAGE AREA
- Tc FLOW PATH
- ACCUMULATION POINT (1)
- JUNCTION POINT (A)

NOTES:

- SEE FLYING W SITE DISCHARGE AND DETENTION ANALYSIS REPORT FOR ADDITIONAL SITE DISCHARGE INFORMATION, WHICH IS PROVIDED IN THE STORMWATER MANAGEMENT PLAN.

1




## TYPICAL LOT SITE PLAN

N.T.S.




SCALE: 1"=200'

0 200 400


CUDEENGINEERS.COM

CUDE ENGINEERS

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


# FLYING W UNIT 3

ULTIMATE MASTER DRAINAGE PLAN

DATE
03/26/2024

PROJECT NO.
04024-004

DRAWN BY
CG/AM/JG/WDS

CHECKED BY
JC/AL

REVISIONS
1. 05/24/23 - ADDED A NOTE, ADDED A,B,C TYPE
2.
3.
4.
5.
6.
7.
8.

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

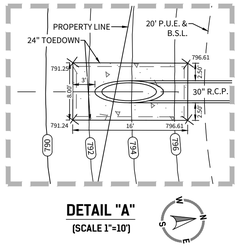
C6.00


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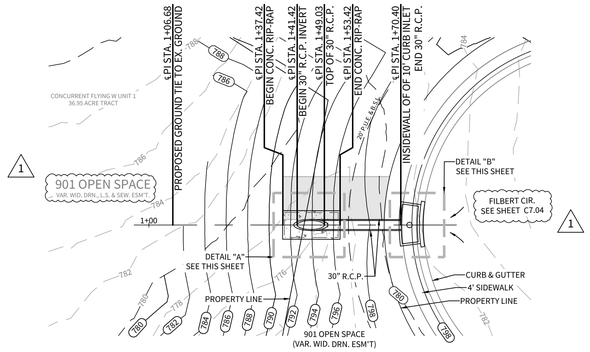
**Project Name: Flying W Tract** — **Preci** — **PA1**

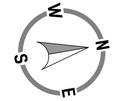
**Calculation Summary for Time of Concentrations & Ultimate Flow**

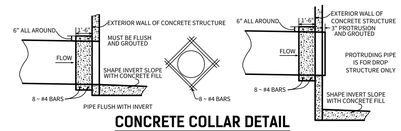
| HYDROLOGY | | | | | | | | | | Sheet Flow Tc Compuations | | | | | | Shallow Conc. Tc Compuations | | | | | Concentrated Tc Computations | | | Overall | INTENSITY | | | | | | Q FLOW | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 4.46 | 4.46 | = 1 | 0.59 | 0.63 | 0.65 | 0.70 | 0.74 | 0.78 | *100.00* | N | 799.57 | 794.63 | 4.94% | 11.00 | *188.52* | N | 786.76 | 4.17% | 0.95 | *552.21* | 6 | 1.53 | 13.49 | 4.47 | 5.61 | 6.60 | 7.98 | 9.08 | 10.23 | 11.76 | 15.76 | 19.13 | 24.91 | 29.97 | 35.59 | 1 |
| 1-CO | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.69 | 2.12 | 3.65 | 6.71 | 9.69 | 13.25 | 1-CO |
| 2A | 4.49 | 4.49 | = 2A | 0.60 | 0.64 | 0.67 | 0.72 | 0.75 | 0.80 | *100.00* | N | 810.63 | 808.27 | 2.36% | 12.28 | *188.39* | N | 794.20 | 7.47% | 0.71 | *435.53* | 6 | 1.21 | 14.20 | 4.36 | 5.47 | 6.42 | 7.76 | 8.83 | 9.95 | 11.75 | 15.72 | 19.31 | 25.09 | 31.72 | 35.74 | 2A |
| 2B | 0.45 | 0.45 | = 2B | 0.68 | 0.73 | 0.76 | 0.81 | 0.85 | 0.90 | *16.82* | N | 809.13 | 808.36 | 4.58% | 11.00 | | | | | | *240.70* | 6 | 0.67 | 11.67 | 4.76 | 5.99 | 7.06 | 8.56 | 9.74 | 10.97 | 1.46 | 1.97 | 2.41 | 3.12 | 3.94 | 4.44 | 2B |
| 3 | 3.36 | 3.36 | = 3 | 0.57 | 0.61 | 0.63 | 0.68 | 0.71 | 0.76 | *100.00* | N | 826.49 | 823.05 | 3.44% | 11.56 | *221.21* | N | 816.06 | 3.16% | 1.28 | *305.39* | 6 | 0.85 | 13.69 | 4.44 | 5.57 | 6.55 | 7.92 | 9.01 | 10.15 | 8.50 | 11.42 | 13.87 | 18.10 | 23.01 | 25.92 | 3 |
| 4A | 3.00 | 3.00 | = 4A | 0.56 | 0.60 | 0.62 | 0.67 | 0.70 | 0.75 | *100.00* | N | 833.82 | 831.68 | 2.14% | 12.72 | *94.53* | N | 826.67 | 5.30% | 0.42 | *455.42* | 6 | 1.27 | 14.41 | 4.33 | 5.43 | 6.38 | 7.70 | 8.76 | 9.87 | 7.27 | 9.77 | 11.87 | 15.48 | 19.71 | 22.21 | 4A |
| 4A-CO | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.25 | 1.02 | 1.88 | 3.67 | 6.08 | 7.61 | 4A-CO |
| 4B | 4.89 | 7.89 | = 4B, 4A-CO | 0.55 | 0.59 | 0.62 | 0.66 | 0.70 | 0.74 | *100.00* | N | 833.82 | 831.68 | 2.14% | 12.72 | *94.53* | N | 826.67 | 5.30% | 0.42 | *1338.20* | 6 | 3.72 | 16.86 | 3.99 | 5.00 | 5.86 | 7.05 | 8.02 | 9.02 | 10.29 | 14.52 | 18.68 | 24.91 | 30.66 | 38.07 | 4B |
| 4B-CO | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.19 | 1.56 | 3.54 | 6.73 | 4B-CO |
| 4C | 0.24 | 8.13 | = 4C, 4A-CO, 4B-CO | 0.55 | 0.59 | 0.62 | 0.66 | 0.70 | 0.74 | *26.62* | N | 763.14 | 760.62 | 9.47% | 10.00 | | | | | | *96.85* | 6 | 0.27 | 10.27 | 5.00 | 6.30 | 7.43 | 9.03 | 10.27 | 11.58 | 5.04 | 6.94 | 8.98 | 13.30 | 17.69 | 23.73 | 4C |
| 5 | 3.36 | 3.36 | = 5 | 0.57 | 0.61 | 0.63 | 0.68 | 0.72 | 0.76 | *100.00* | N | 827.46 | 824.27 | 3.19% | 11.81 | *184.19* | N | 816.12 | 4.42% | 0.90 | *212.45* | 6 | 0.59 | 13.30 | 4.50 | 5.65 | 6.65 | 8.04 | 9.15 | 10.30 | 8.62 | 11.58 | 14.08 | 18.37 | 23.37 | 26.30 | 5 |
| 6 | 1.77 | 1.77 | = 6 | 0.60 | 0.64 | 0.67 | 0.72 | 0.75 | 0.80 | *100.00* | N | 828.56 | 826.70 | 1.86% | 13.28 | *98.36* | N | 825.85 | 0.86% | 1.10 | *230.62* | 6 | 0.64 | 15.03 | 4.24 | 5.32 | 6.23 | 7.51 | 8.55 | 9.63 | 4.50 | 6.03 | 7.39 | 9.57 | 12.11 | 13.64 | 6 |
| 7 | 3.97 | 3.97 | = 7 | 0.60 | 0.64 | 0.67 | 0.71 | 0.75 | 0.80 | *100.00* | N | 820.03 | 819.23 | 0.80% | 16.00 | *147.77* | N | 815.02 | 2.85% | 0.91 | *581.28* | 6 | 1.61 | 18.52 | 3.80 | 4.76 | 5.58 | 6.71 | 7.62 | 8.58 | 9.05 | 12.09 | 14.84 | 18.91 | 24.20 | 27.25 | 7 |
| 8 | 2.80 | 2.80 | = 8 | 0.60 | 0.64 | 0.67 | 0.72 | 0.75 | 0.80 | *99.04* | N | 820.03 | 818.37 | 1.68% | 13.65 | | | | | | *597.45* | 6 | 1.66 | 15.31 | 4.20 | 5.26 | 6.18 | 7.44 | 8.46 | 9.53 | 7.06 | 9.43 | 11.59 | 15.00 | 18.95 | 21.35 | 8 |
| 9 | 0.58 | 0.58 | = 9 | 0.69 | 0.73 | 0.76 | 0.81 | 0.85 | 0.90 | *14.52* | N | 810.08 | 810.00 | 0.55% | 17.00 | | | | | | *333.83* | 6 | 0.93 | 17.93 | 3.87 | 4.84 | 5.67 | 6.83 | 7.76 | 8.73 | 1.55 | 2.05 | 2.50 | 3.21 | 4.05 | 4.56 | 9 |
| 10 | 1.14 | 1.14 | = 10 | 0.62 | 0.66 | 0.69 | 0.74 | 0.77 | 0.82 | *100.00* | N | 807.70 | 805.70 | 2.00% | 13.00 | *36.11* | N | 804.92 | 2.16% | 0.25 | *261.86* | 6 | 0.73 | 13.98 | 4.39 | 5.51 | 6.47 | 7.83 | 8.91 | 10.04 | 3.10 | 4.15 | 5.09 | 6.61 | 8.33 | 9.39 | 10 |
| 11A | 7.57 | 7.57 | = 11A | 0.55 | 0.59 | 0.61 | 0.66 | 0.70 | 0.74 | *100.00* | N | 806.05 | 804.05 | 2.00% | 13.00 | *44.08* | N | 802.35 | 3.86% | 0.23 | *1085.54* | 6 | 3.02 | 16.25 | 4.07 | 5.10 | 5.98 | 7.20 | 8.18 | 9.21 | 16.95 | 22.78 | 27.61 | 35.97 | 45.82 | 51.59 | 11A |
| 11A-CO | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.80 | 2.75 | 4.84 | 9.13 | 14.89 | 18.51 | 11A-CO |
| 11B | 3.97 | 11.54 | = 11B, 11A-CO | 0.56 | 0.60 | 0.62 | 0.67 | 0.70 | 0.75 | *100.00* | N | 800.02 | 798.47 | 1.55% | 13.90 | *50.94* | N | 795.64 | 5.56% | 0.22 | *1140.50* | 6 | 3.17 | 17.29 | 3.94 | 4.94 | 5.78 | 6.96 | 7.91 | 8.90 | 9.32 | 14.18 | 18.58 | 26.97 | 32.96 | 43.95 | 11B |
| 11B-CO | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.64 | 2.60 | 4.89 | 10.01 | 14.03 | 21.90 | 11B-CO |
| 12A | 1.06 | 1.06 | = 12A | 0.55 | 0.59 | 0.62 | 0.66 | 0.70 | 0.74 | *100.00* | N | 810.26 | 807.69 | 2.57% | 12.00 | *81.58* | N | 805.97 | 2.11% | 0.58 | *136.61* | 6 | 0.38 | 12.96 | 4.55 | 5.72 | 6.73 | 8.14 | 9.26 | 10.44 | 2.65 | 3.58 | 4.42 | 5.69 | 6.87 | 8.19 | 12A |
| 12B | 2.23 | 3.29 | = 12B | 0.57 | 0.61 | 0.63 | 0.68 | 0.71 | 0.76 | *100.00* | N | 810.26 | 807.69 | 2.57% | 12.00 | *81.58* | N | 805.97 | 2.11% | 0.58 | *784.46* | 6 | 2.18 | 14.76 | 4.28 | 5.37 | 6.29 | 7.59 | 8.64 | 9.73 | 8.03 | 10.78 | 13.04 | 16.98 | 20.18 | 24.33 | 12B |
| 12B-CO | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.72 | 1.81 | 2.89 | 5.07 | 7.02 | 9.72 | 12B-CO |
| 13A | 2.60 | 4.83 | = 13A | 0.57 | 0.61 | 0.64 | 0.68 | 0.72 | 0.76 | *100.00* | N | 810.26 | 807.69 | 2.57% | 12.00 | *81.58* | N | 805.97 | 2.11% | 0.58 | *1371.19* | 6 | 3.81 | 16.39 | 4.05 | 5.08 | 5.95 | 7.17 | 8.14 | 9.17 | 3.84 | 6.00 | 8.25 | 11.64 | 15.15 | 19.05 | 13A |
| 13A-CO | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.10 | 0.87 | 1.93 | 4.39 | 6.77 | 10.33 | 13A-CO |
| 13B | 0.57 | 21.40 | = 13B, 1-CO, 12, 11B-CO, 13A-CO | 0.57 | 0.61 | 0.64 | 0.68 | 0.72 | 0.76 | *100.00* | N | 800.02 | 798.47 | 1.55% | 13.90 | *50.94* | N | 795.64 | 5.56% | 0.22 | *1405.00* | 6 | 3.90 | 18.03 | 3.86 | 4.83 | 5.66 | 6.81 | 7.73 | 8.70 | 0.14 | 3.71 | 9.11 | 17.93 | 27.42 | 40.70 | 13B |
| 13B-CO | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.00 | 4.83 | 11.59 | 13B-CO |
| 13C | 17.94 | 27.59 | = 13C. 2B, 7, 4A | 0.46 | 0.49 | 0.52 | 0.56 | 0.59 | 0.64 | *100.00* | N | 820.03 | 819.23 | 0.80% | 16.00 | *147.77* | N | 815.02 | 2.85% | 0.91 | *1468.36* | 6 | 4.08 | 20.98 | 3.57 | 4.46 | 5.23 | 6.29 | 7.12 | 8.01 | 44.59 | 58.49 | 72.14 | 92.11 | 108.88 | 131.72 | 13C |
| 13D | 0.54 | 21.94 | = 13D, 13B-CO | 0.57 | 0.61 | 0.63 | 0.68 | 0.72 | 0.76 | *100.00* | N | 800.02 | 798.47 | 1.55% | 13.90 | *50.94* | N | 795.64 | 5.56% | 0.22 | *1612.76* | 6 | 4.48 | 18.60 | 3.79 | 4.75 | 5.56 | 6.70 | 7.60 | 8.56 | 0.31 | 0.52 | 0.00 | 1.86 | 5.78 | 12.83 | 13D |
| 13E | 1.68 | 31.87 | = 13E, 13C, 13A, 7, 4A, 2B | 0.47 | 0.50 | 0.53 | 0.57 | 0.60 | 0.65 | *100.00* | N | 820.03 | 819.23 | 0.80% | 16.00 | *147.77* | N | 815.02 | 2.85% | 0.91 | *1785.87* | 6 | 4.96 | 21.87 | 3.49 | 4.36 | 5.12 | 6.16 | 6.97 | 7.85 | 51.21 | 65.78 | 79.78 | 98.77 | 113.41 | 134.96 | 13E |
| 14A | 15.57 | 22.30 | = 14A, 6, 14C | 0.46 | 0.50 | 0.52 | 0.57 | 0.60 | 0.64 | *100.00* | N | 825.00 | 824.84 | 0.16% | 17.00 | *456.37* | N | 819.30 | 1.21% | 4.28 | *788.92* | 6 | 2.19 | 23.47 | 3.38 | 4.22 | 4.94 | 5.94 | 6.72 | 7.56 | 34.67 | 47.05 | 57.28 | 75.50 | 95.91 | 107.90 | 14A |
| 14B | 2.33 | 2.33 | = 14B | 0.64 | 0.68 | 0.71 | 0.76 | 0.80 | 0.84 | *100.00* | N | 834.05 | 830.91 | 3.14% | 11.86 | *10.66* | N | 830.60 | 2.91% | 0.06 | *480.51* | 6 | 1.33 | 13.26 | 4.50 | 5.66 | 6.66 | 8.05 | 9.16 | 10.32 | 6.71 | 8.97 | 11.02 | 14.25 | 17.93 | 20.20 | 14B |
| A | - | 24.63 | = 14A, 14B | 0.48 | 0.52 | 0.54 | 0.58 | 0.62 | 0.66 | *20.00* | N | 825.00 | 824.60 | 2.00% | 13.00 | | | | | | *826.66* | 6 | 2.30 | 15.30 | 4.20 | 5.27 | 6.18 | 7.44 | 8.47 | 9.54 | 49.65 | 67.50 | 82.20 | 106.28 | 137.69 | 155.08 | A |
| 14C | 4.96 | 4.96 | = 14C | 0.60 | 0.64 | 0.67 | 0.72 | 0.75 | 0.80 | *100.00* | N | 827.57 | 827.36 | 0.21% | 17.00 | *163.75* | N | 826.76 | 0.37% | 2.28 | *426.15* | 6 | 1.18 | 20.46 | 3.61 | 4.52 | 5.30 | 6.38 | 7.22 | 8.13 | 10.74 | 14.35 | 17.61 | 22.78 | 28.65 | 32.26 | 14C |
| 14D | 3.83 | 3.83 | = 14D | 0.63 | 0.67 | 0.70 | 0.75 | 0.78 | 0.83 | *100.00* | N | 831.50 | 829.50 | 2.00% | 13.00 | *150.96* | N | 826.37 | 2.07% | 1.09 | *269.69* | 6 | 0.75 | 14.84 | 4.26 | 5.35 | 6.28 | 7.57 | 8.62 | 9.70 | 10.28 | 13.73 | 16.84 | 21.74 | 27.40 | 30.84 | 14D |
| 14E | 7.43 | 7.43 | = 14E | 0.61 | 0.65 | 0.68 | 0.73 | 0.76 | 0.81 | *100.00* | N | 831.50 | 829.50 | 2.00% | 13.00 | *150.96* | N | 826.47 | 2.01% | 1.11 | *894.06* | 6 | 2.48 | 16.59 | 4.02 | 5.04 | 5.91 | 7.12 | 8.09 | 9.11 | 18.22 | 24.34 | 29.86 | 38.62 | 48.69 | 54.83 | 14E |
| 14F | 4.81 | 4.81 | = 14F | 0.62 | 0.66 | 0.69 | 0.73 | 0.77 | 0.82 | *100.00* | N | 829.27 | 828.49 | 0.78% | 16.00 | *66.37* | N | 827.19 | 1.96% | 0.49 | *783.41* | 6 | 2.18 | 18.67 | 3.79 | 4.74 | 5.55 | 6.68 | 7.59 | 8.54 | 11.30 | 15.05 | 18.42 | 23.46 | 29.94 | 33.68 | 14F |
| 14G | 0.32 | 0.32 | = 14G | 0.75 | 0.80 | 0.83 | 0.88 | 0.92 | 0.97 | *11.00* | N | 828.80 | 828.67 | 1.18% | 14.64 | | | | | | *113.78* | 7 | 0.27 | 14.91 | 4.25 | 5.34 | 6.26 | 7.55 | 8.59 | 9.68 | 1.02 | 1.37 | 1.66 | 2.13 | 2.67 | 3.00 | 14G |
| 15 | 7.11 | 7.11 | = 15 | 0.57 | 0.61 | 0.64 | 0.68 | 0.72 | 0.76 | *100.00* | N | 815.02 | 813.33 | 1.69% | 13.62 | *163.67* | N | 809.93 | 2.08% | 1.18 | *440.38* | 6 | 1.22 | 16.02 | 4.10 | 5.14 | 6.03 | 7.25 | 8.24 | 9.28 | 16.62 | 22.29 | 27.44 | 35.05 | 44.53 | 50.15 | 15 |
| 16A | 10.07 | 60.40 | = 16A, 8, 9, 15, 18, A | 0.49 | 0.52 | 0.55 | 0.59 | 0.62 | 0.67 | *100.00* | N | 825.00 | 824.84 | 0.16% | 17.00 | *456.37* | N | 819.30 | 1.21% | 4.28 | *2343.47* | 6 | 6.51 | 27.79 | 3.10 | 3.87 | 4.54 | 5.45 | 6.16 | 6.93 | 91.75 | 121.55 | 150.82 | 194.22 | 249.28 | 280.44 | 16A |
| 16B | 5.30 | 5.30 | =16B | 0.54 | 0.58 | 0.61 | 0.65 | 0.69 | 0.73 | *100.00* | N | 804.93 | 799.57 | 5.36% | 10.64 | *103.99* | N | 792.38 | 6.91% | 0.41 | *734.68* | 6 | 2.04 | 13.09 | 4.53 | 5.69 | 6.70 | 8.10 | 9.22 | 10.39 | 12.96 | 17.49 | 21.66 | 27.90 | 35.67 | 40.20 | 16B |
| 16C | 9.90 | 41.64 | = 16C, 15, A | 0.48 | 0.52 | 0.54 | 0.59 | 0.62 | 0.66 | *100.00* | N | 825.00 | 824.84 | 0.16% | 17.00 | *456.37* | N | 819.30 | 1.21% | 4.28 | *1646.20* | 6 | 4.57 | 25.85 | 3.21 | 4.01 | 4.70 | 5.66 | 6.39 | 7.19 | 64.16 | 86.83 | 105.68 | 139.05 | 175.61 | 197.60 | 16C |
| B | - | 55.80 | = 16A, 16B | 0.50 | 0.54 | 0.56 | 0.61 | 0.64 | 0.69 | *100.00* | N | 825.00 | 824.84 | 0.16% | 17.00 | *456.37* | N | 819.30 | 1.21% | 4.28 | *2896.59* | 6 | 8.05 | 29.32 | 3.01 | 3.77 | 4.41 | 5.30 | 5.99 | 6.74 | 83.98 | 113.60 | 137.80 | 180.40 | 230.63 | 259.50 | B |
| 17A | 5.06 | 5.06 | =17A | 0.54 | 0.58 | 0.61 | 0.65 | 0.69 | 0.73 | *100.00* | N | 815.03 | 813.41 | 1.62% | 13.76 | *191.11* | N | 807.02 | 3.34% | 1.08 | *196.35* | 6 | 0.55 | 15.38 | 4.19 | 5.25 | 6.16 | 7.42 | 8.44 | 9.51 | 11.45 | 15.41 | 19.01 | 24.40 | 31.18 | 35.13 | 17A |
| 17B | 4.07 | 4.07 | =17B | 0.56 | 0.60 | 0.63 | 0.67 | 0.71 | 0.75 | *100.00* | N | 795.06 | 792.75 | 2.31% | 12.38 | *175.70* | N | 789.15 | 2.05% | 1.28 | *362.65* | 6 | 1.01 | 14.66 | 4.29 | 5.38 | 6.32 | 7.62 | 8.67 | 9.77 | 9.78 | 13.14 | 16.21 | 20.78 | 26.47 | 29.82 | 17B |
| 18 | 5.31 | 5.31 | = 18 | 0.59 | 0.63 | 0.65 | 0.70 | 0.74 | 0.78 | *100.00* | N | 806.00 | 804.47 | 1.53% | 13.94 | *105.40* | N | 800.34 | 3.92% | 0.55 | *636.28* | 6 | 1.77 | 16.26 | 4.07 | 5.10 | 5.98 | 7.20 | 8.18 | 9.21 | 12.75 | 17.06 | 20.64 | 26.76 | 33.88 | 38.15 | 18 |
| 19 | 4.74 | 4.74 | = 19 | 0.60 | 0.64 | 0.67 | 0.72 | 0.75 | 0.80 | *100.00* | N | 833.00 | 831.00 | 2.00% | 13.00 | *34.25* | N | 830.25 | 2.19% | 0.24 | *623.03* | 6 | 1.73 | 14.97 | 4.24 | 5.33 | 6.25 | 7.53 | 8.57 | 9.65 | 12.06 | 16.17 | 19.85 | 25.70 | 32.50 | 36.59 | 19 |
| 20A | 6.30 | 6.30 | = 20A | 0.57 | 0.61 | 0.64 | 0.68 | 0.72 | 0.76 | *100.00* | N | 847.37 | 844.84 | 2.53% | 12.00 | *50.14* | N | 843.52 | 2.63% | 0.32 | *930.66* | 6 | 2.59 | 14.90 | 4.25 | 5.34 | 6.26 | 7.55 | 8.59 | 9.68 | 15.26 | 20.52 | 25.24 | 32.34 | 41.13 | 46.35 | 20A |
| 20B | 16.71 | 72.53 | = 20B, 20A, 20D, 21A, 22, 27, 28, 29, C | 0.54 | 0.58 | 0.61 | 0.65 | 0.69 | 0.73 | *100.00* | N | 847.37 | 844.84 | 2.53% | 12.00 | *50.14* | N | 843.52 | 2.63% | 0.32 | *2641.54* | 6 | 7.34 | 19.66 | 3.68 | 4.61 | 5.41 | 6.51 | 7.38 | 8.31 | 144.13 | 193.93 | 239.36 | 306.91 | 390.75 | 439.99 | 20B |
| 20C | 6.74 | 6.74 | = 20C | 0.59 | 0.63 | 0.65 | 0.70 | 0.74 | 0.78 | *100.00* | N | 841.89 | 839.54 | 2.35% | 12.30 | *164.96* | N | 835.73 | 2.31% | 1.12 | *703.19* | 6 | 1.95 | 15.37 | 4.19 | 5.25 | 6.16 | 7.42 | 8.44 | 9.51 | 16.66 | 22.29 | 26.99 | 35.01 | 44.37 | 50.00 | 20C |
| 20D | 5.97 | 5.97 | = 20D | 0.60 | 0.64 | 0.67 | 0.71 | 0.75 | 0.80 | *100.00* | N | 832.50 | 830.50 | 2.00% | 13.00 | *98.36* | N | 828.57 | 1.96% | 0.73 | *847.72* | 6 | 2.35 | 16.09 | 4.09 | 5.13 | 6.01 | 7.24 | 8.23 | 9.26 | 14.65 | 19.60 | 24.04 | 30.69 | 39.31 | 44.23 | 20D |
| 21A | 3.25 | 3.25 | = 21B | 0.60 | 0.64 | 0.66 | 0.71 | 0.75 | 0.79 | *100.00* | N | 825.20 | 823.75 | 1.45% | 14.10 | *161.30* | N | 813.61 | 6.29% | 0.66 | *355.10* | 6 | 0.99 | 15.75 | 4.14 | 5.19 | 6.08 | 7.33 | 8.33 | 9.38 | 8.07 | 10.80 | 13.04 | 16.91 | 21.39 | 24.08 | 21A |
| F | - | 12.27 | = 25A, 25B, 29-CO | 0.58 | 0.62 | 0.64 | 0.69 | 0.72 | 0.77 | *100.00* | N | 832.00 | 830.00 | 2.00% | 13.00 | *98.36* | N | 828.18 | 1.85% | 0.75 | *847.72* | 6 | 2.35 | 16.10 | 4.09 | 5.12 | 6.01 | 7.24 | 8.22 | 9.26 | 29.11 | 38.95 | 47.20 | 61.30 | 77.66 | 87.49 | F |
| 21B | 7.56 | 7.56 | = 21B | 0.57 | 0.61 | 0.64 | 0.69 | 0.72 | 0.77 | *100.00* | N | 829.45 | 827.87 | 1.58% | 13.84 | *186.46* | N | 824.98 | 1.55% | 1.55 | *828.30* | 6 | 2.30 | 17.69 | 3.89 | 4.88 | 5.71 | 6.87 | 7.81 | 8.79 | 16.76 | 22.50 | 27.63 | 35.84 | 45.46 | 51.17 | 21B |
| 21B-CO | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.10 | 3.20 | 5.58 | 9.99 | 15.82 | 19.50 | 21B-CO |
| 21C | 3.51 | 11.07 | = 21C, 21B-CO | 0.57 | 0.61 | 0.64 | 0.68 | 0.72 | 0.76 | *100.00* | N | 829.45 | 827.87 | 1.58% | 13.84 | *186.46* | N | 824.98 | 1.55% | 1.55 | *977.49* | 6 | 2.72 | 18.11 | 3.85 | 4.82 | 5.64 | 6.79 | 7.72 | 8.68 | 8.63 | 13.24 | 17.91 | 25.27 | 31.89 | 41.36 | 21C |
| C | - | 11.07 | = 21B, 21C | 0.57 | 0.61 | 0.64 | 0.68 | 0.72 | 0.76 | *100.00* | N | 829.45 | 827.87 | 1.58% | 13.84 | *186.46* | N | 824.98 | 1.55% | 1.55 | *975.00* | 6 | 2.71 | 18.10 | 3.85 | 4.82 | 5.64 | 6.79 | 7.72 | 8.69 | 24.29 | 32.55 | 39.96 | 51.11 | 64.95 | 73.11 | C |
| 22 | 5.61 | 5.61 | = 22 | 0.55 | 0.59 | 0.61 | 0.66 | 0.69 | 0.74 | *100.00* | N | 825.00 | 823.00 | 2.00% | 13.00 | *105.30* | N | 821.00 | 1.90% | 0.79 | *1166.07* | 6 | 3.24 | 17.03 | 3.97 | 4.98 | 5.82 | 7.01 | 7.97 | 8.97 | 12.25 | 16.48 | 19.92 | 25.96 | 33.09 | 37.24 | 22 |
| 23 | 4.45 | 4.45 | = 23 | 0.58 | 0.63 | 0.65 | 0.70 | 0.73 | 0.78 | *100.00* | N | 794.00 | 792.00 | 2.00% | 13.00 | *123.29* | N | 789.90 | 1.70% | 0.97 | *581.83* | 6 | 1.62 | 15.59 | 4.16 | 5.21 | 6.12 | 7.37 | 8.38 | 9.43 | 10.74 | 14.61 | 17.70 | 22.96 | 29.09 | 32.73 | 23 |
| 24 | 1.30 | 1.30 | = 24 | 0.59 | 0.63 | 0.66 | 0.71 | 0.74 | 0.79 | *96.90* | N | 792.71 | 790.00 | 2.80% | 12.00 | | | | | | *460.07* | 6 | 1.28 | 13.28 | 4.50 | 5.65 | 6.65 | 8.04 | 9.15 | 10.31 | 3.45 | 4.63 | 5.71 | 7.42 | 9.40 | 10.59 | 24 |
| 25A | 3.72 | 10.64 | = 25A | 0.56 | 0.60 | 0.62 | 0.67 | 0.71 | 0.75 | *100.00* | N | 864.96 | 863.02 | 1.94% | 13.12 | *28.36* | N | 862.21 | 2.86% | 0.17 | *1850.94* | 6 | 5.14 | 18.44 | 3.81 | 4.77 | 5.59 | 6.73 | 7.64 | 8.60 | 7.73 | 11.69 | 15.23 | 22.60 | 28.18 | 36.99 | 25A |
| 25B | 1.59 | 1.59 | = 25B | 0.61 | 0.66 | 0.68 | 0.73 | 0.77 | 0.81 | *81.87* | N | 792.91 | 790.83 | 2.54% | 12.00 | | | | | | *609.54* | 6 | 1.69 | 13.69 | 4.44 | 5.57 | 6.55 | 7.92 | 9.01 | 10.15 | 20.51 | 27.60 | 33.42 | 43.45 | 55.18 | 62.19 | 25B |
| D | - | 77.84 | = 20B, 20A, 21A, 22, 27, 28, 29, C | 0.54 | 0.58 | 0.61 | 0.65 | 0.69 | 0.73 | *100.00* | N | 847.37 | 844.84 | 2.53% | 12.00 | *50.14* | N | 843.52 | 2.63% | 0.32 | *2641.54* | 6 | 7.34 | 19.66 | 3.68 | 4.61 | 5.41 | 6.51 | 7.38 | 8.31 | 154.68 | 208.13 | 256.88 | 329.38 | 419.36 | 472.20 | D |
| E | - | 5.31 | = 25A, 25B, 29-CO | 0.58 | 0.62 | 0.64 | 0.69 | 0.72 | 0.77 | *100.00* | N | 800.33 | 797.06 | 3.27% | 11.73 | *157.82* | N | 788.97 | 5.13% | 0.72 | *401.12* | 6 | 1.11 | 13.56 | 4.46 | 5.60 | 6.58 | 7.96 | 9.05 | 10.20 | 14.18 | 20.42 | 26.28 | 36.58 | 49.76 | 57.71 | E |
| 26A | 7.20 | 7.20 | = 26A | 0.58 | 0.63 | 0.65 | 0.70 | 0.73 | 0.78 | *100.00* | N | 807.15 | 802.31 | 4.84% | 11.00 | *57.50* | N | 799.72 | 4.50% | 0.28 | *1106.88* | 6 | 3.07 | 14.35 | 4.34 | 5.44 | 6.39 | 7.71 | 8.78 | 9.89 | 18.12 | 24.68 | 29.91 | 38.86 | 49.31 | 55.54 | 26A |
| 26B | 3.37 | 3.37 | = 26B | 0.59 | 0.63 | 0.66 | 0.71 | 0.74 | 0.79 | *100.00* | N | 800.24 | 796.89 | 3.35% | 11.65 | *167.84* | N | 788.36 | 5.08% | 0.77 | *384.27* | 6 | 1.07 | 13.48 | 4.47 | 5.61 | 6.60 | 7.98 | 9.08 | 10.23 | 8.89 | 11.91 | 14.68 | 19.09 | 24.17 | 27.24 | 26B |
| 27 | 8.78 | 8.78 | = 27 | 0.57 | 0.61 | 0.64 | 0.69 | 0.72 | 0.77 | *100.00* | N | 853.78 | 851.25 | 2.53% | 12.00 | *153.02* | N | 848.45 | 1.83% | 1.16 | *749.12* | 6 | 2.08 | 15.24 | 4.21 | 5.28 | 6.19 | 7.46 | 8.48 | 9.55 | 21.07 | 28.28 | 34.78 | 45.19 | 57.33 | 64.56 | 27 |
| 28 | 7.92 | 7.92 | = 28 | 0.57 | 0.61 | 0.64 | 0.68 | 0.72 | 0.76 | *100.00* | N | 859.25 | 856.54 | 2.71% | 12.00 | *153.02* | N | 853.20 | 2.18% | 1.07 | *761.29* | 6 | 2.11 | 15.18 | 4.21 | 5.29 | 6.20 | 7.47 | 8.50 | 9.58 | 19.01 | 25.56 | 31.43 | 40.23 | 51.16 | 57.66 | 28 |
| 29 | 6.92 | 6.92 | = 29 | 0.55 | 0.59 | 0.62 | 0.66 | 0.70 | 0.75 | *100.00* | N | 864.96 | 863.02 | 1.94% | 13.12 | *28.36* | N | 862.21 | 2.86% | 0.17 | *1101.03* | 6 | 3.06 | 16.35 | 4.05 | 5.08 | 5.96 | 7.18 | 8.15 | 9.18 | 15.41 | 20.74 | 25.57 | 32.79 | 42.30 | 47.64 | 29 |
| 29-CO | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.44 | 1.98 | 3.92 | 7.42 | 12.76 | 16.01 | 29-CO |
| 30 | 6.69 | 6.69 | = 30 | 0.57 | 0.61 | 0.63 | 0.68 | 0.71 | 0.76 | *100.00* | N | 877.70 | 875.70 | 2.00% | 13.00 | *32.24* | N | 875.00 | 2.17% | 0.23 | *624.56* | 6 | 1.73 | 14.96 | 4.25 | 5.33 | 6.25 | 7.53 | 8.57 | 9.66 | 16.21 | 21.75 | 26.34 | 34.26 | 43.57 | 49.12 | 30 |
| 31 | 3.41 | 3.41 | = 31 | 0.53 | 0.57 | 0.60 | 0.64 | 0.68 | 0.72 | *100.00* | N | 877.70 | 875.70 | 2.00% | 13.00 | *32.24* | N | 875.00 | 2.17% | 0.23 | *504.33* | 6 | 1.40 | 14.63 | 4.30 | 5.39 | 6.33 | 7.63 | 8.69 | 9.79 | 7.77 | 10.48 | 12.95 | 16.65 | 21.34 | 24.04 | 31 |
| 32 | 22.56 | 32.66 | = 30, 31, 32 | 0.43 | 0.46 | 0.48 | 0.53 | 0.56 | 0.60 | *100.00* | N | 875.35 | 874.35 | 1.00% | 15.00 | *768.81* | N | 793.32 | 10.54% | 2.45 | *475.37* | 6 | 1.32 | 18.77 | 3.78 | 4.72 | 5.54 | 6.66 | 7.56 | 8.52 | 53.09 | 70.91 | 86.85 | 115.28 | 148.15 | 166.96 | 32 |
| G | - | 36.33 | = 13E, 13C, 13A, 7, 4A, 2B, 1 | 0.55 | 0.59 | 0.62 | 0.66 | 0.70 | 0.74 | *100.00* | N | 820.03 | 819.23 | 0.80% | 16.00 | *147.77* | N | 815.02 | 2.85% | 0.91 | *1845.42* | 6 | 5.13 | 22.03 | 3.48 | 4.35 | 5.10 | 6.14 | 6.94 | 7.81 | 67.78 | 87.42 | 104.53 | 127.38 | 146.93 | 169.06 | G |
| 33 | 3.60 | 15.98 | = 33, 2A, 4A, 4B | 0.53 | 0.57 | 0.60 | 0.64 | 0.68 | 0.72 | *100.00* | N | 833.82 | 831.68 | 2.14% | 12.72 | *94.53* | N | 826.67 | 5.30% | 0.42 | *1976.39* | 6 | 5.49 | 18.63 | 3.79 | 4.74 | 5.56 | 6.69 | 7.59 | 8.55 | 25.07 | 34.42 | 43.13 | 55.05 | 65.31 | 77.05 | 33 |
| 34 | 13.13 | 13.13 | = 34 | 0.37 | 0.40 | 0.42 | 0.46 | 0.49 | 0.53 | *100.00* | N | 802.00 | 800.00 | 2.00% | 13.00 | *321.60* | N | 781.15 | 5.86% | 1.37 | *1116.86* | 6 | 3.10 | 17.47 | 3.92 | 4.91 | 5.75 | 6.92 | 7.87 | 8.85 | 19.04 | 25.79 | 31.71 | 41.80 | 50.63 | 61.59 | 34 |
| 35 | 73.32 | 73.32 | = 35 | 0.33 | 0.36 | 0.38 | 0.42 | 0.45 | 0.49 | *100.00* | N | 835.00 | 834.00 | 1.00% | 15.00 | *681.00* | N | 811.00 | 3.38% | 3.82 | *2500.00* | 6 | 6.94 | 25.76 | 3.22 | 4.02 | 4.71 | 5.67 | 6.40 | 7.21 | 77.91 | 106.11 | 



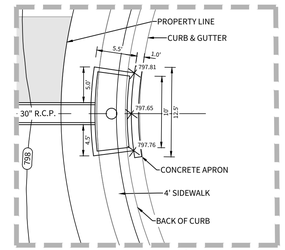

**DETAIL "A"**
**(SCALE 1"=10')**




**CONCRETE COLLAR DETAIL**
**(N.T.S.)**




**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 12' ACCESS PATH
- PROPOSED R.C.P.
- PROPOSED CONCRETE RIP-RAP
- GABION MATTRESS

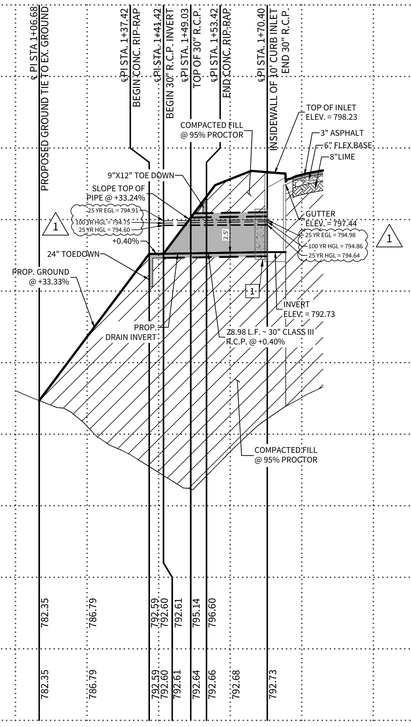
GENERAL NOTES

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 "M"

STA. 1+06.68 TO END

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




**10' CURB INLET OPENING**
**DRAIN "M"**

$Q_{25\ PROJECT}$ = 18.91 c.f.s.
$Q_{25\ ULTIMATE}$ = 18.91 c.f.s.

$$L = Q/(C*w*(2*g*h)^{1/2}) = \frac{18.91}{0.7*0.50*(2*32.2*0.54)^{1/2}}$$

L = 9.16' INLET REQ'D.
USED - 10' INLET (TYPE C-1)
A = 4.91 s.f. (1 - 2.5' DIAMETER OPENING(S))
V = 3.85 f.p.s.
Hv = 0.23'
1.5Hv = 0.35'
Hw = z + y + 1.5Hv
Hw = 778.23+2.5+0.35
Hw = 781.08
GUTTER = 797.44

**30" CLASS III R.C.P. DRAIN "M"**

**STA. 1+41.42 TO 2+70.40**

PIPE SLOPE = 0.4 %
$Q_{25}$ = 18.91 c.f.s.
DEPTH OF FLOW = 1.48 ft
FLOW AREA = 3.31 $ft^2$
% FULL = 67.31 %
$VELOCITY_{25}$ = 5.72 ft/s
n = 0.013


CUDEENGINEERS.COM

4122 Pond Hill Road, Suite 101
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**FLYING W UNIT 3**

DRAINAGE PLAN & PROFILE - DRAIN "M"

**DATE**
03/26/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

**REVISIONS**
1. 05/24/23 - ADDED CLASS III R.C.P. TO LBLS, REVISED STRT NAMES, ADDED HGL AND EGLS, ADDED 12' ACCESS PATH.
2.
3.
4.
5.
6.
7.
8.

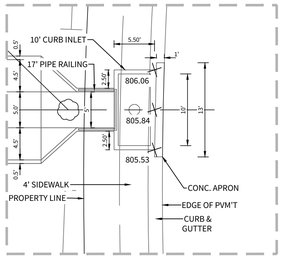
STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

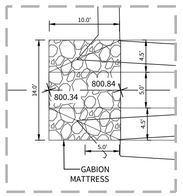
**C6.02**

P:\PROJECTS\04024_UNIT 3 FLYING W\CAD\DRAINAGE PLANS & PROFILE DRAIN "M".dwg, 03/24/2023 4:37:09 PM, Thomas


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.




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




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

LEGEND:

1

PROPOSED 12' ACCESS PATH

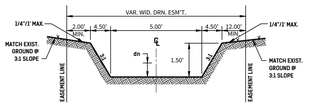
GABION MATTRESS

PROPOSED CONCRETE RIP-RAP

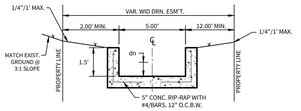
GENERAL NOTES

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

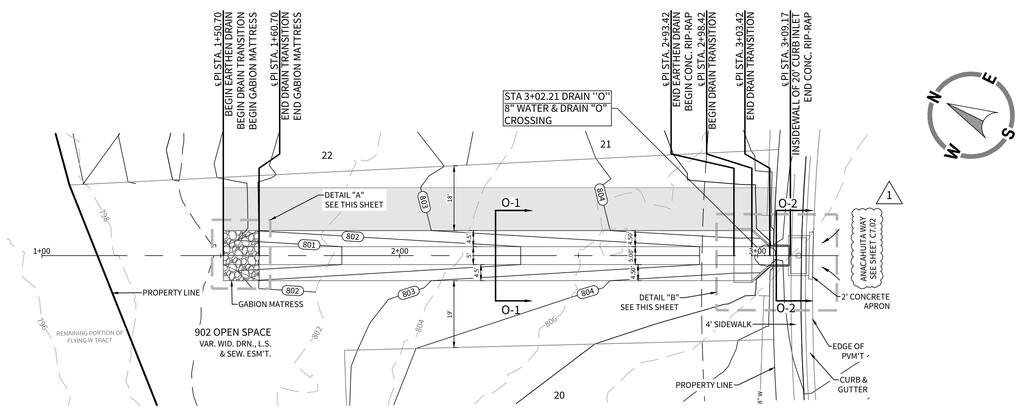
| Name | "O-1" | "O-2" | | Name | "O-1" | "O-2" |
|---|---|---|---|---|---|---|
| BEGIN STA | 1+50.70 | 3+03.42 | | BEGIN STA | 1+50.70 | 3+03.42 |
| END STA | 2+93.42 | 3+09.17 | | END STA | 2+93.42 | 3+09.17 |
| $Q_{25}$ (cfs) | 15.00 | 15.00 | | $Q_{100}$ (cfs) | 21.35 | 21.35 |
| h (ft) | 1.50' | 1.50' | | h (ft) | 1.50' | 1.50' |
| $D_w$ (ft) | 5.00' | 5.00' | | $D_w$ (ft) | 5.00' | 5.00' |
| $t_w$ (ft) | 14 | 5 | | $t_w$ (ft) | 14 | 5 |
| n | 0.035 | 0.013 | | n | 0.035 | 0.013 |
| Slope (%) | 2.00% | 0.50% | | Slope (%) | 2.00% | 0.50% |
| $d_n$ (ft) | 0.61' | 0.60' | | $d_n$ (ft) | 0.61' | 0.60' |
| V (fps) | 3.63 | 5.00 | | V (fps) | 2.07 | 1.84 |
| Channel Type | Channel | Channel | | Channel Type | Channel | Channel |
| Min Esm't (ft) | 31.00 | 22.00 | | Min Esm't (ft) | 31.00 | 22.00 |

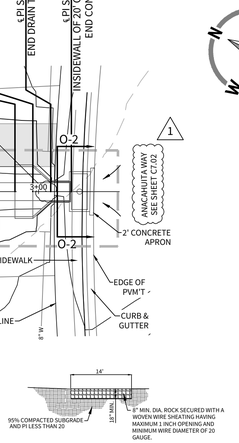



**DRAIN "O–1" SECTION**
(N.T.S.)

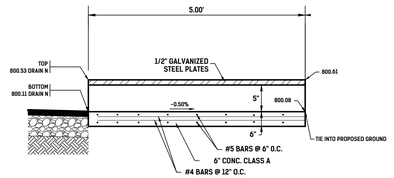



**DRAIN "O–2" SECTION**
(N.T.S.)

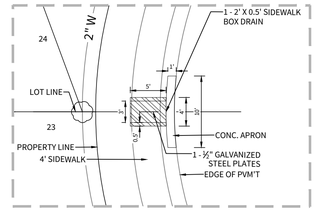


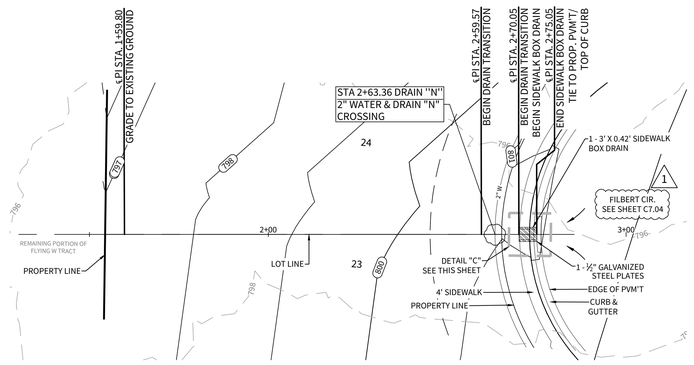

**GABION STYLE ROCK EROSION CONTROL MATRESS DETAIL**
NOTE: GABION MATTRESS TO BE FREE OF GEO-TEXTILE FABRIC LINING.
(N.T.S.)




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




**DETAIL "C"**
(SCALE 1"=10')



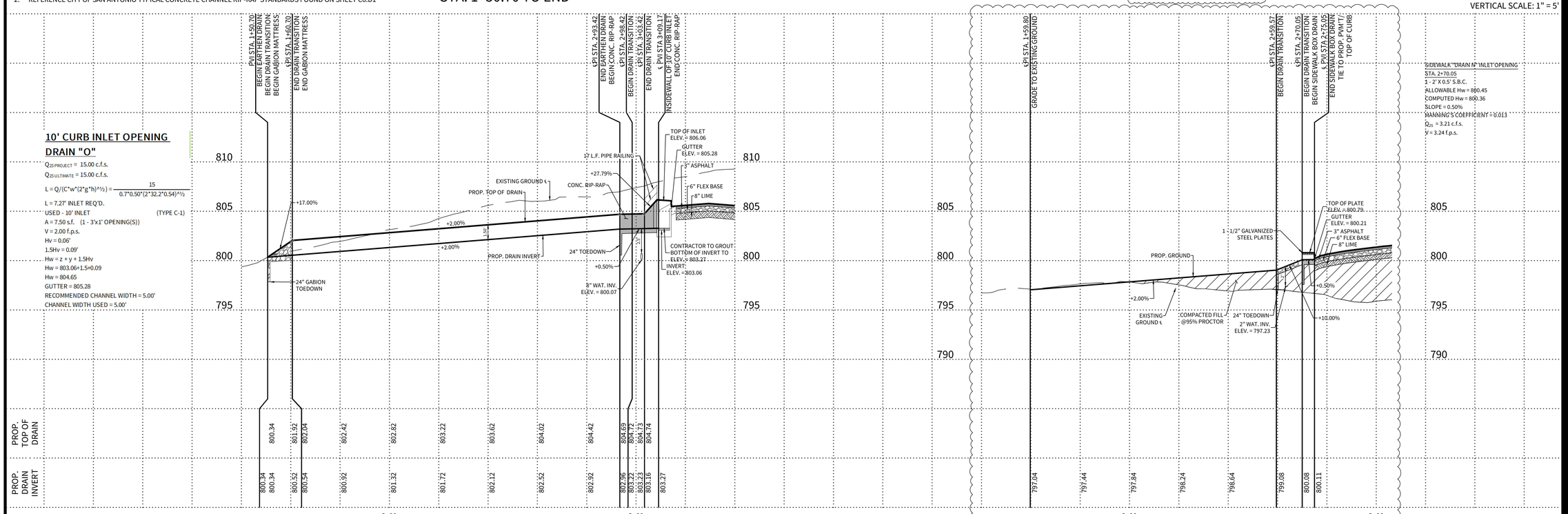

# DRAIN "O"

STA. 1+50.70 TO END

# DRAIN "N"

1 STA. 2+26.65 TO END

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





CUDEENGINEERS.COM

CUDE ENGINEERS

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


**FLYING W**
**UNIT 3**

DRAINAGE PLAN & PROFILE - DRAIN "N" & "O"

**DATE**
03/29/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

**REVISIONS**
1. 05/24/23 - ADDED 12' ACCESS PATH, REVISED STRT NAMES.
2. REVISED DRAIN "N" STATION LABELS.
3.
4.
5.
6.
7.
8.

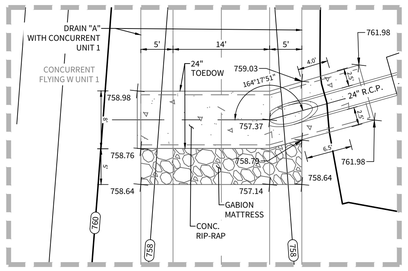
STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

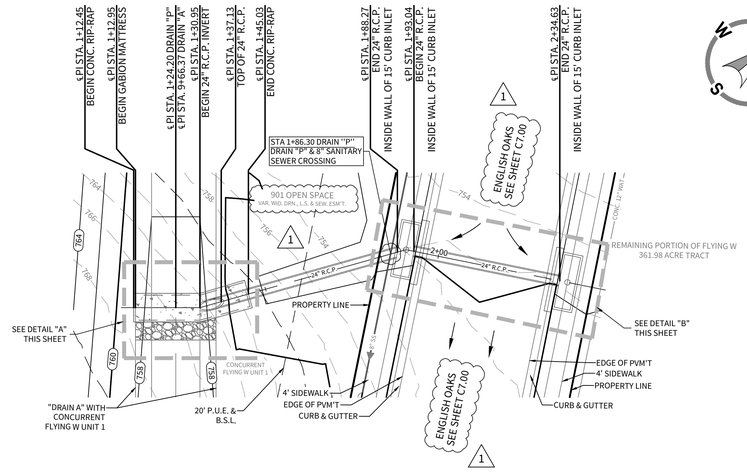
**C6.03**

P:\PROJ\FLYW_UNIT 3\DWGS\03 DRAINAGE PLANS & PROFILE\DRAIN "N" & "O".dwg, 2024/03/29 12:24pm, frankh


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.

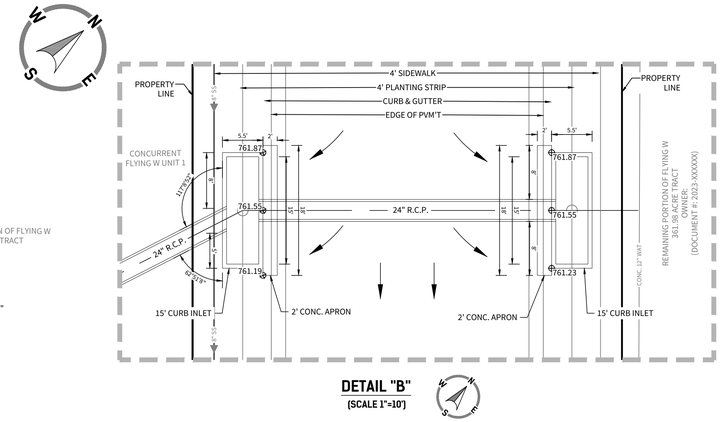



**DETAIL "A"**
**(SCALE 1"=10')**

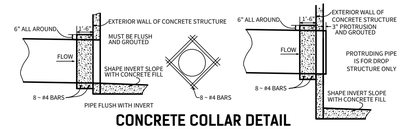



# DRAIN "P"

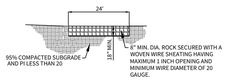
STA. 1+12.45 TO END




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




**CONCRETE COLLAR DETAIL**
**(N.T.S.)**




**GABION STYLE ROCK EROSION CONTROL MATRESS DETAIL**
NOTE: GABION MATTRESS TO BE FREE OF GEO-TEXTILE FABRIC LINING.
(N.T.S.)

KEYNOTES:

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

LEGEND:

PROPOSED R.C.P.

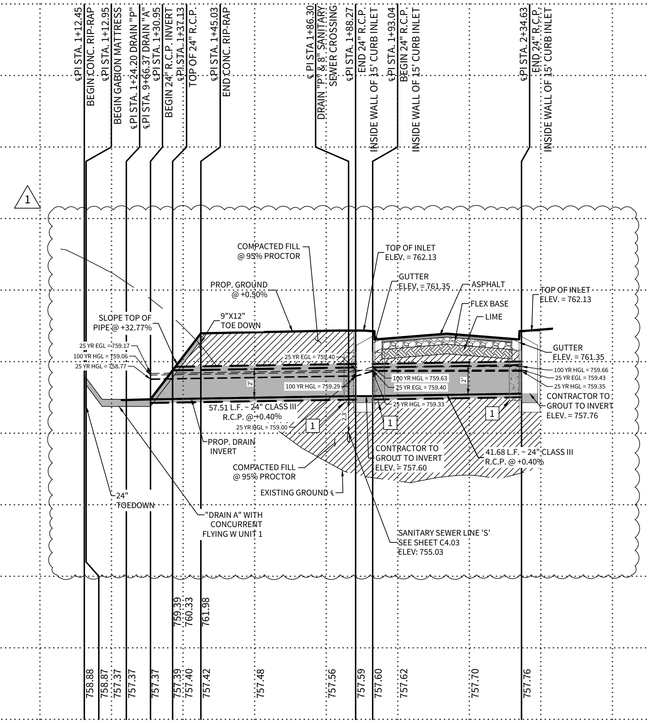
PROPOSED CONCRETE RIP-RAP

GABION MATTRESS

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

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




**INLET "P" STA. 1+93.04**
**CURB INLET ON GRADE – TxDOT METHOD**

$Q_{25}$ = 8.49 c.f.s.
$S_x$ = GUTTER CROSS SLOPE = 0.02
$S_l$ = STREET SLOPE = 0.04
$S_E = S_x + (\frac{a}{b})E_o$
$S_E$ = EQUIVALENT CROSS SLOPE = 0.04

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

$L_R$ = 30.66' INLET REQ'D
$L_A$ = 15' CURB INLET USED
$CO_T$ = CARRY OVER FLOW = $Q_{25}[(1-\frac{L_A}{L_R})^{1.8}]$

$CO_T$ = 2.53 C.F.S.
$Q_i$ = ACTUAL INLET INTERCEPTION = 5.96 C.F.S.

**INLET "P" STA. 2+34.63**
**CURB INLET ON GRADE – TxDOT METHOD**

$Q_{25}$ = 8.49 c.f.s.
$S_x$ = GUTTER CROSS SLOPE = 0.02
$S_l$ = STREET SLOPE = 0.04
$S_E = S_x + (\frac{a}{b})E_o$
$S_E$ = EQUIVALENT CROSS SLOPE = 0.04

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

$L_R$ = 30.66' INLET REQ'D
$L_A$ = 15' CURB INLET USED
$CO_T$ = CARRY OVER FLOW = $Q_{25}[(1-\frac{L_A}{L_R})^{1.8}]$

$CO_T$ = 2.53 C.F.S.
$Q_i$ = ACTUAL INLET INTERCEPTION = 5.96 C.F.S.

1

**24" CLASS III R.C.P.**
**DRAIN "P"**
**STA.1+30.95 TO 1+88.27**

PIPE SLOPE = 0.4 %
$Q_{25}$ = 11.92 c.f.s.
DEPTH OF FLOW = 1.24 ft
FLOW AREA = 2.35 ft²
% FULL = 74.94%
$VELOCITY_{25}$ = 5.06 ft/s
n = 0.013

**24" CLASS III R.C.P.**
**DRAIN "P"**
**STA. 1+93.04 TO 2+34.63**

PIPE SLOPE = 0.4 %
$Q_{25}$ = 5.96 c.f.s.
DEPTH OF FLOW = 0.86 ft
FLOW AREA = 1.38 ft²
% FULL = 43.94%
$VELOCITY_{25}$ = 4.32 ft/s
n = 0.013


CUDEENGINEERS.COM

CUDE ENGINEERS

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


**FLYING W UNIT 3**

DRAINAGE PLAN & PROFILE - DRAIN "P"

**DATE**
03/26/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

**REVISIONS**
1. 05/14/25 - ADDED CLASS III R.C.P. TO LBLS, REVISED STRT NAMES, REVISED PROP. GROUND & CONC RIP-RAP
2.
3.
4.
5.
6.
7.
8.

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

**C6.04**


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.

LEGEND

- CONC. RIP RAP
- GABION MATTRESS
- EARTHEN VEGETATION
- PROPOSED CONTOUR
- EXISTING CONTOUR
- PROPOSED SLOPE

## GENERAL NOTES:

CONTRACTOR TO HYDROMULCH ENTIRE DISTURBED LIMITS OF EARTHEN PORTION OF POND. 85% OF POND SURFACE MUST HAVE ESTABLISHED VEGETATION PRIOR TO ACCEPTANCE BY COMAL COUNTY & THE DISTRICT.

THE CONTRACTOR SHALL NOTIFY A UTILITY LOCATOR AT LEAST 48 HOURS PRIOR TO PERFORMING ANY EXCAVATION ACTIVITY ADJACENT TO THE CONSTRUCTION OF ANY ON-SITE DRAINAGE FACILITIES TO PROTECT ANY UNIDENTIFIED EXISTING UNDERGROUND UTILITY FACILITY FROM DAMAGE OR HARM. THE CONTRACTOR SHALL HAVE THE SOLE RESPONSIBILITY FOR ANY DAMAGES TO UTILITIES AS A RESULT OF NOT LOCATING UNDERGROUND UTILITY RESOURCES.

ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE SUBDIVISION REGULATIONS OF COMAL COUNTY.

ANY AREAS EXPOSED TO HIGH VELOCITY FLOWS SHALL EITHER HAVE A 6" THICK ROCK GABION MATTRESS INSTALLED OR THE INSTALLATION OF APPROPRIATE GEOTECHNICAL LINER AS DIRECTED BY THE CONSTRUCTION ENGINEER IN CHARGE.

ALL CONCRETE SHALL BE A MINIMUM OF 4000 PSI @ 28 DAYS COMPRESSIVE STRENGTH UNLESS OTHERWISE SPECIFIED HEREIN ON THESE DOCUMENTS.

A 6 FOOT HIGH FENCE (WOOD, CHAINLINK, OR OTHER DECORATIVE FENCE AS SPECIFIED BY THE OWNER OR BY RESTRICTIVE COVENANT) SHALL BE INSTALLED AT THE TOP OF THE WATER QUALITY BASIN ALONG ALL SIDES. AT THE LOCATION OF THE 12' WIDE (MIN) MAINTENANCE RAMP, A DOUBLE SWING GATE WITH MINIMUM OPEN WIDTH OF 12' WITH LOCK SHALL BE PROVIDED TO ALLOW ACCESS TO THE DETENTION POND.

ALL REBAR SPLICES AND LAPS SHALL BE A MINIMUM OF 40 BAR DIAMETERS UNLESS OTHERWISE SPECIFIED.

UPON COMPLETION OF CONSTRUCTION, AND IN ACCORDANCE WITH TCEQ REGULATIONS, ALL PERMANENT BMP'S (FILTERSTRIPS AND BASIN) MUST BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER.

ALL AREAS DISTURBED AS PART OF CONSTRUCTION OF BASIN SHALL BE REVEGETATED PRIOR TO COMPLETION.

UPON COMPLETION OF CONSTRUCTION, AND IN ACCORDANCE WITH TCEQ REGULATIONS, ALL PERMANENT BMP'S MUST BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER.

| Overall Site Discharge Summary | | | |
|---|---|---|---|
| Discharge at Pond 3 Outfall (AP 030) | | | |
| 100 YR Storm Event | Pre-Development | Post Development | Reduction |
| Peak Discharge (cfs) | 446.50 | 444.60 | 1.9 |

## POND 3 WEIR ANALYSIS

$Q_{100}$ = 444.60 c.f.s.

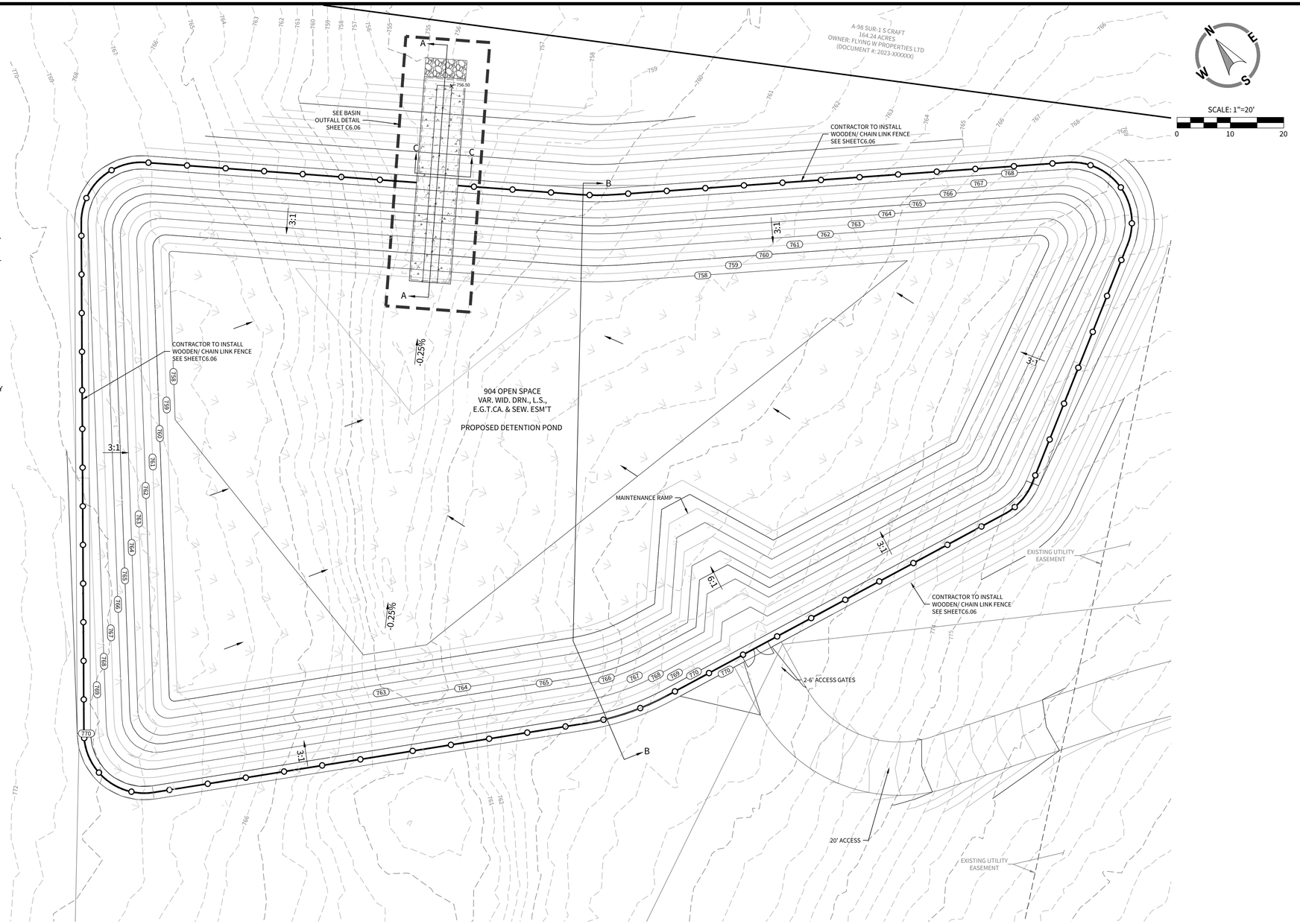
H = 8.70 ft

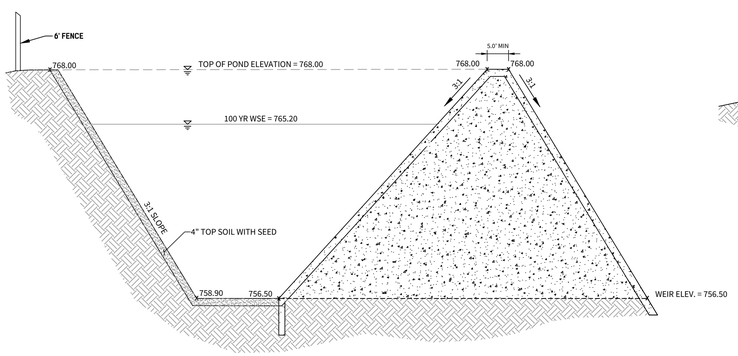
$C_{SCW}$ = 3.33 C.F.S.

$L = Q_{100} / C_{SCW} * H^{1.5}$

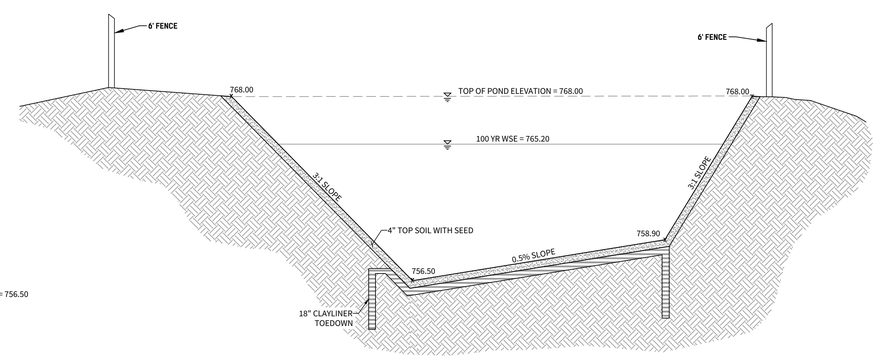
$L_{NEED}$ = 5.20 ft

$L_{PROVIDED}$ = 5.50 ft

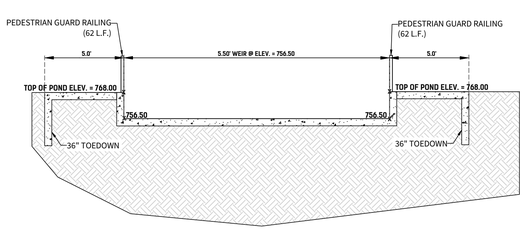



**SECTION A-A**
N.T.S.




**SECTION B-B**
N.T.S.




**SECTION C-C**
N.T.S.

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.

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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 3

DETENTION POND PLAN - POND 3

DATE
03/28/2024

PROJECT NO.
04024-004

DRAWN BY
CG/AM/JG/WDS

CHECKED BY
JC/AL

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

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

C6.05

P:\04024\SOLO 2\SHEETS\Sheet\05_C6.05_DETENTION POND PLAN - POND 3.dwg 3/28/2024 3:54pm trianr

## NOTES TO CONTRACTOR

**(EACH PHASE OF BASIN CONSTRUCTION)**

1. CONTRACTOR SHALL NOTIFY CERTIFYING ENGINEER WHEN BASIN CONSTRUCTION HAS PROGRESSED TO THE FOLLOWING MILESTONES:

   - REINFORCING STEEL FOR BASIN OVERFLOW WALL HAS BEEN SET, CONCRETE HAS NOT BEEN PLACED AND DRAIN PIPE AND RISER PIPE IS IN PLACE. CONTRACTOR SHALL PROVIDE ENGINEER WITH SURVEY DATA WHICH DEMONSTRATES THE RISER PIPE HAS BEEN SET AT PROPER ELEVATION AND GRADE.

   - BASIN HAS BEEN COMPLETELY FINISHED INCLUDING SOD OR SEED PLACEMENT ON SIDE SLOPES (WHERE APPLICABLE)

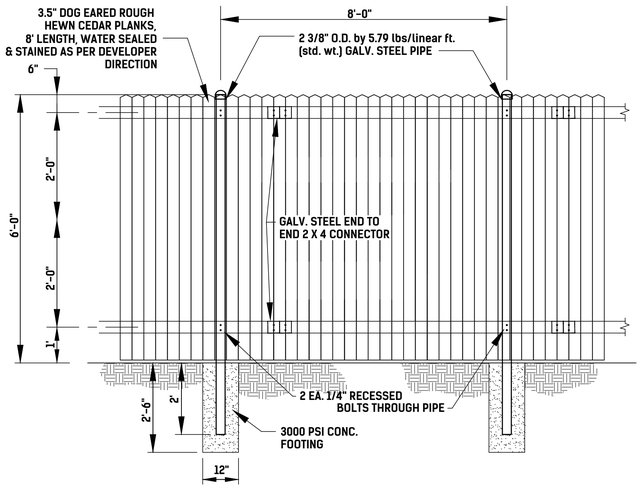
2. CONTRACTOR IS ADVISED THAT TCEQ DOES NOT ALLOW CHANGES TO PERMANENT POLLUTION ABATEMENT MEASURES WITHOUT THEIR APPROVAL.

3. UPON SUBSTANTIAL COMPLETION, OR AS REQUIRED BY ENGINEER, CONTRACTOR TO PROVIDE CERTIFYING ENGINEER WITH FIELDS SHOTS VERIFYING ELEVATIONS OF THE FOLLOWING:

   - TOP OF BANK/WALL AT EACH CORNER OF BASIN
   - TOE OF SLOPE AT EACH CORNER OF BASIN (INSIDE BASIN TOE)
   - OVERFLOW WEIRS

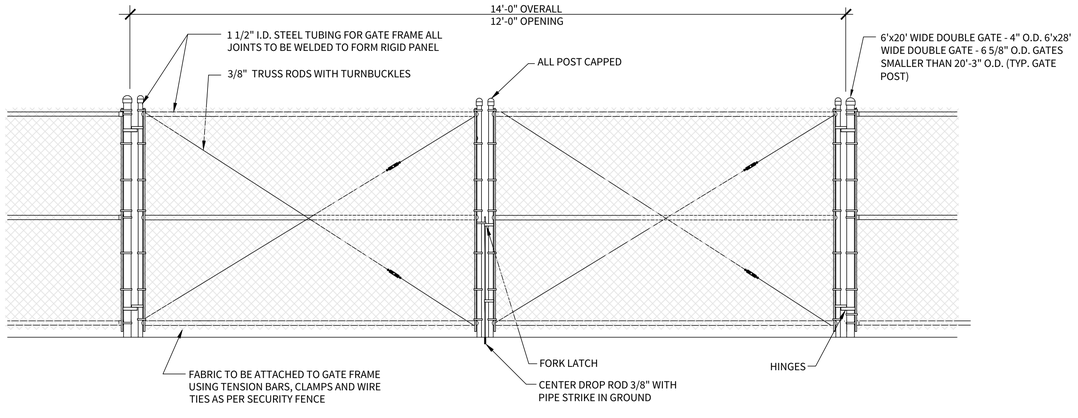
4. WORK SHALL NOT CONTINUE ON THE BASIN UNTIL THE ENGINEER HAS HAD AN OPPORTUNITY TO OBSERVE THE STATUS OF CONSTRUCTION AT EACH STAGE. CONTRACTOR SHALL PROVIDE ENGINEER A MINIMUM OF 24 HOURS ADVANCE NOTICE PRIOR TO TIME THE BASIN WILL BE AT THE REQUIRED STAGE.

5. BEFORE FINAL ACCEPTANCE OF CONSTRUCTION BY THE OWNER, THE CONTRACTOR WILL REMOVE ALL TRASH, DEBRIS AND ACCUMULATED SILT FROM THE BASINS AND REESTABLISH THEM TO THE PROPER OPERATING CONDITION.




## WOODEN PRIVACY FENCE DETAIL

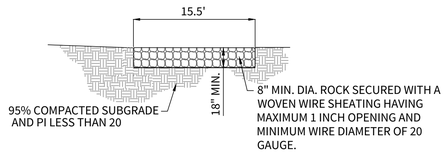
NTS




## CHAIN LINK FENCE GATE DETAIL

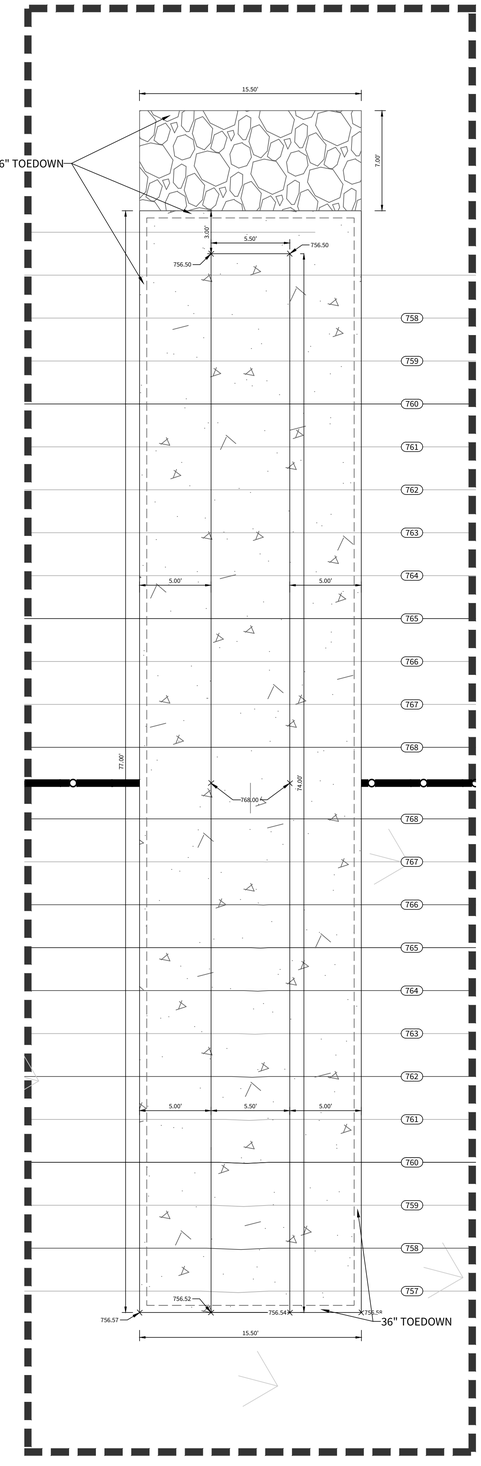
NTS

| POND 3 RESULTS TABLE | | |
|---|---|---|
| EVENTS | PEAK WSEL (FT) | PEAK DETENTION STORAGE (Ac-FT) |
| 100 YR | 765.2 | 7.6 |




## GABION STYLE ROCK EROSION CONTROL MATRESS DETAIL

NOTE: GABION MATTRESS TO BE FREE OF GEO-TEXTILE FABRIC LINING.
(N.T.S.)




## BASIN OUTFALL DETAIL

SCALE : 1" = 5'


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**FLYING W UNIT 3**

DETENTION POND PLAN - POND 3

**DATE**
03/26/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

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

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

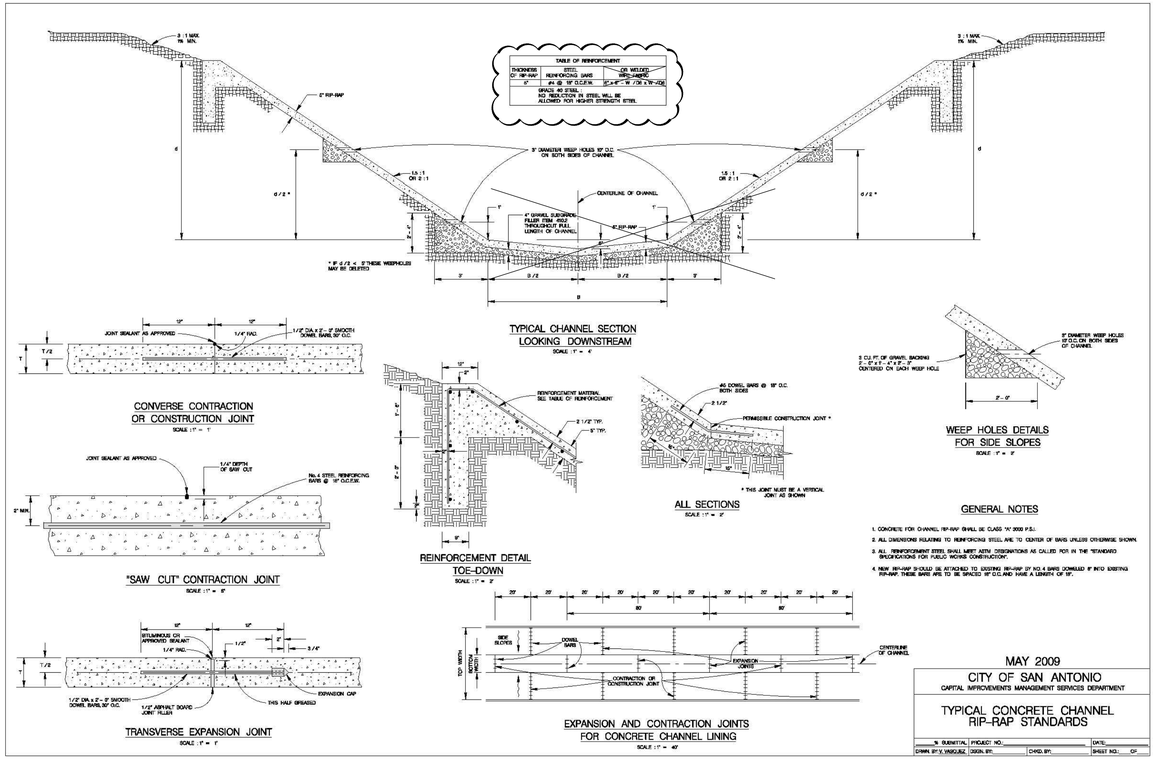
CUDE ENGINEERS
TBPELS No. 10048500

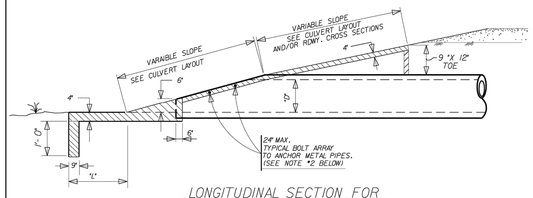
**C6.06**


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.

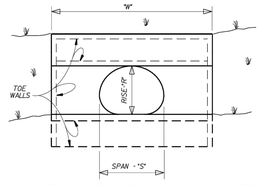


P:\04024\05\2-DWG\2-Plans\05_C6.06 DETENTION POND PLAN - POND 3.dwg 2024/03/26 1:14pm hvane

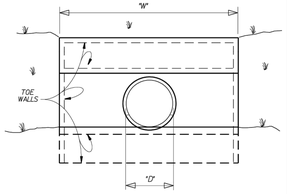



LONGITUDINAL SECTION FOR CIRCULAR & ARCH PIPES




SINGLE C.M.P. ARCH PIPE CULVERT



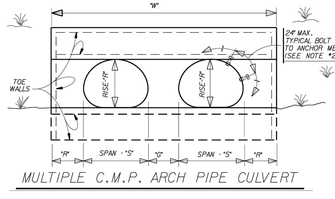

SINGLE CIRCULAR PIPE CULVERT

(CMP or RCP)

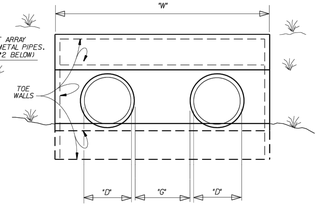
DIMENSIONS FOR CIRCULAR (CMP and RCP) PIPE CULVERTS

| "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.




MULTIPLE C.M.P. ARCH PIPE CULVERT




MULTIPLE CIRCULAR PIPE CULVERT

(CMP or RCP)

DIMENSIONS FOR C.M.P. ARCH PIPE CULVERTS

| DESIGN SIZE | APPROX. ARCH DIM. SPAN "S" | RISE "R" | "L" | "G" | SINGLE | DOUBLE | TRIPLE | QUADRUPLE |
|---|---|---|---|---|---|---|---|---|
| | | | | | "W" | | | |
| 2 | 27" | 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'-8" | 16'-1" | 20'-6" |
| 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

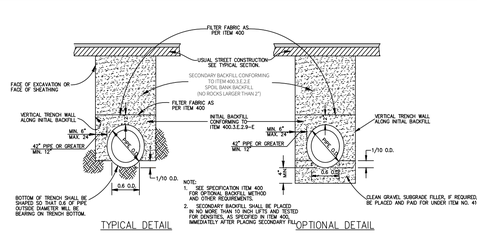
RIPRAP HEADWALL

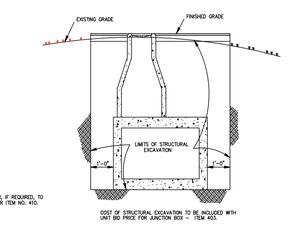
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| FED.RD. DIV.NO. | PROJECT NO. | | SHEET NO. |
|---|---|---|---|
| 6 | | | |
| STATE | STATE DIST. | COUNTY | |
| TEXAS | SAT | | |
| CONT. | SECT. | JOB | HIGHWAY NO. |
| | | | |

10/95

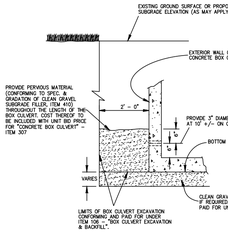
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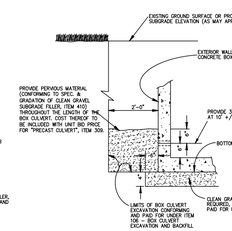


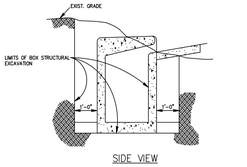

STRUCTURAL EXCAVATION AT JUNCTION BOXES

NO SCALE




CONCRETE BOX CULVERT




STRUCTURAL EXCAVATIONS AT DRAINAGE INLETS

NO SCALE

MAY 2009

CITY OF SAN ANTONIO

CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

PIPE BEDDING & MISCELLANEOUS DRAINAGE DETAILS

% SUBMITTAL
PROJECT NO.
DATE:
DRAWN BY:
DESIGN BY:
CHKD. BY:
SHEET NO.: OF

CUDEENGINEERS.COM

CUDE ENGINEERS

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

FLYING W
UNIT 3

CONCRETE RIP-RAP & MISC. DRAINAGE DETAILS

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

DATE
03/26/2024

PROJECT NO.
04024-004

DRAWN BY
CG/AM/JG/WDS

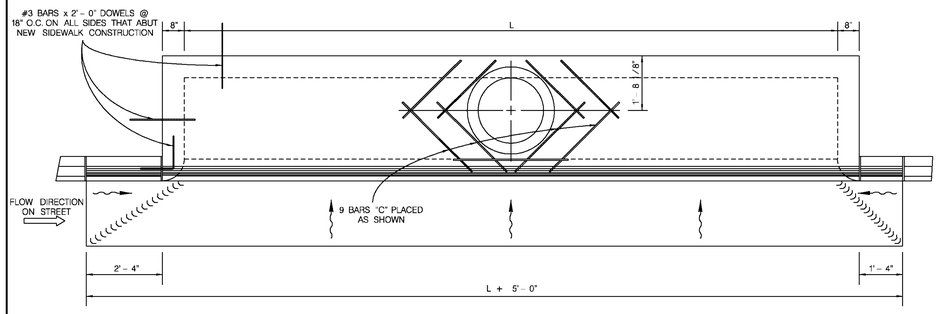
CHECKED BY
JC/AL

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

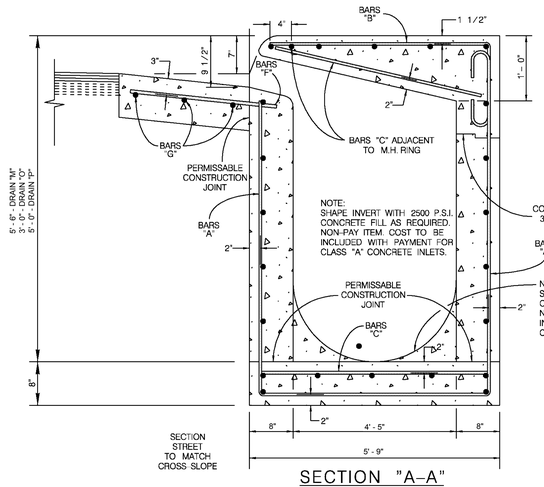
C6.D1

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.



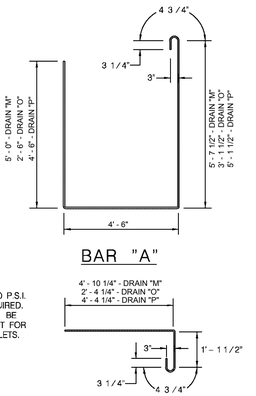

PLAN VIEW

SCALE : 1" = 2'




SECTION "A-A"

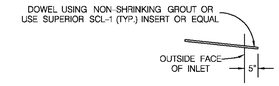
SCALE : 1" = 1'



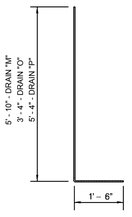

BAR "A"




BAR "B"




BAR "F"



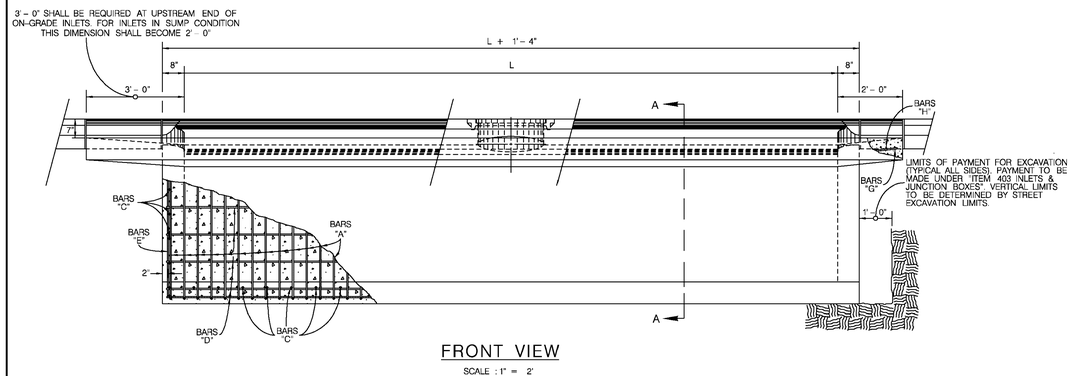

BAR "E"

| INLET LENGTH | REINFORCING STEEL SCHEDULE | | | | | | |
|---|---|---|---|---|---|---|---|
| | BAR | No. | Size | Spa. | Length | Weight lbs. |
| DRAIN "M" L= 10' DEPTH= 5.5' | A | 27 | 4 | 5' o.c. | 15' 9 1/2" | 284.82 |
| | B | 27 | 4 | 5" | 6' 7 3/4" | 119.86 |
| | C | 38 | 4 | 9" | 4' 6" | 114.23 |
| | D | 25 | 4 | 10" | 11' 1" | 185.09 |
| | E | 12 | 4 | 10 1/2" | 7' 4" | 58.78 |
| | F | 12 | 5 | 12" | 2' 3" | 28.16 |
| | G | 3 | 4 | 12" | 14' 8" | 29.39 |
| | H | 5 | 5 | 12" | 1' 8" | 8.69 |
| *Concrete Total = 6.62 C.Y. | Manhole Casting = 260 lbs. | | | | Steel Total = 1089.03 lbs. | |

| INLET LENGTH | REINFORCING STEEL SCHEDULE | | | | | | |
|---|---|---|---|---|---|---|---|
| | BAR | No. | Size | Spa. | Length | Weight lbs. |
| DRAIN "O" L= 10' DEPTH= 3' | A | 27 | 4 | 5' o.c. | 10' 9 1/2" | 194.64 |
| | B | 27 | 4 | 5" | 4' 1 3/4" | 74.77 |
| | C | 33 | 4 | 9" | 4' 6" | 99.20 |
| | D | 20 | 4 | 10" | 11' 1" | 148.07 |
| | E | 12 | 4 | 10 1/2" | 4' 10" | 38.74 |
| | F | 12 | 5 | 12" | 2' 3" | 28.16 |
| | G | 3 | 4 | 12" | 14' 8" | 29.39 |
| | H | 5 | 5 | 12" | 1' 8" | 8.69 |
| *Concrete Total = 4.79 C.Y. | Manhole Casting = 260 lbs. | | | | Steel Total = 881.67 lbs. | |

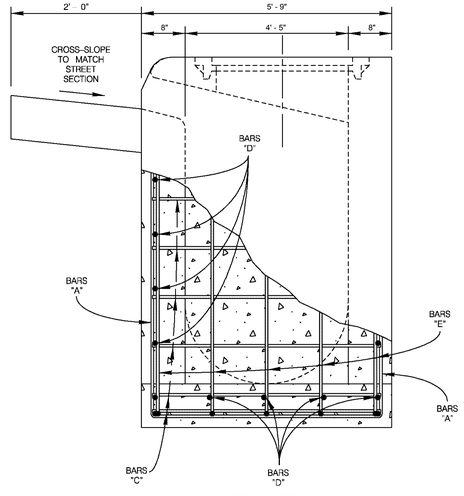
| INLET LENGTH | REINFORCING STEEL SCHEDULE | | | | | | |
|---|---|---|---|---|---|---|---|
| | BAR | No. | Size | Spa. | Length | Weight lbs. |
| DRAIN "P" L= 15' DEPTH= 5' | A | 39 | 4 | 5' o.c. | 14' 9 1/2" | 385.35 |
| | B | 39 | 4 | 5" | 6' 1 3/4" | 160.11 |
| | C | 43 | 4 | 9" | 4' 6" | 129.26 |
| | D | 24 | 4 | 10" | 16' 1" | 257.85 |
| | E | 12 | 4 | 10 1/2" | 6' 10" | 54.78 |
| | F | 17 | 5 | 12" | 2' 3" | 39.89 |
| | G | 3 | 4 | 12" | 19' 8" | 39.41 |
| | H | 5 | 5 | 12" | 1' 8" | 8.69 |
| *Concrete Total = 8.7 C.Y. | Manhole Casting = 260 lbs. | | | | Steel Total = 1335.34 lbs. | |

* THESE FIGURES DO NOT EXCLUDE CONCRETE & STEEL INTERCEPTED BY MANHOLE AND REINFORCED CONC. PIPE
* INCLUDES CONCRETE GUTTER FOR ON GRADE INLET. REDUCE BY .06 C.Y. FOR INLETS IN SUMP.



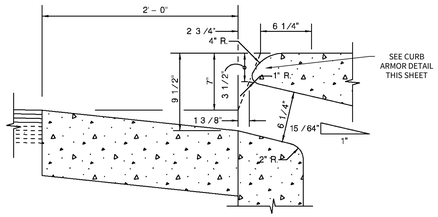

FRONT VIEW

SCALE : 1" = 2'



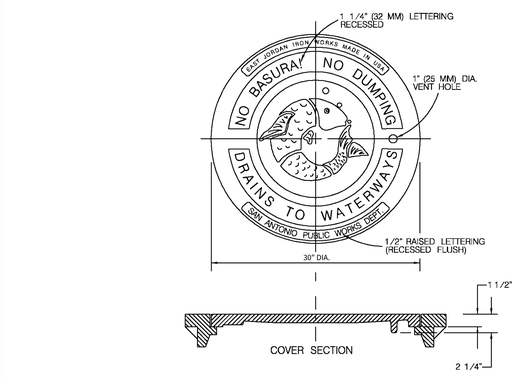

SIDE VIEW

SCALE : 1" = 1'




OPENING DETAIL FOR CURB SECTION

SCALE : 1" = 6"

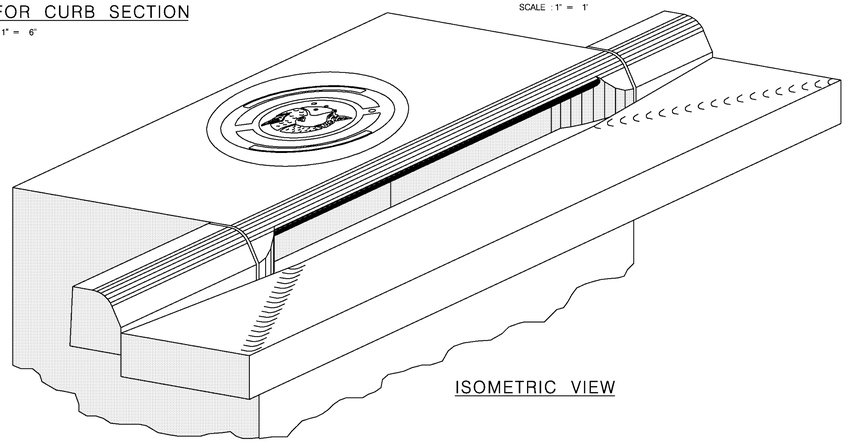



MANHOLE LID & RING DETAIL (ITEM 409)

SCALE : 1" = 8"

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.



ISOMETRIC VIEW

GENERAL NOTES

1. ALL BARS INTERCEPTING MANHOLE RING & REINFORCING CONCRETE PIPE SHALL BE FIELD CUT.
2. CONCRETE FOR STRUCTURES SHALL BE CLASS "A", 3000 PSI IN 28 DAYS.
3. ALL DIMENSIONS RELATING TO REINFORCING STEEL ARE TO CENTER BARS.
4. ALL EXPOSED CORNERS SHALL BE CHAMFERED TO 3 / 4"
5. CONSTRUCTION JOINT SHOWN AT FLOWLINE MAY BE RAISED A MAXIMUM OF 6" AT THE CONTRACTOR'S DISCRETION. ADJUST LENGTH OF VERTICAL STEEL AS REQUIRED.
6. ALL REINFORCING STEEL SHALL CONFORM TO A.S.T.M. A 615, GRADE 60 REQUIREMENTS.
7. INVERT OF DROP INLET TO BE SHAPED WITH CONCRETE FILL TO AFFECT DRAINAGE TO OUTLET PIPE.
8. DELETE 4 "C" BARS FROM SCHEDULE QUANTITIES IF MANHOLE RING AND COVER ARE PLACED AT END OF INLET.
9. 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.
10. PAYMENT FOR ALL EXCAVATION, BACK FILLING, CONCRETE, REINFORCING STEEL, RING AND COVER SHALL BE INCLUDED IN THE UNIT COST OF ITEM 403 "STORM SEWER JUNCTION BOXES AND INLETS".

JANUARY 2005

STANDARD PLANS
CITY OF SAN ANTONIO, TEXAS
DEPARTMENT OF PUBLIC WORKS

TYPE "C" INLET DETAILS

| DRAWN BY: V. VASQUEZ | DATE | REVISIONS | SCALE: SEE ABOVE |
|---|---|---|---|
| CHECKED BY: NAT HARDY, P.E. | | | DATE: |
| | | | SHEET: OF |

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

FLYING W UNIT 3

TYPE C CURB INLET CAST IN PLACE DRAINAGE DETAILS

DATE 03/26/2024
PROJECT NO. 04024-004
DRAWN BY CG/AM/JG/WDS
CHECKED BY JC/AL

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

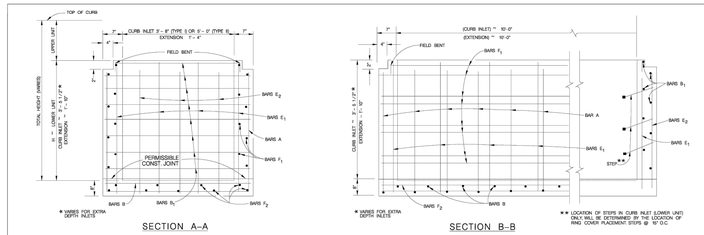
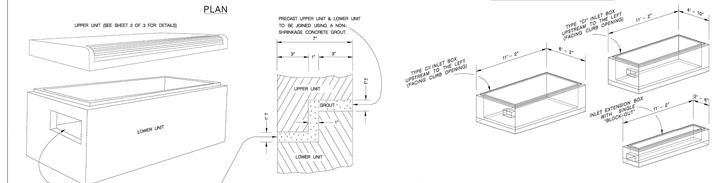
STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

C6.D2

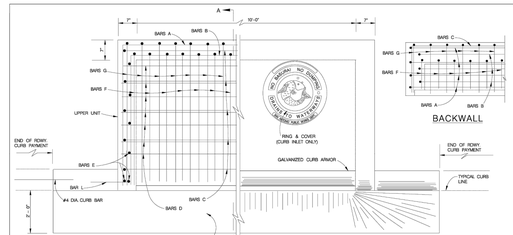
P:\PROJECTS\04024_UNIT 3 (FLYING W)\CAD\C6.D2 TYPE C CURB INLET CAST IN PLACE DRAINAGE DETAILS.dwg 2024/03/26 3:56pm frankm

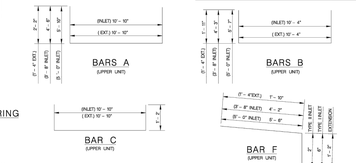
REPRODUCTION OF THE ORIGINAL SIGNED AND SEALED PLAN AND/OR ELECTRONIC MEDIA MAY HAVE BEEN INADVERTENTLY ALTERED. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE SCALE OF THE DOCUMENT AND CONTACTING CUDE ENGINEERS TO VERIFY DISCREPANCIES PRIOR TO CONSTRUCTION.

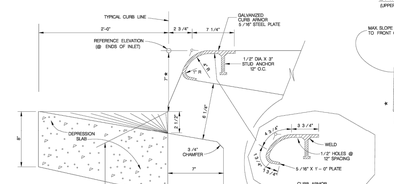

TOP OF CURB
CURB INLET 3'-9" (TYPE I) OR 5'-0" (TYPE II) EXTENSION 1'-0"
FIELD BENT
PERMISSIBLE CONST JOINT
BARS E2
BARS E1
BARS A
BARS F1
BARS B1
BARS F2
* VARIES FOR EXTRA DEPTH INLETS
SECTION A-A
(CURB INLET) = 10'-0" (EXTENSION) = 10'-0"
BARS B1
BARS A
BARS E2
BARS E1
BARS F2
BARS B
** LOCATION OF STEPS IN CURB INLET (LOWER UNIT) ONLY, WILL BE DETERMINED BY THE LOCATION OF RING COVER PLACEMENT STEPS @ 16" O.C.
SECTION B-B
BARS E1
BARS F1
BARS A
BARS B
BARS E2
BARS E
BARS F2
FLOOR STEEL
WALL STEEL
PLAN
SEE NOTE 2
JOINT
H=S+T+4" (11" MIN.)
S=DEPTH OF PAVEMENT SECTION
T="PLATE" THICKNESS
5" MINIMUM
PHASE CONSTRUCTION
NOTES FOR PHASE CONSTRUCTION (WHEN DIRECTED BY THE ENGINEER):
1. THE CURB INLET AND EXTENSION SHALL BE CONSTRUCTED TO A DEPTH "H1" 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 PAVING OVERLAY, SAW CUT THE PAVEMENT, REMOVE THE PLATE AND CONCRETE, TAB 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'-8"
B1 | VARIES | #4 | 12" | 4'-8"
E1 | 22 | #4 | 12" | VARIES
E2 | 6 | #4 | 12"± | VARIES
F1 | VARIES | #4 | 12"± | 10'-10"
F2 | 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"
B1 | VARIES | #4 | 12" | 5'-10"
E1 | 22 | #4 | 12"± | VARIES
E2 | 8 | #4 | 12"± | VARIES
F1 | VARIES | #4 | 12"± | 10'-10"
F2 | 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 (L-C).
2. TYPE C-4 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 409 "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 BENT.
17. ALL LOWER UNITS SHALL RECEIVE INVERT MORTAR SHAPING.
18. PIPE BLOCKOUTS IN INLET WALLS SHOULD NOT EXCEED 9" BEYOND THE OUTER SHELL OF THE PIPE, TAKING INTO ACCOUNT THE SIZE OF THE PIPE AS NECESSARY. CONSTRUCTION JOINT MAY BE PAIRED A MAXIMUM OF 9".


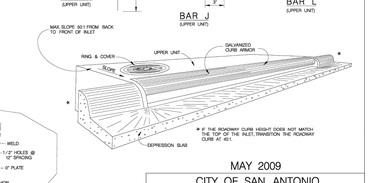


MAY 2009
CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT
TYPE "C" INLET (TYPE I & II) & INLET EXTENSION STANDARDS
SHEET 1 OF 3
% SUBMITTAL | PROJECT NO.: | DATE:
DRAWN BY: V. VASQUEZ | DESIGN BY: L.E. MALTOS, P.E. | CHKD. BY: R.S. HOSSEIN, P.E. | SHEET NO.: ___ OF ___

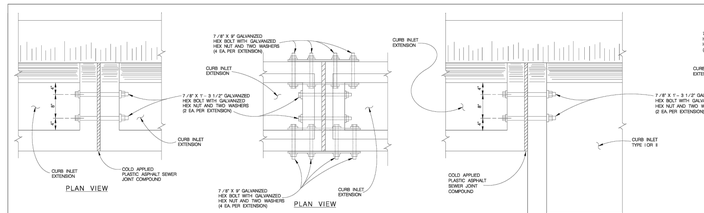


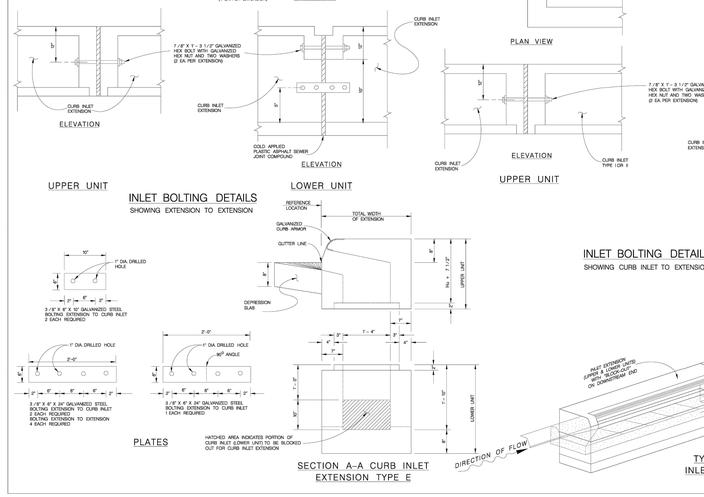
REINFORCING STEEL (FOR Hu=11")
UPPER UNIT 10' X 3'-8" (TYPE I)
BAR | NO. | SIZE | SPAC. | LENGTH | WEIGHT
A | 4 | #4 | ---- | 19'-05" | 53
B | 3 | #4 | ---- | 18'-10" | 38
C | 5 | #4 | 11" | 13'-2" | 44
D | 7 | #4 | 6" | 10'-05" | 51
E | 12 | #4 | 11" | 1'-2" | 9
F | 21 | #6 | 6" | 2'-0" | 63
G | 22 | #6 | 6" | 5'-8" | 187
H | 4 | #4 | ---- | 10'-05" | 29
J | 12 | #4 | 12" | 2'-6" | 20
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 | ---- | 23'-6" | 60
B | 3 | #4 | ---- | 21'-6" | 43
C | 7 | #4 | 11" | 15'-2" | 62
D | 11 | #4 | 6" | 10'-10" | 80
E | 18 | #4 | 11" | 1'-2" | 13
F | 25 | #6 | 6" | 4'-0" | 179
G | 22 | #6 | 6" | 7'-0" | 231
H | 4 | #4 | ---- | 10'-10" | 29
J | 12 | #4 | 12" | 2'-6" | 20
L | 4 | #4 | ---- | 2'-0" | 5
M | 3 | #4 | ---- | 14'-8" | 29
TOTAL WEIGHT | | | | | 769 LBS.
1 1/4" (32 MM) LETTERING RECESSED
7" (25 MM) DIA. VENT HOLE
NO BASURA/NO DUMPING
DRAINS TO WATERWAYS
1/2" RAISED LETTERING (RECESSED FLUSH)
DIA.= 29 1/4"
SOLID COVER
MANHOLE
6" MIN.
4 1/4" MIN.
30" MAX. DIA.
DIA.= 23 3/4"
CLEAR OPENING DIA.= 22"
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 360 LBS.
SEE SHEET 1 OF 3 FOR GENERAL NOTES.
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
5' EXTENSION | 1.0






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:
DRAWN BY: V. VASQUEZ | DESIGN BY: L.E. MALTOS, P.E. | CHKD. BY: R.S. HOSSEIN, P.E. | SHEET NO.: ___ OF ___



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" | 28
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
B1 | 3 | #4 | 12" | 2' - 2" | 4
E1 | 18 | #4 | 18" ± | 2' - 3" | 27
E2 | 4 | #4 | 18" ± | 2' - 1" | 6
F1 | 18 | #4 | 12" ± | 10' - 10" | 116
F2 | 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.


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:
DRAWN BY: V. VASQUEZ | DESIGN BY: L.E. MALTOS, P.E. | CHKD. BY: R.S. HOSSEIN, P.E. | SHEET NO.: ___ OF ___


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


FLYING W
UNIT 3

TYPE C CURB INLET PRECAST DRAINAGE DETAILS

DATE
03/26/2024
PROJECT NO.
04024-004
DRAWN BY
CG/AM/JG/WDS
CHECKED BY
JC/AL

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

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024
CUDE ENGINEERS
TBPELS No. 10048500

C6.D3

P:\2024\04024_UNIT 3\DWG\SUB\3 TYPE C CURB INLET PRECAST DRAINAGE DETAILS.dwg, 2024.03.26 1:37:31pm, hossein


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

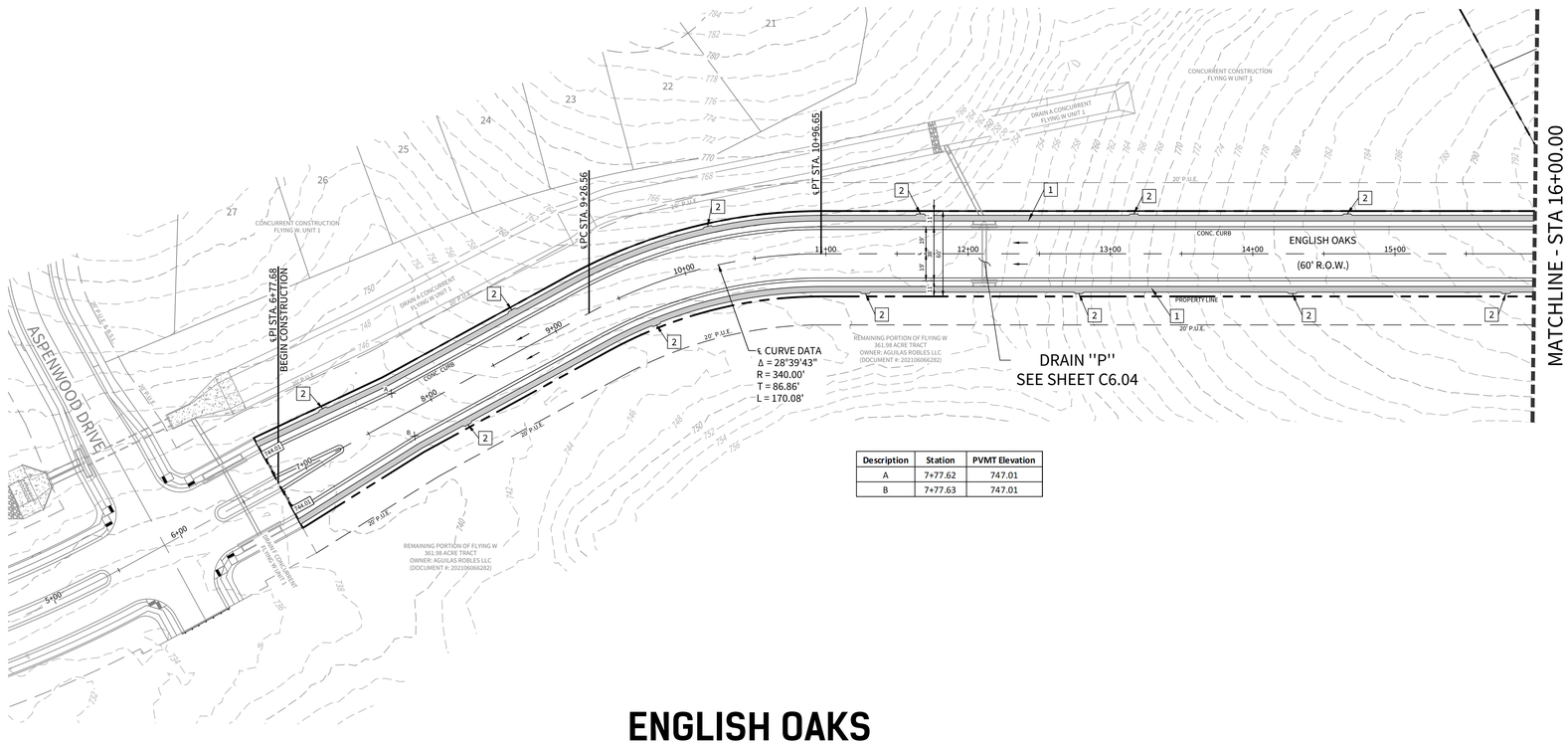
XXXX.XX$_a$ PROPOSED ASPHALT PAVEMENT ELEVATION

KEYNOTES:

1 CONTRACTOR TO INSTALL SIDEWALK WITH INFRASTRUCTURE

2 CONTRACTOR TO INSTALL 5' X 5' SIDEWALK PASSING SPACE WITH HOMEBUILDING

1) CONTRACTOR TO ENSURE OF A MINIMUM 20' SPACING BETWEEN DRIVEWAYS IN KNUCKLE SAC/CUL-DE-SAC AREAS.




| Description | Station | PVMT Elevation |
|---|---|---|
| A | 7+77.62 | 747.01 |
| B | 7+77.63 | 747.01 |

**LEGEND**

STREET WASHOUT (SEE SHEET C7.D1)

SIDEWALK TO BE CONSTRUCTED WITH INFRASTRUCTURE

SIDEWALK TO BE CONSTRUCTED WITH HOME BUILDING

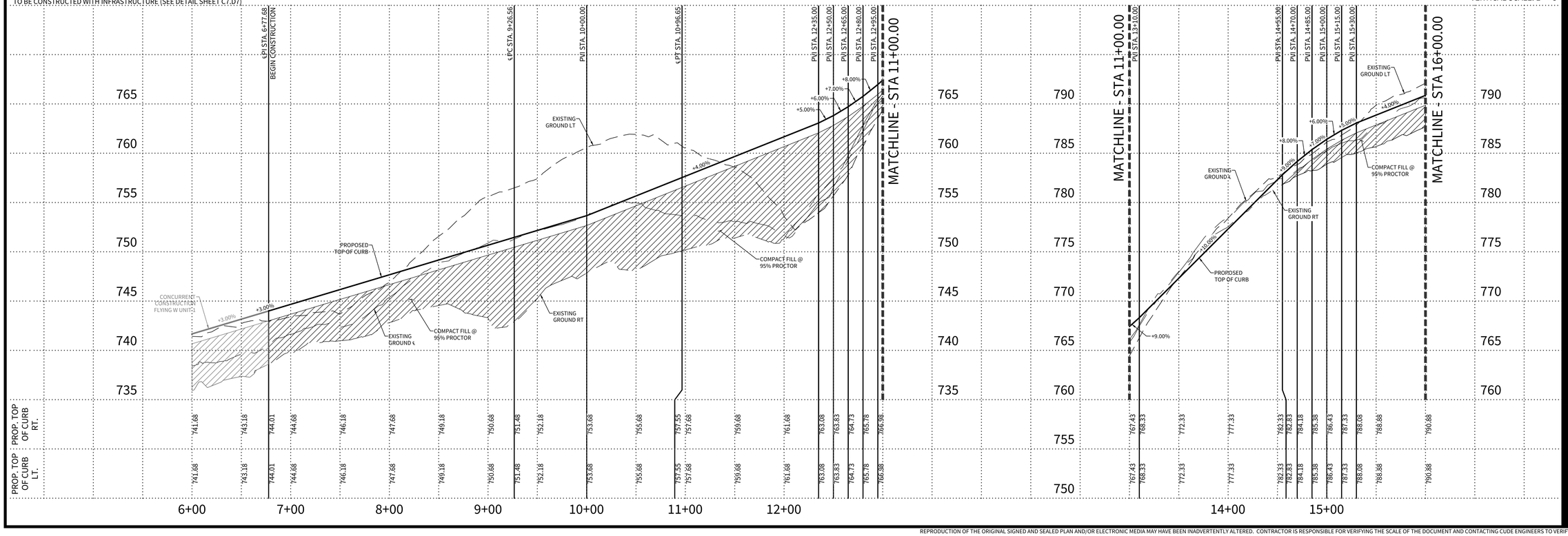
SPEED LIMIT DESIGNATED BY STREET TYPE;
RESIDENTIAL 20 MPH
RESIDENTIAL COLLECTOR 30 MPH
MINOR COLLECTOR 35 MPH
TxDOT TYPE "2" WHEEL CHAIR RAMPS ARE INDICATED THUS " " OR " " UNLESS OTHERWISE NOTED. (SHEET C7.D7)
FOR ADA RAMPS AT SIDEWALK INTERSECTIONS
TYPE "10" DIRECTIONAL WHEEL CHAIR RAMPS ARE INDICATED
THUS " " OR " " UNLESS OTHERWISE NOTED.

FOR ADA RAMPS AT SIDEWALK INTERSECTIONS .
DETECTABLE WARNING PAVER WITH TRUNCATED DOMES ONLY. ADA RAMPS TO BE CONSTRUCTED WITH INFRASTRUCTURE (SEE DETAIL SHEET C7.D7)

# ENGLISH OAKS

STA. 6+77.68 TO STA. 16+00.00

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





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EST. 1980 CUDE ENGINEERS



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


**FLYING W UNIT 3**

STREET PLAN & PROFILE - ENGLISH OAKS

**DATE**
03/26/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

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

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

**C7.00**


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ELEVATIONS:

XXXX.XX PROPOSED TOP OF CONCRETE CURB ELEVATION

XXXX.XX$_{a}$ PROPOSED ASPHALT PAVEMENT ELEVATION

KEYNOTES:

1. CONTRACTOR TO INSTALL SIDEWALK WITH INFRASTRUCTURE
2. CONTRACTOR TO CONSTRUCT ADA RAMP WITH INFRASTRUCTURE
3. CONTRACTOR TO INSTALL 5' X 5' SIDEWALK PASSING SPACE WITH HOMEBUILDING

1) CONTRACTOR TO ENSURE OF A MINIMUM 20' SPACING BETWEEN DRIVEWAYS IN KNUCKLE SAC/CUL-DE-SAC AREAS.

**LEGEND**

STREET WASHOUT (SEE SHEET C7.D1)

SIDEWALK TO BE CONSTRUCTED WITH INFRASTRUCTURE

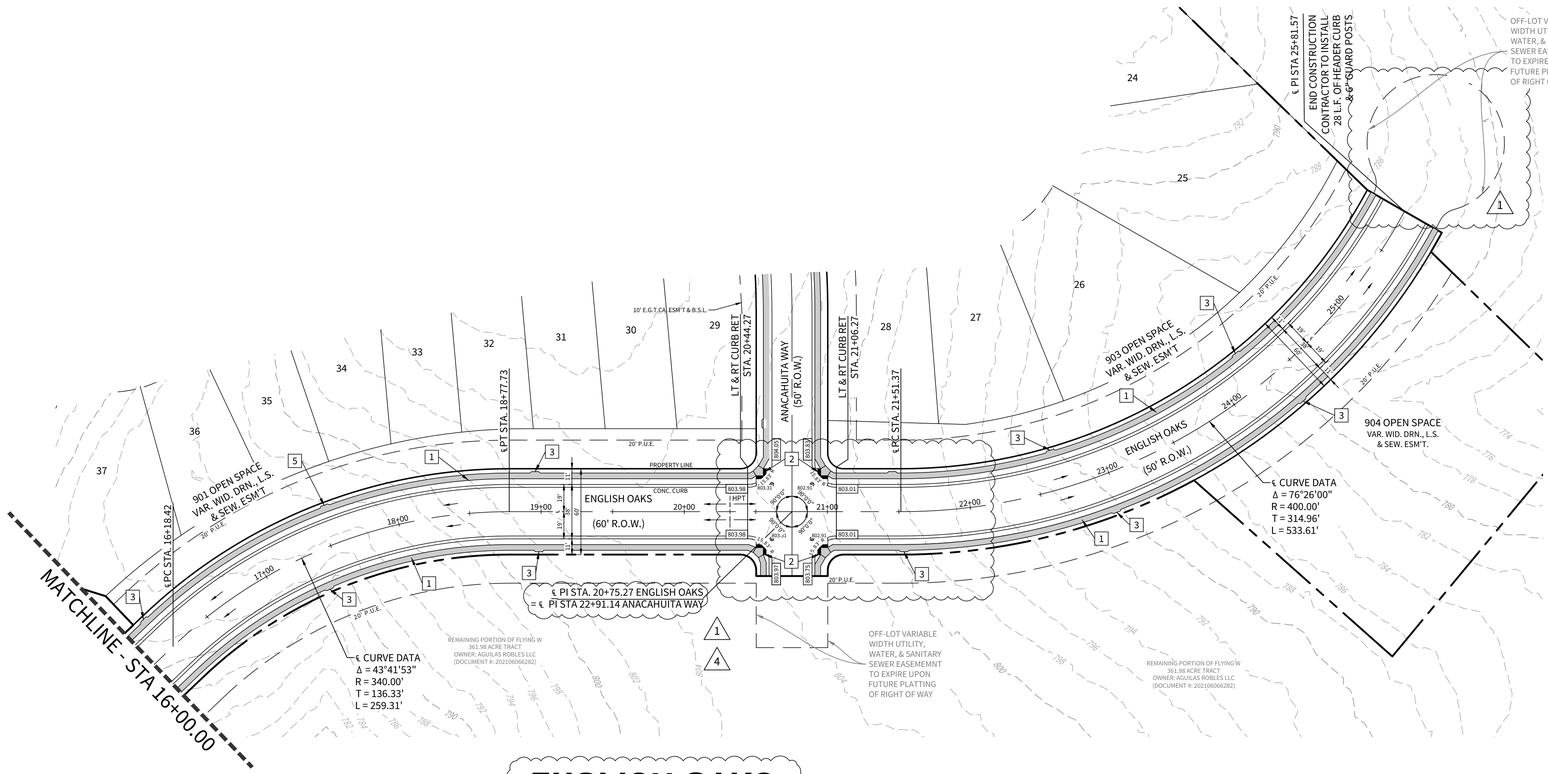
SIDEWALK TO BE CONSTRUCTED WITH HOME BUILDING

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.

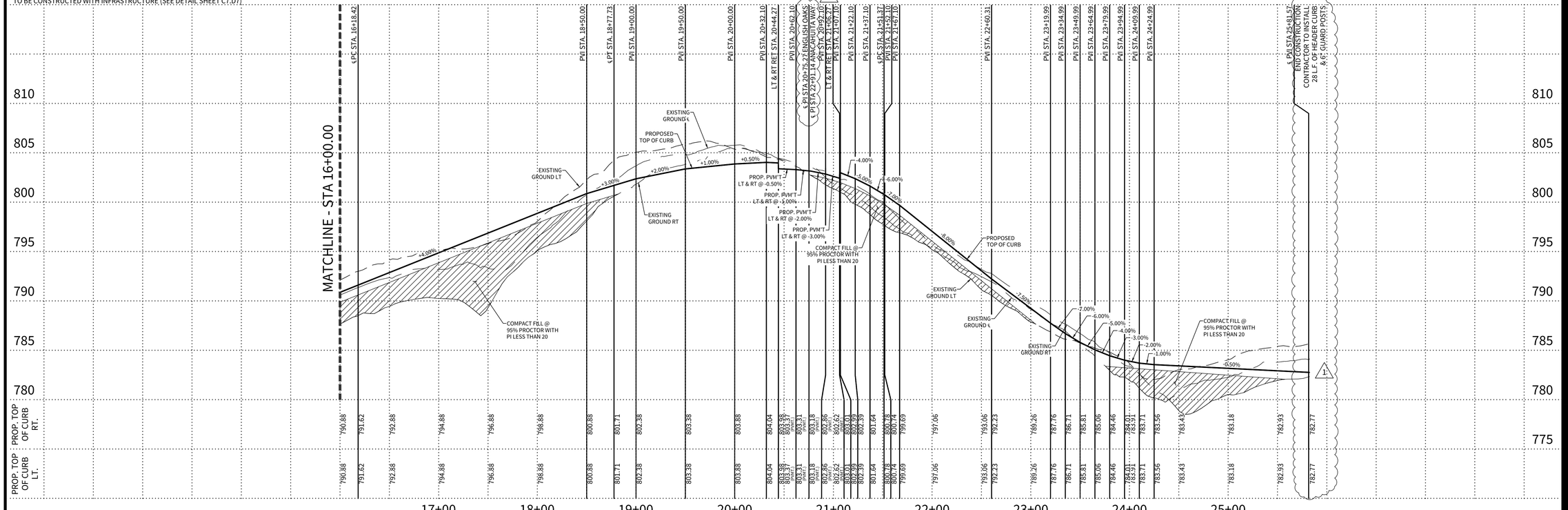
FOR ADA RAMPS AT SIDEWALK INTERSECTIONS .
DETECTABLE WARNING PAVER WITH TRUNCATED DOMES ONLY. ADA RAMPS TO BE CONSTRUCTED WITH INFRASTRUCTURE (SEE DETAIL SHEET C7.D7)




# ENGLISH OAKS

STA. 16+00.00 TO STA. END

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





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CUDE ENGINEERS

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


**FLYING W UNIT 3**

STREET PLAN & PROFILE - ENGLISH OAKS

**DATE**
03/26/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

**REVISIONS**
1. 05/30/23 - REVISED CURB RETURN RADII LABELS, REVISED STREET NAMES, ADDED STREET NAMES TO CROSS SECTIONS
2. ADDED POINT TABLE, UPDATED KEYNOTES, ADDED CROSS GUTTERS, ADJUSTED FINAL PVI, ADDED VAR. WIDTH UTILITY EASEMENT
3.
4. 03/25/24 - REMOVED VALLEY GUTTERS
5.
6.
7.
8.

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

**C7.01**


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.



C:\DOCS\FOR_UNIT 3\DWG\C7.01 STREET PLAN & PROFILE - ENGLISH OAKS.dwg, 3/26/2024 3:43pm Tristin

## ELEVATIONS:

XXXX.XX PROPOSED TOP OF CONCRETE CURB ELEVATION

XXXX.XX$_{ASPH}$ PROPOSED ASPHALT PAVEMENT ELEVATION

## KEYNOTES:

1. CONTRACTOR TO INSTALL SIDEWALK WITH INFRASTRUCTURE
2. CONTRACTOR TO INSTALL SIDEWALK WITH HOME BUILDING
3. CONTRACTOR TO CONSTRUCT ADA RAMP WITH INFRASTRUCTURE
4. BEGIN WASHOUT STA. 8+18.58 PVMT. ELEV. RT= 821.58 PVM'T. ELEV. LT= 821.59
5. END WASHOUT STA. 9+30.71 PVM'T. ELEV. = 821.16
6. CONTRACTOR TO INSTALL 5' X 5' SIDEWALK PASSING SPACE WITH HOMEBUILDING
7. BEGIN STREET TRANSITION FROM RESIDENTIAL COLLECTOR TO RESIDENTIAL(SEE POINT AND LINE TABLE)
8. END STREET TRANSITION FROM RESIDENTIAL COLLECTOR TO RESIDENTIAL(SEE POINT AND LINE TABLE)

1

1) CONTRACTOR TO ENSURE OF A MINIMUM 20' SPACING BETWEEN DRIVEWAYS IN KNUCKLE SAC/CUL-DE-SAC AREAS.

| Point | Elevation | Description |
|---|---|---|
| A | 821.070' | PVMT |
| B | 820.690' | PVMT |
| C | 820.880' | PVMT |
| D | 822.070' | PVMT |

1

**LEGEND**

STREET WASHOUT (SEE SHEET C7.D1)

SIDEWALK TO BE CONSTRUCTED WITH INFRASTRUCTURE

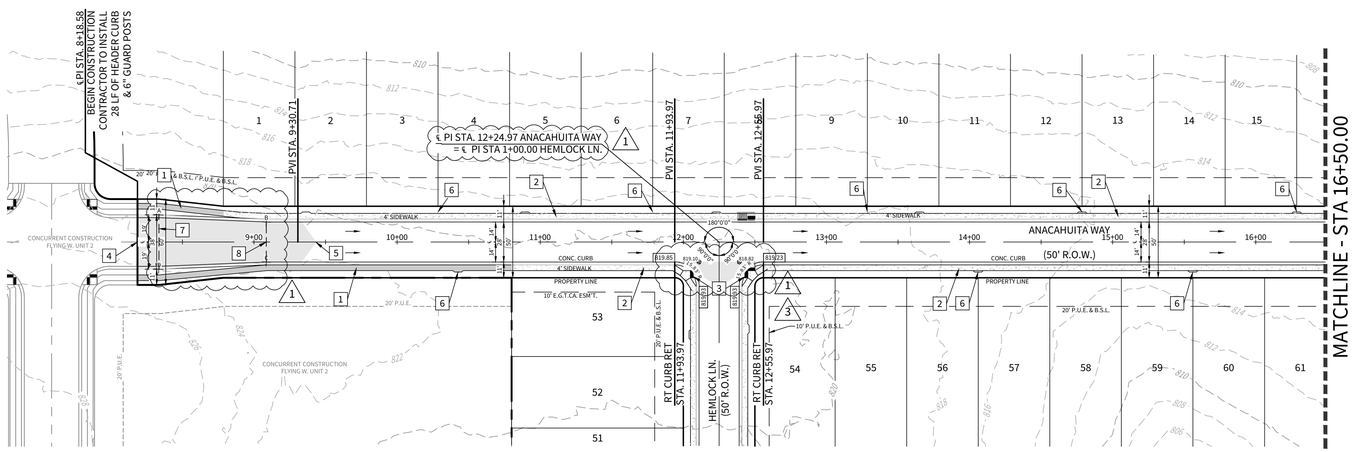
SIDEWALK TO BE CONSTRUCTED WITH HOME BUILDING

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. ADA RAMPS TO BE CONSTRUCTED WITH INFRASTRUCTURE (SEE DETAIL SHEET C7.D7)

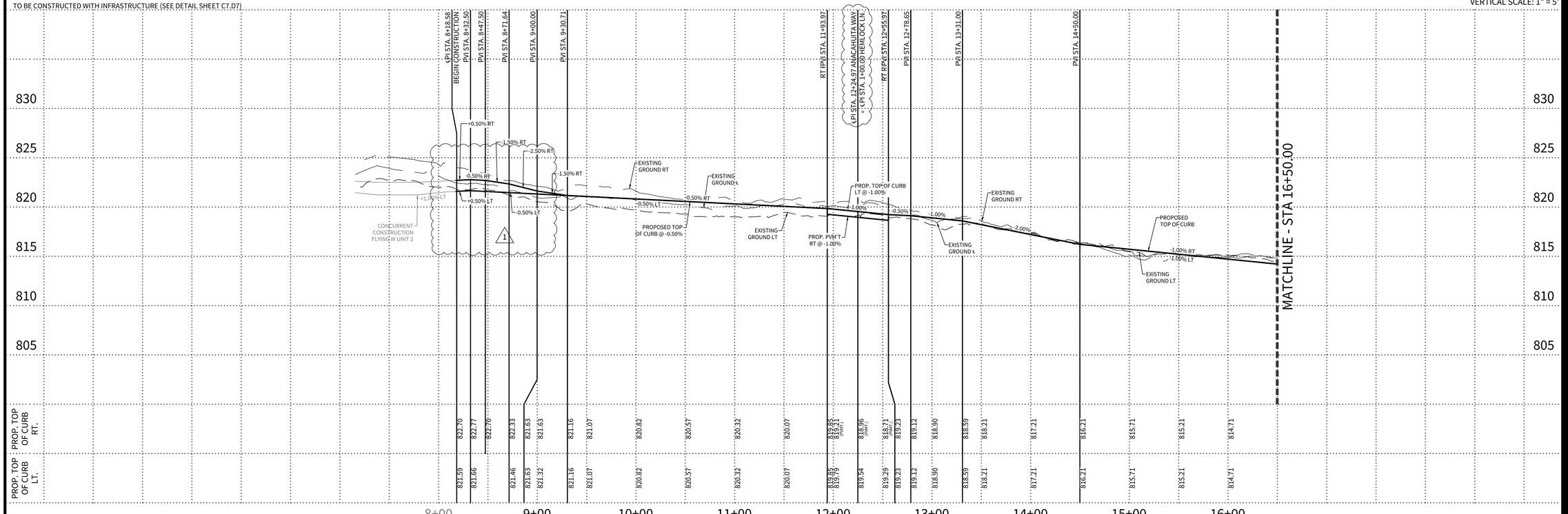



# ANACAHUITA WAY

1

STA. 8+18.58 TO STA. 16+50.00

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





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**FLYING W UNIT 3**

STREET PLAN & PROFILE - ANACAHUITA WAY

**DATE**
03/29/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

**REVISIONS**
1. 05/30/23 - REVISED CURB RETURN RADII LABELS, REVISED STREET NAME, ADDED CONCURRENT CONSTRUCTION NOTES
2. ADDED POINT TABLE, UPDATED KEYNOTES, ADDED PASSING SPACES, SHOWING DRIVEWAYS, ADJUSTED PVI'S
3. 08/29/23 - ADDED VALLEY GUTTERS, 1% STREET SLOPE IN INTERSECTION
4.
5.
6.
7.
8.

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

**C7.02**


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

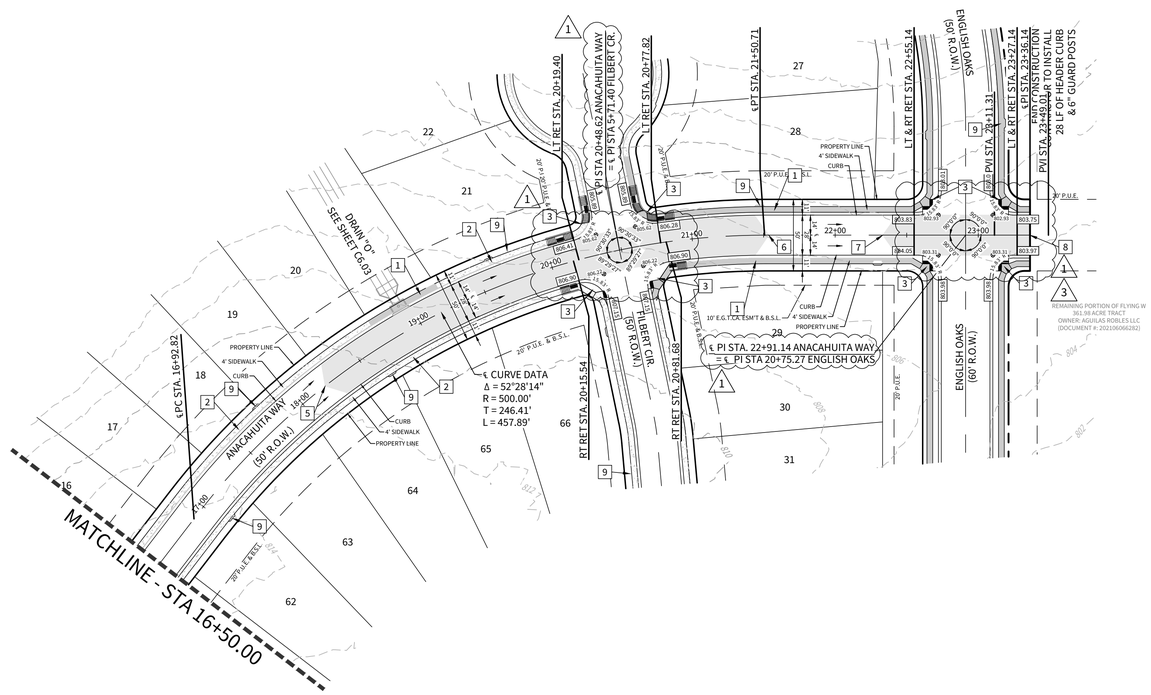
XXXX.XX$_{A}$ PROPOSED ASPHALT PAVEMENT ELEVATION

## KEYNOTES:

1. CONTRACTOR TO INSTALL SIDEWALK WITH INFRASTRUCTURE
2. CONTRACTOR TO INSTALL SIDEWALK WITH HOME BUILDING
3. CONTRACTOR TO CONSTRUCT ADA RAMP WITH INFRASTRUCTURE
4. CONTRACTOR TO CONSTRUCT ADA RAMP AT TIME OF HOMEBUILIDING
5. BEGIN WASHOUT STA. 18+20.08 PVM'T. ELEV. = 807.32
6. END WASHOUT STA. 21+52.84 PVM'T. ELEV. = 806.05
7. BEGIN WASHOUT STA. 22+33.27 PVM'T. ELEV. = 804.27
8. END WASHOUT STA. 23+36.14 PVM'T. ELEV. LT = 803.89 PVM'T. ELEV. RT = 804.01
9. CONTRACTOR TO INSTALL 5' X 5' SIDEWALK PASSING SPACE WITH HOMEBUILDING

1

1) CONTRACTOR TO ENSURE OF A MINIMUM 20' SPACING BETWEEN DRIVEWAYS IN KNUCKLE SAC/CUL-DE-SAC AREAS.




## LEGEND

STREET WASHOUT (SEE SHEET C7.D1)

SIDEWALK TO BE CONSTRUCTED WITH INFRASTRUCTURE

SIDEWALK TO BE CONSTRUCTED WITH HOME BUILDING

SPEED LIMIT DESIGNATED BY STREET TYPE;

| | |
|---|---|
| RESIDENTIAL | 20 MPH |
| RESIDENTIAL COLLECTOR | 30 MPH |
| MINOR COLLECTOR | 35 MPH |

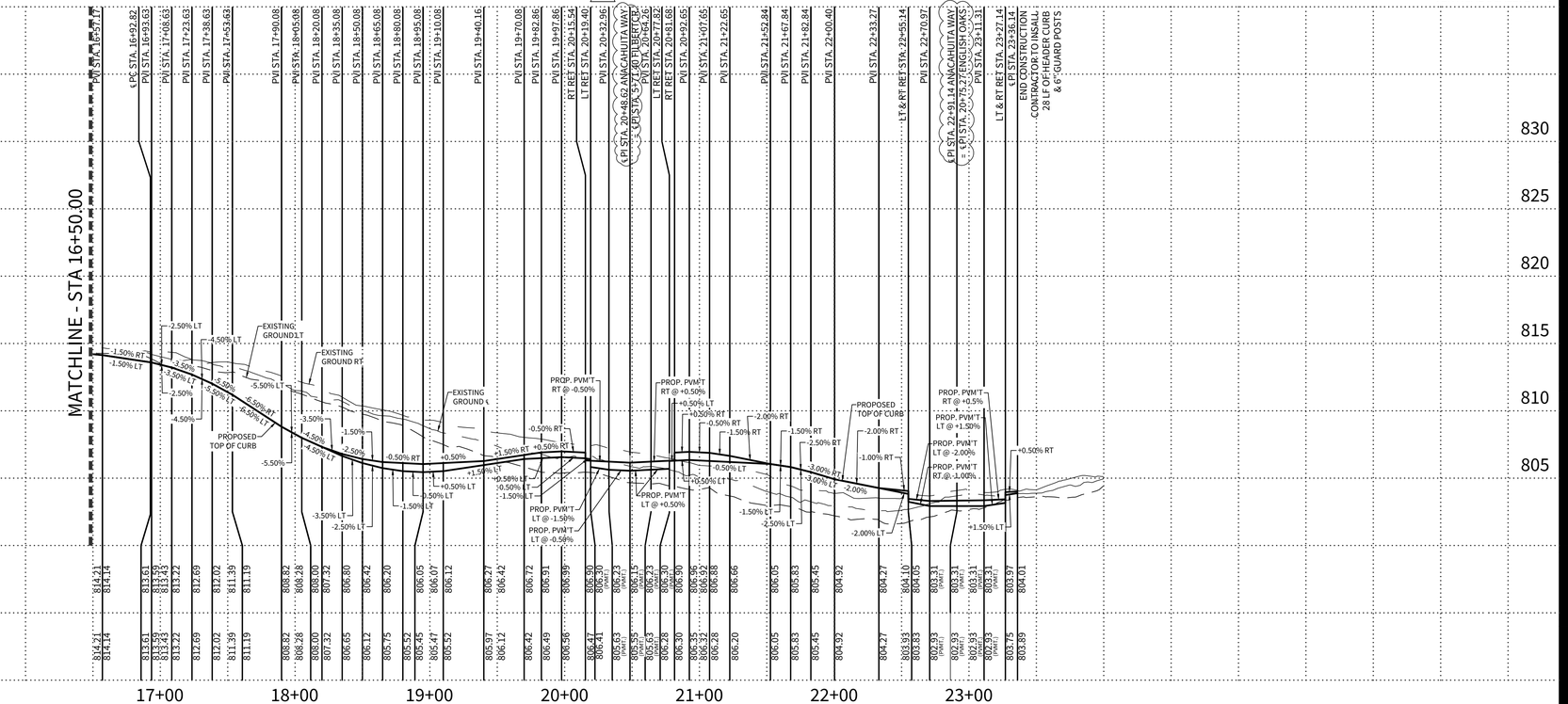
TxDOT TYPE "2" WHEEL CHAIR RAMPS ARE INDICATED THUS " " OR " " UNLESS OTHERWISE NOTED. (SHEET C7.D7)
FOR ADA RAMPS AT SIDEWALK INTERSECTIONS
TYPE "10" DIRECTIONAL WHEEL CHAIR RAMPS ARE INDICATED THUS " " OR " " UNLESS OTHERWISE NOTED.

FOR ADA RAMPS AT SIDEWALK INTERSECTIONS .
DETECTABLE WARNING PAVER WITH TRUNCATED DOMES ONLY. ADA RAMPS TO BE CONSTRUCTED WITH INFRASTRUCTURE (SEE DETAIL SHEET C7.D7)

# ANACAHUITA WAY

STA. 16+50.00 TO END 1

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





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**FLYING W UNIT 3**

STREET PLAN & PROFILE - ANACAHUITA WAY

**REVISIONS**
1. 05/30/23 - REVISED CURB RETURN RADII LABELS, REVISED STREET NAMES, ADDED ADDITIONAL ACCESSIBLE RAMPS & SPACES, SHOWING DRIVEWAYS, ADDED CROSS GUTTERS
2. 3. 03/25/24 - REMOVED VALLEY GUTTERS
4. 5. 6. 7. 8.

**DATE**
03/26/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

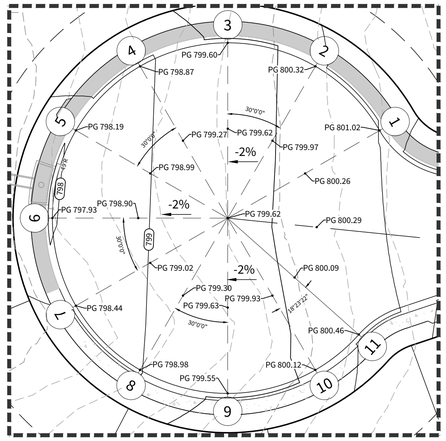
**CHECKED BY**
JC/AL

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

**C7.03**


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.




## CUL-DE-SAC DETAIL

SCALE: 1"= 20'

| CUL-DE-SAC BACK OF CURB ELEVATIONS | |
|---|---|
| NUMBER | TOC ELEV. |
| 1 | 803.54 |
| 2 | 801.59 |
| 3 | 799.65 |
| 4 | 797.71 |
| 5 | 795.77 |
| 6 | 795.07 |
| 7 | 796.84 |
| 8 | 798.61 |
| 9 | 800.38 |
| 10 | 802.15 |
| 11 | 803.24 |

1) CONTRACTOR TO ENSURE OF A MINIMUM 20' SPACING BETWEEN DRIVEWAYS IN KNUCKLE SAC/CUL-DE-SAC AREAS.

**LEGEND**

STREET WASHOUT (SEE SHEET C7.D1)

SIDEWALK TO BE CONSTRUCTED WITH INFRASTRUCTURE

SIDEWALK TO BE CONSTRUCTED WITH HOME BUILDING

SPEED LIMIT DESIGNATED BY STREET TYPE;

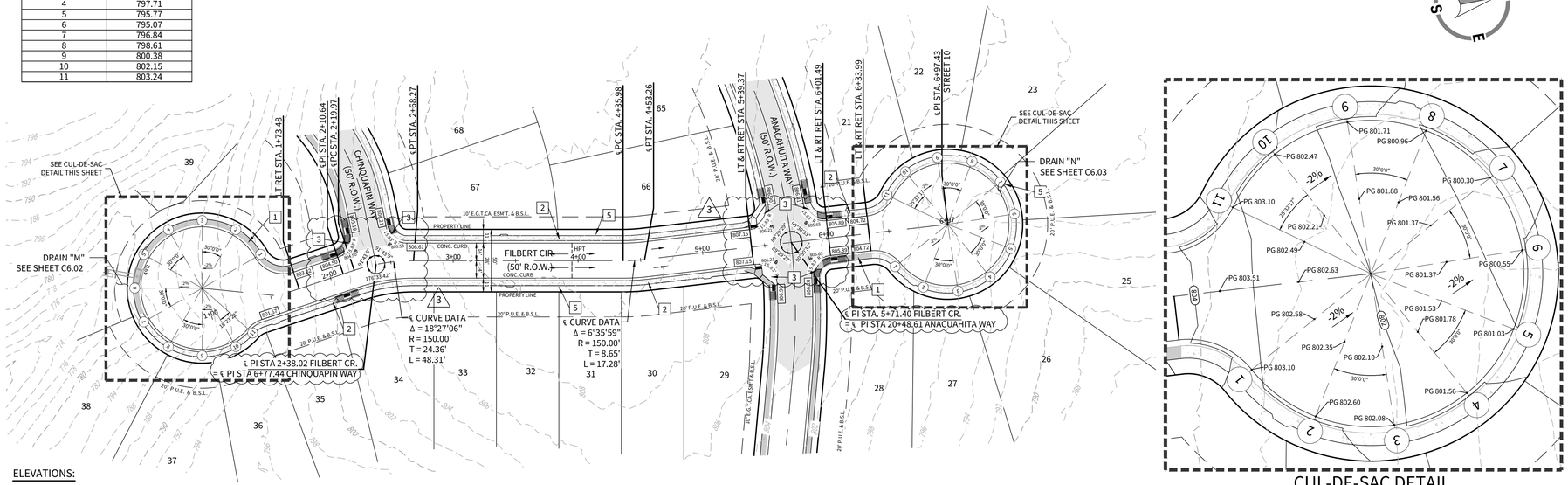
| | |
|---|---|
| RESIDENTIAL | 20 MPH |
| RESIDENTIAL COLLECTOR | 30 MPH |
| MINOR COLLECTOR | 35 MPH |

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. ADA RAMPS TO BE CONSTRUCTED WITH INFRASTRUCTURE (SEE DETAIL SHEET C7.D7)




ELEVATIONS:

xxxx.xx PROPOSED TOP OF CONCRETE CURB ELEVATION

$xxxx.xx_a$ PROPOSED ASPHALT PAVEMENT ELEVATION

KEYNOTES:

1. CONTRACTOR TO INSTALL SIDEWALK WITH INFRASTRUCTURE
2. CONTRACTOR TO INSTALL SIDEWALK WITH HOME BUILDING
3. CONTRACTOR TO CONSTRUCT ADA RAMP WITH INFRASTRUCTURE
4. CONTRACTOR TO CONSTRUCT ADA RAMP AT TIME OF HOMEBUILDING
5. CONTRACTOR TO INSTALL 5' X 5' SIDEWALK PASSING SPACE WITH HOMEBUILDING




## CUL-DE-SAC DETAIL

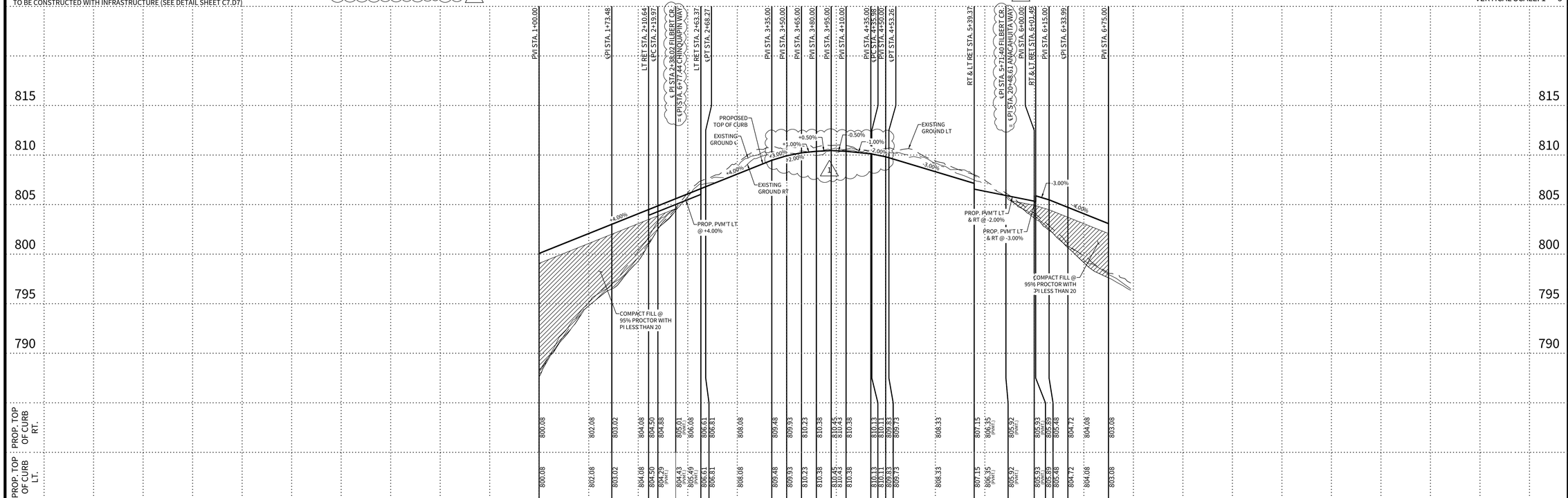
SCALE: 1"= 20'

| CUL-DE-SAC BACK OF CURB ELEVATIONS | |
|---|---|
| NUMBER | TOC ELEV. |
| 1 | 805.11 |
| 2 | 803.21 |
| 3 | 802.52 |
| 4 | 801.22 |
| 5 | 799.94 |
| 6 | 798.65 |
| 7 | 797.79 |
| 8 | 799.69 |
| 9 | 801.59 |
| 10 | 803.56 |
| 11 | 805.11 |

# FILBERT CIR.

STA. 1+00.00 TO STA. 6+97.43

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




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CUDE ENGINEERS

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


**FLYING W UNIT 3**

STREET PLAN & PROFILE - FILBERT CIRCLE

**DATE**
03/26/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

**REVISIONS**
1. 05/30/23 - REVISED CURB RETURN RADII LABELS, REVISED STREET NAMES, ADDED CURB RAMPS, ADDED SIDEWALK SPACES, SHOWING DRIVEWAYS, ADDED CROSS GUTTERS.
2. REVISED PVI'S
3. 03/25/24 - REMOVED VALLEY GUTTERS
4.
5.
6.
7.
8.

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

**C7.04**


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.



P:\04024\04024_UNIT 3\DWG\C7.04 STREET PLANS PROFILE - FILBERT CIRCLE.dwg 2024/03/26 7:45am tmann

ELEVATIONS:

XXXX.XX PROPOSED TOP OF CONCRETE CURB ELEVATION

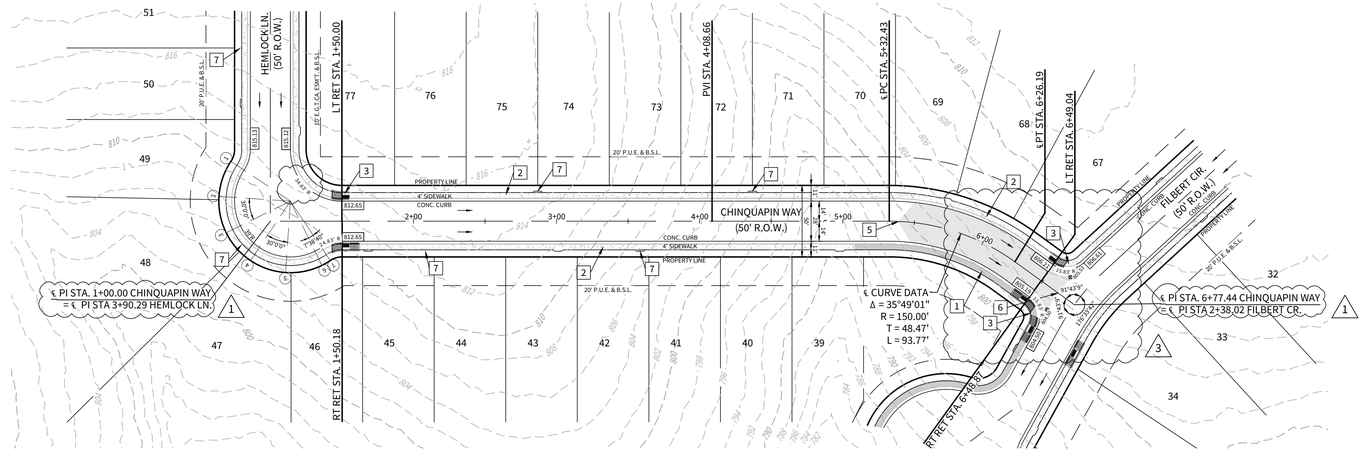
XXXX.XX$_{a}$ PROPOSED ASPHALT PAVEMENT ELEVATION

KEYNOTES:

1. CONTRACTOR TO INSTALL SIDEWALK WITH INFRASTRUCTURE
2. CONTRACTOR TO INSTALL SIDEWALK WITH HOME BUILDING
3. CONTRACTOR TO CONSTRUCT ADA RAMP WITH INFRASTRUCTURE
4. CONTRACTOR TO CONSTRUCT ADA RAMP AT TIME OF HOMEBUILDING
5. BEGIN WASHOUT STA. 5+39.01 PVMT. ELEV. = 806.79
6. END WASHOUT STA. 6+62.90 PVMT. ELEV. = 804.46
7. CONTRACTOR TO INSTALL 5' X 5' SIDEWALK PASSING SPACE WITH HOMEBUILDING

1

1) CONTRACTOR TO ENSURE OF A MINIMUM 20' SPACING BETWEEN DRIVEWAYS IN KNUCKLE SAC/CUL-DE-SAC AREAS.




**LEGEND**

STREET WASHOUT (SEE SHEET C7.D1)

SIDEWALK TO BE CONSTRUCTED WITH INFRASTRUCTURE

SIDEWALK TO BE CONSTRUCTED WITH HOME BUILDING

SPEED LIMIT DESIGNATED BY STREET TYPE;

| | |
|---|---|
| RESIDENTIAL | 20 MPH |
| RESIDENTIAL COLLECTOR | 30 MPH |
| MINOR COLLECTOR | 35 MPH |

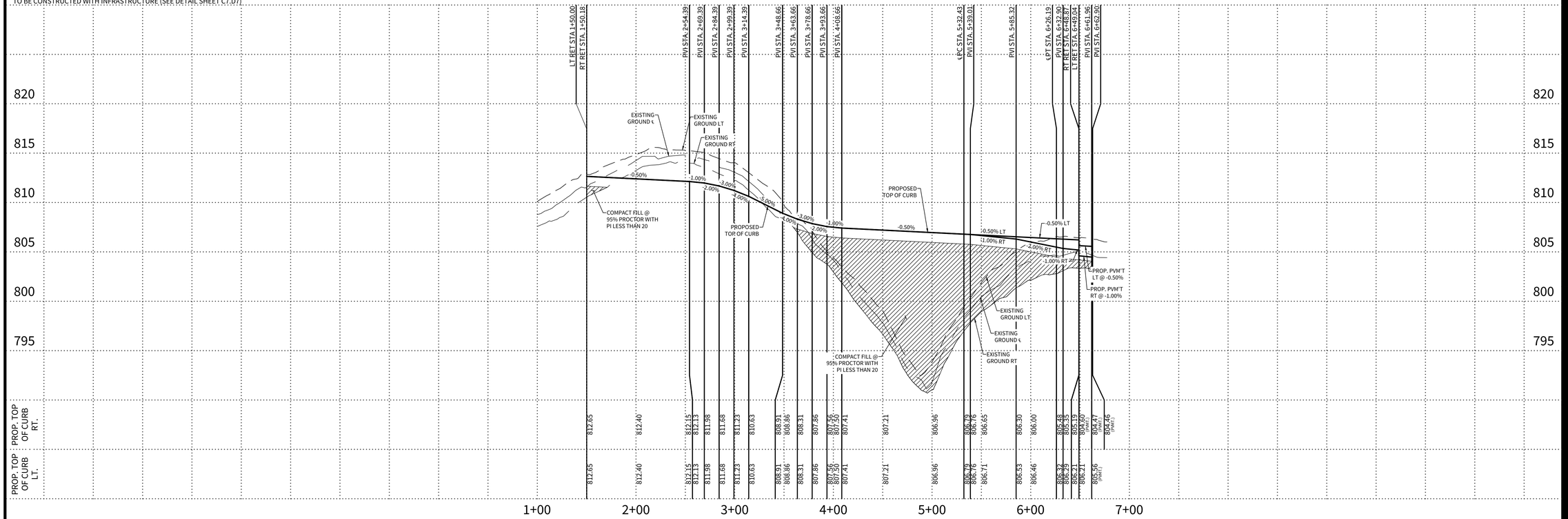
TxDOT TYPE "2" WHEEL CHAIR RAMPS ARE INDICATED THUS " " OR " " UNLESS OTHERWISE NOTED. (SHEET C7.D7)
FOR ADA RAMPS AT SIDEWALK INTERSECTIONS
TYPE "10" DIRECTIONAL WHEEL CHAIR RAMPS ARE INDICATED THUS " " OR " " UNLESS OTHERWISE NOTED.

FOR ADA RAMPS AT SIDEWALK INTERSECTIONS .
DETECTABLE WARNING PAVER WITH TRUNCATED DOMES ONLY. ADA RAMPS TO BE CONSTRUCTED WITH INFRASTRUCTURE (SEE DETAIL SHEET C7.D7)

# CHINQUAPIN WAY

STA. 1+00.00 TO STA. 6+77.44 1

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





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**FLYING W UNIT 3**

STREET PLAN & PROFILE - CHINQUAPIN WAY

**DATE**
03/26/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

**REVISIONS**
1. 05/30/23 - REVISED CURB RETURN RADII LABELS, REVISED STREET NAMES, REVISED LOT LAYOUT
2. 09/25/23 - SPACES, ADD PVMT ELEVATIONS TO WASHOUT, SHOWING DRIVEWAYS, ADDED CROSS GUTTERS
3. 03/25/24 - REMOVED VALLEY GUTTERS
4.
5.
6.
7.
8.

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

**C7.05**


C:\04024\04024_UNIT 3\04024_C7.05 STREET PLAN & PROFILE - CHINQUAPIN WAY.dwg 2024/03/26 1:58pm thowe

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. CONTRACTOR TO INSTALL SIDEWALK WITH INFRASTRUCTURE
2. CONTRACTOR TO INSTALL SIDEWALK WITH HOME BUILDING
3. CONTRACTOR TO CONSTRUCT ADA RAMP WITH INFRASTRUCTURE
4. CONTRACTOR TO CONSTRUCT ADA RAMP AT TIME OF HOMEBUILDING
5. BEGIN WASHOUT STA. 1+15.17 PVMT. ELEV. LT= 819.03 PVMT. ELEV. RT= 819.18
6. END WASHOUT STA. 1+30.67 PVMT. ELEV. = 819.35
7. CONTRACTOR TO INSTALL 5' X 5' SIDEWALK PASSING SPACE WITH HOMEBUILDING

1) CONTRACTOR TO ENSURE OF A MINIMUM 20' SPACING BETWEEN DRIVEWAYS IN KNUCKLE SAC/CUL-DE-SAC AREAS.

## LEGEND

STREET WASHOUT (SEE SHEET C7.D1)

SIDEWALK TO BE CONSTRUCTED WITH INFRASTRUCTURE

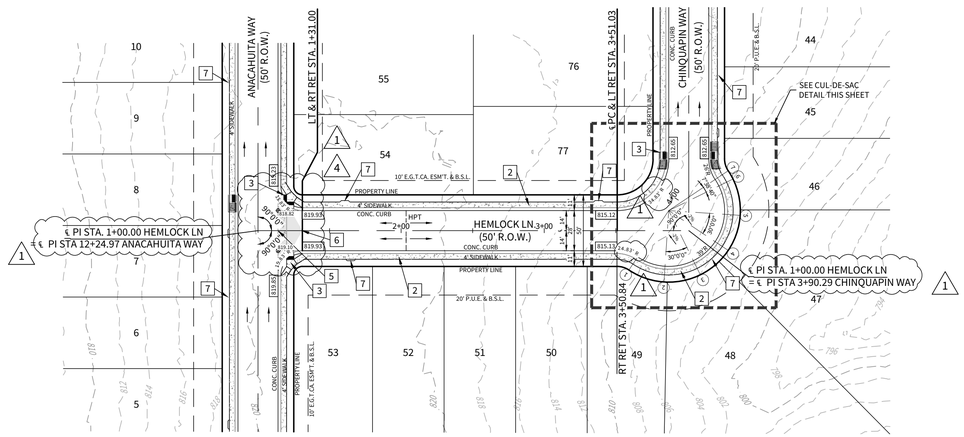
SIDEWALK TO BE CONSTRUCTED WITH HOME BUILDING

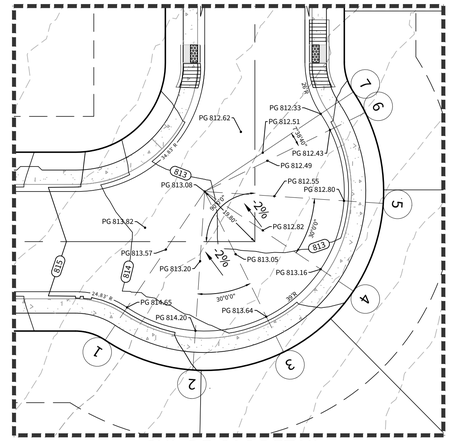
SPEED LIMIT DESIGNATED BY STREET TYPE;

| | |
|---|---|
| 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. ADA RAMPS TO BE CONSTRUCTED WITH INFRASTRUCTURE (SEE DETAIL SHEET C7.D7)




## CUL-DE-SAC DETAIL

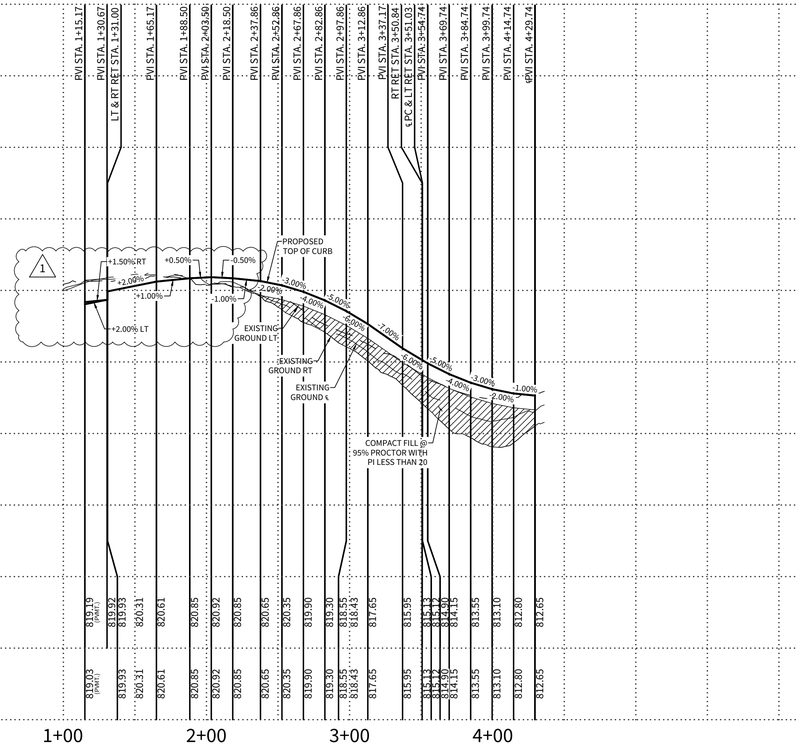
SCALE: 1"= 20'

| CUL-DE-SAC BACK OF CURB ELEVATIONS | |
|---|---|
| NUMBER | TOC ELEV. |
| 1 | 815.42 |
| 2 | 814.84 |
| 3 | 814.26 |
| 4 | 813.76 |
| 5 | 813.40 |
| 6 | 813.03 |
| 7 | 812.94 |

# HEMLOCK LN. 1

STA. 1+00.00 TO STA. 4+36.19

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





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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 3**

STREET PLAN & PROFILE - HEMLOCK LANE

**DATE**
03/26/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

**REVISIONS**
1. 05/30/23 - REVISED CURB RETURN RADII LABELS, REVISED ALIGNMENT, LABELS, REVISED SIDEWALK, ADDED SOME SPACES, ADD PVMT ELEVATIONS TO WASHOUT, SHOWING DRIVEWAYS, ADDED CROSS GUTTERS, REVISED PVI & RELATED SLOPES
2. 03/25/24 - REMOVED VALLEY GUTTERS
3.
4.
5.
6.
7.
8.

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

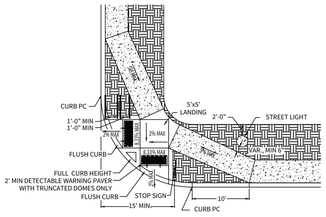
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TBPELS No. 10048500

**C7.06**


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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.

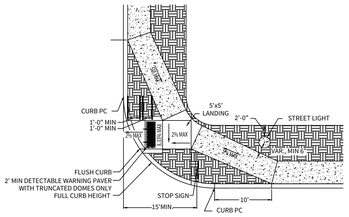



## ADA RAMP INTERSECTION LAYOUT DETAIL (TYPE 10 DIRECTIONAL RAMPS) N.T.S.

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.

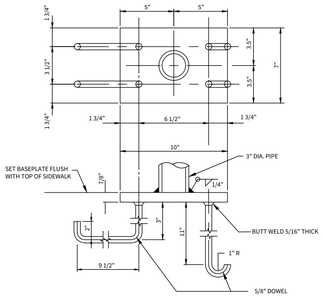



## ADA RAMP INTERSECTION LAYOUT DETAIL (TYPE 10 DIRECTIONAL RAMPS - SINGLE DIRECTION) N.T.S.

NOTES:

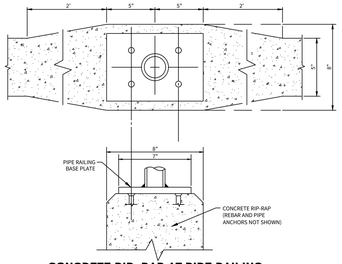
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2) FIRE HYDRANTS (AS APPLICABLE) SHALL BE INSTALLED WITHIN THE R.O.W, A MINIMUM OF 1' FROM THE BACK OF THE CURB AND A MINIMUM OF 1' AWAY FROM THE PROPOSED SIDEWALK.




## PIPE ANCHORAGE DETAILS

N.T.S.

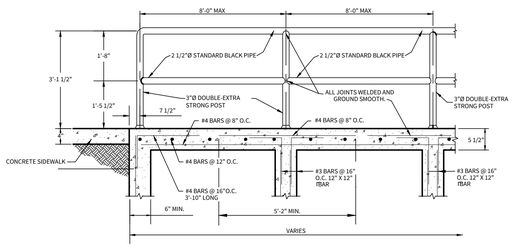



## CONCRETE RIP-RAP AT PIPE RAILING BASE PLATE DETAIL

NOTES:

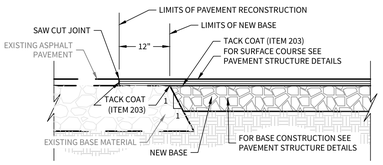
1) CONTRACTOR TO FLARE CONCRETE RIP-RAP TO 8" AT PROPOSED PIPE RAILING BASE PLATE LOCATIONS.

N.T.S.



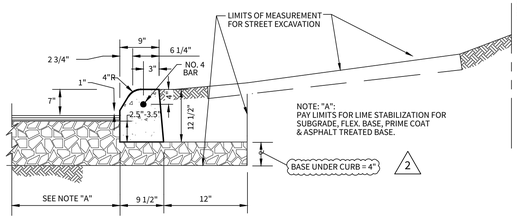

## TYPICAL SIDEWALK BRIDGE SECTION AND SIDEWALK PIPE RAILING

N.T.S.



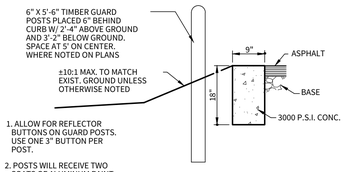

## PAVEMENT JUNCTION DETAILS

N.T.S.



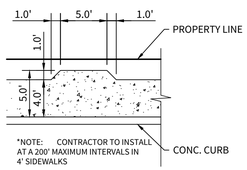

## CURB SECTIONS

N.T.S.



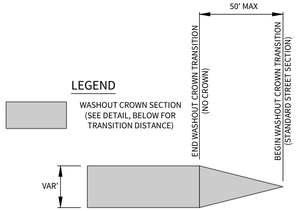

## HEADER CURB DETAIL

N.T.S.



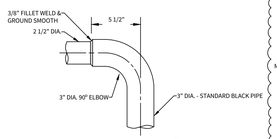

## 5'x5' SIDEWALK PASSING LANE

N.T.S.




## WASHOUT CROWN TRANSITION DETAIL

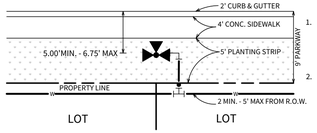
N.T.S.




## 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"




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

N.T.S.

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.

## 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.

- SUBGRADE SOILS SHOULD BE TESTED FOR SOLUBLE SULFATE CONTENT PRIOR TO LINE TRARMENT. (1)

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).

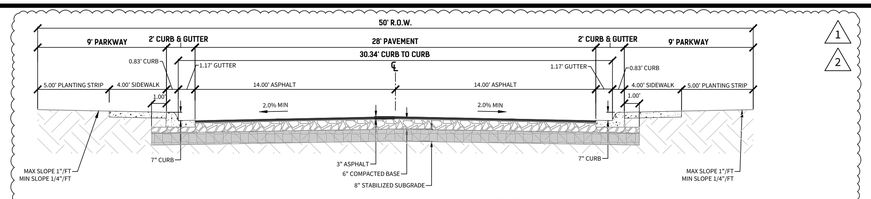
SELECT FILL:

- 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).

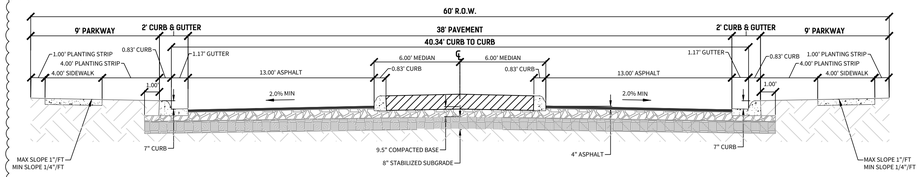
SUBGRADE VERIFICATION:

- AT THE TIME OF CONSTRUCTION, THE FINAL PAVEMENT SUBGRADE SHOULD BE OBSERVED AND VERIFIED BY A REPRESENTATIVE OF INTEC



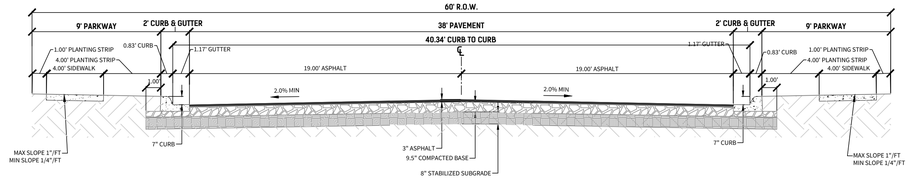

## TYPICAL "RESIDENTIAL" STREET CROSS SECTION

N.T.S.



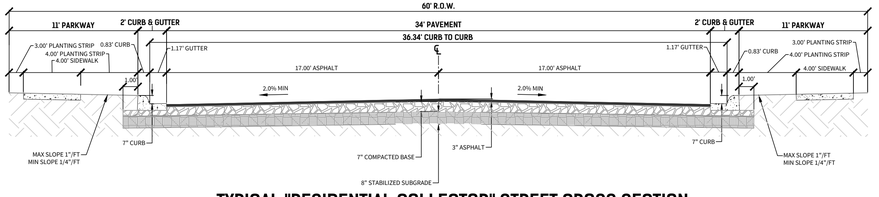

## TYPICAL "MINOR COLLECTOR" STREET CROSS SECTION WITH MEDIAN

N.T.S.



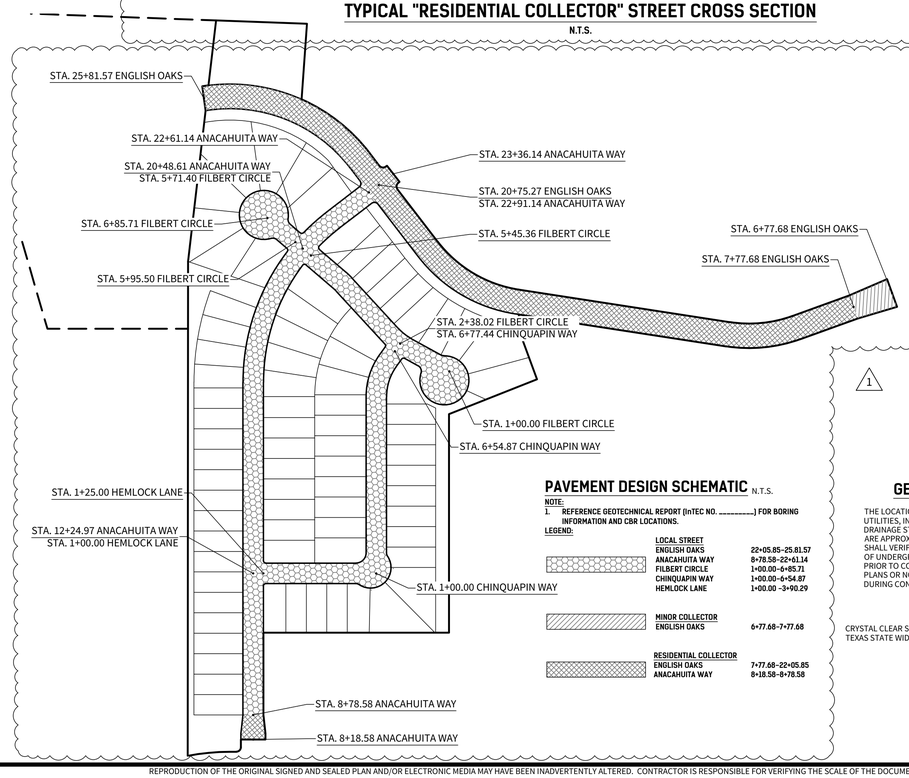

## TYPICAL MINOR COLLECTOR STREET CROSS SECTION

N.T.S.




## TYPICAL "RESIDENTIAL COLLECTOR" STREET CROSS SECTION

N.T.S.




## PAVEMENT DESIGN SCHEMATIC N.T.S.

NOTE:
1. REFERENCE GEOTECHNICAL REPORT (InTEC NO. _____) FOR BORING INFORMATION AND CBR LOCATIONS.

LEGEND:

| | | |
|---|---|---|
| LOCAL STREET | | |
| ENGLISH OAKS | | 22+05.85–25.81.57 |
| ANACAHUITA WAY | | 8+78.58–22+61.14 |
| FILBERT CIRCLE | | 1+00.00–6+85.71 |
| CHINQUAPIN WAY | | 1+00.00–6+54.87 |
| HEMLOCK LANE | | 1+00.00 –3+90.29 |
| MINOR COLLECTOR | | |
| ENGLISH OAKS | | 6+77.68–7+77.68 |
| RESIDENTIAL COLLECTOR | | |
| ENGLISH OAKS | | 7+77.68–22+05.85 |
| ANACAHUITA WAY | | 8+18.58–8+78.58 |

## 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 |


CUDEENGINEERS.COM

CUDE ENGINEERS

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


FLYING W
UNIT 3

STANDARD STREET DETAILS

DATE
03/28/2024

PROJECT NO.
04024-004

DRAWN BY
CG/AM/JG/WDS

CHECKED BY
JC/AL

REVISIONS
1. 05/24/23 - REVISED STREET NAMES. NOTE ADDED, REVISED
2. 03/25/24 - ADDED CURB DIMENSION, 4" BASE
3. 03/25/24 - ADDED CURB TO CURB DIMENSION, 4" BASE UNDER CURB AND GUTTER
4.
5.
6.
7.
8.

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
SURVEY OVAL
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

C7.D1


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P:\04024\04024_UNIT 3\SHEETS\04024_STANDARD STREET DETAILS.dwg, 3/28/2024 8:28:54 AM, bhayes

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 manner in which this standard is used or for any incorrect results or damages resulting from its use.

DATE: 7/1/01
FILE:

## SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

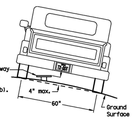
**Post Type**
- FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
- TWT = Thin-Walled Tubing (see SMD(TWT))
- 10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
- SR0 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

**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. "Plate" (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
- (EXT or EXAT - 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 W/Ft W/Ig Channel (see SMD(SLIP-1) to (SLIP-3))
- EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

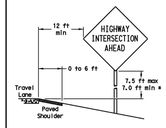
## REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT




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).

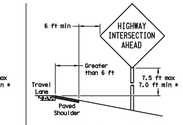
## SIGN LOCATION

### PAVED SHOULDERS




LESS THAN 6 FT. WIDE

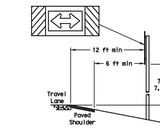
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



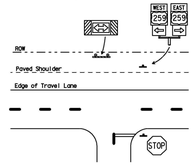

GREATER THAN 6 FT. WIDE

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.

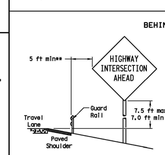
### T-INTERSECTION



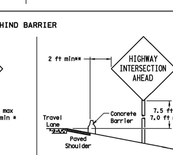

When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.




### BEHIND BARRIER




BEHIND GUARDRAIL




BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

* Signs shall be mounted using the following condition that results in the greatest sign elevations

(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.

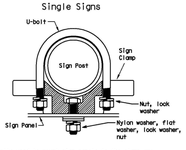
The maximum values may be increased when directed by the Engineer.

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:
https://www.txdot.gov/publications/traffic.htm

## TYPICAL SIGN ATTACHMENT DETAIL

### Single Signs

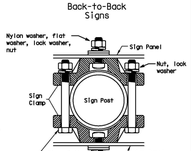



Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

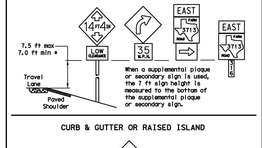
Sign clamps may be either the specific size clamp or the universal clamp.

### Back-to-Back Signs



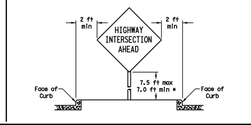

| Pipe Diameter | Approximate Bolt Length | |
|---|---|---|
| | Specific Clamp | Universal Clamp |
| 2" nominal | 3" | 3 or 3 1/2" |
| 2 1/2" nominal | 3 or 3 1/2" | 3 1/2 or 4" |
| 3" nominal | 3 1/2 or 4" | 4 1/2" |

## SIGNS WITH PLAQUES



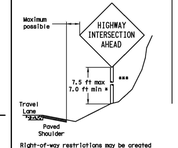

When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

## CURB & GUTTER OR RAISED ISLAND




## RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)




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.

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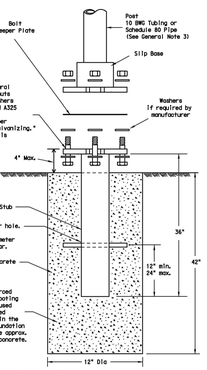
# SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

| ©TxDOT July 2002 | Tw: TXDOT | CK: TXDOT | DW: TXDOT | CK: TXDOT |
|---|---|---|---|---|
| 9-08 REVISIONS | DsN? | SHT? | AsN | HIGHWAY |
| | TCS? | | DsN-T1 | SHEET No. |

26A

## TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS




SM RD SGN ASSM TY XXXXX(10)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. https://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:**

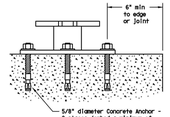
1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   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 2.857" to 2.893"
   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 followings
   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 2.857" 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 and 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 traveloay (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 traveloay. 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




SM RD SGN ASSM TY XXXXX(10)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, nuts, and flat type washers galvanized per Item 445, "Galvanizing." 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

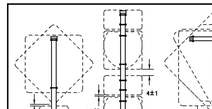
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| ©TxDOT July 2002 | Tw: TXDOT | CK: TXDOT | DW: TXDOT | CK: TXDOT |
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| 9-08 REVISIONS | DsN? | SHT? | AsN | HIGHWAY |
| | TCS? | | DsN-T1 | SHEET No. |

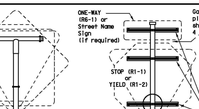
26B

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DATE:
FILE:



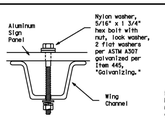

SM RD SGN ASSM TY XXXXX(1)XX(P)



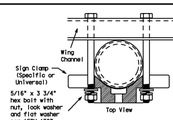

SM RD SGN ASSM TY XXXXX(1)XX(P-BM)




SM RD SGN ASSM TY XXXXX(1)XX(P-SM)




Detail A



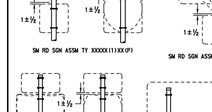

Detail B

**GENERAL NOTES:**

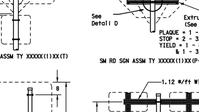
1.

| 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 |

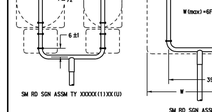
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material 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 sign clamps required on the "T-bracket" post provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamps 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.



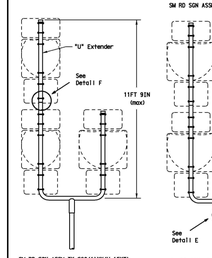

SM RD SGN ASSM TY XXXXX(11)XX(U-WC)
(See Note 11)



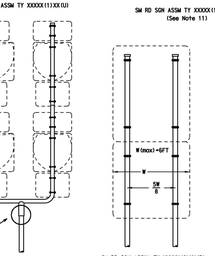

SM RD SGN ASSM TY XXXXX(11)XX(U)




SM RD SGN ASSM TY XXXXX(11)XX(U)



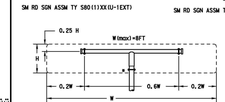

SM RD SGN ASSM TY SB0(11)XX(U-1EXT)




SM RD SGN ASSM TY SB0(11)XX(U-2EXT)

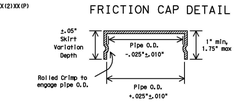



SM RD SGN ASSTM TY XXXXX(2)XX(P)



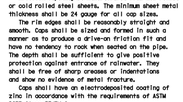

SM RD SGN ASSM TY XXXXX(11)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

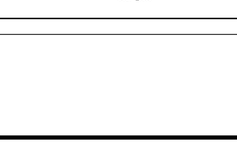



Detail C

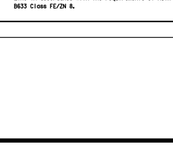
SIDE VIEW




Detail E




Detail D




| REQUIRED SUPPORT | | |
|---|---|---|
| | SIGN DESCRIPTION | SUPPORT |
| Regulatory | 48-inch STOP sign (R1-1) | TY 10BWG(11)XX(T) TY 10BWG(11)XX(P-BM) |
| | 60-inch YIELD sign (R1-2) | TY 10BWG(11)XX(T) TY 10BWG(11)XX(P-BM) |
| | 48x16-inch ONE-WAY sign (R6-1) | TY 10BWG(11)XX(T) TY 10BWG(11)XX(P-BM) |
| | 36x48, 48x36, and 48x48-inch signs | TY 10BWG(11)XX(T) |
| | 48x60-inch signs | TY SB0(11)XX(T) |
| | 48x48-inch signs (diamond or square) | TY 10BWG(11)XX(T) |
| | 48x60-inch signs | TY SB0(11)XX(T) |
| Warning | 48-inch Advance School X-ing sign (S1-1) | TY 10BWG(11)XX(T) |
| | 48-inch School X-ing sign (S2-1) | TY 10BWG(11)XX(T) |
| | Large Arrow sign (W1-6 & W1-7) | TY 10BWG(11)XX(T) |

## FRICTION CAP DETAIL




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 fractures.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

Texas Department of Transportation
Traffic Operations Division

# SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

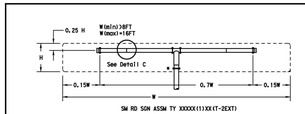
SMD(SLIP-2)-08

| ©TxDOT July 2002 | Tw: TXDOT | CK: TXDOT | DW: TXDOT | CK: TXDOT |
|---|---|---|---|---|
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| | TCS? | | DsN-T1 | SHEET No. |

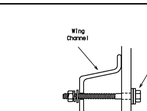
26C

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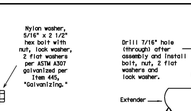
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SM RD SGN ASSM TY XXXXX(11)XX(T-2EXT)
(* - See Note 12)

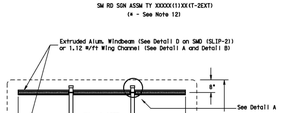



Detail B

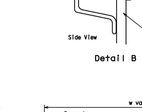



Detail C

Splices shall only be allowed behind the sign substrate.

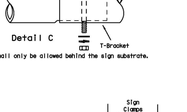



SM RD SGN ASSM TY XXXXX(11)XX(U-XX)

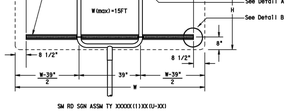



Typical Sign Mount
SM RD SGN ASSM TY SB0(2)XX(P-EXAL)
※ Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

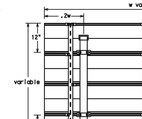
See Detail E for clamp installation



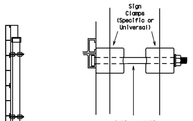

Detail E




Detail A

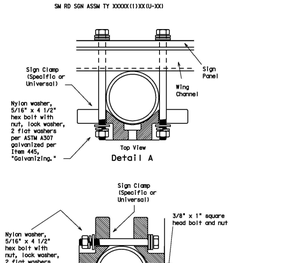



Extruded Aluminum Sign With T Bracket




Use Extruded Alum. Windbeam as stiffeners See SMD (2-1) for additional details

See Detail E for clamp installation




Detail D
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 clamps 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.

| REQUIRED SUPPORT | | |
|---|---|---|
| | SIGN DESCRIPTION | SUPPORT |
| Regulatory | 48-inch STOP sign (R1-1) | TY 10BWG(11)XX(T) TY 10BWG(11)XX(P-BM) |
| | 60-inch YIELD sign (R1-2) | TY 10BWG(11)XX(T) TY 10BWG(11)XX(P-BM) |
| | 48x16-inch ONE-WAY sign (R6-1) | TY 10BWG(11)XX(T) TY 10BWG(11)XX(P-BM) |
| | 36x48, 48x36, and 48x48-inch signs | TY 10BWG(11)XX(T) |
| | 48x60-inch signs | TY SB0(11)XX(T) |
| | 48x48-inch signs (diamond or square) | TY 10BWG(11)XX(T) |
| | 48x60-inch signs | TY SB0(11)XX(T) |
| Warning | 48-inch Advance School X-ing sign (S1-1) | TY 10BWG(11)XX(T) |
| | 48-inch School X-ing sign (S2-1) | TY 10BWG(11)XX(T) |
| | Large Arrow sign (W1-6 & W1-7) | TY 10BWG(11)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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| 9-08 REVISIONS | DsN? | SHT? | AsN | HIGHWAY |
| | TCS? | | DsN-T1 | SHEET No. |

26D

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FLYING W
UNIT 3

SMALL ROADSIDE GENERAL NOTES & DETAILS

REVISIONS
1 2 3 4 5 6 7 8

DATE
03/26/2024

PROJECT NO.
04024-004

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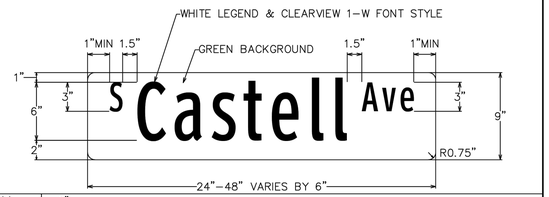
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ANDREW R. LOWRY
123410
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PROFESSIONAL ENGINEER
04/01/2024
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## STREET SIGN DETAIL - GROUND MOUNT




| | |
|---|---|
| Height | 9" |
| Length | 24" min<br>48" max<br>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 ½" 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 | | | |
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| ISSUE DATE: February 2013 | DWG. NO: ST-024 | SCALE: N.T.S. | |
| DRAWN BY: RAS | CONTACT: GF | SHEET: 1 OF 1 | |

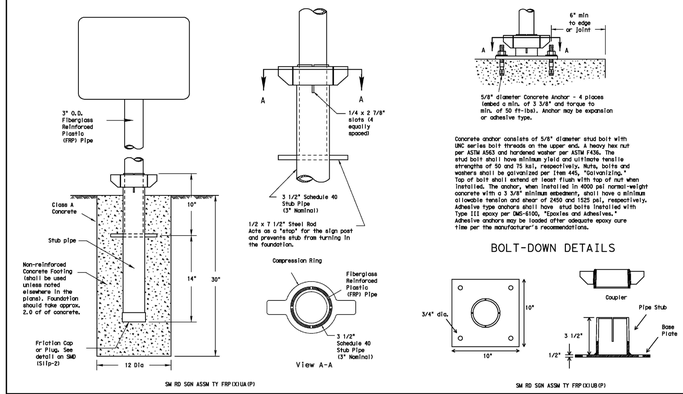
City of New Braunfels
ENGINEERING DIVISION
424 S. CASTELL AVE.
NEW BRAUNFELS, TEXAS 78130
PHONE: 830 221 4020
FAX: 830 626 3600

P:\2010 ENGINEERING-AUTOCAD\DETAILS\NB-PUBLIC WORKS DETAILS\NB-UNAPPROVED DETAILS-2013\ST-2013.024 STREET SIGN DETAIL - GROUND MOUNT.DWG

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## Universal Anchor System with Fiberglass Reinforced Plastic (FRP) Post




SM RD SGN ASSM TY FRP(X)U(A)(P)

SM RD SGN ASSM TY FRP(X)U(B)(P)

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-6410 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 detailed by writing:
   Texas Department of Transportation
   Traffic Operations Division
   125 East 11th Street
   Austin, Texas 78701-2483

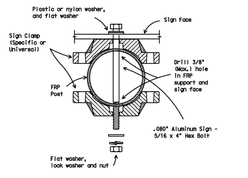
UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURES

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 16". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(SIGN) 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, mortar 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 insert stop.
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.

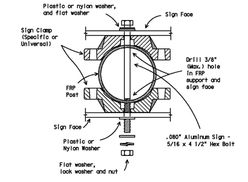
BOLT DOWN SIGN SUPPORT

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.

## Typical Sign Mounting Detail for FRP Support with Single Sign




## Typical Sign Mounting Detail for FRP Support with Back-to-Back Signs




Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
UNIVERSAL ANCHOR SYSTEM
WITH FRP POST

SMD(FRP)-08

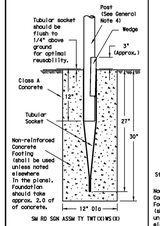
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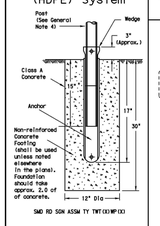
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## Wedge Anchor Steel System



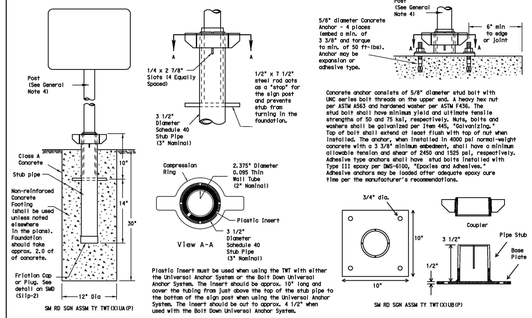

SM RD SGN ASSM TY TWT(X)WS(X)

## Wedge Anchor High Density Polyethylene (HDPE) System




SMD RD SGN ASSM TY TWT(X)WP(X)

## Universal Anchor System with Thin-Walled Tubing Post

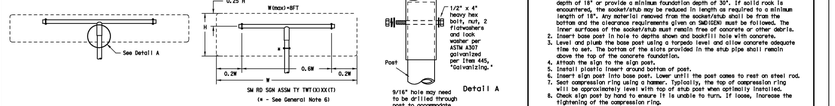



Plastic Insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

SM RD SGN ASSM TY TWT(X)U(A)(P)

SM RD SGN ASSM TY TWT(X)U(B)(P)

## Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post




SM RD SGN ASSM TY TWT(X)XX(T)
(* - See General Note 6)

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. Methods, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts 113 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 on 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 HSLA-65 per ASTM A1011 or ASTM A1008
   Other steel may be used if it meet the followings
   35,000 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: https://www.txdot.gov/publications/traffic.htm

WEDGE 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 16". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(SIGN) 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, mortar 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 tubular socket into concrete until top of socket is approximately 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 wedge into the socket to secure post. This will leave approximately 1" 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 16". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(SIGN) 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
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TXDOT SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS

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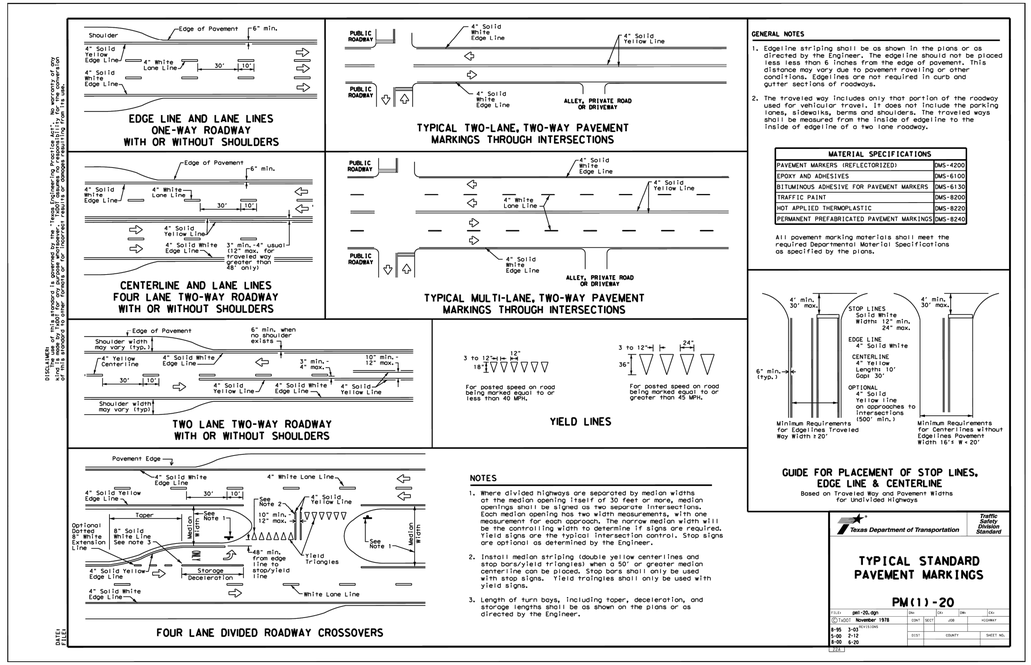
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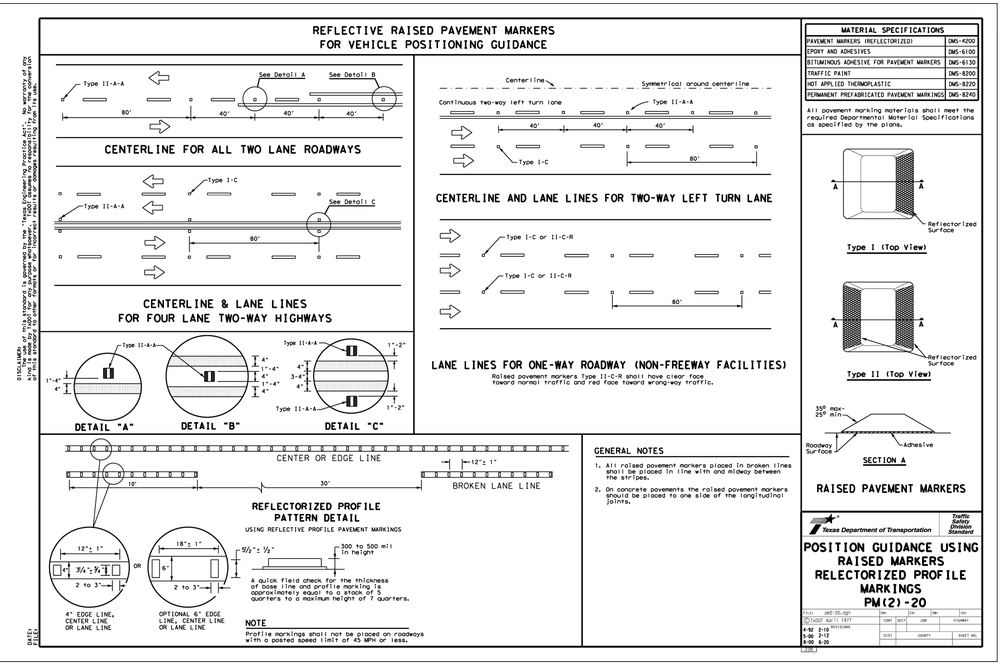
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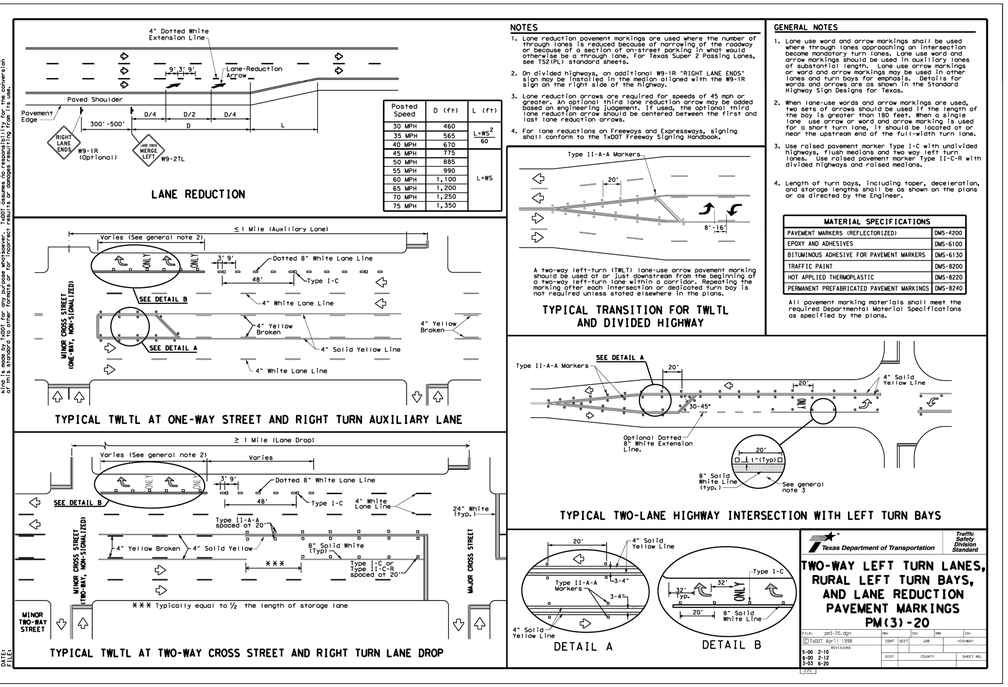
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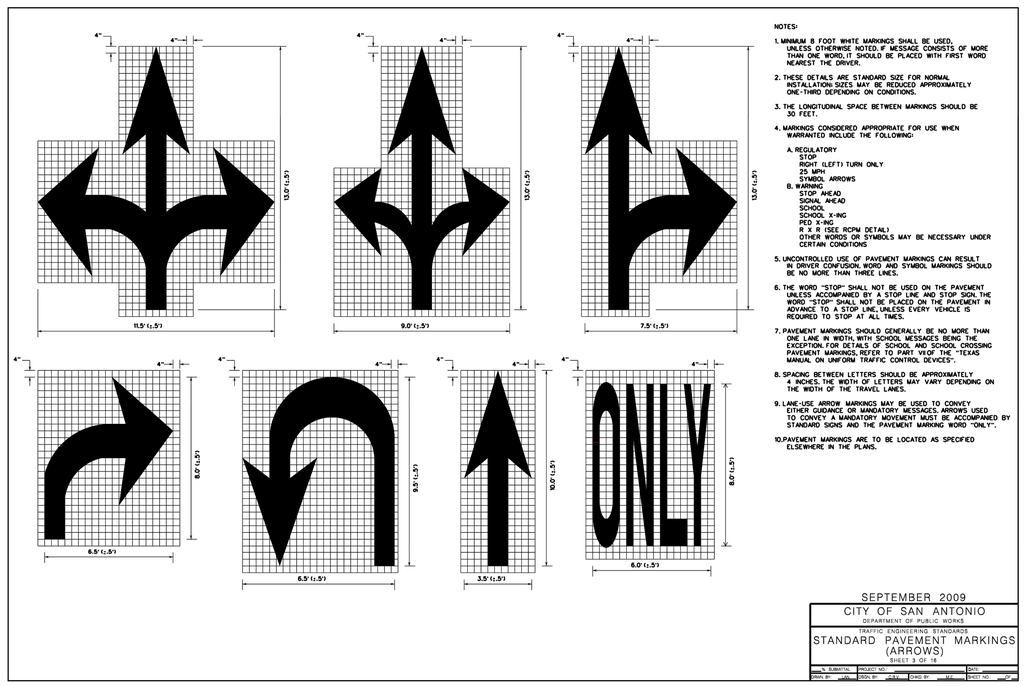
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TXDOT PAVEMENT MARKING DETAILS

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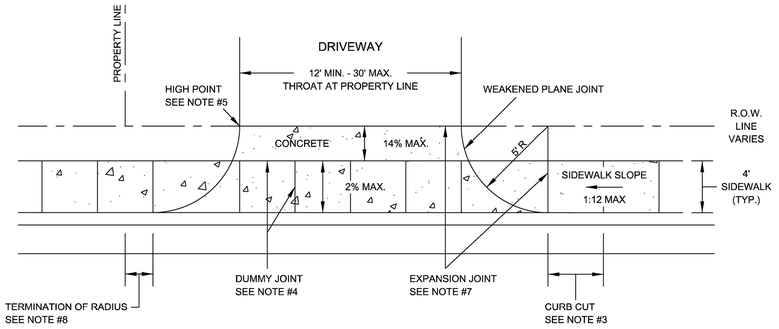
STATE OF TEXAS
ANDREW R. LOWRY
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PROFESSIONAL ENGINEER
04/01/2024
CUDE ENGINEERS
TBPELS No. 10048500

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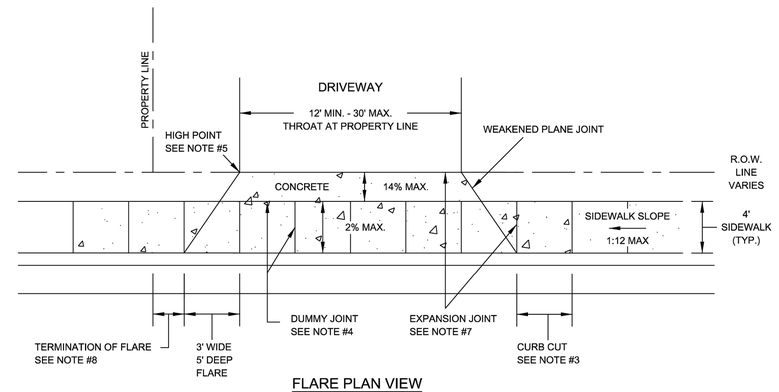
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# DRIVEWAY APRON
## (RESIDENTIAL - ONE OR TWO FAMILY)




RADIUS PLAN VIEW

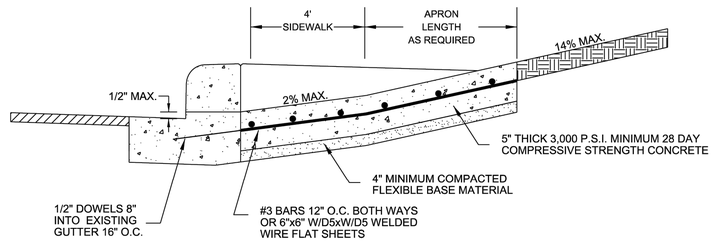



FLARE PLAN VIEW

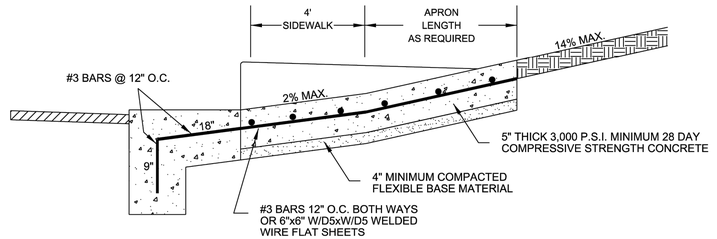
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| FILENAME: DRIVEWAY (RESIDENTIAL - ONE OR TWO FAMILY) | | |

City of New Braunfels — ENGINEERING DEPARTMENT

# DRIVEWAY APRON
## (RESIDENTIAL - ONE OR TWO FAMILY)




STRUCTURAL SECTION




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. THE TANGENT POINT OF THE DRIVEWAY CURB RETURN AT THE PUBLIC ROADWAY LINE OR FLARE SHALL BE A MINIMUM DISTANCE OF 1' OFF THE PROPERTY PROJECTED PERPENDICULAR TO THE STREET CENTERLINE, EXCEPT SINGLE FAMILY OR ZERO LOT LINE LOTS. ON SINGLE FAMILY ZERO LOT LINE LOTS WHERE THE DRIVE IS ON THE ZERO LOT LINE, THE TANGENT POINT OR FLARE SHALL BE NO GREATER THAN 3' BEYOND THE ADJOINING PROPERTY LINE PROJECTED PERPENDICULAR TO THE STREET CENTERLINE.

| | | |
|---|---|---|
| DATE APPROVED: 04/2016 | DWG. NO: ST-014.2 | SCALE: N.T.S. |
| DRAWN BY: RAS | SHEET: 2 OF 2 | |
| FILENAME: DRIVEWAY (RESIDENTIAL - ONE OR TWO FAMILY) | | |

City of New Braunfels — ENGINEERING DEPARTMENT


CUDEENGINEERS.COM

CUDE ENGINEERS

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


**FLYING W UNIT 3**

TYPICAL CONCRETE DRIVEWAY DETAILS

**DATE**
03/26/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

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

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

P:\04024\04024_UNIT 3\SHEETS\C7.D5 TYPICAL CONCRETE DRIVEWAY DETAILS.dwg 2024/03/26 1:54pm trayne

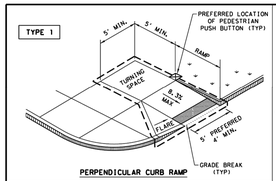
**C7.D5**


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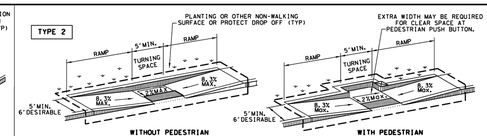
DATE:
FILE:

TYPE 1




PERPENDICULAR CURB RAMP

TYPE 2




WITHOUT PEDESTRIAN PUSH BUTTON

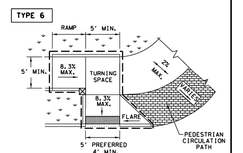
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

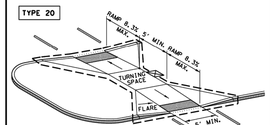



TYPE 6




COMBINATION CURB RAMPS

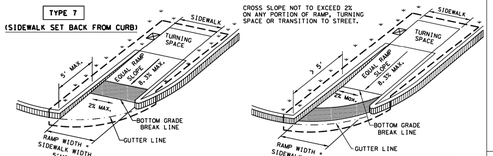
TYPE 20




CURB RAMPS AT MEDIAN ISLANDS

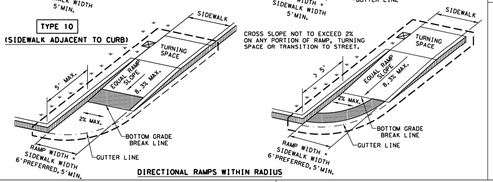
TYPE 7

(SIDEWALK SET BACK FROM CURB)



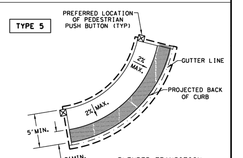

TYPE 10

(SIDEWALK ADJACENT TO CURB)



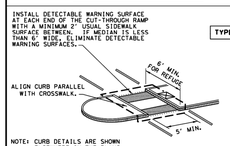

DIRECTIONAL RAMPS WITHIN RADIUS

TYPE 5



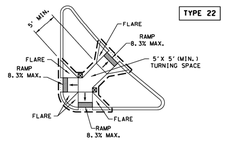

BLENDED TRANSITION (FLUSH LANDING)

TYPE 21




NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22




COMBINATION ISLAND RAMPS

BOTTOM GRADE BREAK OF CURB RAMP WILL NORMALLY BE AT GUTTER LINE. SURFACE SLOPES AT GRADE BREAKS SHALL BE FLUSH.




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.

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK

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 | CK: | DW: | CK: |
|---|---|---|---|---|
| © TxDOT: MARCH, 2002 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | | | | |
| REVISED 08-2005 | DIST | COUNTY | | SHEET NO. |
| REVISED 07-2014 | | | | |

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FILE:

## 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 applicable 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 the 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.

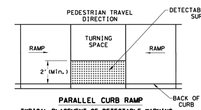
### DETECTABLE WARNING PAVERS (IF USED)

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

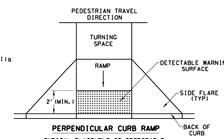
27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items 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 SURFACE DETAILS



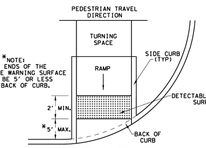

PARALLEL CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.




PERPENDICULAR CURB RAMP

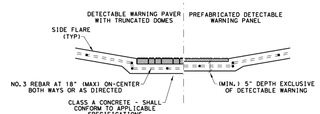
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.




*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.




SECTION VIEW DETAIL

CURB RAMP AT DETECTIBLE WARNINGS

SHEET 2 OF 4

Texas Department of Transportation — Design Division Standard

# PEDESTRIAN FACILITIES CURB RAMPS

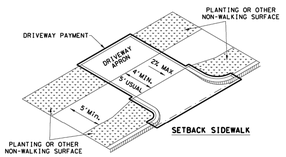
## PED-18

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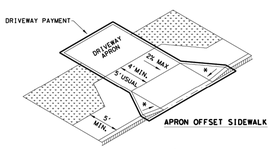
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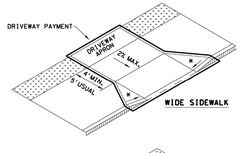
## SIDEWALK TREATMENT AT DRIVEWAYS



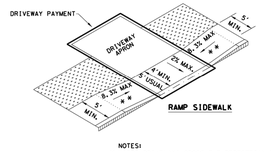

SETBACK SIDEWALK




APRON OFFSET SIDEWALK

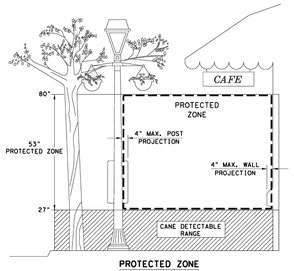



WIDE SIDEWALK



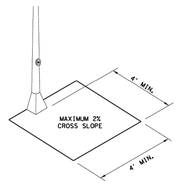

RAMP SIDEWALK

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.

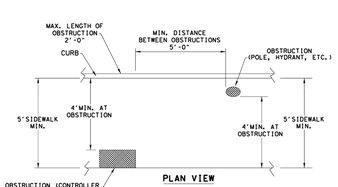



PROTECTED ZONE

NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



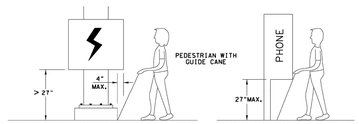

CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON




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.




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

Texas Department of Transportation — Design Division Standard

# PEDESTRIAN FACILITIES CURB RAMPS

## PED-18

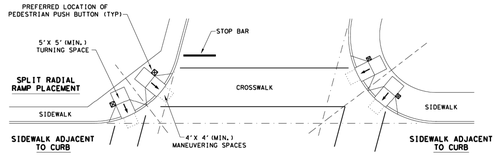
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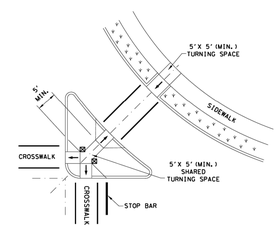
DATE:
FILE:

## TYPICAL CROSSING LAYOUTS

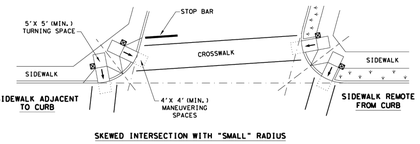
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



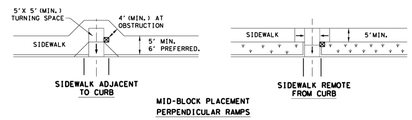

SKEWED INTERSECTION WITH "LARGE" RADIUS

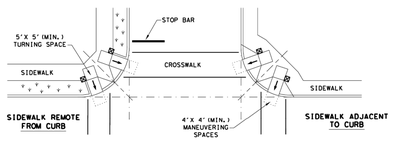



AT INTERSECTION W/FREE RIGHT TURN & ISLAND




SKEWED INTERSECTION WITH "SMALL" RADIUS




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

Texas Department of Transportation — Design Division Standard

# PEDESTRIAN FACILITIES CURB RAMPS

## PED-18

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CUDE ENGINEERS
4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
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FLYING W
UNIT 3

TXDOT PEDESTRIAN FACILITIES DETAILS CURB RAMPS

DATE
03/26/2024

PROJECT NO.
04024-004

DRAWN BY
CG/AM/JG/WDS

CHECKED BY
JC/AL

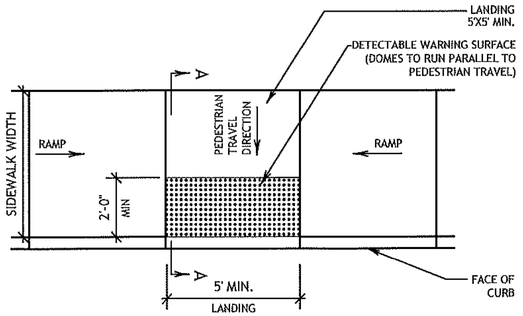
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STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

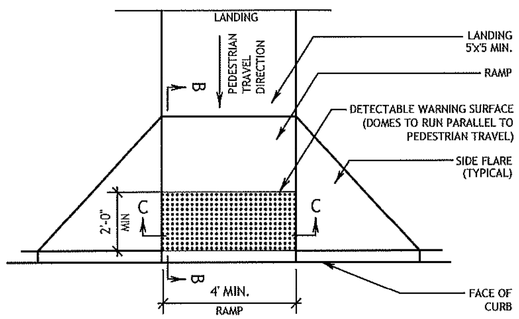
CUDE ENGINEERS
TBPELS No. 10048500

C7.D6

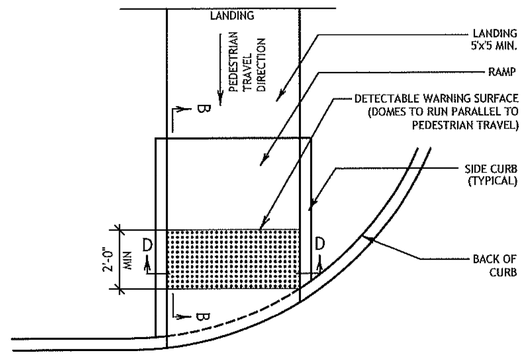
J:\PROJ\4024_UNIT 3\DWG\C7.D6 TXDOT PEDESTRIAN FACILITIES DETAILS CURB RAMPS.dwg 2024/03/26 1:29pm thowe



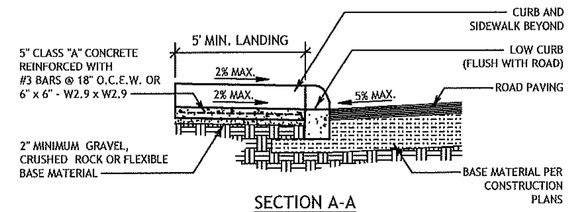

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING FOR PARALLEL CURB RAMP.



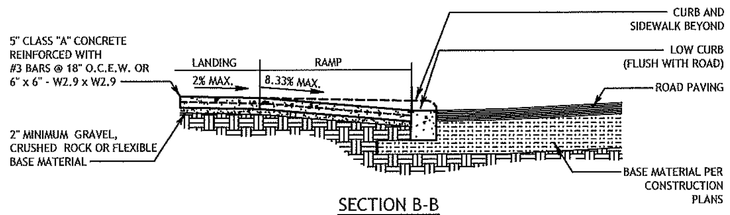

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE FOR PERPENDICULAR CURB RAMP.



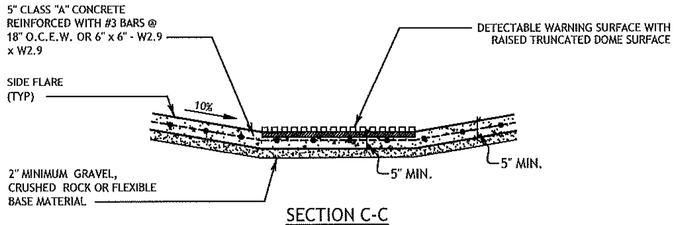

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN FOR DIRECTIONAL CURB RAMP.



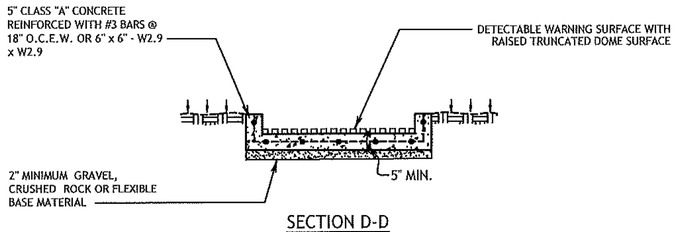

SECTION A-A




SECTION B-B




SECTION C-C




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.

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 |

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.

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

FLYING W
UNIT 3

WHEELCHAIR RAMPS STANDARDS

DATE
03/26/2024
PROJECT NO.
04024-004
DRAWN BY
CG/AM/JG/WDS
CHECKED BY
JC/AL

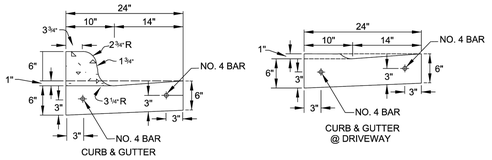
REVISIONS
1 2 3 4 5 6 7 8

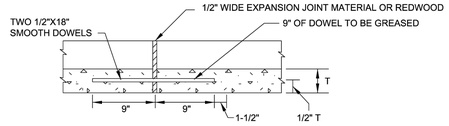
STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024
CUDE ENGINEERS
TBPELS No. 10048500

C7.D7

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.

# CURB AND GUTTER



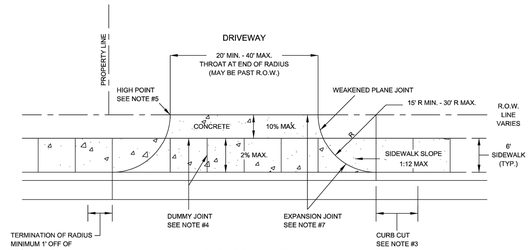

LONGITUDINAL SECTION THRU CURB AND GUTTER
SHOWING TYPICAL EXPANSION JOINT DETAILS.
REINFORCING STEEL SHALL NOT CROSS EXPANSION JOINTS.
STEEL SHALL BE TERMINATED 3" (+ OR - ) 1" FROM FACE OF THE JOINT.

NOTES:

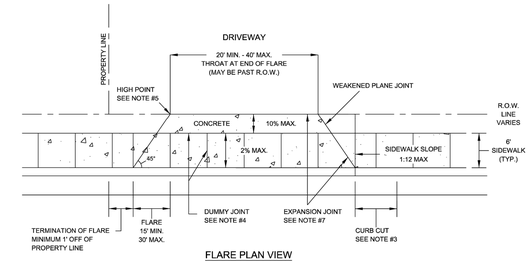
1. REINFORCING BARS SHALL BE LAPPED A MINIMUM OF 18".
2. CURB AND GUTTER SHALL HAVE FORMED TOOLED OR SAWED CONTRACTION JOINTS AT ± 10'. THE DEPTH OF THESE JOINTS SHALL BE SUFFICIENT TO ENSURE CRACKING AT THE JOINTS.
3. CURB OR CURB AND GUTTER SHALL HAVE EXPANSION JOINTS AT POINTS OF CURVATURE, AT INTERVALS 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)



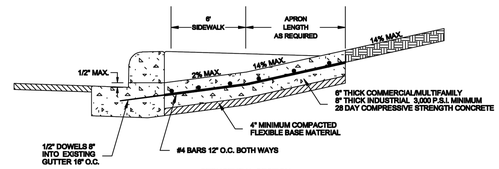

RADIUS PLAN VIEW



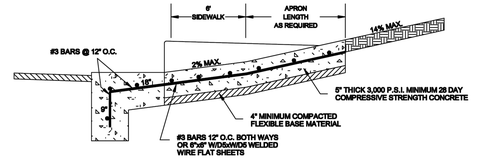

FLARE PLAN VIEW

| | | | | |
|---|---|---|---|---|
| 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)




STRUCTURAL SECTION



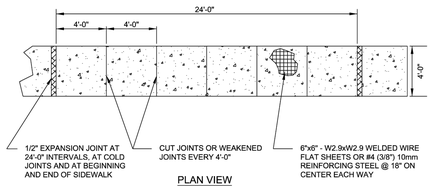

NO EXISTING CURB STRUCTURAL SECTION

NOTES:

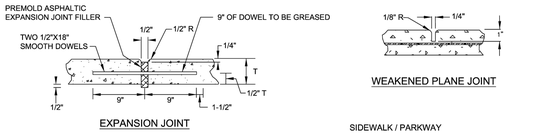
1. WHERE GUTTER DOES NOT EXIST DRIVEWAY APRON SHALL EXTEND TO EDGE OF ASPHALT AND SHALL HAVE A MINIMUM 6" WIDE 1' DEEP GRADE BEAM MONOLITHIC AND REINFORCED SIMILAR TO APRON.
2. PLACEMENT OF SIDEWALK SHOWN IS TYPICAL; HOWEVER, ALTERNATIVE SIDEWALK PLACEMENT COMMON TO DRIVEWAY APRON WILL BE CONSIDERED 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)



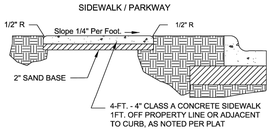

PLAN VIEW




EXPANSION JOINT




WEAKENED PLANE JOINT



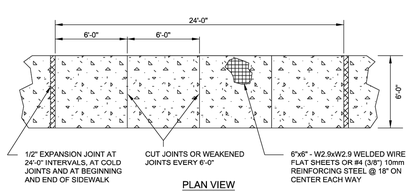

TYPICAL SECTION

NOTES:

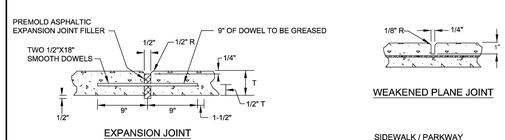
1. EXPANSION JOINTS ARE TO BE USED BETWEEN CONCRETE DRIVEWAY AND SIDEWALK.
2. SCORED JOINTS DENOTE SIDEWALK ACROSS THE DRIVEWAY AND ARE TO BE PLACED AT LEAST 1/3 rd. THROUGH THE SLAB THICKNESS.
3. ALL SIDEWALK AND DRIVEWAY CONSTRUCTION SHALL MEET A.D.A. SPECIFICATIONS.

| | | | | |
|---|---|---|---|---|
| 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)



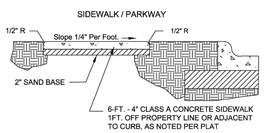

PLAN VIEW




EXPANSION JOINT




WEAKENED PLANE JOINT



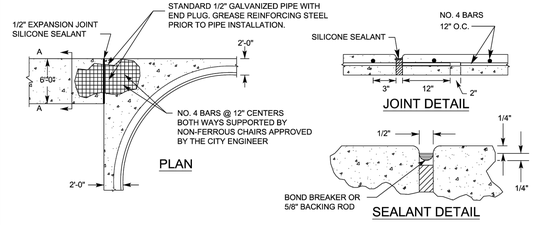

TYPICAL SECTION

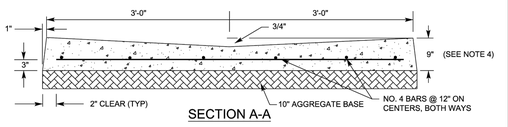
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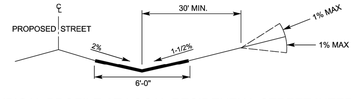
1. EXPANSION JOINTS ARE TO BE USED BETWEEN CONCRETE DRIVEWAY AND SIDEWALK.
2. SCORED JOINTS DENOTE SIDEWALK ACROSS THE DRIVEWAY AND ARE TO BE PLACED AT LEAST 1/3 rd. THROUGH THE SLAB THICKNESS.
3. ALL SIDEWALK AND DRIVEWAY CONSTRUCTION SHALL MEET A.D.A. SPECIFICATIONS.

| | | | | |
|---|---|---|---|---|
| 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




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 | | | | |


CUDEENGINEERS.COM

CUDE ENGINEERS

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


FLYING W
UNIT 3

CITY OF NEW BRAUNFELS STANDARD DETAILS

DATE
03/26/2024

PROJECT NO.
04024-004

DRAWN BY
CG/AM/JG/WDS

CHECKED BY
JC/AL

REVISIONS
1 2 3 4 5 6 7 8

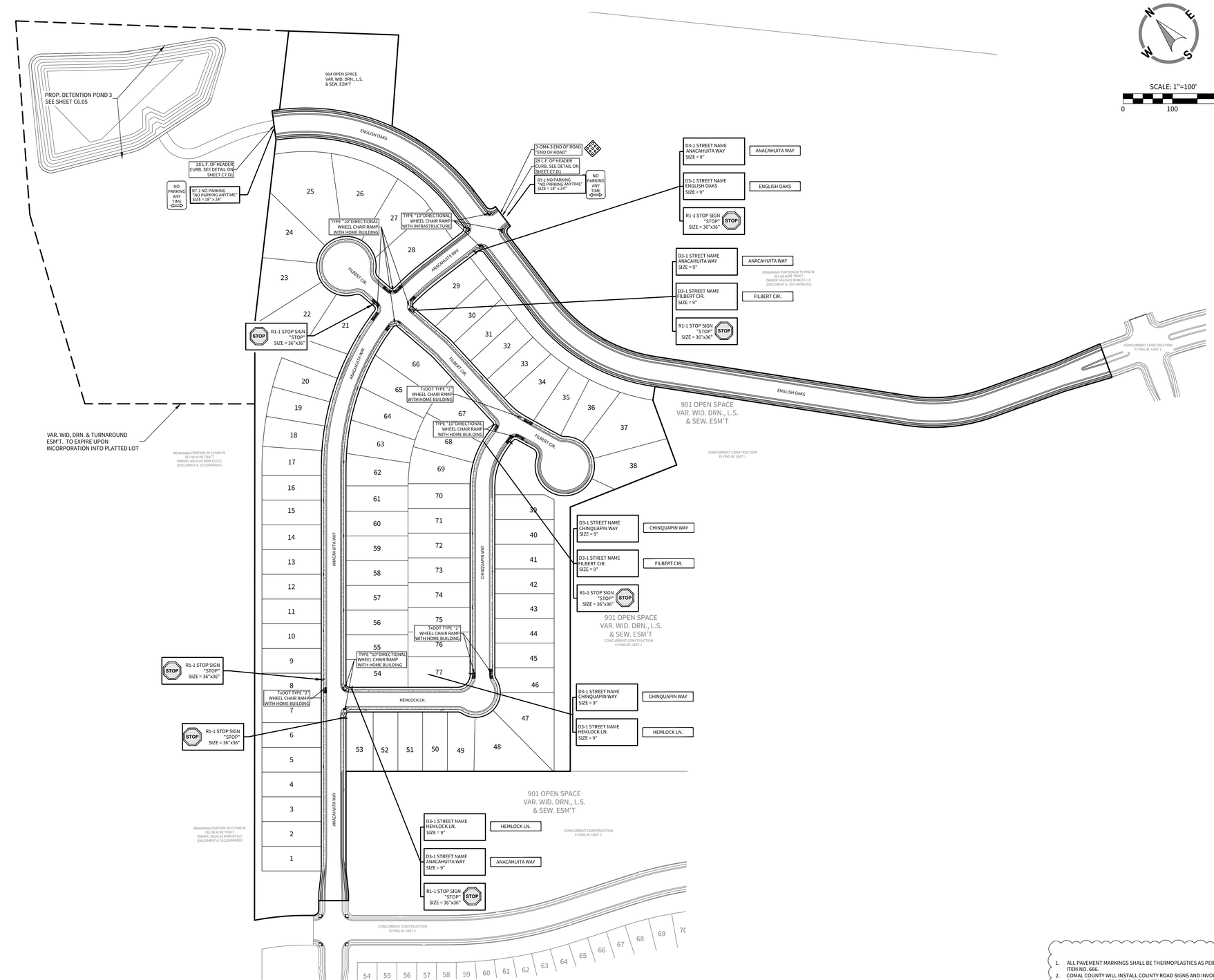
STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024
CUDE ENGINEERS
TBPELS No. 10048500

C7.D8


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.

SIDEWALK TO BE CONSTRUCTED WITH INFRASTRUCTURE

SIDEWALK TO BE CONSTRUCTED WITH HOME BUILDING




SCALE: 1"=100'

0 100 200

1

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

CUDE ENGINEERS

4122 Pond Hill Road, Suite 101
San Antonio, Texas 78231
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# FLYING W UNIT 3

## TRAFFIC SIGNAGE PLAN

**DATE**
03/29/2024

**PROJECT NO.**
04024-004

**DRAWN BY**
CG/AM/JG/WDS

**CHECKED BY**
JC/AL

**REVISIONS**
1. 03/25/24 - ADDED SIGNAGE NOTE
2.
3.
4.
5.
6.
7.
8.

STATE OF TEXAS
ANDREW R. LOWRY
123410
LICENSED
PROFESSIONAL ENGINEER
04/01/2024

CUDE ENGINEERS
TBPELS No. 10048500

**C8.00**

E:\04024\SUB_UNIT 3\DWG\C8.00 TRAFFIC SIGNAGE PLAN.dwg 03/29/2024 11:53am bwoe


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