TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

September 30, 1998

Mr. Leonard Hitzfelder
LEMA, Inc.
2553 F.M. 725
New Braunfels, TX 78130

Mr. Rudy Seidel
Tract Development Inc.
706 Timber Drive.
New Braunfels, TX 78130

Re: EDWARDS AQUIFER, Comal County
PROJECT: Laurel Heights - Units 4, 5 & 6, Project number 987, Located on Twin Oaks Drive between Valley View and Wood Road, New Braunfels, Texas
TYPE: Request for Approval of Water Pollution Abatement Plan (WPAP); 30 Texas Administrative Code (TAC) §213.5(b); Edwards Aquifer Protection Program

Dear Mr. Hitzfelder and Mr. Seidel:

The Texas Natural Resource Conservation Commission (TNRCC) has completed its review of the WPAP application for the referenced project that was submitted by S. Craig Hollmig, Inc. on behalf of LEMA, Inc. to the San Antonio Regional Office on June 10, 1998. Final review of the WPAP submittal was completed after additional material was received on September 22, 1998. The WPAP proposed in the application is in general compliance with 30 TAC § 213.5(b); therefore, approval of the plan is hereby granted subject to applicable state rules and the conditions in this approval letter. *This approval expires two (2) years from the date of this approval unless, prior to the expiration date, construction has commenced on the project or an extension of time has been requested.*

PROJECT DESCRIPTION

The proposed residential project will have an area of 24 acres and will consist of 44 single-family residences. Project wastewater will be disposed of by conveyance to the existing Kuehler Road Sewage Treatment Plant owned by New Braunfels Utilities. The proposed impervious cover for the

development is approximately 5.9 acres (25%). The site is located within the City of New Braunfels, and must conform with applicable codes and requirements of the City of New Braunfels.

GEOLOGY ON SITE

According to the geologic assessment included with the submittal, there are two possibly sensitive features on the project site. One feature is described as fill material. The other feature is described as "a small oval solution cavity approximately 9" X 12" extending to a depth of approximately 3'. Feature has probably developed within the fill material found on the northern end of the site."

The San Antonio Regional Office site inspection of September 9, 1998, revealed existing fill material (soil and rock) on the site. The "small oval solution cavity" was not located, and no other sensitive features were observed.

GEOLOGY DOWNGRADIENT OF SITE

According to the geologic assessment, the southeastern end of the property crosses the Edwards Aquifer Recharge Zone boundary.

PERMANENT POLLUTION ABATEMENT MEASURES

The following measures will be taken to prevent pollution of stormwater originating on-site or up-gradient from the project site and potentially flowing across and off the site after construction:

One geologic or manmade features on the project site were assessed as being sensitive or possibly sensitive. The permanent pollution abatement measure that will be provided to protect this feature is to fill it with concrete up to the surface.

SPECIAL CONDITIONS

1. If any potential sensitive features are encountered during construction, a geologist shall evaluate the significance of the features. The evaluation shall include representative photographs and a description of the feature forwarded to the San Antonio office. Construction in the vicinity of the features may only continue with written approval from the TNRCC.

2. Placement of hydrocarbon or hazardous substance storage facilities regulated pursuant to 213.5(d) and 213.5(e), requires submittal of all appropriate applications with appropriate fees and must receive prior approval from the TNRCC.

STANDARD CONDITIONS

1. During the course of regulated activities related to this project, the applicant or his agent shall comply with all applicable provisions of 30 TAC Chapter 213, Edwards Aquifer. The applicant shall remain responsible for the provisions and conditions of this approval until such responsibility is legally transferred to another person or entity, upon which that person or entity shall assume responsibility for all provisions and conditions of this approval.

2. Any modification to the activities described in the referenced WPAP application following the date of approval may require the submittal of a WPAP to amend this approval, including the payment of appropriate fees and all information necessary for its review and approval.

3. Prior to commencing any regulated activity, the applicant or his agent must notify the San Antonio Regional Office in writing of the date on which the regulated activity will begin.

4. The applicant or his agent shall record this WPAP approval in the county deed records within 30 days of receiving this notice of approval. Proof of deed recordation shall be submitted to the San Antonio Regional Office prior to commencing construction. A suggested format that you may use to deed record the approved WPAP is enclosed.

5. All contractors conducting regulated activities at the project location shall be provided a copy of this notice of approval. At least one complete copy of the approved WPAP and this notice of approval shall be maintained at the project location until all regulated activities are completed.

6. Temporary erosion and sedimentation (E&S) controls, i.e., silt fences, rock berms, stabilized construction entrances, or other controls described in the approved WPAP, must be installed prior to construction and maintained during construction. Temporary E&S controls may be removed when vegetation is established and the construction area is stabilized. If a water quality pond is proposed, it shall be used as a sedimentation basin during construction. The TNRCC may monitor stormwater discharges from the site to evaluate the adequacy of temporary E&S control measures. Additional controls may be necessary if excessive solids are being discharged from the site.

7. If any significant recharge feature [sensitive feature] is discovered during construction, all regulated activities near the feature must be suspended immediately. The applicant or his agent must immediately notify the San Antonio Regional Office of the discovery of the feature. Regulated activities near the feature may not proceed until the executive director has reviewed and approved the methods proposed to protect the feature and the aquifer from potential adverse impacts to water quality.

8. At project locations where construction is initiated and abandoned, or not completed, the site shall be returned to a condition such that the aquifer is protected from potential contamination.

9. Approval of the design of the sewage collection system for this proposed project shall be obtained from the TNRCC prior to commencement of construction of any sewage collection system.

10. No wells exist on the site. Any abandoned wells shall be plugged in accordance with 30 TAC § 338 or an equivalent method, as approved by the Executive Director.

    Any drill holes resulting from core sampling on-site or down-gradient of the site shall be plugged with native soil, from the bottom of the hole to the top of the hole, so as to not allow water or contaminants to enter the subsurface environment.

11. Pursuant to §26.136 of the Texas Water Code, any violations of the requirements in 30 TAC §213 may result in administrative penalties.

If you have any questions or require additional information, please contact John Mauser of the Edwards Aquifer Protection Program at 210/490-3096. Please reference project number 987.

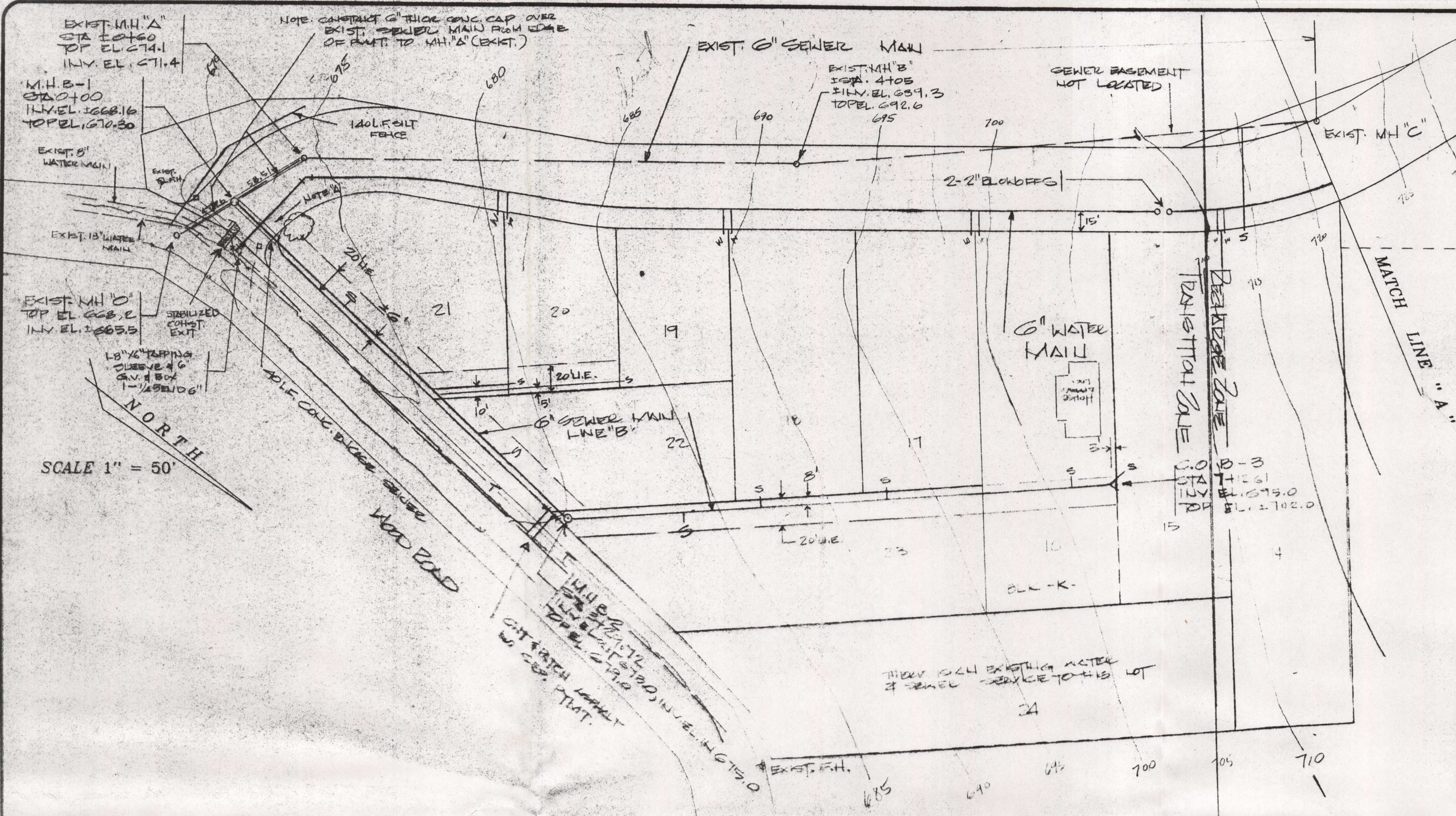
Sincerely,

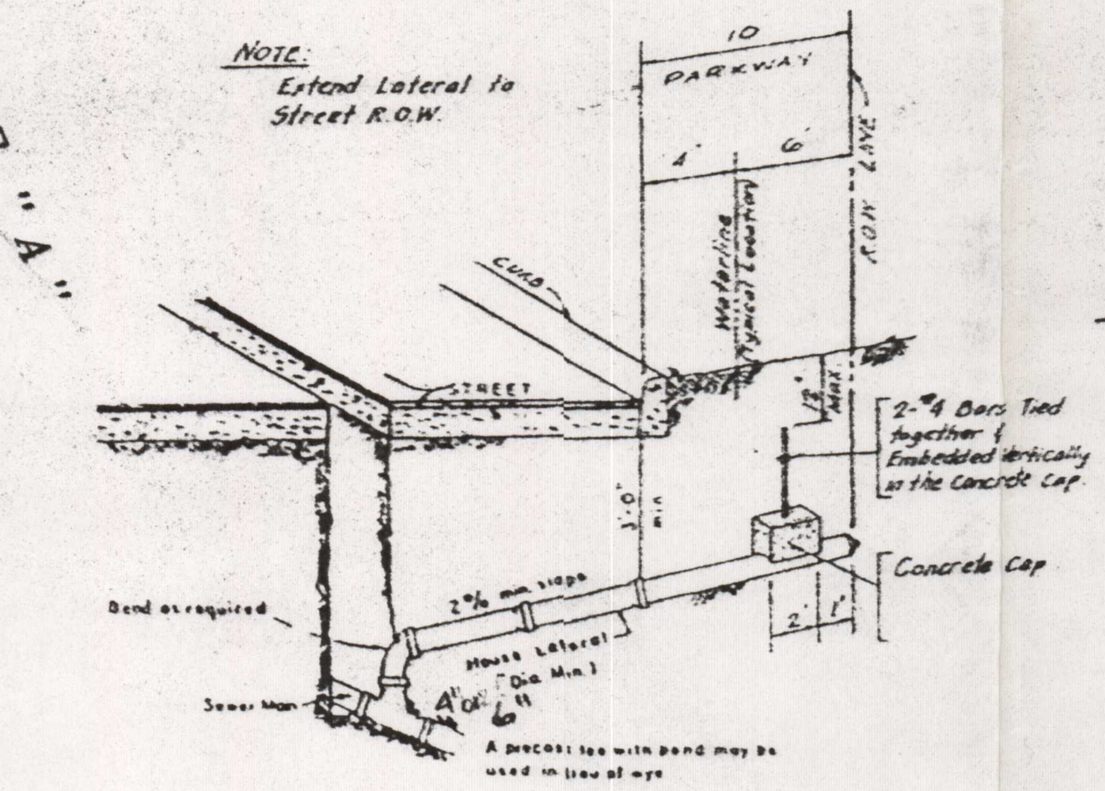
Jeffrey A. Saitas, P.E.
Executive Director

JAS/ JKM/eg

Enclosure: Deed Recordation Affidavit

cc: S. Craig Hollmig, S. Craig Hollmig, Inc.
Harry Bennett, City of New Braunfels
Tom Hornseth, Comal County
Greg Ellis, Edwards Aquifer Authority
TNRCC Field Operations, Austin





HOUSE LATERAL DETAIL

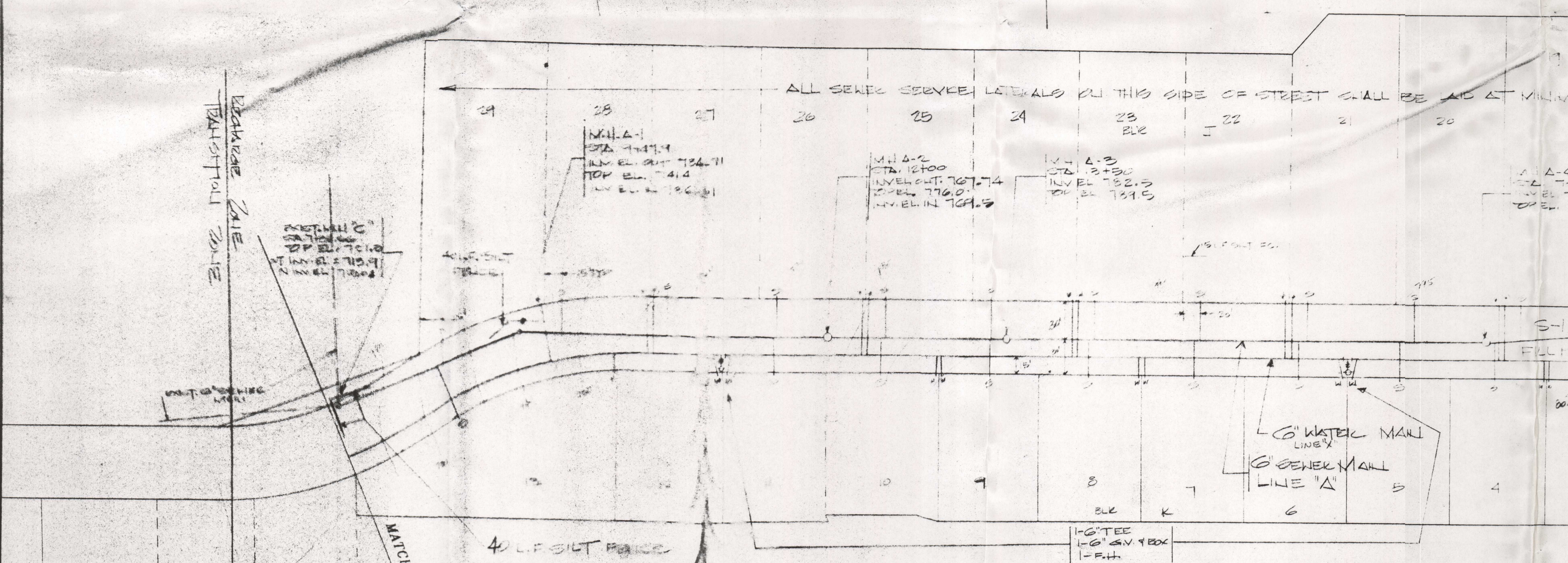
Lateral line will be ductile iron or PVC SDR 26 or equal and extent to the street right-of-way line. All connections of the lateral line to the main will be by an approved saddle, or manufactured tee or wye. Breaking of a main to tie in a lateral or use of cement or other grout material in making of joints, or connections is prohibited. Two feet (2') of the lateral will be concrete capped, commencing one foot (1') from end of pipe and ending three feet (3') from end of pipe. The location of the lateral pipe and will be marked up two (2) #4 rebars tied together and embedded vertically in the concrete cap and extending vertically to within 12" of top of curb. Backfill requirements are the same as other 402ERZD, Sanitary Sewers.

GENERAL CONSTRUCTION NOTES FOR WATER:

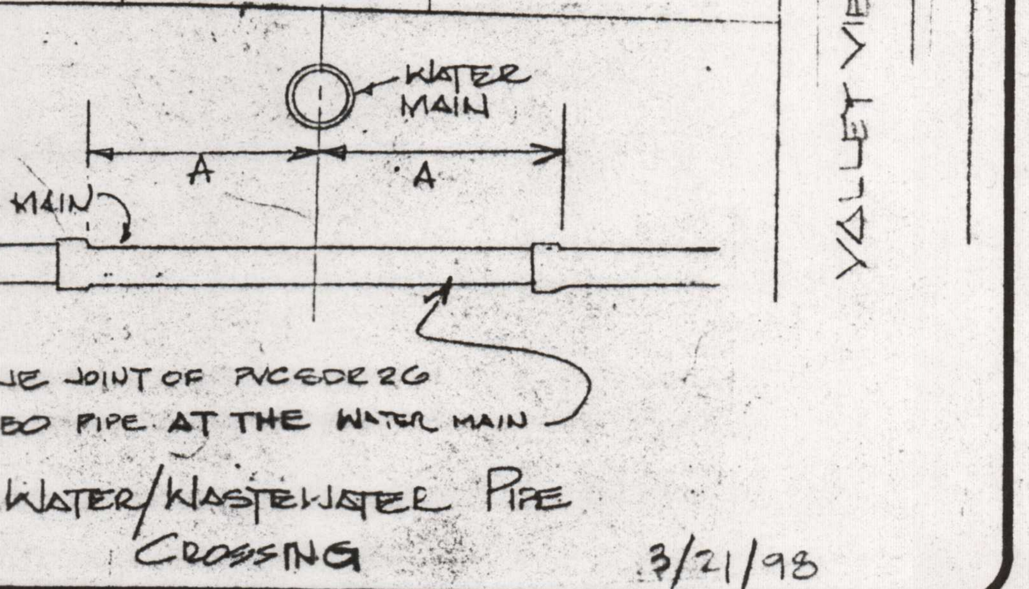
1. Materials and construction methods for water and sewer improvements shall conform to specifications of the New Braunfels Utilities Water/Sewer Connection and Construction Policy Manual.
2. Use only Mueller valves, fittings, curb and corporation stops and fittings.
3. Trench backfill shall have no stones larger than 4" and be compacted to 95% of proctor.
4. All construction shall comply with regulations of the Texas Department of Health.
5. Water line depth to be 42" below top of pavement unless otherwise noted.
6. No separate payment will be made on water main and services testing and water quality testing.
7. Use pea gravel or 3/4" to dust backfill around pipes.
8. Utility Contractor shall reset meter boxes to final grade after Street Contractor is finished, at no separate payment.
9. Street Contractor shall adjust valve boxes and manholes at no separate payment.
10. The Water and Sewer Contractor and the Street Contractor shall coordinate with each other to achieve the required density in the trench backfill.
11. The Contractor shall be responsible for damages to all existing utilities. The location of the existing utilities shown on these plans are the approximate location. These plans may not show all existing utilities. The Contractor shall locate all existing utilities before beginning work.
12. All water mains shall be C-900, Cl. 150 and meet AWWA Specifications. WATER SERVICES TO BE TYPE K SOFT COPPER
13. The Contractor shall uncover and verify the depths and horizontal locations of existing water and sewer mains to be extended or tied to (by this project) prior to construction.

GENERAL CONSTRUCTION NOTES FOR SEWER:

1. Materials and construction methods for sewer improvements shall conform to specifications of the New Braunfels Utilities Water/Sewer Connection and Construction Policy Manual.
2. Trench backfill shall have no stones larger than 4" and be compacted to 95% of proctor.
3. All construction shall comply with regulations of the Texas Department of Health.
4. No separate payment will be made on sewer main and services testing.
5. Use pea gravel or 3/4" to dust backfill around pipes.
6. Sewer services to be from 4' to 6' below natural ground at the R.O.W. line unless otherwise noted. Sewer services are 4" unless otherwise noted.
7. Street Contractor shall adjust manholes at no separate payment.
8. The Water and Sewer Contractor and the Street Contractor shall coordinate with each other to achieve the required density in the trench backfill.
9. The Contractor shall be responsible for damages to all existing utilities. The location of the existing utilities shown on these plans are the approximate location. These plans may not show all existing utilities. The Contractor shall uncover and verify the depths and horizontal locations of existing water and sewer mains to be extended or tied to (by this project) prior to construction.
10. Sewer Mains shall be SDR 26.



NOTE "A"
Encase the proposed 6" water main with a 12" PVC pipe with a minimum pipe stiffness of 115 psi at 5% deflection. The length of this casing pipe shall be 24' and shall be centered at the centerline of the sewer main. The space around the 6" water main pipe shall be supported at 5' or less intervals with spacers or be filled to the spring line with washed sand. Each end of the casing shall be sealed with water tight non-shrink cement grout or a manufactured water tight seal. The water main may be allowed to pass underneath the sewer main, provided there is a minimum 1' separation between the sewer main and the casing pipe.



3/21/98

SHEET NOTES

S. CRAIG HOLLMIG, INC.
engineers ~ surveyors
new braunfels, texas
512/625-8555

LAUREL HEIGHTS UNITS 4 & 5
WATER, SEWER & STREET PLANS

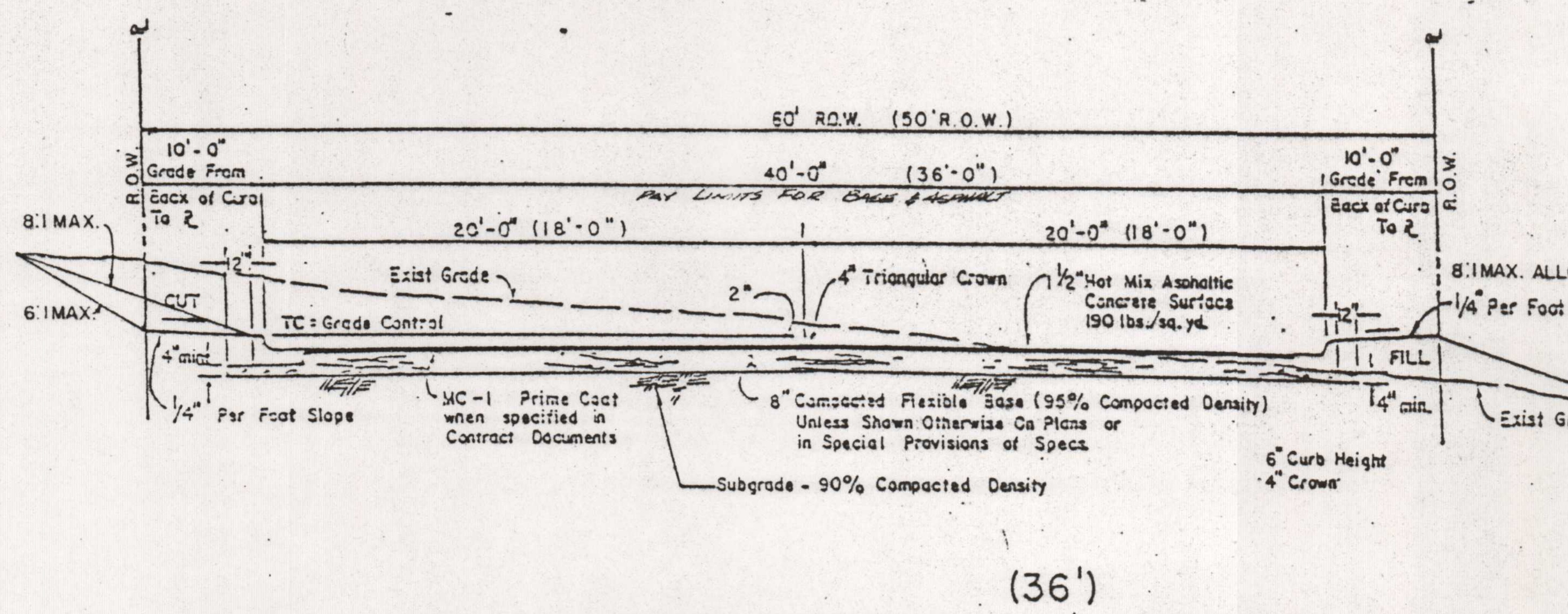
SHEET ___ OF 7

As Approved

FINAL SURVEY	BY	DATE
SURVEYED		
PLOTTED		
TEMPLATE		
AREAS		
AREAS CHECKED		
NOTE BOOK		
NO.		

ORIGINAL SURVEY	BY	DATE
SURVEYED		
PLOTTED		
TEMPLATE		
AREAS		
AREAS CHECKED		
NOTE BOOK		
NO.		

NOTE:
The Street Contractor, at no separate payment, shall locate a City of New Braunfels Fire Department-type blue reflector in the middle of the street opposite all fire hydrants.



(36')
TYPICAL SECTION THROUGH A 40' STREET
AND TYPICAL CUT/FILL PARKWAY GRADING
NO SCALE:

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
WATER POLLUTION ABATEMENT PLAN
GENERAL CONSTRUCTION NOTES

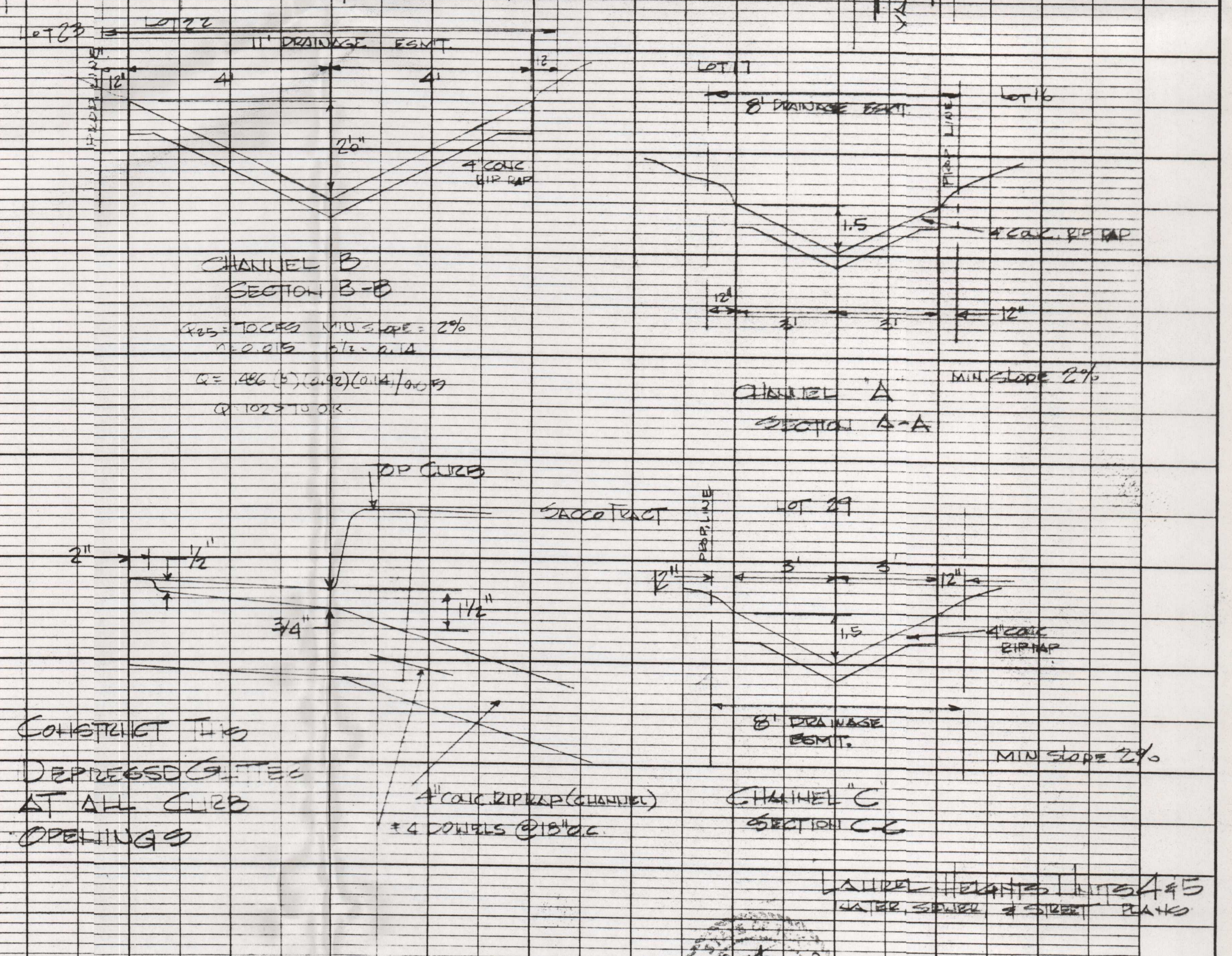
1. The construction activities associated with this project must meet all applicable criteria of the Texas Natural Resource Conservation Commission set forth in 30 Texas Administrative Code (TAC) §213.5(b) - Water Pollution Abatement Plan for Regulated Activities undertaken on the recharge zone of the Edwards Aquifer.

2. Temporary erosion and sedimentation controls are required during construction. The controls must remain in place until disturbed areas are revegetated and the areas have become permanently stabilized. The temporary erosion and sedimentation controls must be inspected periodically for damage caused by construction activities and following every rainfall. Damaged or obstructed controls must be repaired or replaced as necessary to maintain proper operation.

3. If any sensitive feature is discovered during construction, regulated activities near the sensitive feature must be suspended immediately. The owner must immediately notify the appropriate regional office of the Texas Natural Resource Conservation Commission of the sensitive feature discovered. The regulated activities near the sensitive feature may not proceed until the executive director has review and approved the methods proposed to protect the sensitive feature and the Edwards Aquifer from any potentially adverse impacts to water quality while maintaining the structural integrity of the line.

4. Any modification to the approved Water Pollution Abatement Plan must be submitted to the appropriate regional office for approval by the executive director of the Texas Natural Resource Conservation Commission before construction of the proposed modification may commence.

5. All contractors conducting regulated activities associated with this project must be provided with copies of the approved Water Pollution Abatement Plan and the TNRCC letter indicating the specific conditions of its approval. During the course of these regulated activities, the contractors are required to keep on-site copies of the approved plan and approval letter.

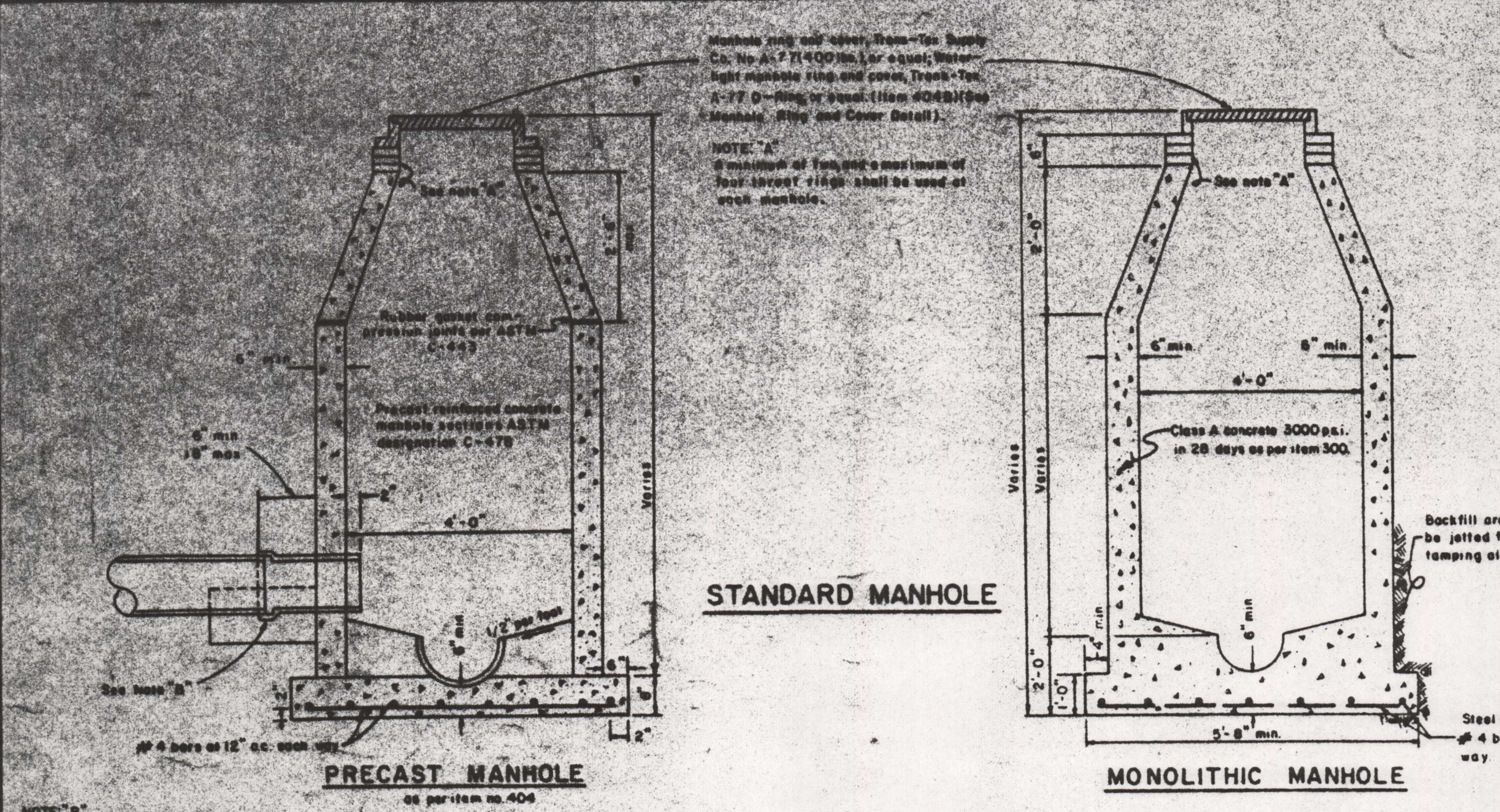


0 1 2 3 4 5 6 7

KEUFFEL & ESSER PLATE 1, PLAN-PROFILE
46 7008 Made in U.S.A.

SHT. 3 OF 7

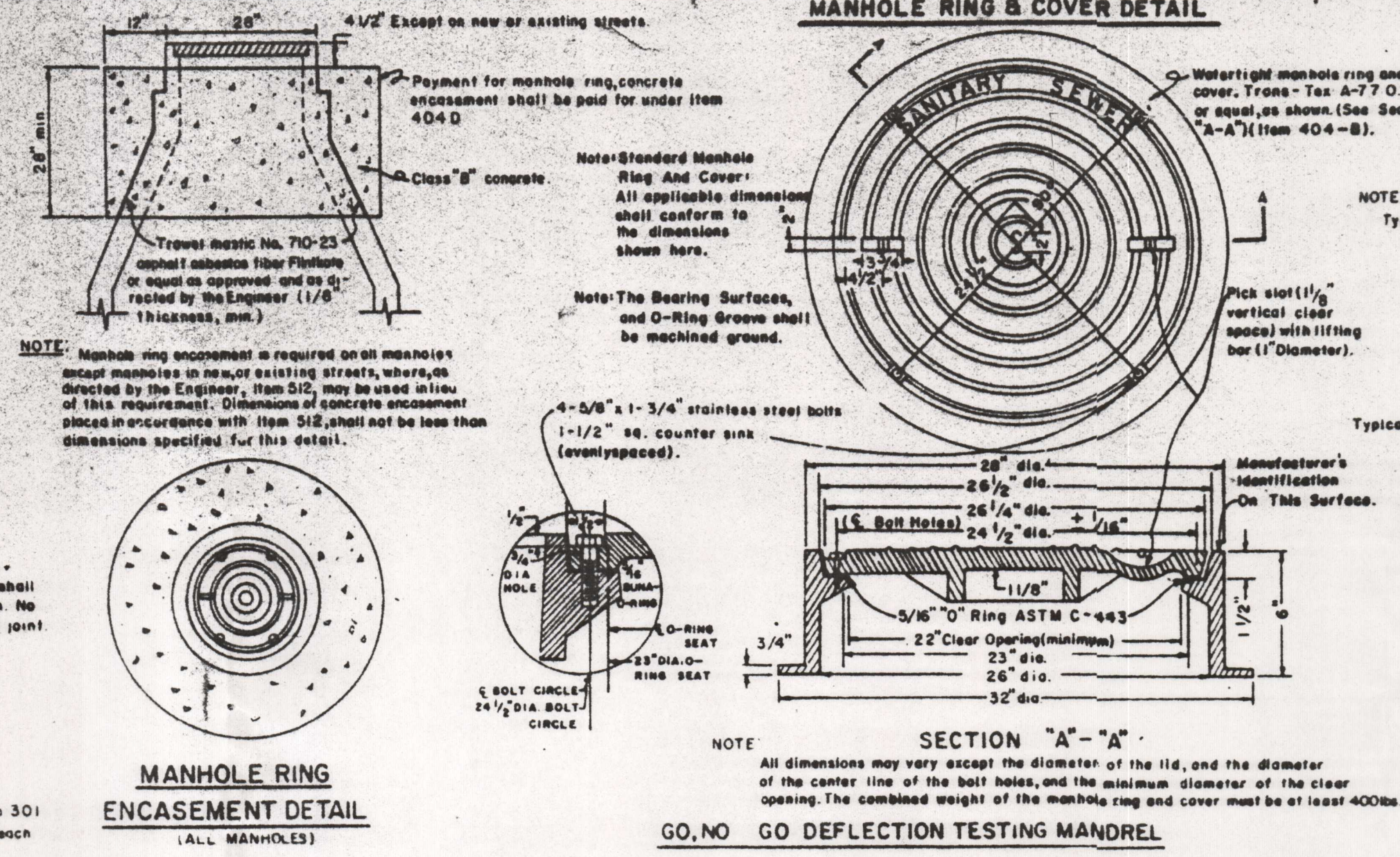
North
1"=20'
Section A-A
Section B-B
Section C-C
Legend
Exist. Contour
Proposed Contour
Twin Oaks
6" Sewer Main
Exist. 6" Swr Main
Tel. Ped.
Exist. F.H.
Approx. Location of Part of a 26.6025 Ac Tract conveyed to Tract Dev. Co. Vol. 226 ... in conflict w/ owner of Lot 1 Blk-1- Werner Subd.
Remove Trees & Brush to Construct Channel "D" as Necessary
Power Pole & Tel. Ped.
Original Iron Pins Fnd
9 Steel Barricade Posts @ 8' o.c. Painted Green w/ Reflectors
Remove Cedar Tree
Channel "D"
50 L.F. Silt Fence
Approx. Location Lot 1 Blk 1 Werner Subd.
Profile at Twin Oaks/Wood Rd. Intersection
Compute Capacity of
Wood Rd.
Exist. M.H. "O" Inv. El. ± 665.5
Approx. Location 8" Water Main Exist.
Approx. Location 18" Water Main Exist.
Sta 0+00 Begin Curb
Laurel Heights U. 4 & 5
Channel "D" & Wood Rd.
Twin Oaks Intersection



STANDARD MANHOLE

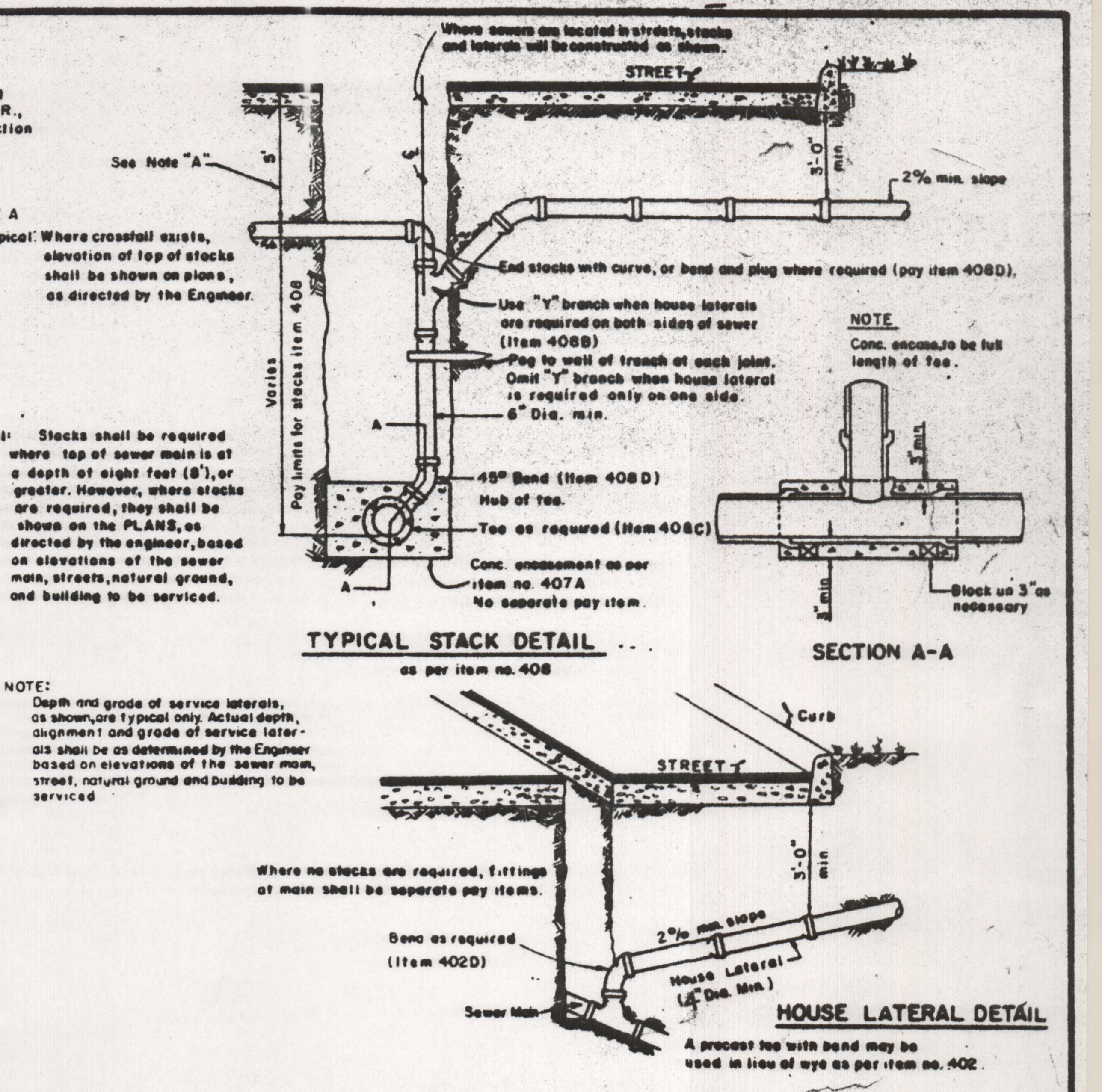
PRECAST MANHOLE

MONOLITHIC MANHOLE



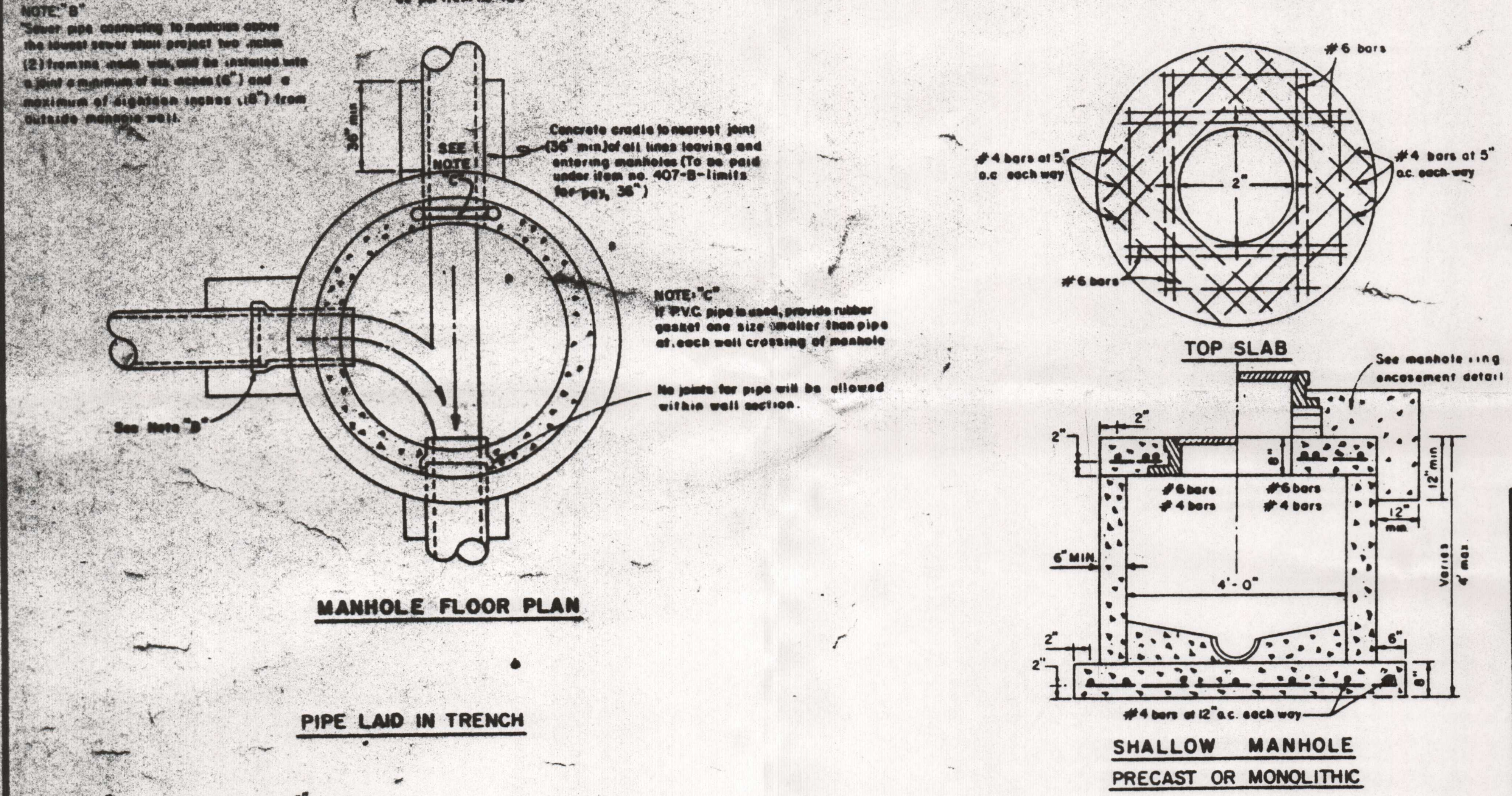
MANHOLE RING ENCASEMENT DETAIL

MANHOLE RING & COVER DETAIL



TYPICAL STACK DETAIL

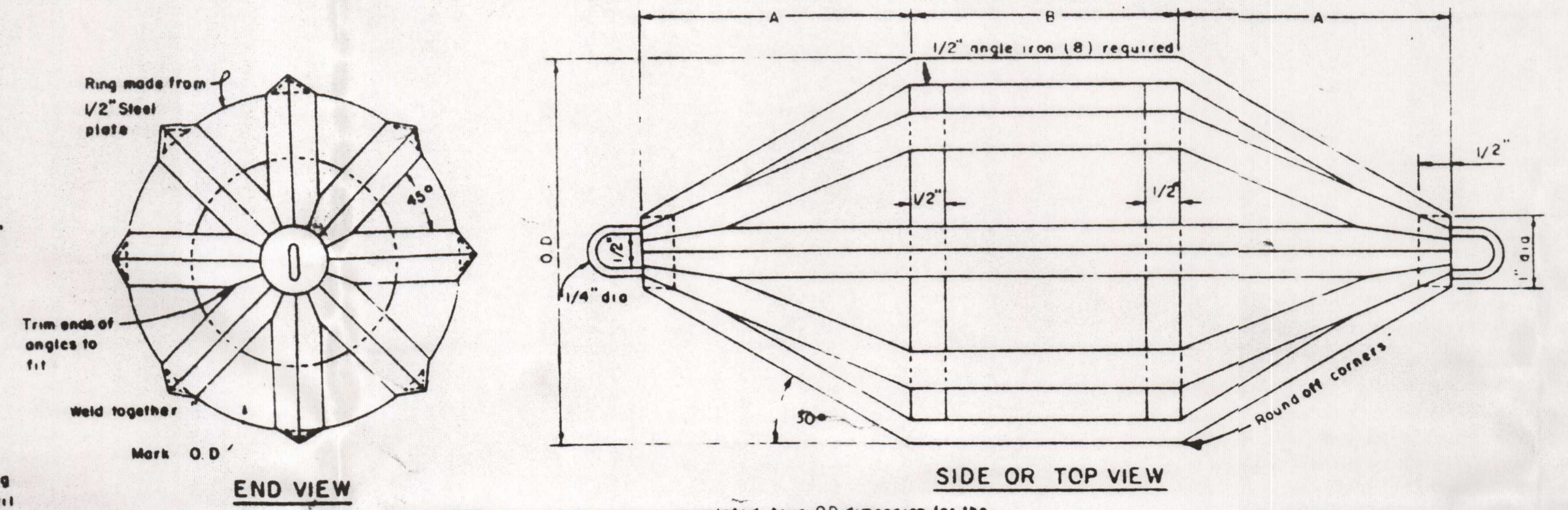
HOUSE LATERAL DETAIL



MANHOLE FLOOR PLAN

TOP SLAB

SHALLOW MANHOLE PRECAST OR MONOLITHIC



GO, NO GO DEFLECTION TESTING MANDREL

END VIEW

SIDE OR TOP VIEW

NOTE After construction is completed, true O.D. dimension for the full length of "B" to 0.010 inch by tool and lathe or grinding

SIZE	A	B	MANDREL O. D. PSM (SDR-41)	MANDREL O. D. PSM (SDR-35)	MANDREL O. D. PSM (SDR-26)	MANDREL O. D. LARGE DIA. RIBBED	RING O. D. PSM (SDR-41)	RING O. D. PSM (SDR-35)	RING O. D. PSM (SDR-26)	RING O. D. LARGE DIA. RIBBED
6"	4.0"	4"	5.62	5.56	5.43	—	4.91	4.85	4.72	—
8"	5.3"	6"	7.52	7.45	7.28	—	6.81	6.74	6.57	—
10"	6.7"	6"	9.41	9.32	9.10	—	8.70	8.61	8.39	—
12"	8.0"	8"	11.20	11.08	10.83	—	10.49	10.37	10.12	—
15"	10.0"	9"	13.71	13.57	13.26	—	13.00	12.86	12.55	—
18"	12.0"	11"	—	16.58	—	16.72	—	15.89	—	16.01
21"	14.0"	12"	—	19.56	—	19.66	—	18.85	—	18.95
24"	16.0"	15"	—	22.00	—	22.26	—	21.29	—	21.55
27"	18.0"	16"	—	24.80	—	25.10	—	24.09	—	24.39
30"	20.0"	18"	—	—	—	27.94	—	—	—	27.23
36"	24.0"	21"	—	—	—	33.63	—	—	—	32.92
40"	26.8"	24"	—	—	—	37.41	—	—	—	36.70
48"	32.0"	29"	—	—	—	44.99	—	—	—	44.28

[redacted]

CHART

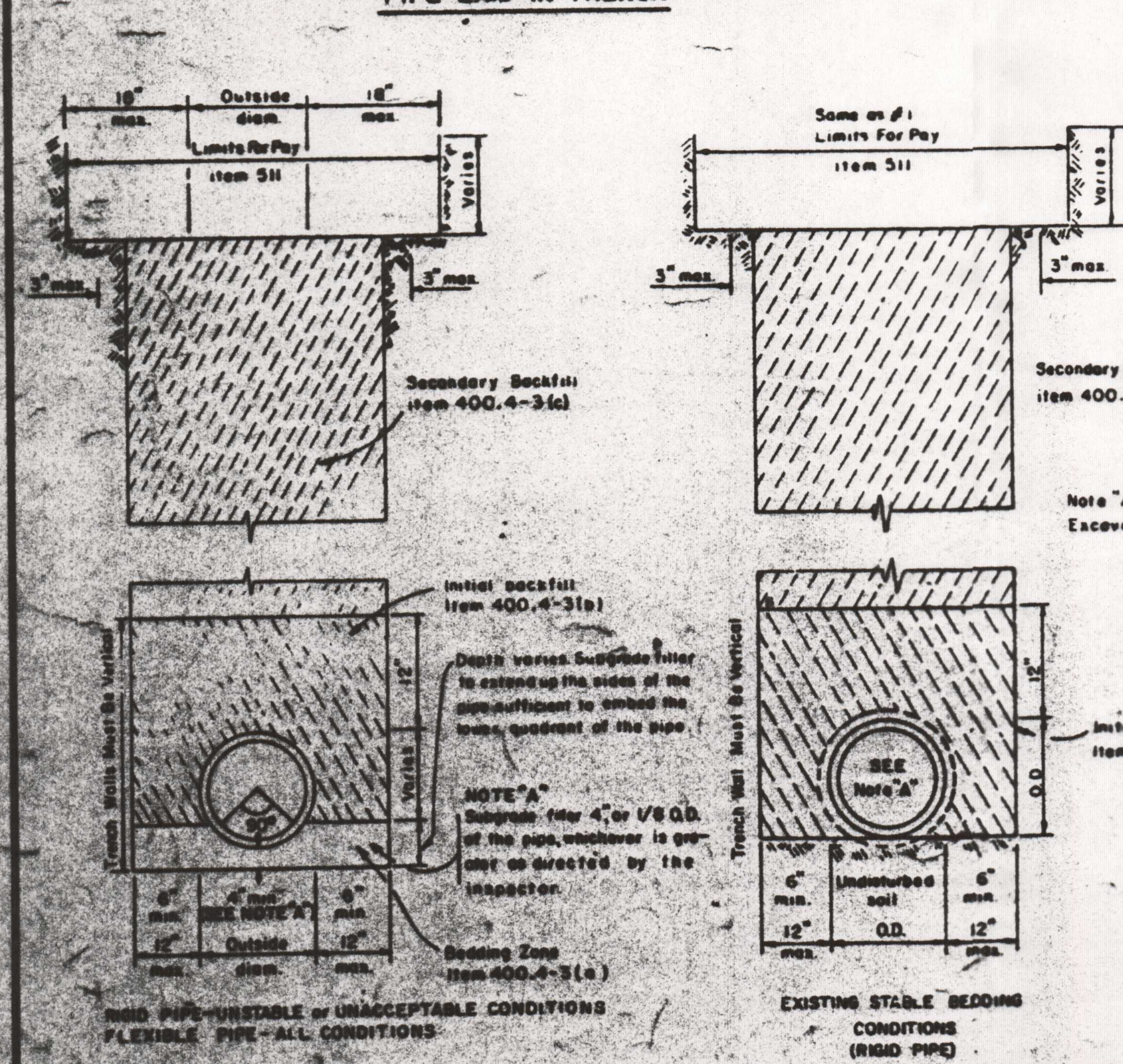
GENERAL NOTES

1. All construction and materials shall be in strict conformance with applicable provision of "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION".
2. Manhole rings and covers shall be Trans-Tex A77, or Equal. When watertight manhole rings and covers are specified, they shall be Trans-Tex A77 "O" Ring, or Equal.

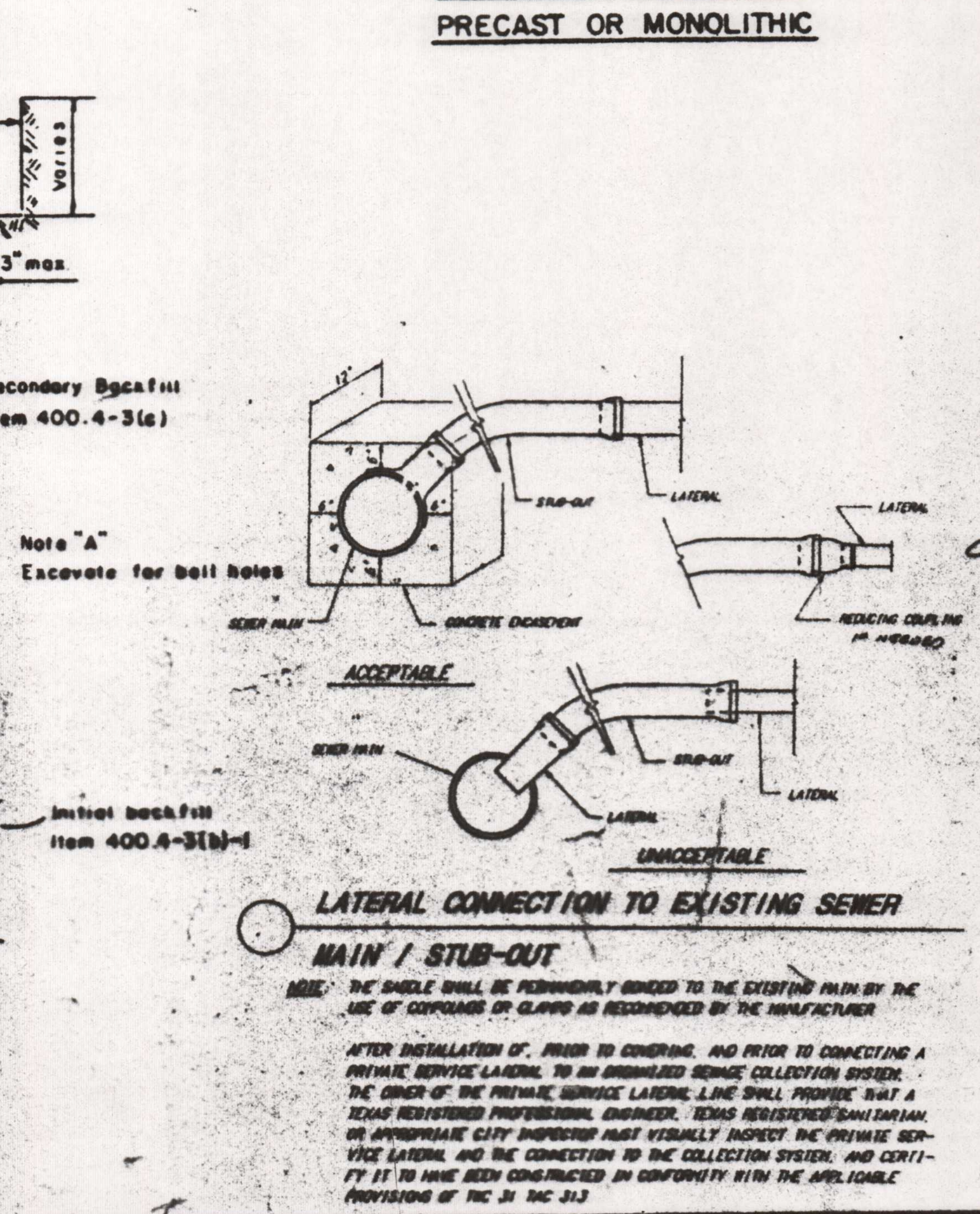
3a. Material for sanitary sewer pipe must be the same from manhole to manhole. Changes in type of pipe may be made, only, at manholes, or special structures, except as approved by the Sewer Engineer.

b. Adaptors and concrete collars shall be used, only, as directed by the Engineer, and as approved by the Sewer Engineer.

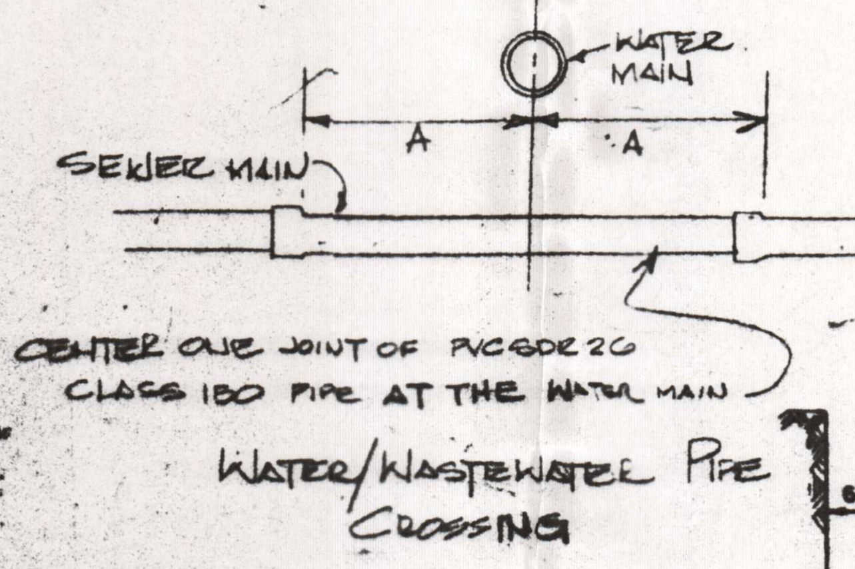
4. All sewer pipe with less than three feet (3') of cover shall be conc. encased, as per item no. 407.
5. All Force Mains shall be provided with thrust blocks, where changes in direction occur, at tees, bends, crosses, changes in size, stops (dead ends), valves and /or as shown below, or as directed by the Engineer.



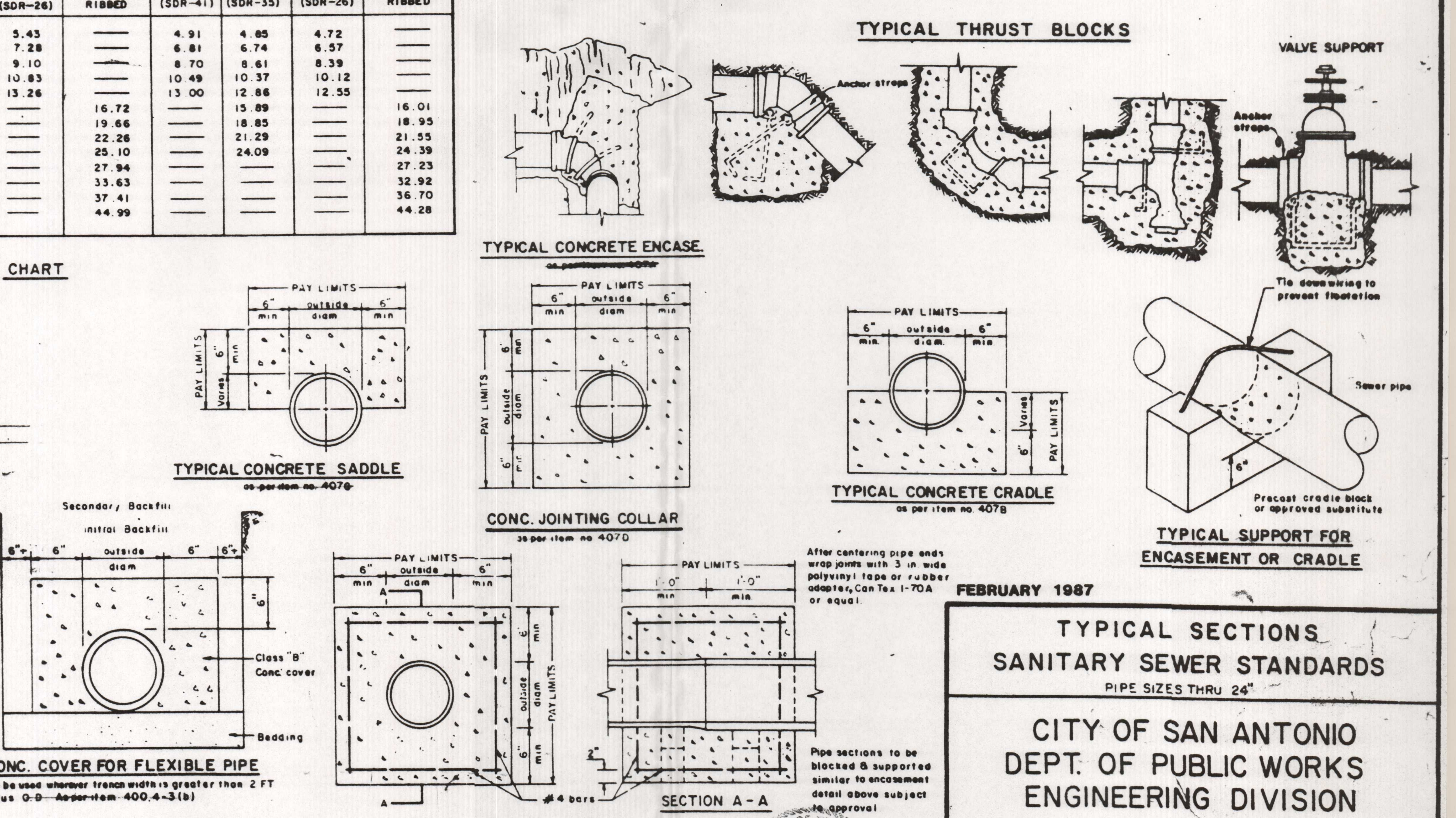
PIPE LAID IN TRENCH



LATERAL CONNECTION TO EXISTING SEWER MAIN / STUB-OUT



WATER/WASTEWATER PIPE CROSSING



TYPICAL CONCRETE ENCASE

TYPICAL CONCRETE SADDLE

CONC. JOINTING COLLAR

TYPICAL CONCRETE CRADLE

CONC. COVER FOR FLEXIBLE PIPE

SECTION A-A

TYPICAL THRUST BLOCKS

VALVE SUPPORT

TYPICAL SUPPORT FOR ENCASEMENT OR CRADLE

FEBRUARY 1987

TYPICAL SECTIONS
SANITARY SEWER STANDARDS
PIPE SIZES THRU 24"

CITY OF SAN ANTONIO
DEPT. OF PUBLIC WORKS
ENGINEERING DIVISION

LAUREL HEIGHTS UNITS 4 & 5

SHEET 5 of 7

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
ORGANIZED SEWAGE COLLECTION SYSTEM
GENERAL CONSTRUCTION NOTES

1. This Organized Sewage Collection System is designed and will be constructed in accordance with the Texas Natural Resource Conservation Commission's Edwards Aquifer Rules 30 Texas Administrative Code (TAC) §213.5(c), the Design Criteria for Sewerage Systems 30 TAC §317.1, 30 TAC §317.2, 30 TAC §317.3, and 30 TAC §317.13, and the City of SAN ANTONIO Standard Specifications.

2. All contractors conducting regulated activities associated with this proposed regulated project will be provided with copies of the Sewage Collection System submittal and the TNRCC letter indicating the specific conditions of its approval. During the course of these regulated activities, the contractors will be required to keep on-site copies of the submittal and the approval letter.

3. The temporary erosion and sedimentation controls will be installed prior to initiating any other construction activity and maintained in accordance with the requirements of the construction plans. All temporary erosion and sedimentation controls will be removed when the construction area is stabilized.

4. The sewer line trench details showing the cross section with the dimensions, pipe placement, and backfill instructions are included on Plan Sheet 5 of 7 of these plans. All sewer pipes joints will meet the requirements in 30 TAC §317.2(a)(3).

   The ASTM, ANSI, or AWWA specification numbers for the pipe(s) and joints are ASTM 3034 & ASTM 2441.

   The pipe material, the pressure classes, and the SDR and/or DR designations are PVC SDR 26 CLASS 160.

5. **If any caverns or sensitive features are discovered during the wastewater line trenching activities, all regulated activities near the sensitive feature must be suspended immediately. The owner must notify the appropriate regional office of the Texas Natural Resource Conservation Commission in writing within two working days of the feature discovered. The regulated activities near the sensitive feature may not proceed until the executive director has review and approved the methods proposed to protect the sensitive feature and the Edwards Aquifer from any potentially adverse impacts to water quality while maintaining the structural integrity of the line.**

6. Sewer lines located within or crossing the 5-year floodplain of a drainageway will be protected from inundation and stream

velocities which could cause erosion and scouring of backfill. The trench will be capped with concrete to prevent scouring of backfill, or the sewer lines will be encased in concrete. All concrete shall have a minimum thickness of six (6) inches.

7. Blasting procedures for protection of existing sewer lines and other utilities will be in accordance with the National Fire Protection Association criteria. If any existing sewer lines are damaged, the lines must be repaired and retested.

8. All manholes constructed or rehabilitated on this project will have watertight construction joints, rings, and covers. If manholes are constructed within the 100-year floodplain, the cover will have a gasket and be bolted to the ring. Where gasketed manhole covers are required for more than three manholes in sequence or for more than 1500 feet, alternate means of venting will be provided. Bricks are not an acceptable construction material for any portion of the manhole.

   The diameter of the manholes will be a minimum of four feet and the manhole covers will have a minimum nominal diameter of two feet. These dimensions and other details showing compliance with the commission's rules concerning manholes and sewer line/manhole inverts described in 30 TAC 317.2(c)(5)(E) are included on Plan Sheet 5 of 7.

9. **Where water lines and new sewer line are installed with a separation distance closer nine feet (i.e., water lines crossing wastewater lines, water lines paralleling wastewater lines, or water lines next to manholes) the installation will meet the requirements of 30 TAC §317.13 (Design of Sewerage Systems) or 30 TAC §290.44(e) (Water Hygiene).**

10. **Where sewers lines deviate from straight alignment and uniform grade all curvature of sewer pipe will be achieved by the following procedure which is recommended by the pipe manufacturer:**

    N/A

    If pipe flexure is proposed, the following method of preventing deflection of the joint will be used:

    N/A

    Specific care will be taken to ensure that the joint is placed in the center of the trench and properly bedded in accordance with 30 TAC §317.2(a)(5) and 30 TAC 317.2(c)(10)(D).

11. **New sewage collection system lines will be constructed with "stub outs" for the connection of anticipated extensions. The location of such "stub outs" will be marked on the ground such that the location of such "stub outs" can be easily determined at the time**

of connection of the extensions. Such "stub outs" will be manufactured wyes or tees that are compatible in size and material with both the sewer line and the extension. At the time of original construction, new "stub-outs" will be constructed sufficiently to extend beyond the edge(s) of any street pavement under which they will pass to the property line. All "stub-outs" will be sealed with a manufactured cap to prevent leakage. Extensions that were not anticipated at the time of original construction or that are to be connected to an existing sewer line not furnished with "stub outs" will be connected using a manufactured saddle and in accordance with accepted plumbing techniques.

If no stub-out is present an alternate method of joining laterals is shown in the detail on Plan Sheet 5 of 7. (For potential future laterals).

The private service lateral stub-outs will be installed as shown on the plan and profile sheets on Plan Sheet 1&5 of 7 and marked after backfilling as shown in the detail on Plan Sheet 1 of 7.

12. The bedding and backfill for flexible pipe will comply with the standards of ASTM D-2321, Classes I or II. Rigid pipe bedding will comply with the requirements of ASTM C 12 classes A or B. Reference 30 TAC §317.2(a)(5)(A). Sand is not allowed as bedding or backfill in trenches that have been blasted.

13. Sewer lines will be tested from manhole to manhole. When a stub or clean-out is used at the end of a proposed sewer line, it cannot be certified as conforming with the provisions of 30 TAC §213.5(c)(3)(E). When a new sewer line is connected to an existing stub or clean-out, it will be tested from existing manhole to new manhole.

14. All sewer lines will be tested in accordance with 30 TAC §317.2(a)(4). Testing method will be:

    (A) Infiltration or Exfiltration Tests. The total exfiltration as determined by a hydrostatic head test, will not exceed 50 gallons per inch diameter per mile of pipe per 24 hours at a minimum test head of two feet above the crown of the pipe at the upstream manhole. When pipes are installed below the groundwater level an infiltration test will be used in lieu of the exfiltration test. The total infiltration, as determined by a hydrostatic head test, will not exceed 50 gallons per inch diameter per mile of pipe per 24 hours at a minimum test head of two feet above the crown of the pipe at the upstream manhole, or at least two feet above existing groundwater level, whichever is greater. For construction within the 25 year flood plain, the infiltration or exfiltration will not exceed 10 gallons per inch diameter per mile of pipe per 24 hours at the same minimum test head. If the quantity of infiltration or exfiltration exceeds the maximum quantity specified, remedial action will be undertaken in

order to reduce the infiltration or exfiltration to an amount within the limits specified.

(B) Low Pressure Air Test. The procedure for the low pressure air test will conform to the procedures described in ASTM C-828, ASTM C-924, ASTM F-1417 or other appropriate procedures, except for testing times. The test times will be as outlined in this section. For sections of pipe less than 36-inch average inside diameter, the following procedure will apply unless the pipe is to be joint tested. The pipe will be pressurized to 3.5 psi greater than the pressure exerted by groundwater above the pipe. Once the pressure is stabilized, the minimum time allowable for the pressure to drop from 3.5 pounds per square inch gauge to 2.5 pounds per square inch gauge will be computed from the following equation:

$$T = \frac{0.085 \times D \times K}{Q}$$

where:

T = time for pressure to drop 1.0 pound per square inch gauge in seconds
K = 0.000419(D)(L), but not less than 1.0
D = average inside diameter in inches
L = length of line in feet of same size being tested
Q = rate of loss, 0.0015 cubic feet per minute per square foot internal surface will be used.

Since a K value of less than 1.0 will not be used, there are minimum times for each pipe diameter as outlined below:

Pipe Diameter (inches)	Minimum Time (seconds)	Length for Minimum (feet)	Time for Longer Length (seconds)
6	340	398	0.855(L)
8	454	298	1.520(L)
10	567	239	2.374(L)
12	680	199	3.419(L)
15	850	159	5.342(L)
18	1020	133	7.693(L)
21	1190	114	10.471(L)
24	1360	100	13.676(L)
27	1530	88	17.309(L)
30	1700	80	21.369(L)
33	1870	72	25.856(L)

The test may be stopped if no pressure loss has occurred during the first 25% of the calculated testing time. If any pressure loss or leakage has occurred during the first 25% of the testing period, then the test will continue for the entire test duration as outlined above or until failure. Lines with a 27-inch average inside diameter and larger may be air tested at each joint. Pipe greater than 36 inch diameter will be tested for leakage at each joint. If the joint test is used, a visual inspection of the joint will be performed immediately after testing. The pipe is to be pressurized to 3.5 psi greater than the pressure exerted by groundwater above the pipe. Once the pressure has stabilized, the minimum time allowable for the pressure to drop from 3.5 pounds per square inch gauge to 2.5 pounds per square inch gauge will be 10 seconds.

(C) Deflection Testing. Deflection tests will be performed on all flexible pipes. For pipelines with inside diameters less than 27 inches, a rigid mandrel will be used to measure deflection. For pipelines with an inside diameter of 27 inches and greater, a method approved by the executive director will be used to test for vertical deflections. Other methods will provide a precision of ± two tenths of one percent (0.2 %) deflection. The test will be conducted after the final backfill has been in place at least 30 days. No pipe will exceed a deflection of five percent. If a pipe should fail to pass the deflection test, the problem will be corrected and a second test will be conducted after the final backfill has been in place an additional 30 days. The tests will be performed without mechanical pulling devices. The design engineer should recognize that this is a maximum deflection criterion for all pipes and a deflection test less than five percent may be more appropriate for specific types and sizes of pipe. Upon completion of construction, the design engineer or other Texas Registered Professional Engineer appointed by the owner will certify, to the Executive Director, that the entire installation has passed the deflection test. This certification may be made in conjunction with the notice of completion required in §317.1(e)(1) of this title (relating to General Provisions). This certification will be provided for the Commission to consider the requirements of the approval to have been met.

15. All manholes will be tested to meet or exceed the requirements of 30 TAC §317.2(c)(5)(H).

16. All private service laterals will be inspected and certified in accordance with 30 TAC §213.5(c)(3)(I), if applicable. After installation of, prior to covering, and prior to connecting a private service lateral to an existing organized sewage collection system, a Texas Registered Professional Engineer, Texas registered sanitarian, or appropriate city inspector will visually inspect

the private service lateral and the connection to the sewage collection system, and certify that it is constructed in conformity with the applicable provisions of this section. The owner of the collection system will maintain such certifications for three years and forward copies to the appropriate district office upon request. Connections may only be made to an approved sewage collection system subsequent to receipt by the executive director of the certification of new construction or repairs, and subsequent testing as required by 30 TAC 213.5(c)(3)(I).

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
WATER POLLUTION ABATEMENT PLAN
GENERAL CONSTRUCTION NOTES

1. The construction activities associated with this project must meet all applicable criteria of the Texas Natural Resource Conservation Commission set forth in 30 Texas Administrative Code (TAC) §213.5(b) - Water Pollution Abatement Plan for Regulated Activities undertaken on the recharge zone of the Edwards Aquifer.

2. Temporary erosion and sedimentation controls are required during construction. The controls must remain in place until disturbed areas are revegetated and the areas have become permanently stabilized. The temporary erosion and sedimentation controls must be inspected periodically for damage caused by construction activities and following every rainfall. Damaged or obstructed controls must be repaired or replaced as necessary to maintain proper operation.

3. **If any sensitive feature is discovered during construction, regulated activities near the sensitive feature must be suspended immediately. The owner must immediately notify the appropriate regional office of the Texas Natural Resource Conservation Commission of the sensitive feature discovered. The regulated activities near the sensitive feature may not proceed until the executive director has review and approved the methods proposed to protect the sensitive feature and the Edwards Aquifer from any potentially adverse impacts to water quality while maintaining the structural integrity of the line.**

4. Any modification to the approved Water Pollution Abatement Plan must be submitted to the appropriate regional office for approval by the executive director of the Texas Natural Resource Conservation Commission before construction of the proposed modification may commence.

5. All contractors conducting regulated activities associated with this project must be provided with copies of the approved Water Pollution Abatement Plan and the TNRCC letter indicating the specific conditions of its approval. During the course of these regulated activities, the contractors are required to keep on-site copies of the approved plan and approval letter.

SHEET NOTES

Designed ____ Scale ____
Drawn ____ Job No. ____
Checked ____ Fbk Ref ____
Approved ____ Date ____
Revised to Conform with Construction Records.
By ____ Date ____

S. CRAIG HOLLMIG, INC.
engineers ~ surveyors
new braunfels, texas
210/625-8555

GENERAL NOTES
LAUREL HEIGHTS UNITS 4 & 5

STATE OF TEXAS
S. CRAIG HOLLMIG
3-21-98

SHEET 6 OF 7

STORMWATER POLLUTION PLAN NOTES

I. PERMITTEE IDENTIFICATION

This Stormwater Pollution Prevention Plan (SW3P) is prepared in accordance with the guidelines in the Federal Register, Volume 57, No. 175, dated Wednesday, September 9, 1992, "Final NPDES General Permits for Storm Water Discharges from Construction Sites."

The Contractor and his subcontractors shall avoid the pollution of runoff water by adhering to the measures outlined in these "Notes" and/or specified on the "Plan". Contractor shall be held responsible for his actions and the actions of all of his subsequent subcontractors.

The Contractor shall provide the following Certification in writing to the Engineer prior to starting construction.

"I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (N.P.D.E.S.) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification."

SUBDIVISION: ______________________________
CO. NAME:
ADDRESS:

RESPONSIBLE CO. OFFICER:
TITLE:

II. SITE DESCRIPTION

A. NATURE OF CONSTRUCTION ACTIVITY

This SW3P addresses specifically the infrastructure construction of the above referenced development which is to involve the clearing and excavation for, and the installation of drainage, streets, and utilities (water, sanitary sewer, gas, electric, telephone, and cable television services).

The Developer may sell lots to a home builder(s) for the construction of single family dwellings in advance of the completion of the infrastructure. In some instances, initiation of new-home construction may occur prior to the stabilization of the infrastructure "disturbed area". Pollution and soil erosion control measures that are to be installed by the Contractor have been specifically designed to provide control of soil erosion and pollution originating from the infrastructure construction. Where possible, these control measures have also been designed to provide effective control of soil erosion and pollution originating on the lots due to new-home construction. However, each home builder(s) shall be responsible for all soil erosion and pollution originating from his lots during new-home construction.

The Contractor shall file a "Notice of Termination" (N.O.T) for infrastructure construction activities after the area(s) disturbed by the infrastructure construction, and not being disturbed by new-home construction activity, has been permanently stabilized.

B. INTENDED SEQUENCE OF MAJOR CONSTRUCTION ACTIVITIES

Typically the intended sequence of major activities which will disturb the soil during construction of the infrastructure are:

Implementation of SW3P;

Clearing vegetation from street right-of-ways;

Grading of streets to proposed subgrade elevation;

Rough grading of lots (if applicable);

Clearing vegetation, as needed, from utility easements;

Construction of utilities within street right-of-ways and utility easements;

Clearing vegetation, as needed, from drainage easements;

Construction of drainage improvements;

Placement of roadway section (base, curbs, and asphalt);

Construction of new-home(s) where the home builder(s) has started construction prior to the completion of the infrastructure;

Site cleanup and revegetation of parkways, drainage and utility easements, and graded or otherwise disturbed areas.

C. SITE AREA

Typically the street right-of-way and drainage/utility easements is where the majority of the soil disturbance during infrastructure construction is expected to occur.

D. SITE RUNOFF FACTORS

After infrastructure activities are completed and disturbed areas are stabilized, concentrations of suspended soils in the stormwater runoff from the site are expected to be approximately at pre-development levels. After new-home construction is complete, runoff may contain modest concentrations of organic wastes (from pets), small concentrations of fertilizers (lawn and shrub care) and hydrocarbons (from streets and vehicle drippings), and possibly trace amounts of pesticides and herbicides.

E. SITE MAP

A Stormwater Pollution Prevention Plan (SW3P) showing site topography, drainage patterns, and proposed soil erosion and sedimentation control measures has been prepared to meet the requirements of Article IV.C.1.a of the NPDES Requirements for Construction Site Permits.

III. SOIL EROSION AND SEDIMENT CONTROL MEASURES

Temporary control of pollution, soil erosion and sedimentation in particular, for this project will be accomplished through the installation of structural barriers to trap and filter silt from runoff waters and the temporary stabilization of disturbed areas. Permanent control will be achieved by permanently stabilizing disturbed areas through sodding or seeding with standard lawn or native grasses. The control measures specified on the "Stormwater Pollution Prevention Plan" for the site will be installed and maintained by the Contractor(s) during the entire time infrastructure construction is in progress and until the N.O.T is filed. The Contractor, as part of final site cleanup, will remove all installed erosion control measures not being specifically turned over to other responsible parties.

A. INFRASTRUCTURE CONSTRUCTION

Soil disturbances shall be minimized by exposing only the smallest practical area of land required for the construction activity and for the shortest practical period of time. Trenching and associated backfilling for utilities and storm drainage shall be coordinated to minimize the time period of the disturbance. Maximum practical use of natural vegetation for erosion control will be used by leaving this vegetation in place until clearing is necessary. All clearing will be conducted as directed and approved by the Engineer.

1. STABILIZATION PRACTICES

Construction entrances, parking and staging areas, shall be stabilized with course aggregate or as otherwise directed by the Engineer;

All significant disturbed areas, other than proposed roadways, where construction has been completed, temporarily halted, or no further work is planned for 21 days or longer, shall be revegetated within 14 days of the last construction activity;

Landscaping may be provided by contractor as may be provided for elsewhere within contract or within a separate contract.

2. STRUCTURAL PRACTICES

To intercept off-site overland sheet flow, diversion dikes/swales will be constructed along the boundaries if necessary as shown on the Plan before street or utility construction begins. The channel areas of these dikes/swales will be lined as directed on the Plan or by the Engineer. These dikes and swales, which serve to protect the subdivision from overland flow from the adjacent upgradient areas, will be left in place until infrastructure construction is completed unless specifically noted otherwise.

B. NEW HOME CONSTRUCTION

It is expect that new-home construction may have commenced on some of the platted lots prior to completion of the infrastructure construction. For the construction activity on these lots, individual home builders may be expected to install a silt fence or some other form of generally accepted soil erosion barrier. Contractor has the right to file a Notice of Termination (N.O.T.) after the area(s) disturbed by the infrastructure construction, and not associated with any new-home construction activity, have been permanently stabilized and accepted by the Engineer.

Areas of lots that must have grade adjustments (excavation and/or fill) shall be revegetated within 14 days unless building construction, or some other construction activity, is to commence within 21 days. As much as possible, natural vegetation will be left in place and undisturbed.

C. OTHER MISCELLANEOUS CONTROLS

The Contractor shall avoid the pollution of runoff water by using "best management practices."

Some best management practices which the Contractor shall be expected to conform to are as follows:

All construction and related activities shall comply with applicable state and/or local regulations.

A stabilized construction exit is to be provided which will help to reduce vehicle tracking of sediments. All vehicular traffic leaving the construction site (prior to improved streets) will exit through this stabilized area as located on the SW3P. When soils have collected on the stabilized vehicular exit to an extent which reduces its intended effectiveness, the surface will be cleaned or, if needed, replaced.

Construction materials for each phase of construction shall be stored within a designated storage area(s) whose size, shape, and location shall be approved by the Engineer.

Construction equipment (except large, slow moving equipment) not removed from the site at night shall be stored in the designated area(s).

Sediment collected behind silt fences or in sediment traps will be periodically collected and placed as fill material within the property as approved by the Engineer.

The use of temporary construction fuel storage tanks on-site will not be allowed. Release of vehicle fluid(s) onto the ground shall not be allowed. Tainted soil resulting from any spill(s) shall be promptly removed and disposed of by the Contractor in accordance with all applicable regulations. Soil shall be replaced at Contractor's expense.

Rinsing out concrete trucks will not be allowed unless a controlled area on site is designated and approved for a rinse-out pit. Pits shall be surrounded by a berm and/or silt fence to prevent runoff of contaminated water.

Construction waste materials, domestic garbage, etc. shall be periodically collected and properly disposed of off-site.

All sanitary waste from any portable units shall be regularly collected and disposed of by a licensed sanitary waste management contractor.

Chemicals, solvents, paints, and other potentially toxic materials must be protected from rainfall and surface runoff water while stored.

In the event that hazardous waste materials are encountered, all hazardous waste will be disposed of in the manner specified by federal, state and/or local regulations, and as specified by the manufacturer.

D. STATE AND LOCAL REQUIREMENTS

Contractor shall comply with all applicable Federal, state or local stormwater pollution prevention control regulations for construction activities that this project may be within the jurisdiction of.

IV. STORMWATER MANAGEMENT

Following the filing of a N.O.T., all soil erosion control measures installed by the Contractor or subcontractors will be removed unless specifically instructed otherwise. In case of the latter, the responsible party(s) will be identified which is to become fully responsible for those control measures. As previously noted, street parkways, utility easements, and any constructed earthen channels will be permanently stabilized.

V. MAINTENANCE

All control measures, as well as general site conditions, shall be inspected at least once every seven (7) calendar days and within 24 hours following any 1/2 inch, or greater, rainfall. Silt accumulations in excess of 12 inches or 1/4 of the height/depth of the control measure, whichever is less, shall be removed. The removed silt shall be deposited within the project at a location not subjected to concentrated runoff. Any damaged or non-functioning control measure(s) shall be repaired immediately. Until such time that the Construction Contract is 100% complete, the Contractor shall remain fully responsible for the maintenance of the erosion control measures installed for the project. Any silt fences or other erosion control barrier temporarily moved from its designated location to facilitate work shall be replaced at the end of each work day or if rain appears imminent.

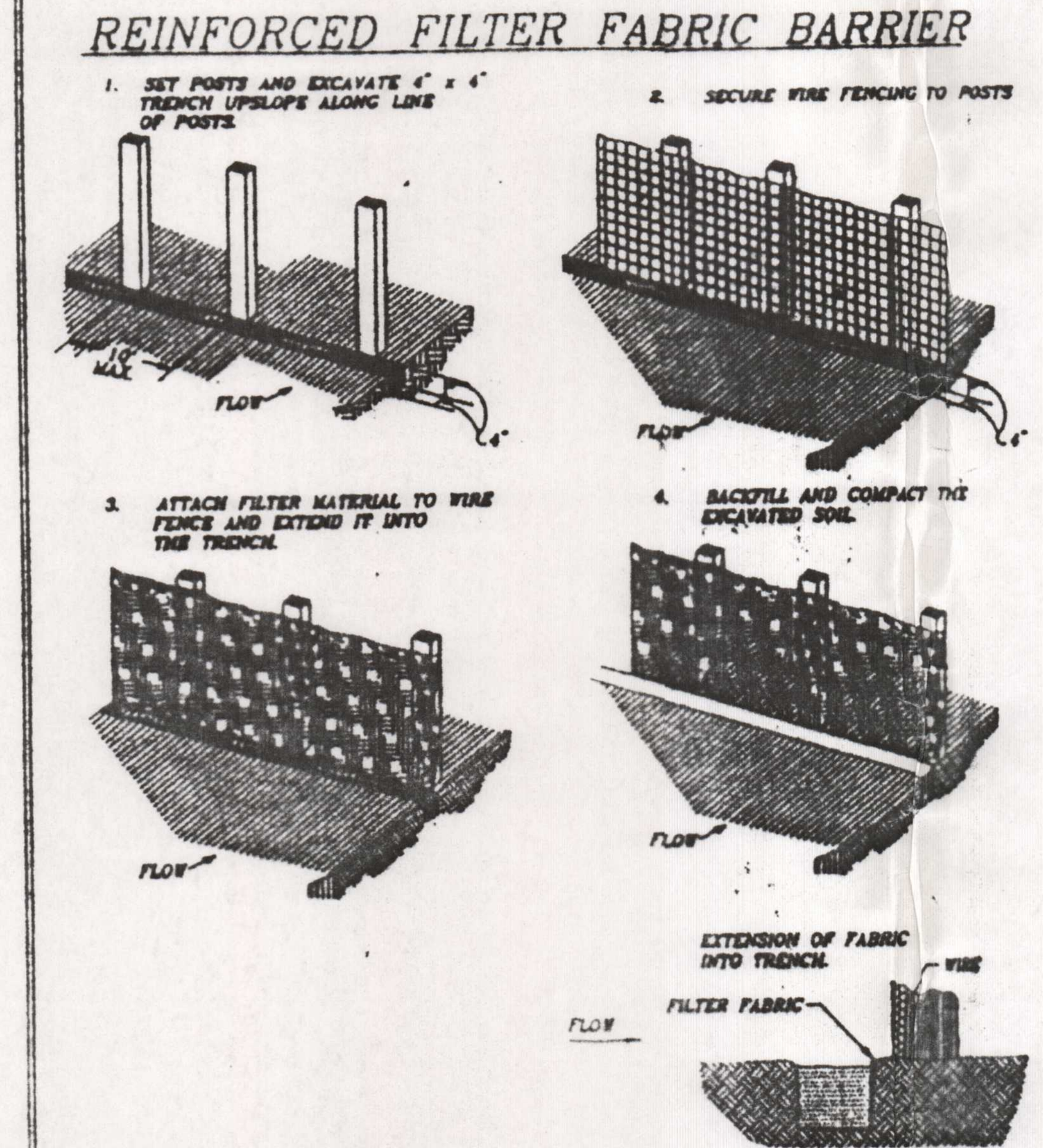
VI. INSPECTION OF CONTROL MEASURES

The person or entity primarily responsible for inspection of pollution prevention and erosion control measures for the subject site is that person or entity designated by the Contractor. Reports of the weekly inspection, recording the scope of the inspection, name of inspector, date of inspection, major observations, and actions taken as a result of the inspection, shall be recorded with copies provided to the Engineer on a weekly basis. These reports shall be retained by the Contractor as part of storm water N.P.D.E.S. data for three years after the N.O.T for the project is filed.

As a minimum, the inspector shall observe: disturbed areas for evidence of erosion, storage areas for evidence of leakage from stored materials, structural controls, stabilized construction exits for evidence of off-site sediment tracking, vehicle storage areas for signs of leaking equipment of spills, and concrete truck rinse-out pit for signs of potential failure. All deficiencies noted during the inspection will be documented and corrected within seven calendar days following the inspection.

VII. NON-STORM WATER DISCHARGES

Small discharges associated with activities such as pressure testing of newly-installed water system and sewer system facilities, water blasting curbs, and cleaning and testing activities for construction are expected. For such activities, the Contractor is hereby directed to use reasonable diligence to avoid causing unnecessary erosion. Any observed eroded areas shall be promptly corrected by Contractor.



GENERAL NOTES

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH STAPLES.
2. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24 INCHES AT TOP AND MIDSECTION.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER, THEY SHALL BE OVERLAPPED 6 INCHES AT THE POSTS AND FOLDED.

×—(RFB)—×
SYMBOL

713-1

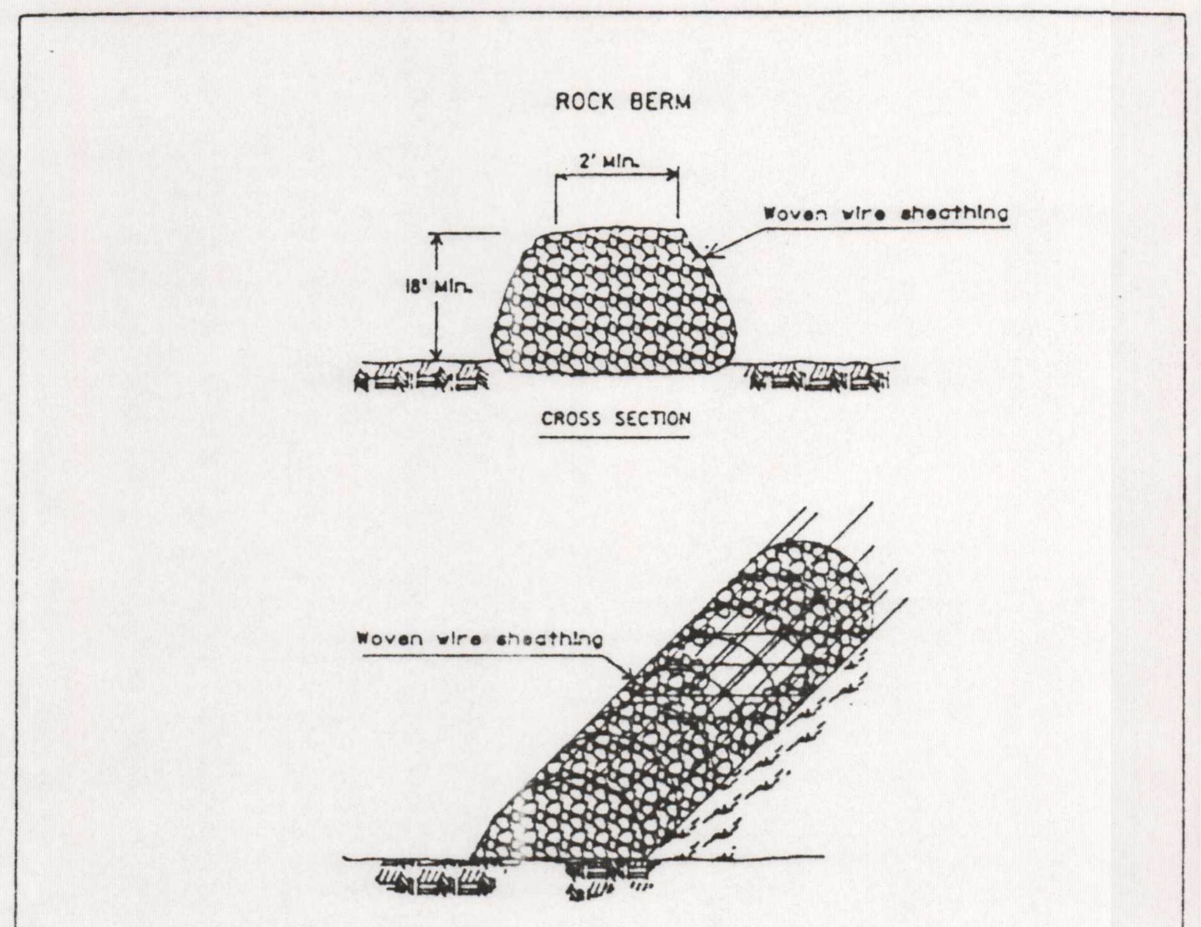
BMP 4.3.1.1
REINFORCED FILTER FABRIC BARRIER

4 - 45

GENERAL NOTES for SEDIMENT & EROSION CONTROL

The following will be required of the Contractor:

1. To comply with the Stormwater Pollution Prevention Plan (SW3P) filed for this Project with the EPA in accordance with the National Pollutant Discharge Elimination System General Permit, the following will be required of the Contractor:
   - a. An N.O.I. shall be submitted by the contractor to the E.P.A. in accordance with the National Pollutant Dishcharge Elimination System General Permit.
   - b. All control measures, as well as general site conditions, shall be inspected at least once every seven (7) calendar days and within 24 hours following any 1/2 inch, or greater, rainfall. Silt accumulations in excess of 12 inches or 1/4 of the height/depth of the control measure, whichever is less, shall be removed. Any sediment in the drainage culverts will be removed. The removed silt shall be deposited within the Project Limits at a location not subjected to concentrated runoff or removed to a Site Approved by the Engineer. Any damaged or non-functioning control measure(s) shall be repaired immediately. Until such time that the Construction Contract is 100% complete, the Contractor shall remain responsible for the Maintenance of the Erosion Control Measures installed for the Project. Any erosion control barrier moved from its designated location shall be replaced at the end of each work day or if rain appears imminent. All Temporary Controls will be removed after the disturbed areas have been stabilized.
   - c. The Contractor will designate a Qualified Person(s) to perform the Inspections. As a minimum, the Inspector shall observe the following:
     1. Disturbed areas and areas used for storage of materials that are exposed to precipitation will be inspected for evidence of, or the potential for, pollutants entering the drainage system.
     2. Erosion and Sediment Control Measures identified in the plan will be observed to ensure that they are operating correctly.
     3. Discharge locations and points of site access will be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.
     4. Locations where vehicles enter or exit the site will be inspected for evidence of off-site sediment tracking.
     5. The vehicle/equipment Wash Area and the Rinse-out Pit will be inspected for loss of aggregate, proper drainage, and proper maintenance of sediment trap and washing equipment.
   - d. All deficiencies noted during the inspection will be documented and corrected within seven (7) calendar days following the inspection.
   - e. After any Phase of the Site is Temporarily Stabilized, inspections will be conducted at least once every month until Permanent Stabilization occurs and the N.O.T. is filed.
   - f. Based on the results of the inspection, the control measures of the SW3P will be Revised as appropriate after Approval from the Engineer.
   - g. A Report summarizing the Scope of the Inspection, names(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the SW3P, and actions taken in accordance with the above will be made and signed in accordance with Part VI.G of the NPDES General Permit. The Report will be retained as part of the SW3P for at least three (3) years from the date that the site is Permanently Stabilized and the N.O.T. is filed.
2. To comply with this SW3P, the following will be required of the Contractor:
   - a. Compliance with the SW3P "notes" included elsewhere within these plans.
   - b. Purposeful release of vehicle or equipment fluids onto the ground will not be allowed. Contaminated soil resulting from accidental spills will be immediately removed and disposed of properly.
   - c. All construction (and personal) material/debris will be regularly collected and disposed of properly at an authorized landfill.
   - d. Construction equipment/vehicles will be limited to traveling within the limits of the Street Right-of-Way, Utility, Grading, and Construction Easements, and immediately upstream and downstream of Drainage Crossings.
   - e. All soils, sand, gravel and excavated materials stockpiled on-site will have appropriately sized Erosion and Sedimentation Controls placed both upgradient and downgradient.
3. To comply with this SW3P, the Contractor shall construct and maintain:
   - a. Stabilized Construction Exit(s) at all used access points to the site.
   - c. Rock Berms, Reinforced (wire backed) Silt Fences, or Silt Fences placed immediately downstream of all Drainage Crossings with sides flared back to meet the roadway embankment unless otherwise clearly shown on the Plan or directed by the Engineer.



GENERAL NOTES:

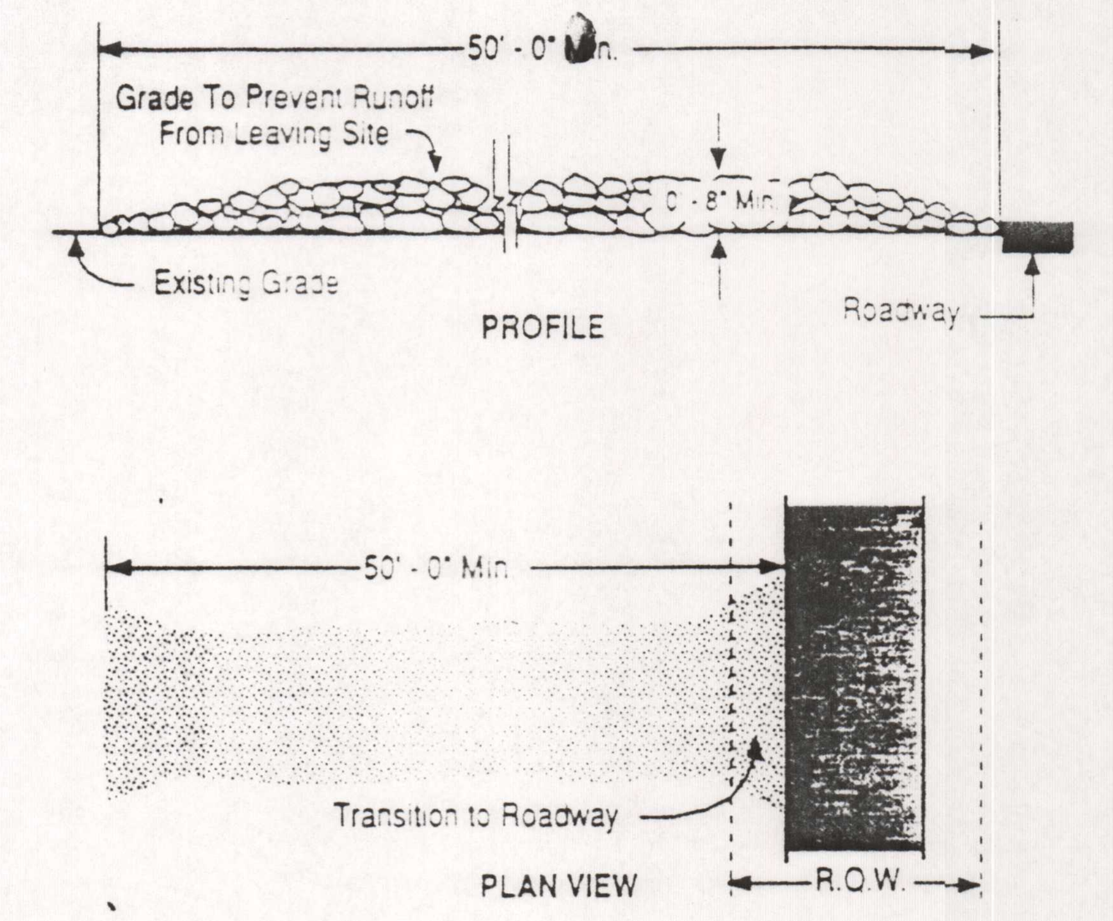
1. Use only open graded rock 4-8 inch diameter for streamflow condition; use open graded rock 3-5 inches diameter for other conditions.
2. The rock berm shall be secured with a woven wire sheathing having maximum 1inch opening and minimum wire diameter of 20 gauge.
3. The rock berm shall be inspected weekly or after each rain, and the stone and/or fabric core-woven wire sheathing shall be replaced when the structure ceases to function as intended, due to silt accumulation among the rocks, washout, construction traffic damage, etc.
4. When silt reaches a depth equal to one-third the height of the berm or one foot, whichever is less, the silt shall be removed and disposed of in an approved site and in a manner as to not create a siltation problem.
5. Daily inspection shall be made on Serve Service rock berms; silt shall be removed when accummulation reaches 6 inches.
6. When the site is completely stabilized, the berm and accumulated silt shall be removed and disposed of in an approved manner.

STANDARD SYMBOL —·—RB—·—

SOURCE: COA

Figure 1 - 6 Rock Berm

EDWARDS AQUIFER TECHNICAL GUIDANCE MANUAL



GENERAL NOTES

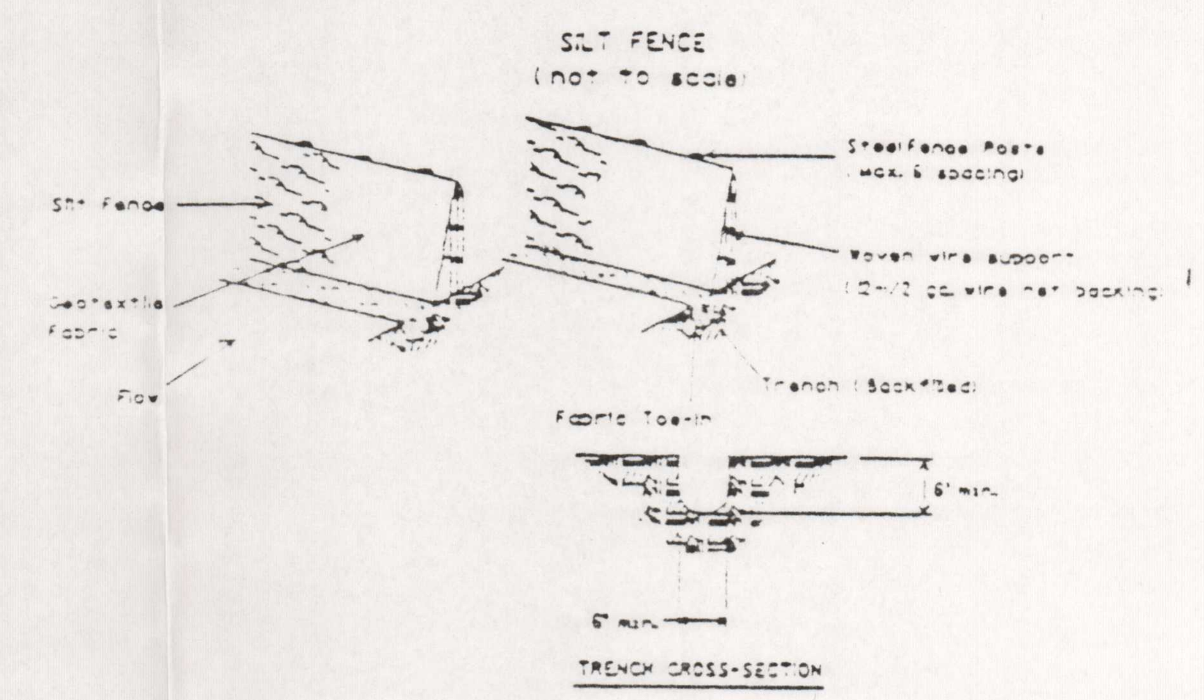
1. Stone size - 3 to 5 inch open graded rock.
2. Length - as effective, but not less than 50 feet.
3. Thickness - not less than 6 inches.
4. Width - not less than full width of all points of ingress or egress.
5. [illegible]
6. [illegible]
7. [illegible]

Source: COA

Detail of Stabilized Construction Exits

VI-56

EDWARDS AQUIFER TECHNICAL GUIDANCE MANUAL



GENERAL NOTES:

1. Steelposts which support the silt fence shall be installed on a slight angle toward the anticipated runoff source. Post must be embedded a minimum of one foot.
2. The toe of the silt fence shall be trenched in with a spade or mechanical trencher, so that the downslope face of the trench is flat and perpendicular to the line of flow. Where fence can not be trenched in (e.g. pavement) weight fabric flap with washed gravel on uphill side to prevent flow under fence.
3. The trench must be a minimum of 6 inches deep and 6 inches wide to allow for the silt fence fabric to be laid in the ground and backfilled with compacted material.
4. Silt fence should be securely fastened to each steel support posts or to woven wire, which is in turn attached to the steel fence post.
5. Inspection shall be made weekly or after each rainfall event and repair or replacement shall be made promptly as needed.
6. Silt fence shall be removed when the site is completely stabilized so as not to block or impede storm flow or drainage.
7. Accumulated silt shall be removed when it reaches a depth of 6 inches. The silt shall be disposed of in an approved site and in such a manner as to not contribute to additional siltation.

Standard Symbol —SF— / Lx

SOURCE: COA

Silt Fence Detail

VI-33

SHEET NOTES

Designed ___ Scale ___
Drawn ___ Job No. ___
Checked ___ File Ref ___
Approved ___ Date ___
Revised to Conform with Construction Records
By ___ Date ___

S. CRAIG HOLLMIG, INC.
engineers ~ surveyors
new braunfels, texas
210/625-8555

LAUREL HEIGHTS UNIT 4

TNRCC TEMPORARY POLLUTION ABATEMENT SITE PLAN
TNRCC PERMANENT POLLUTION ABATEMENT SITE PLAN

3-24-98

SHEET 7 OF 7