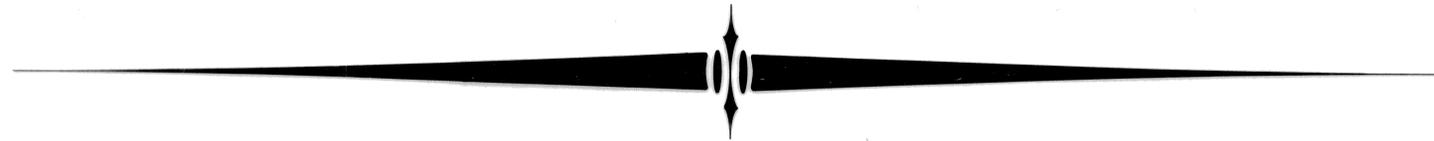


HARRIS COUNTY MUNICIPAL UTILITY DISTRICT 191

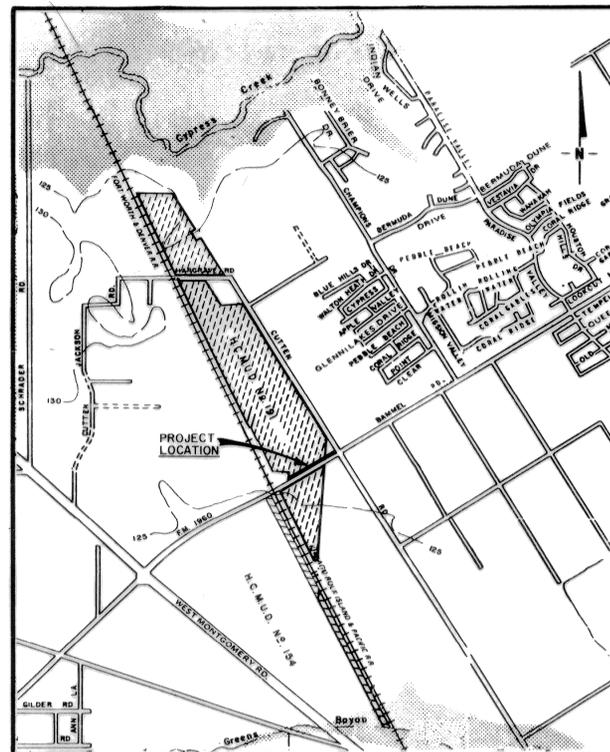
RELOCATION OF

12" WATER LINE ON F.M. 1960



INDEX

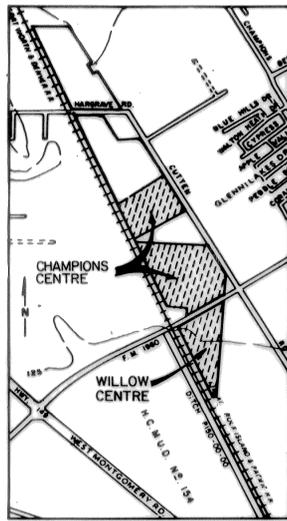
OVERALL LAYOUT	1
GENERAL NOTES	2
PLAN AND PROFILE	3 & 4
WATER DETAILS	5
TRENCH SAFETY SYSTEM	5A



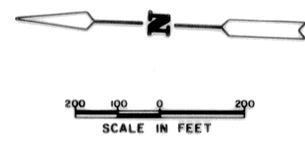
VICINITY MAP
SCALE 1" = 2000'
KEY MAP 370-F

J.O. 85001

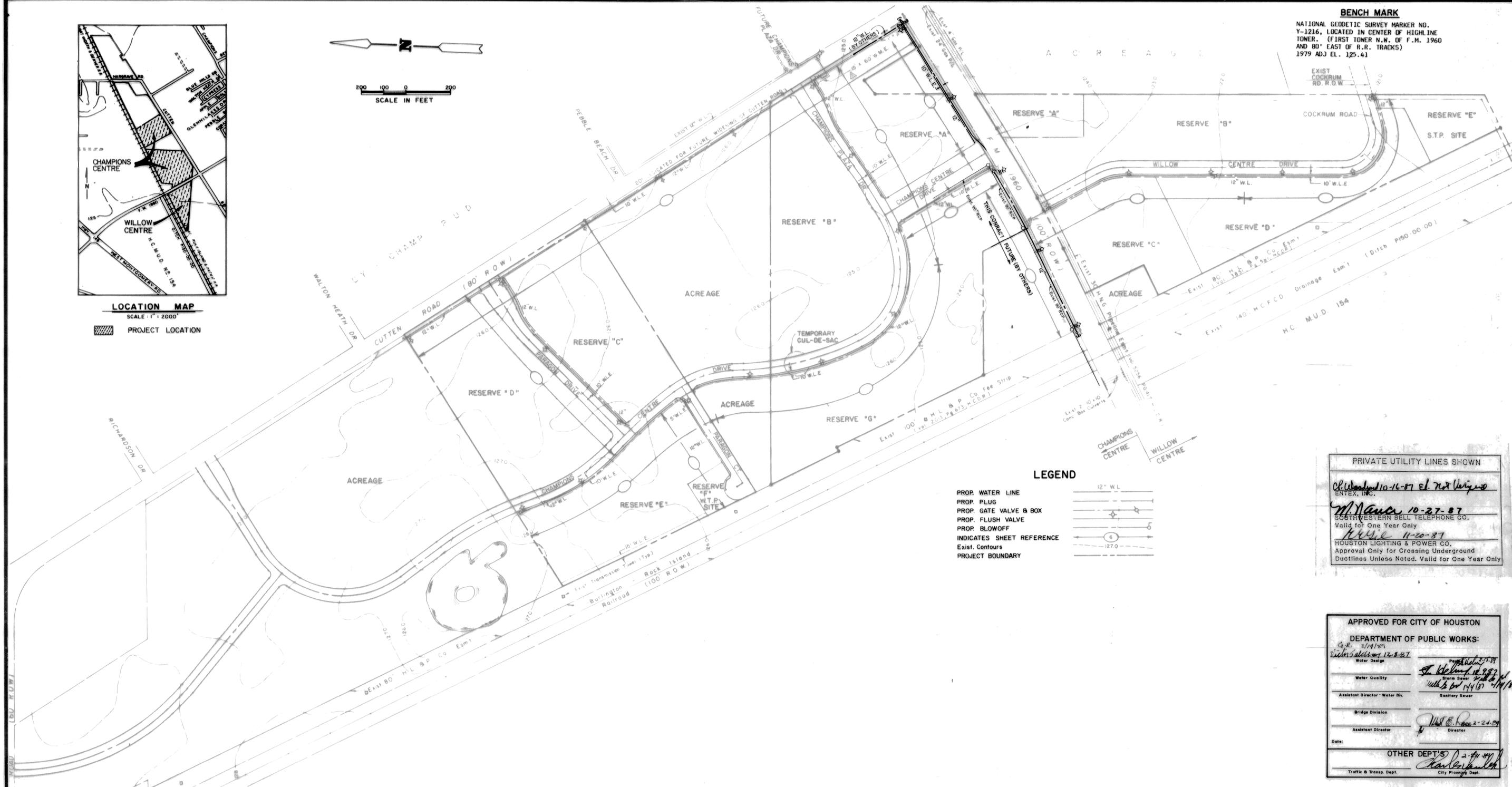
LANDEV ENGINEERS, INC.
1706 SEAMIST DRIVE
Houston, Texas 77008



LOCATION MAP
SCALE: 1" = 2000'
PROJECT LOCATION



BENCH MARK
NATIONAL GEODETIC SURVEY MARKER NO. Y-1216, LOCATED IN CENTER OF HIGHLINE TOWER, (FIRST TOWER N.W. OF F.M. 1960 AND 80' EAST OF R.R. TRACKS) 1979 ADJ EL. 125.41



LEGEND

- PROP. WATER LINE
- PROP. PLUG
- PROP. GATE VALVE & BOX
- PROP. FLUSH VALVE
- PROP. BLOWOFF
- INDICATES SHEET REFERENCE
- Exist. Contours
- PROJECT BOUNDARY

PRIVATE UTILITY LINES SHOWN

Ch. Wood 10-16-87 *Ed. J. ...*
ENTEX, INC.

M. ... 10-27-87
SOUTHWESTERN BELL TELEPHONE CO.
Valid for One Year Only

R. ... 11-20-87
HOUSTON LIGHTING & POWER CO.
Approval Only for Crossing Underground Ductlines Unless Noted. Valid for One Year Only

APPROVED FOR CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS:

Water Design 12-8-87
Water Quality 12-8-87
Assistant Director - Water Div. *[Signature]*

Bridge Division
Assistant Director *[Signature]* Director

Date: *[Blank]*

OTHER DEPT'S
Traffic & Transp. Dept. *[Signature]* City Planning Dept. *[Signature]*

INTERPOSE NO OBJECTION
FINAL APPROVAL
[Signature]
12-2-87
THE ABOVE SIGNATURE VALID
FOR ONE (1) YEAR ONLY

David A. Galvin
[Signature]
1-30-89

Rev.	Date	Description	App.
RELOCATION OF 12" WATER LINE ON F.M. 1960			
HARRIS COUNTY M.U.D. No. 191			
OVERALL LAYOUT			
Design By: J.W.	Job No: 85001	Sheet	1
Drawn By: J.G.R.	Scale: 1" = 200'		
Checked By: M.W.B.	Date: OCTOBER, 1987	of	5

LANDEV ENGINEERS, INC.
1700 SEAMIST DRIVE
Houston, Texas 77008

GENERAL NOTES - SANITARY SEWER

- SPECIAL BACKFILL - SEE ADDENDUM SEWER SPECIFICATION E-14-62, CITY OF HOUSTON SEWER SPECIFICATIONS FOR CEMENT STABILIZED BACKFILL OF SANITARY AND TRENCHES UNDER OR WITHIN (1) FT. OF PROPOSED OR EXISTING PAVEMENT.
- WYE BRANCHES, STACKS AND TEES FOR HOUSE SERVICE CONNECTION SHALL BE CENTERED BETWEEN SIDE LOT LINES UNLESS OTHERWISE SHOWN. CONTRACTOR SHALL PROVIDE ENGINEER WITH DRAWINGS OF ACTUAL FIELD TIES OF THE WYES, STACKS AND TEES LOCATING THEM FROM THE NEAREST DOWNSTREAM MANHOLE.
- LOCATION OF UTILITIES WITHIN 10-FT and 16-FT WIDE UTILITY EASEMENTS SHALL BE GOVERNED BY THE "UTILITY COORDINATING COMMITTEE" FOR THE METROPOLITAN AREA.
- SANITARY SEWERS SHALL HAVE CLASS AA^{1/2} BEDDING WHERE CEMENT STABILIZED SAND BACKFILL IS USED OR WHEN DEPTH IS GREATER THAN TEN (10) FEET.
- ALL MANHOLE RIMS LOCATED OUTSIDE OF THE PROPOSED PAVING WILL BE SET 3" ABOVE TOP OF CURB ELEVATION WHEN WITHIN STREET RIGHT-OF-WAY OR 3" TO 6" ABOVE SURROUNDING LEVEL OF FINISHED GRADE ELSEWHERE WITH SLOPED FILL ADDED FOR STORM WATER DRAINAGE AWAY FROM THE MANHOLE RIM.
- ALL SANITARY SEWER MATERIALS, CONSTRUCTION, AND TESTING WILL BE IN ACCORDANCE WITH CITY OF HOUSTON E-14-62 (1977 PRINTING AND ALL SUBSEQUENT AMENDMENTS THERETO).
- ALL SANITARY SEWERS LOCATED IN SIDELOT EASEMENT WILL HAVE CLASS "AA" BEDDING AND BANK SAND BACKFILL (B.S.B.F.).
- ALL EASEMENTS CONTAINING SANITARY SEWERS ARE 16' U.E.S. UNLESS OTHERWISE SHOWN ON CONSTRUCTION DRAWINGS.
- 6" A.B.S. WILL NOT BE ALLOWED UNDER PAVEMENT.
- CONTRACTOR TO OBTAIN ALL CONSTRUCTION PERMITS REQUIRED BY THE "REGULATIONS OF HARRIS COUNTY, TEXAS FOR FLOOD PLAIN MANAGEMENT".
- FOR USE IN WET SAND CONSTRUCTION AREAS, USE C/H SPEC. SEC. NO. 5, DMG NO. 485-5 (E-14-62) (1977 PRINTING AND ALL SUBSEQUENT AMENDMENTS THERETO)
- THE CONTRACTOR MAY USE A BACKHOE FOR TRENCH EXCAVATION IN LIEU OF A TRENCHING MACHINE.

GENERAL NOTES - WATER

- ALL WATER LINES TO HAVE A MINIMUM OF FOUR (4) FEET OF COVER TO TOP OF CURB.
- WATER MAINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH CITY OF HOUSTON SPECIFICATIONS WD-3 AND WD-5 & 6 AS CURRENTLY AMENDED.
- ALL FLUSHING VALVES SHALL BE SET THREE (3) FEET BEHIND BACK OF CURB.
- STEEL WATER SECTION TO EXTEND FIVE (5) FEET MINIMUM BEYOND 45° BENDS.
- THE CONTRACTOR MAY USE A BACKHOE FOR TRENCH EXCAVATION IN LIEU OF A TRENCHING MACHINE.
- WHENEVER SANITARY SEWERS CROSS OVER WATER MAINS, ONE 18' JOINT OF DUCTILE PIPE SHALL BE INSTALLED IN THE SEWER LINE AND CENTERED AT THE WATER LINE CROSSING, 6" MINIMUM CLEARANCE.
- DUCTILE IRON PIPE SHALL BE MINIMUM THICKNESS CLASS 50. THE PRESSURE RATING FOR BOTH THE PIPE AND THE JOINTS SHALL BE 150 PSI OR GREATER.
- WHENEVER SANITARY SEWERS CROSS UNDER WATER MAINS, AND THE OUT-TO-OUT PIPE CLEARANCE IS LESS THAN 24", A CENTERED 18' JOINT OF DUCTILE IRON PIPE SHALL BE USED.
- WHENEVER SANITARY SEWER CROSS UNDER WATER MAINS, AND THE MINIMUM PIPE CLEARANCE IS 24" OR GREATER, A CENTERED 20' SECTION OF CEMENT STABILIZED SAND (2 SACKS OF CEMENT PER CUBIC YARD) SHALL BE INSTALLED FROM THE LOWER 1/4 POINT OF THE SEWER PIPE TO A LEVEL OF 1 PIPE DIAMETER ABOVE THE SEWER PIPE, BUT IN NO CASE SHALL THE DEPTH OF SAND ABOVE THE SEWER PIPE BE LESS THAN 12".
- ALL P.V.C. WATER MAINS SHALL BE ANHA C-900, DR 18, CLASS 150.
- ALL WATER METERS MUST HAVE INDIVIDUAL SERVICE LEADS AS PER CITY OF HOUSTON STANDARDS W.D.-6 (EFFECTIVE 6-29-87)
- ALL EXCAVATIONS WITHIN THE PROPOSED F.M. 1960 ROAD BASE FOR REMOVAL AND SALVAGE OF EXISTING FITTINGS, VALVES, OR FLUSH VALVES SHALL BE BACKFILLED WITH CEMENT STABILIZED SAND AS DIRECTED BY THE ENGINEER.
- TEXAS LAW ARTICLE 1436C, PROHIBITS ALL ACTIVITIES IN WHICH PERSONS OR EQUIPMENT MAY COME WITHIN SIX FEET OF ENERGIZED OVERHEAD POWER LINES, AND FEDERAL REGULATIONS, TITLE 29, PART 1910.180(1) AND PART 1926.550(A)(15) REQUIRE A MINIMUM CLEARANCE OF TEN FEET FROM THESE FACILITIES. THE ABOVE LAWS CARRY BOTH CRIMINAL AND CIVIL LIABILITIES, WITH CONTRACTORS AND OWNERS BEING LEGALLY RESPONSIBLE FOR THE SAFETY OF WORKERS UNDER THE LAWS. IF YOU OR YOUR COMPANY MUST WORK NEAR OVERHEAD POWER LINES, CALL (713) 228-7400 FOR THE LINES TO BE DE-ENERGIZED AND/OR MOVED AT YOUR EXPENSE.

GENERAL NOTES - PAVING

- PAVING SHALL BE IN ACCORDANCE WITH HARRIS COUNTY "RULES, REGULATIONS AND REQUIREMENTS RELATING TO THE APPROVAL AND ACCEPTANCE OF IMPROVEMENTS IN SUBDIVISIONS OR RE-SUBDIVISIONS" AND THE LATEST REVISIONS AND/OR AMENDMENTS OF SAME.
- GUIDELINES SET FORTH IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES SHALL BE OBSERVED.
- ALL RADIUS AT CURB RETURNS TO BE 25.0' TO BACK OF CURB UNLESS OTHERWISE NOTED.
- THE CONTRACTOR SHALL NOTIFY HARRIS COUNTY ENGINEERING DEPARTMENT 24 HOURS IN ADVANCE OF COMMENCING CONSTRUCTION.
- STOP SIGN (R1 - 1A) TO BE PLACED AT ALL INTERSECTIONS.
- OWNER TO OBTAIN ALL PERMITS REQUIRED BY HARRIS COUNTY FOR CONSTRUCTION OF UTILITIES AND/OR CULVERTS WITHIN COUNTY ROAD R.O.W.

GENERAL NOTES - STORM SEWERS

- STORM SEWER SHALL BE CONSTRUCTED IN ACCORDANCE WITH CITY OF HOUSTON E-14-62 AS CURRENTLY AMENDED.
- REINFORCED CONCRETE PIPE (C-76 CLASS III) STORM SEWER SHALL BE INSTALLED BEDDED AND BACKFILLED IN ACCORDANCE WITH CITY OF HOUSTON DRAWINGS 529-S-1, 530-S-1 and 530-S-2 AS APPLICABLE.
- ALL SEWERS UNDER OR WITHIN ONE (1) FT. OF PROPOSED OR FUTURE PAVEMENT SHALL BE BACKFILLED WITH 1/2 SACK CEMENT STABILIZED SAND TO WITHIN ONE (1) FT. OF SUBGRADE.
- ALL STORM SEWERS CONSTRUCTED IN SIDELOT EASEMENTS SHALL BE R.C.P. (C-76 CLASS III) AND SHALL BE BEDDED IN ACCORDANCE WITH CITY OF HOUSTON DRAWINGS 529-S-1, 530-S-1 and 530-S-2 AS APPLICABLE. TWENTY (20) FT WIDE, EASEMENT SHALL BE PROVIDED.
- ALL PROPOSED PIPE STUB-OUTS FROM MANHOLES OR INLETS ARE TO BE PLUGGED WITH 8" BRICK WALLS UNLESS OTHERWISE NOTED.
- THE CONTRACTOR SHALL NOTIFY HARRIS COUNTY ENGINEERING DEPARTMENT 24 HOURS IN ADVANCE OF COMMENCING CONSTRUCTION. 221-7024.
- CONTRACTOR TO OBTAIN ALL CONSTRUCTION PERMITS REQUIRED BY THE "REGULATIONS OF HARRIS COUNTY, TEXAS FOR FLOOD PLAIN MANAGEMENT."
- ALL MANHOLE RIMS LOCATED OUTSIDE OF THE PROPOSED PAVING WILL BE SET 3" ABOVE TOP OF CURB ELEVATION WHEN WITHIN STREET RIGHT-OF-WAY OR 3" TO 6" ABOVE SURROUNDING LEVEL OF FINISHED GRADE ELSEWHERE WITH SLOPED FILL ADDED FOR STORM WATER DRAINAGE AWAY FROM THE MANHOLE RIM.
- BEFORE UTILITY CONSTRUCTION BEGINS, ADEQUATE DRAINAGE MUST BE PROVIDED SO THAT NO SHEET FLOW FLOODING OF ROADWAY OR ADJOINING PROPERTIES OCCURS.
- THE CONTRACTOR MAY USE A BACKHOE FOR TRENCH EXCAVATION IN LIEU OF A TRENCHING MACHINE.

STANDARD H.C.F.C.D. NOTES FOR PLANS

- Harris County Flood Control District, Inspection Division, shall be notified at least 48 hours prior to construction (713/684-4040).
- Engineer shall submit letter to Harris County Flood Control District requesting inspection and acceptance of items constructed in Harris County Flood Control District Right-of-Way. Prior to requesting inspection, the drainage right-of-way and/or easements shall be staked and flagged.
- Contractor shall be responsible for protecting, maintaining and restoring backslope drainage systems.
- All disturbed areas within the Harris County Flood Control District right-of-way, except the channel bottom, shall be hydro-mulch seeded as per Harris County Flood Control specification entitled "Hydro-Mulch Seeding" or approved equal.
- Backfill to be compacted in no greater than 1 foot lifts to the density of the undisturbed adjacent soil.
- Contractor shall be responsible for excavation channel flowline to design elevation as shown on plans and downstream as necessary to insure no water in storm sewer during "dry" conditions.
- Contractor shall be responsible for maintaining flow in channel during construction and restoring channel to original condition.
- All excavated material is to be removed from the HCFCO right-of-way. No fill is to be placed within a designated flood plain area without first obtaining a fill permit.
- Engineer shall be responsible for obtaining all applicable City, County, State, and Federal permits.

PRIVATE UTILITY LINES SHOWN	
<i>ENTEX, INC.</i>	<i>10-16-87</i>
<i>SOUTHWESTERN BELL TELEPHONE CO.</i>	<i>10-27-87</i>
<i>HOUSTON LIGHTING & POWER CO.</i>	<i>11-20-87</i>
Approval Only for Crossing Underground Ductlines Unless Noted. Valid for One Year Only	

APPROVED FOR CITY OF HOUSTON	
DEPARTMENT OF PUBLIC WORKS:	
<i>Water Design</i>	<i>11-2-87</i>
<i>Water Quality</i>	<i>11-2-87</i>
<i>Assistant Director - Water Div.</i>	<i>Sanitary Sewer</i>
<i>Bridge Division</i>	<i>11-2-87</i>
<i>Assistant Director</i>	<i>Director</i>
Date: <i>11-2-87</i>	
OTHER DEPT'S	
<i>Traffic & Transp. Dept.</i>	<i>City Planning Dept.</i>

Rev.	Date	Description	App.
RELOCATION OF 12" WATER LINE ON F.M. 1960			
HARRIS COUNTY M.U.D. No. 191			
GENERAL NOTES			
Design By:	Job No: 85001	Sheet	2
Drawn By:	Scale: NONE		
Checked By:	Date: OCT, 1987	of	5
LANDEV ENGINEERS, INC. 1708 SEAMIST DRIVE Houston, Texas 77008			

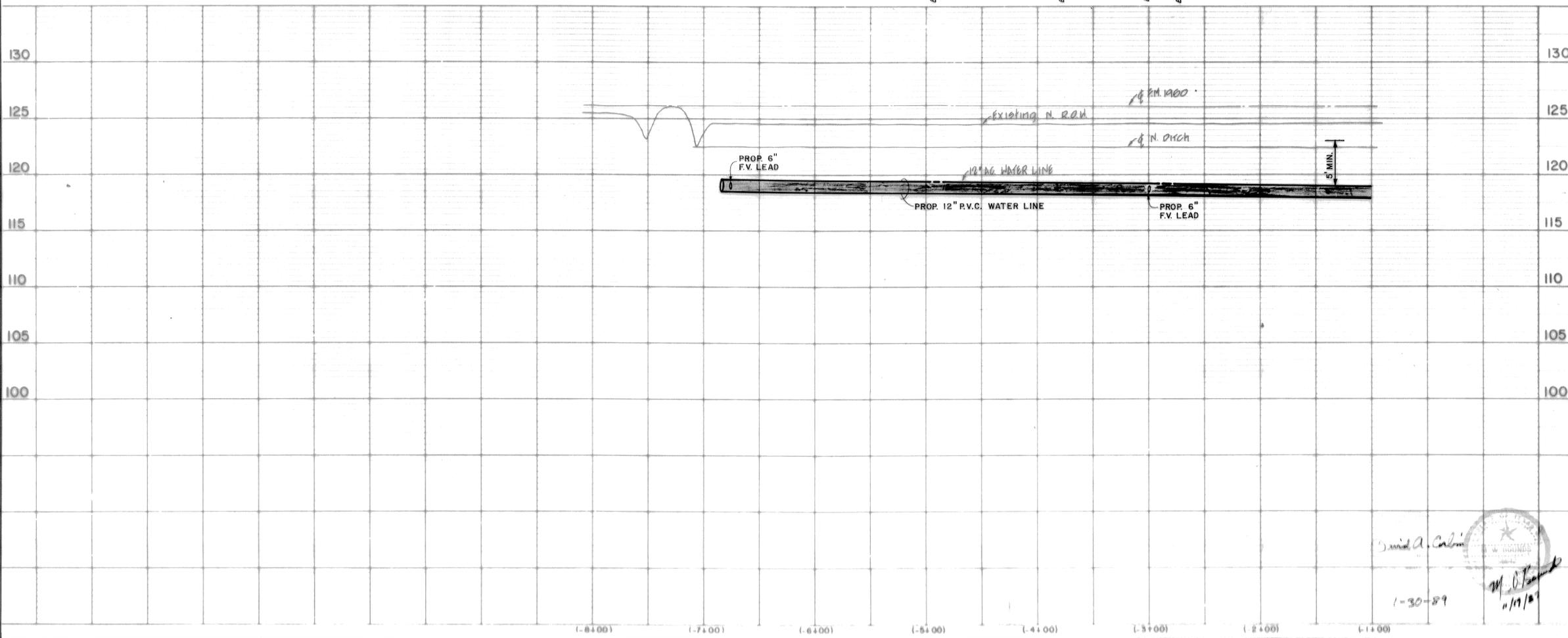
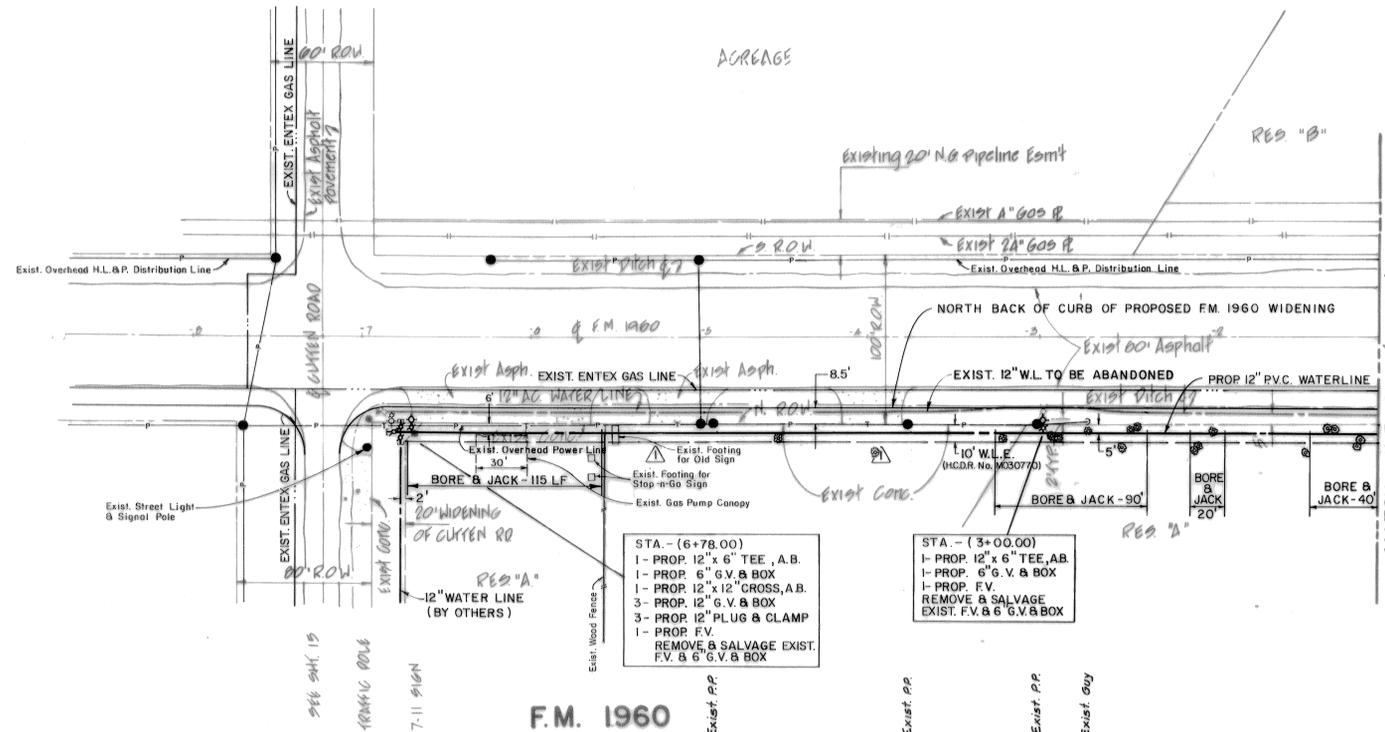
David A. Corbin
11-30-87
M. J. B...
11/19/87

BENCH MARK

NATIONAL GEODETIC SURVEY MARKER NO. Y-1216, LOCATED IN CENTER OF HIGHLINE TOWER. (FIRST TOWER N.W. OF F.M. 1960 AND 80' EAST OF R.R. TRACKS) 1979 ADJ EL. 125.41

NOTES:

- CONTRACTOR SHALL VERIFY ALL LOCATIONS & DEPTHS OF ALL UTILITIES, POLES AND PAVEMENTS IN THE FIELD.
- CONTRACTOR TO NOTIFY MR. STEVE SIMMONS AT 869-4571, EXT. 523 OR JESSE GARCIA AT 880-3031 S.D.H.P.T. 48 HOURS PRIOR TO STARTING CONST. IN THE VICINITY OF FM 1960.
- ALL EXISTING WATER LINE FITTINGS, VALVES, AND FLUSH VALVES ARE TO BE SALVAGED AND REUSED IN CONSTRUCTION OF THE NEW WATER LINE. ALL SALVAGED BUT UNUSED FITTINGS AND VALVES SHALL BE DELIVERED TO THE DISTRICTS WATER PLANT FOR STORAGE.
- CONTRACTOR SHALL PERFORM BEDDING AND BACK-FILL OPERATIONS VERY CAREFULLY AND IN ACCORDANCE WITH THE SPECIFICATIONS.
- CONTRACTOR SHALL EXERCISE EXTREME CAUTION WHEN BORING AND JACKING UNDER AND NEAR TREE ROOTS SO AS TO MINIMIZE DISTURBANCE TO THE TREES.
- CONTRACTOR SHALL VERIFY LOCATION OF SPRINKLER LINES AND HEADS ALONG AND NEAR NORTHSIDE OF 10' WATER LINE EASEMENTS.



PRIVATE UTILITY LINES SHOWN

R. Wood 10-16-87 El. 727 Virginia
ENTEX, INC.

M. Nana 10-22-87
SOUTHWESTERN BELL TELEPHONE CO.
Valid for One Year Only

M. Nana 11-20-87
HOUSTON LIGHTING & POWER CO.
Approval Only for Crossing Underground
Ductlines Unless Noted. Valid for One Year Only

APPROVED FOR CITY OF HOUSTON

DEPARTMENT OF PUBLIC WORKS:

Water Design: *Water Sales* 12-8-87

Water Quality: *St. G. Long* 12-8-87

Assistant Director - Water Div. *St. G. Long* 12/8/87

Assistant Director *M. E. Lee* 12/8/87

Director

OTHER DEPT'S: *Charles* 12-22-87

Traffic & Transp. Dept. City Planning Dept.

1-25-89	ADDED BORE & JACK UNDER TREES, RELOCATED VARIOUS FITTINGS
1-26-88	REMOVE BORE & JACK AT ABANDONED DRIVEWAY ENTRANCES

RELOCATION OF 12" WATER LINE ON F.M. 1960

HARRIS COUNTY M.U.D. No. 191

F.M. 1960

AS-BUILT

STA. -(1+00) TO STA. -(7+00)

Design By: J.W. Job No: 85001-062

Drawn By: J.G.R. Scale: HORIZ. 1"=50'

Checked By: M.W.B. Date: OCTOBER, 1987

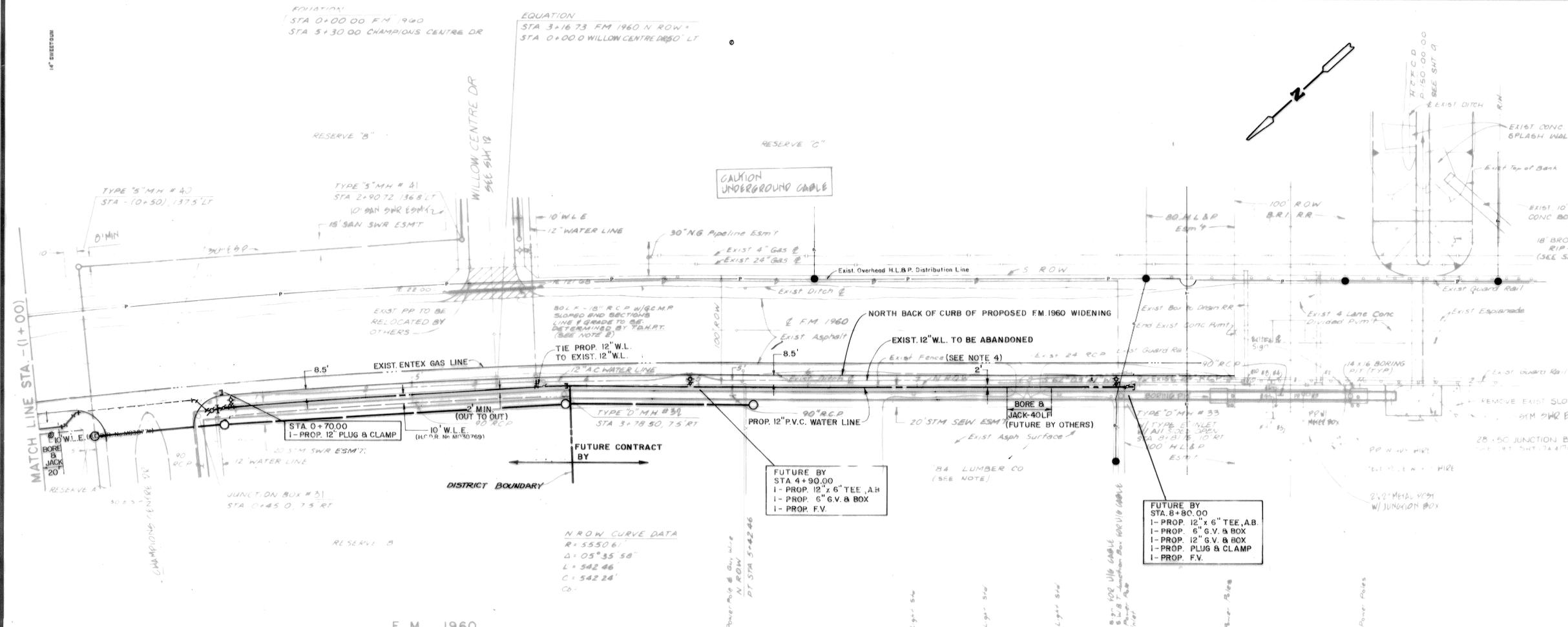
Sheet 3 of 5

LANDEV ENGINEERS, INC.
1708 SEAMIST DRIVE
Houston, Texas 77008

David A. Calin

M. E. Lee 11/17/87

1-30-89



BENCH MARK

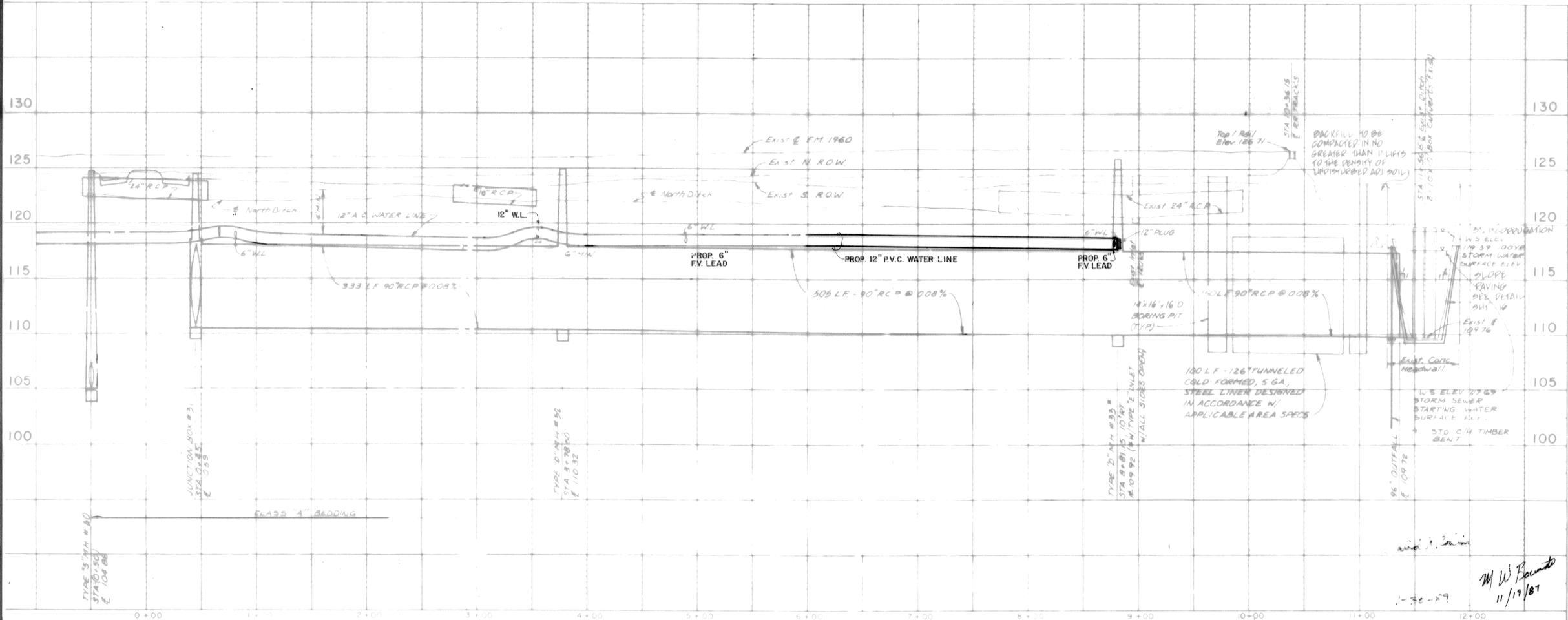
NATIONAL GEODETIC SURVEY MARKER NO. Y-1216, LOCATED IN CENTER OF HIGHLINE TOWER. (FIRST TOWER N.W. OF F.M. 1960 AND 80' EAST OF R.R. TRACKS) 1979 ADJ. EL. 125.41

- NOTES:**
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 - CONTRACTOR SHALL VERIFY LOCATION OF SPRINKLER LINES AND HEADS ALONG AND NEAR NORTHSIDE OF 10' WATER LINE EASEMENTS.
 - CONTRACTOR SHALL MAKE CONNECTIONS AT STATIONS -(0+74), 0+64, 0+70, AND 3+85 AT SUCH TIME TO MINIMIZE WATER LINE SERVICE INTERRUPTION.

PRIVATE UTILITY LINES SHOWN

ENTEX, INC.	10-16-87
SOUTHWESTERN BELL TELEPHONE CO.	10-22-87
HOUSTON LIGHTING & POWER CO.	11-20-87

Approval Only for Crossing Underground
Ductlines Unless Noted. Valid for One Year Only



APPROVED FOR CITY OF HOUSTON

DEPARTMENT OF PUBLIC WORKS:

Water Design: *[Signature]* 11-8-87

Water Quality: *[Signature]* 11-29-87

Assistant Director - Water Div. *[Signature]*

Sanitary Engineer *[Signature]*

Bridge Division *[Signature]*

Assistant Director *[Signature]* Director

Date: _____

OTHER DEPT'S: *[Signature]* 2-24-89

Traffic & Transp. Dept. *[Signature]* City Planning Dept.

1-25-89	ADDED BORE & JACK UNDER TREES, RELOCATED VARIOUS FITTINGS	
Rev.	Date	Description

RELOCATION OF 12" WATER LINE ON F.M. 1960

HARRIS COUNTY M.U.D. No. 191

F.M. 1960
AS-BUILT

STA. -(1+00) TO STA. 12+00

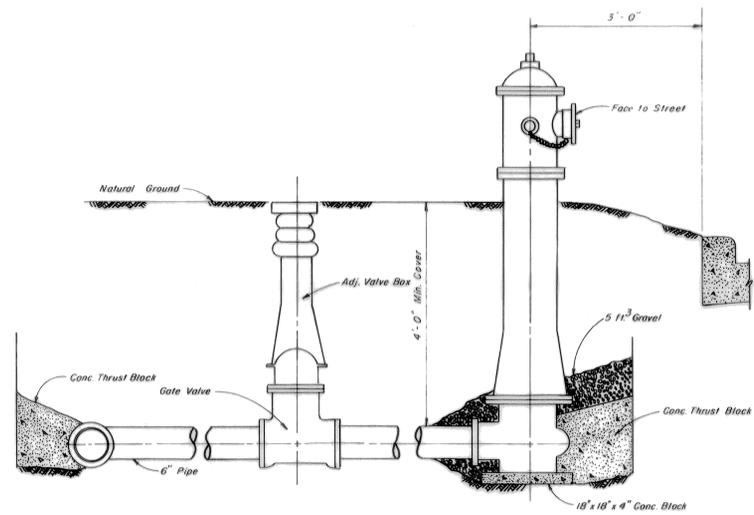
Design By: J.W. Job No: 85001-062 Sheet **4**

Drawn By: J.G.R. Scale: HORIZ. 1"=50' VERT. 1"=5'

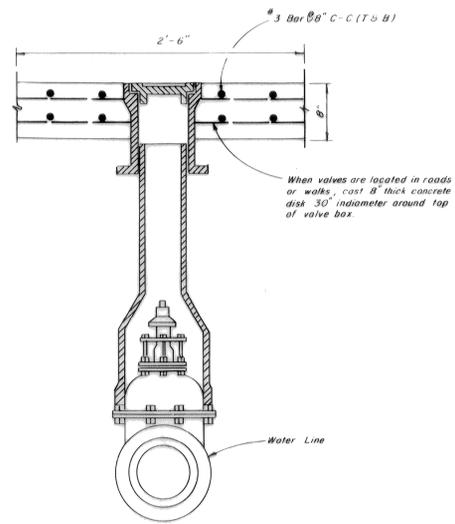
Checked By: M.W.B. Date: OCTOBER, 1987 of 5

LANDEV ENGINEERS, INC.
1706 SEAMIST DRIVE
Houston, Texas 77008

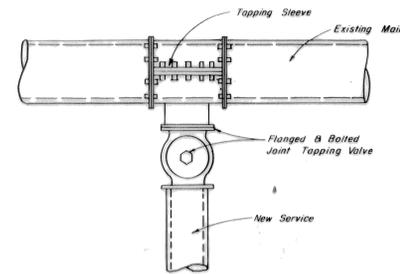
M.W.B. 11/19/87



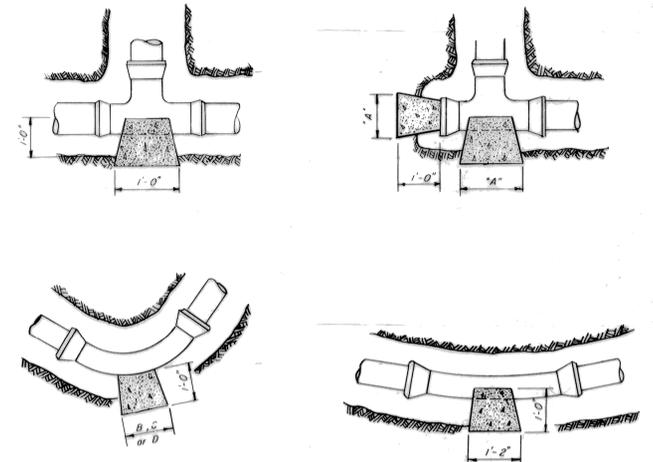
TYPICAL GATE VALVE & HYDRANT INSTALLATION



VALVE BOX DETAIL



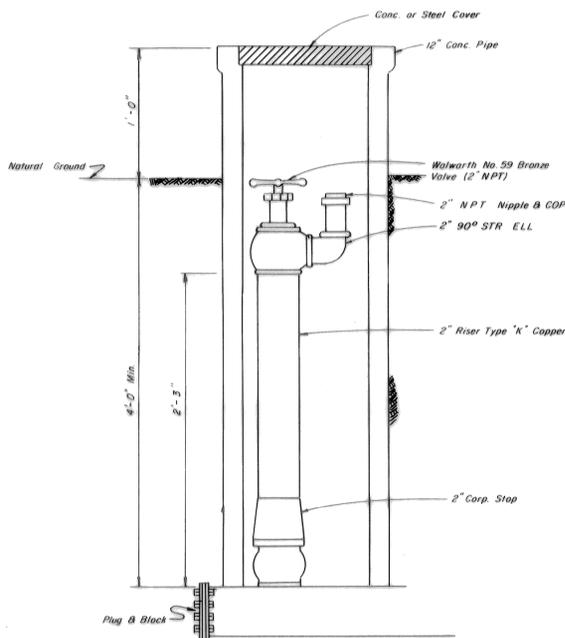
WATER SERVICE CONNECTION



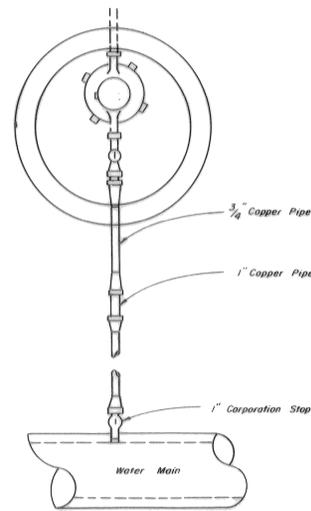
PIPE SIZE	"A" PLUGS & TEES	"B" 90° BEND	"C" 45° BEND	"D" 22 1/2° BEND
4" 6"	1'-0"	1'-3"	1'-0"	1'-0"
8"	2'-0"	2'-6"	1'-6"	1'-0"
12"	4'-0"	4'-0"	2'-6"	1'-6"

NOTE: Safe Bearing Load

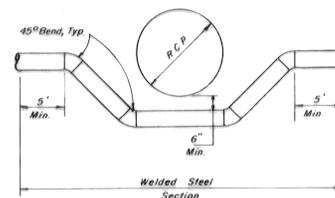
NOTE: Thrust Block at trench face must have a minimum bearing surface of 1 sq. ft., and the least dimension shall be no smaller than 1.5x pipe diameter, but not less than 1.0 ft.



2" BLOW-OFF VALVE ASSEMBLY



SINGLE SERVICE LEAD



WELDED STEEL SECTION

THRUST BLOCK DETAIL

PRIVATE UTILITY LINES SHOWN

Ch. 10-16-87 S.L. K. V. L.
ENTEX, INC.

10-27-87
SOUTHWESTERN BELL TELEPHONE CO.
Valid for One Year Only

HOUSTON LIGHTING & POWER CO.
Approval Only for Crossing Underground
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APPROVED FOR CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS:

A. R. ... 2/11/89
Water Design

...
Water Quality

...
Assistant Director - Water Div.

...
Sanitary Sewer

...
Bridge Division

...
Assistant Director

Date: _____

OTHER DEPT'S
...
Traffic & Transp. Dept. City Planning Dept.

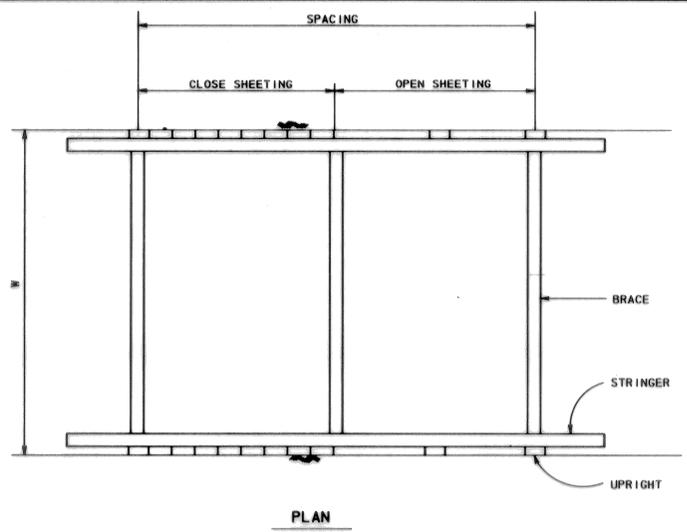
David A. Carlin

1-30-89

M. W. ... 11/19/87

Rev.	Date	Description	App.
RELOCATION OF 12" WATER LINE ON F.M. 1960			
HARRIS COUNTY M.U.D. No. 191			
WATER DETAILS			
Design By:	C. O. H.	Job No: 85001	Sheet 5
Drawn By:	R. T.	Scale: NONE	of 5
Checked By:	D. C. L.	Date: OCTOBER, 1987	

LANDEV ENGINEERS, INC.
1708 SEAMIST DRIVE
Houston, Texas 77008



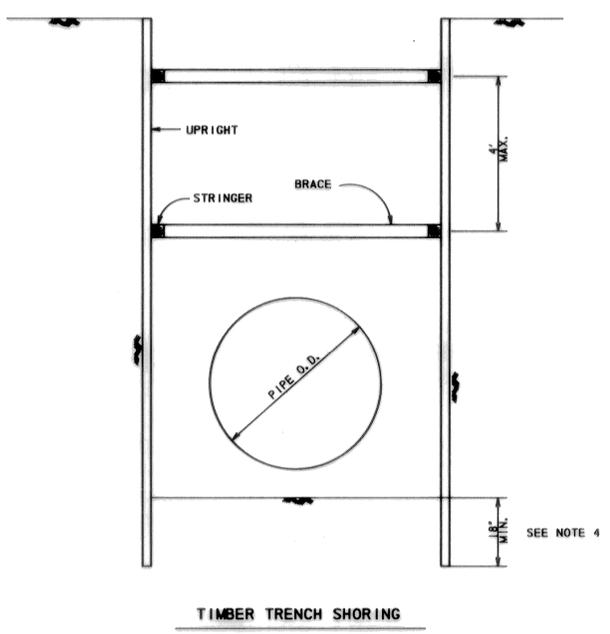
PLAN

TRENCH SHORING - MINIMUM REQUIREMENTS (**)											
DEPTH OF TRENCH	KIND OR CONDITION OF EARTH	SIZE AND SPACING OF MEMBERS									
		UPRIGHTS		STRINGERS		CROSS BRACES ¹			MAXIMUM SPACING		
		MINIMUM DIMENSION	MAXIMUM SPACING	MINIMUM DIMENSION	MAXIMUM SPACING	WIDTH OF TRENCH			VERTICAL	HORIZONTAL	
FEET	TYPE	INCHES	FEET	INCHES	FEET	INCHES	INCHES	INCHES	INCHES	FEET	FEET
5 TO 10	(A) HARD, COMPACT.....	3x4 OR 2x6	6	2x6	4x4	4x6	6x6	6x8	6x8	4	6
	(B) LIKELY TO CRACK.....	3x4 OR 2x6	3	2x6	4x4	4x6	6x6	6x8	6x8	4	6
	(C) SOFT, SANDY, OR FILLED.....	3x4 OR 2x6	CLOSE SHEETING	4x6	4	4x4	4x6	6x6	6x8	4	6
	(D) HYDROSTATIC PRESSURE.....	3x4 OR 2x6	CLOSE SHEETING	6x8	4	4x4	4x6	6x6	6x8	4	6
10 TO 15	(A) HARD, COMPACT.....	3x4 OR 2x6	4	4x6	4	4x4	4x6	6x6	6x8	4	6
	(B) LIKELY TO CRACK.....	3x4 OR 2x6	2	4x6	4	4x4	4x6	6x6	6x8	4	6
	(C) SOFT, SANDY, OR FILLED.....	3x4 OR 2x6	CLOSE SHEETING	4x6	4	4x6	6x6	6x8	8x8	4	6
	(D) HYDROSTATIC PRESSURE.....	3x6	CLOSE SHEETING	8x10	4	4x6	6x6	6x8	8x8	4	6
15 TO 20	(E) ALL KINDS OR CONDITIONS.....	3x6	CLOSE SHEETING	4x12	4	4x12	6x8	8x8	8x10	4	6
	(E) ALL KINDS OR CONDITIONS.....	3x6	CLOSE SHEETING	6x8	4	4x12	8x8	8x10	10x12	4	6
OVER 20	(E) ALL KINDS OR CONDITIONS.....	3x6	CLOSE SHEETING	6x8	4	4x12	8x8	8x10	10x12	4	6

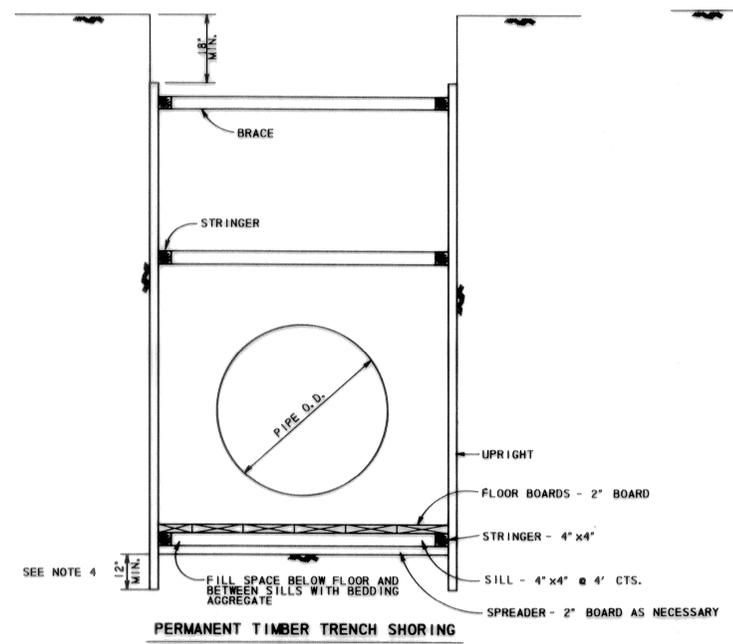
¹ TRENCH JACKS MAY BE USED IN LIEU OF, OR IN COMBINATION WITH, CROSS BRACES. SHORING IS NOT REQUIRED IN SOLID ROCK, HARD SHALE, OR HARD SLAG, WHERE DESIRABLE, STEEL SHEET PILING AND BRACING OF EQUAL STRENGTH MAY BE SUBSTITUTED FOR WOOD.
 (**) DESIGNATION FOR PROPOSAL (BID) PURPOSES
 (**) FROM OSHA SAFETY AND HEALTH REGULATIONS PART 1926, SUBPART P.
 2. SIZE OF TIMBER MEMBERS ARE ROUGH CUT DIMENSIONS (FULL SIZE)

GENERAL NOTES

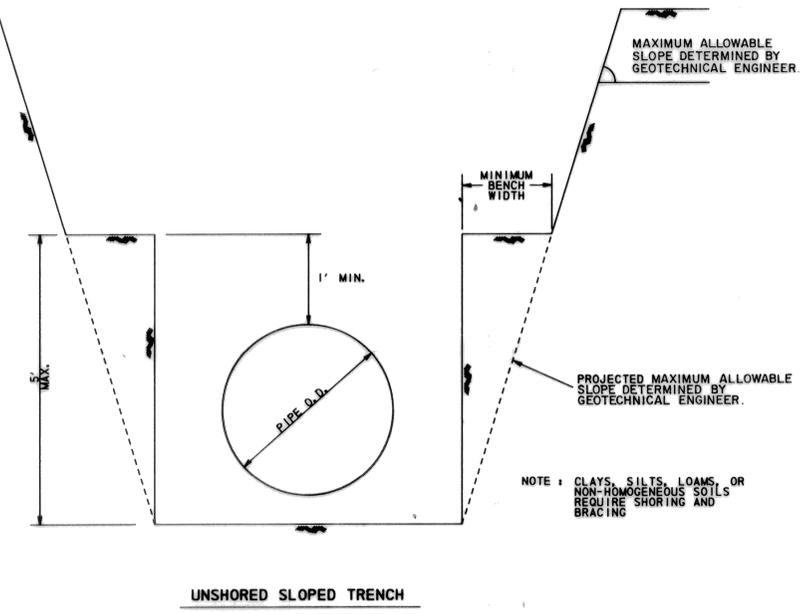
- TRENCH SAFETY SYSTEM TO MEET, AS A MINIMUM, THE REQUIREMENTS OF OSHA SAFETY AND HEALTH REGULATIONS PART 1926, SUBPART P.
- THE CONTRACTOR MAY ELECT TO USE AN ALTERNATE SYSTEM TO THE TIMBER TRENCH SHORING SHOWN IN THE TABLE. THE ALTERNATE SYSTEM, BE IT A TRENCH BOX, STEEL SHEET PILING, TRENCH JACKS OR A COMBINATION OF THE ABOVE, MUST BE CERTIFIED BY THE CONTRACTOR'S REGISTERED PROFESSIONAL ENGINEER THAT IT PROVIDES EQUAL OR GREATER PROTECTION THAN THE TIMBER TRENCH SHORING SHOWN ON THIS DETAIL SHEET.
- CONTRACTOR SHALL PERFORM DAILY TRENCH SAFETY SYSTEM INSPECTIONS TO INSURE THAT THE SYSTEM MEETS OSHA REQUIREMENTS AND IS APPROPRIATE FOR SPECIFIC SITE CONDITIONS OF THE OPEN TRENCH. INSPECTIONS ARE REQUIRED AFTER RAINSTORMS OR ANY CHANGE IN CONDITIONS THAT MAY INCREASE THE POSSIBILITY OF A CAVE-IN OR SLIDE.
- IN THE EVENT THAT TRENCH UPRIGHTS CAN NOT BE PLACED BELOW TRENCH BOTTOM AS SHOWN ON DETAIL, CONTRACTOR MUST PROVIDE ENGINEER WITH PLANS THAT DEMONSTRATE THAT THE UPRIGHTS WILL BE BRACED AND MAINTAINED IN A VERTICAL POSITION.
- WHERE THE TRENCH SAFETY SYSTEM CROSSES A UTILITY, THE UTILITY LINE MUST BE ADEQUATELY SUPPORTED TO PREVENT ANY DAMAGE. IN ADDITION, IN TRENCHES WITH CLOSED SHEETING, THE UPRIGHTS MUST SURROUND THE UTILITY. OPEN TRENCH SHEETING SPACING MUST BE ADJUSTED AS TO NOT EXCEED THE MAXIMUM ALLOWED SPACING. (NO SEPARATE PAY)
- TRENCH SHALL BE DRAINED AS REQUIRED SO WORK MAY BE ACCOMPLISHED SAFELY AND EFFICIENTLY. IF NECESSARY, INSTALL DEWATERING SYSTEM TO PROVIDE A DRY TRENCH BOTTOM. DELIVER DISCHARGE FROM SYSTEM TO NATURAL DRAINAGE CHANNEL OR TO STORM DRAINS.
- IN TRENCHES FOUR FOOT DEEP OR MORE, CONTRACTOR TO PROVIDE ADEQUATE MEANS OF TRENCH EXIT SUCH AS LADDER OR STEPS AND THEY MUST BE LOCATED SO AS TO REQUIRE NO MORE THAN 25 FEET OF LATERAL TRAVEL.
- MEASURE "PERMANENT TIMBER TRENCH SHORING" BY LINEAR FOOT OF TRENCH PROTECTED. PAYMENT IS BY STATED DEPTH OF TRENCH AND EARTH CONDITIONS NOTED IN THE PROPOSAL (BID).
- MEASURE "TRENCH SAFETY SYSTEM" BY LINEAR FOOT OF TRENCH PROTECTED. PAYMENT IS BY STATED DEPTH OF TRENCH AND EARTH CONDITIONS NOTED IN THE PROPOSAL (BID).
- STRINGERS AND BRACES TO BE SECURELY FASTENED.
- ANY PART OF "TRENCH SAFETY SYSTEM" LEFT IN PLACE TO BE REMOVED A MINIMUM OF 18 INCHES BELOW FINISHED GRADE OR NATURAL GROUND, WHICHEVER IS LOWER.
- TRENCH SHORING SYSTEM HAS BEEN DESIGNED WITH NO ALLOWANCE FOR LIVE LOAD SURCHARGE. IF LIVE LOAD SURCHARGE IS ANTICIPATED IT SHALL NOT BE PLACED WITHIN 2 FEET OF EDGE OF TRENCH AND CONTRACTOR'S REGISTERED PROFESSIONAL ENGINEER SHALL DESIGN TRENCH SHORING SYSTEM TO ACCOMMODATE THE ANTICIPATED LIVE LOAD SURCHARGE.
- TIMBER SIZES ARE BASED ON STRESSES OF 1650 PSI FOR EXTREME FIBER IN BENDING AND 1450 PSI FOR COMPRESSION PARALLEL WITH GRAIN.
- EARTH TRENCH CONDITIONS FOR THIS PROJECT ARE ANTICIPATED TO BE AS SHOWN IN THE GEOTECHNICAL REPORT.



TIMBER TRENCH SHORING

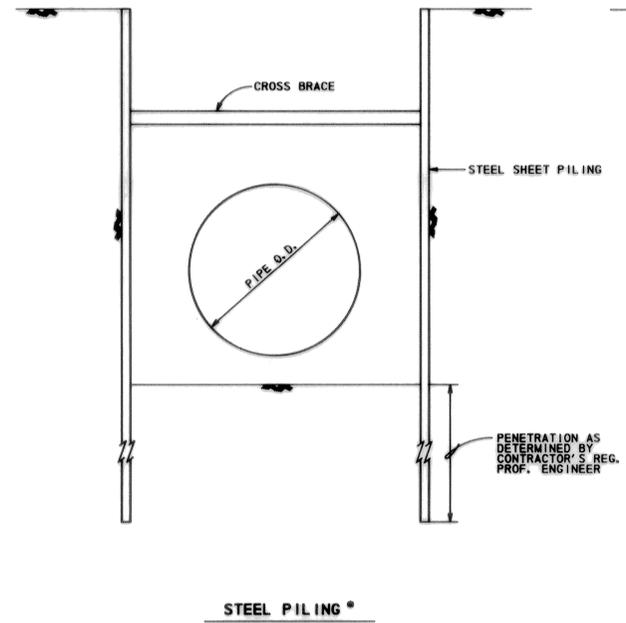


PERMANENT TIMBER TRENCH SHORING

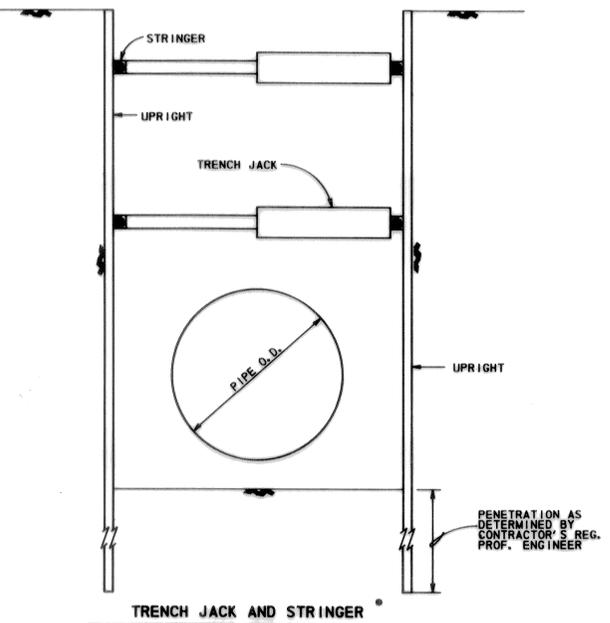


UNSHORED SLOPED TRENCH

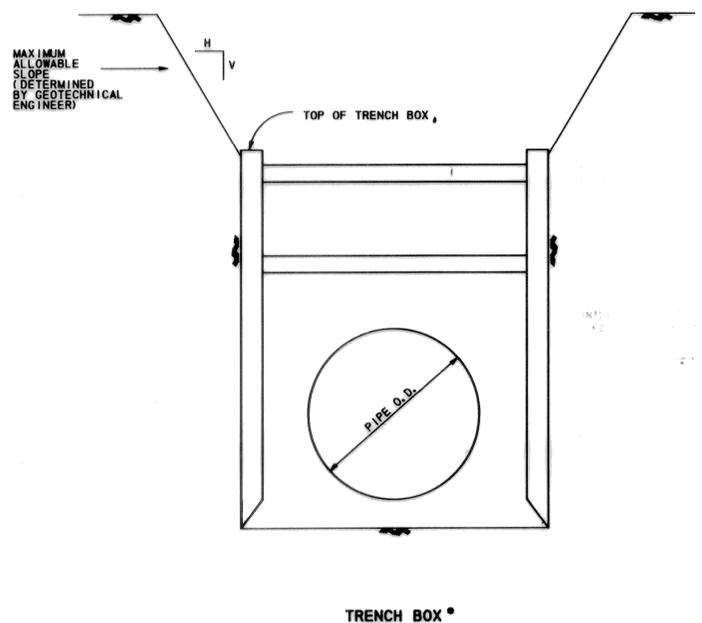
NOTE: CLAYS, SILTS, LOAMS, OR NON-HOMOGENEOUS SOILS REQUIRE SHORING AND BRACING



STEEL PILING



TRENCH JACK AND STRINGER



TRENCH BOX

Rev.	Date	Description	App.
RELOCATION OF 12" WATER LINE ON F.M. 1960			
HARRIS COUNTY M.U.D. No. 191			
TRENCH SAFETY SYSTEM			
Design By:	Job No: 85001	Sheet	5A
Drawn By:	Scale:	of 5	
Checked By:	Date: OCTOBER, 1987		
LANDEV ENGINEERS, INC. 1706 SEAMIST DRIVE Houston, Texas 77008			

ALTERNATE SYSTEM