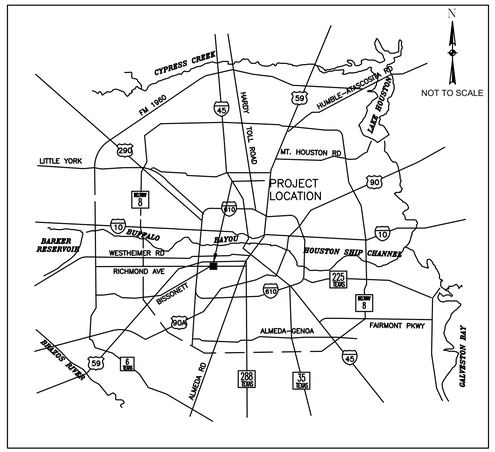
CITY OF HOUSTON

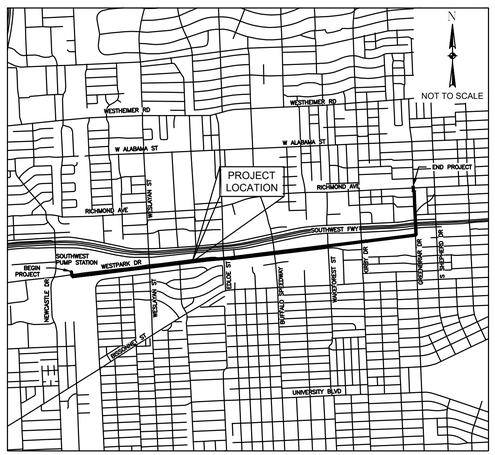
HOUSTON PUBLIC WORKS

CAPITAL PROJECTS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS
WBS NO. S-000900-0136-4



LOCATION MAP



VICINITY MAP
KEY MAP NO 491Z, 492W, 492X, & 492Y
GIMS MAP NO 5256C & 5256D
COUNCIL DISTRICT C

TDLR EABPR N/A

MAYOR
JOHN WHITMIRE

CONTROLLER
CHRIS HOLLINS

DISTRICT COUNCIL MEMBERS

AMY PECK, DISTRICT A
TARSHA JACKSON, DISTRICT B
ABBIE KAMIN, DISTRICT C
CAROLYN EVANS-SHABAZZ, DISTRICT D
FRED FLICKINGER, DISTRICT E
TIFFANY D. THOMAS, DISTRICT F
MARY NAN HUFFMAN, DISTRICT G
MARIO CASTILLO, DISTRICT H
JOAQUIN MARTINEZ, DISTRICT I
EDWARD POLLARD, DISTRICT J
MARTHA CASTEX-TATUM, DISTRICT K

COUNCIL MEMBERS AT-LARGE

JULIAN RAMIREZ, POSITION 1
WILLIE DAVIS, POSITION 2
TWILA CARTER, POSITION 3
LETITIA PLUMMER, POSITION 4
SALLIE ALCORN, POSITION 5

NO.	DATE	REVISION	APP.
1	NOV 2025	90% SUBMITTAL	JM

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77055
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY: AMANI ENGINEERING, INC.
FB NO. P-6329

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PARKS-FORESTRY DEPT.

METRO

HOUSTON WATER

TRANSPORTATION & DRAINAGE OPERATIONS

CAPITAL PROJECTS

SURVEY

CITY ENGINEER DATE

DIRECTOR OF HOUSTON PUBLIC WORKS DATE

SHEET NO 01 OF 169 SHEETS

FOR CITY OF HOUSTON USE ONLY

SHEET No	DRAWING NAME
GENERAL	
01	COVER SHEET
02	SHEET INDEX I
03	LEGENDS AND SYMBOLS
04	ABBREVIATIONS
05	GENERAL CONSTRUCTION NOTES
06	GENERAL NOTES (SHEET 1 OF 2)
07	GENERAL NOTES (SHEET 2 OF 2)
08	KEY NOTES
LAYOUT PLANS	
09	LAYOUT SHEET 1 OF 3
10	LAYOUT SHEET 2 OF 3
11	LAYOUT SHEET 3 OF 3
SURVEY CONTROL MAP	
12	SURVEY CONTROL SHEET 1 OF 5
13	SURVEY CONTROL SHEET 2 OF 5
14	SURVEY CONTROL SHEET 3 OF 5
15	SURVEY CONTROL SHEET 4 OF 5
16	SURVEY CONTROL SHEET 5 OF 5
CIVIL – PLAN AND PROFILE SHEETS	
17	PLAN VIEW 170+00 TO 172+00 – YARD PIPING AT SWPS
18	PROFILE VIEW 170+00 TO 172+00 – YARD PIPING AT SWPS
19	PLAN VIEW 2+00 TO 5+00 ON WESTPARK BRIDGE CROSSING
20	PROFILE VIEW 2+00 TO 5+00 ON WESTPARK BRIDGE CROSSING
21	PROFILE VIEW 2+00 TO 5+00 ON WESTPARK BRIDGE CROSSING
22	PLAN VIEW 10+00 TO 14+50 – METRO WESTPARK DR ROW
23	PROFILE VIEW 10+00 TO 14+50 – METRO WESTPARK DR ROW
24	PLAN VIEW 14+50 TO 19+50 – METRO WESTPARK DR ROW
25	PROFILE VIEW 14+50 TO 19+50 – METRO WESTPARK DR ROW
26	PLAN VIEW 19+50 TO 24+50 – METRO WESTPARK DR ROW
27	PROFILE VIEW 19+50 TO 24+50 – METRO WESTPARK DR ROW
28	PLAN VIEW 24+50 TO 29+50 – METRO WESTPARK DR ROW
29	PROFILE VIEW 24+50 TO 29+50 – METRO WESTPARK DR ROW
30	PLAN VIEW 29+50 TO 34+50 – METRO WESTPARK DR ROW
31	PROFILE VIEW 29+50 TO 34+50 – METRO WESTPARK DR ROW
32	PLAN VIEW 34+50 TO 39+50 – METRO WESTPARK DR ROW & WESLAYAN ST
33	PROFILE VIEW 34+50 TO 39+50 – METRO WESTPARK DR ROW & WESLAYAN ST
34	PLAN VIEW 39+50 TO 44+50 – METRO WESTPARK DR ROW
35	PROFILE VIEW 39+50 TO 44+50 – METRO WESTPARK DR ROW
36	PLAN VIEW 44+50 TO 49+50 – METRO WESTPARK DR ROW
37	PROFILE VIEW 44+50 TO 49+50 – METRO WESTPARK DR ROW
38	PLAN VIEW 49+50 TO 54+50 – METRO WESTPARK DR ROW
39	PROFILE VIEW 49+50 TO 54+50 – METRO WESTPARK DR ROW
40	PLAN VIEW 54+50 TO 59+50 – METRO WESTPARK DR ROW
41	PROFILE VIEW 54+50 TO 59+50 – METRO WESTPARK DR ROW
42	PLAN VIEW 59+50 TO 64+50 – METRO WESTPARK DR ROW & EDLOE ST
43	PROFILE VIEW 59+50 TO 64+50 – METRO WESTPARK DR ROW & EDLOE ST
44	PROFILE VIEW 59+50 TO 64+50 – METRO WESTPARK DR ROW & EDLOE ST
45	PLAN VIEW 64+50 TO 69+50 – METRO WESTPARK DR ROW & COUNTY RD
46	PROFILE VIEW 64+50 TO 69+50 – METRO WESTPARK DR ROW & COUNTY RD
47	PLAN VIEW 69+50 TO 74+50 – METRO WESTPARK DR ROW
48	PROFILE VIEW 69+50 TO 74+50 – METRO WESTPARK DR ROW
49	PLAN VIEW 74+50 TO 78+50 – METRO WESTPARK DR ROW
50	PROFILE VIEW 74+50 TO 78+50 – METRO WESTPARK DR ROW
51	PLAN VIEW 78+50 TO 82+50 – METRO WESTPARK DR ROW & BUFFALO SPEEDWAY
52	PROFILE VIEW 78+50 TO 82+50 – METRO WESTPARK DR ROW & BUFFALO SPEEDWAY
53	PROFILE VIEW 78+50 TO 82+50 – METRO WESTPARK DR ROW & BUFFALO SPEEDWAY
54	PLAN VIEW 82+50 TO 87+50 – METRO WESTPARK DR ROW
55	PROFILE VIEW 82+50 TO 87+50 – METRO WESTPARK DR ROW
56	PLAN VIEW 87+50 TO 92+50 – METRO WESTPARK DR ROW
57	PROFILE VIEW 87+50 TO 92+50 – METRO WESTPARK DR ROW
58	PLAN VIEW 92+50 TO 97+00 – METRO WESTPARK DR ROW
59	PROFILE VIEW 92+50 TO 97+00 – METRO WESTPARK DR ROW
60	PLAN VIEW 97+00 TO 101+00 – METRO WESTPARK DR ROW & WAKEFOREST AVE
61	PROFILE VIEW 97+00 TO 101+00 – METRO WESTPARK DR ROW & WAKEFOREST AVE
62	PLAN VIEW 101+00 TO 104+50 – METRO WESTPARK DR ROW
63	PROFILE VIEW 101+00 TO 104+50 – METRO WESTPARK DR ROW
64	PLAN VIEW 104+50 TO 108+50 – METRO WESTPARK DR ROW
65	PROFILE VIEW 104+50 TO 108+50 – METRO WESTPARK DR ROW
66	PLAN VIEW 108+50 TO 113+00 – METRO WESTPARK DR ROW & KIRBY DR
67	PROFILE VIEW 108+50 TO 113+00 – METRO WESTPARK DR ROW & KIRBY DR
68	PLAN VIEW 113+00 TO 118+00 – METRO WESTPARK DR ROW
69	PROFILE VIEW 113+00 TO 118+00 – METRO WESTPARK DR ROW
70	PLAN VIEW 118+00 TO 122+00 – METRO WESTPARK DR ROW
71	PROFILE VIEW 118+00 TO 122+00 – METRO WESTPARK DR ROW
72	PLAN VIEW 122+00 TO 126+00 – METRO WESTPARK DR ROW
73	PROFILE VIEW 122+00 TO 126+00 – METRO WESTPARK DR ROW
74	PLAN VIEW 126+00 TO 129+03 – METRO WESTPARK DR ROW & GREENBRIAR DR
75	PROFILE VIEW 126+00 TO 129+03 – METRO WESTPARK DR ROW & GREENBRIAR DR
76	PLAN VIEW 140+00 TO 142+00 – GREENBRIAR DR.
77	PROFILE VIEW 140+00 TO 142+00 – GREENBRIAR DR.
78	PLAN VIEW 142+00 TO 147+00 – GREENBRIAR DR. & U.S. HIGHWAY–59
79	PROFILE VIEW 142+00 TO 147+00 – GREENBRIAR DR. & U.S. HIGHWAY–59
80	PLAN VIEW 147+00 TO 152+00 – GREENBRIAR DR
81	PROFILE VIEW 147+00 TO 152+00 – GREENBRIAR DR
82	PLAN VIEW 152+00 TO 156+00 – GREENBRIAR DR & PORTSMOUTH ST
83	PROFILE VIEW 152+00 TO 156+00 – GREENBRIAR DR & PORTSMOUTH ST
84	PLAN VIEW 156+00 TO 160+00 – GREENBRIAR DR & RICHMOND AVE
85	PROFILE VIEW 156+00 TO 160+00 – GREENBRIAR DR & RICHMOND AVE
UTILITY ADJUSTMENT & PAVEMENT RESTORATION	
86	UTILITY ADJUSTMENT GREENBRIAR DR. PROFILE STA 148+28 TO STA 150+40 SHEET 1 OF 2
87	UTILITY ADJUSTMENT GREENBRIAR DR. PROFILE STA 152+65 TO STA 153+84 SHEET 2 OF 2
88	PAVEMENT & WATER LINE REPLACEMENT GREENBRIAR DR. PLAN & PROFILE STA 149+00 TO STA 153+00 SHEET 1 OF 2
89	PAVEMENT & WATER LINE REPLACEMENT GREENBRIAR DR. PLAN & PROFILE STA 153+00 TO STA 157+00 SHEET 2 OF 2
SIGNING AND PAVEMENT MARKING	
90	SIGNING AND PAVEMENT MARKING – GREENBRIAR DR. SHEET 1 OF 1
LDWL STANDARD DETAILS	
91	SOUTHWEST PUMP STATION WATER LINE INTERCONNECTION NO. 1
92	SOUTHWEST PUMP STATION WATER LINE INTERCONNECTION NO. 2
93	SOUTHWEST PUMP STATION WATER LINE INTERCONNECTION NO. 3
94	72–INCH TUNNEL FOUNDATION DETAIL
95	CONSTRUCTION SIGN BUILD HOUSTON FORWARD DETAIL
96	STANDARD LDWL STEEL PIPE DETAILS (SHEET 1 OF 2)
97	STANDARD LDWL STEEL PIPE DETAILS (SHEET 2 OF 2)
98	STANDARD LDWL DETAILS
99	STANDARD LDWL ACCESS MH DETAILS
100	STANDARD LDWL SAF–T–CLIMB DETAILS EXTRA DEPTH MANHOLE
101	STANDARD LDWL BUTTERFLY VALVE AND OPERATOR MANHOLE DETAILS
102	STANDARD LDWL DRAIN LINE VALVE DETAILS
103	LDWL COMBINATION AIR VALVE ASSEMBLY IN SERVICE MANHOLE DETAILS
104	LDWL AIR VALVE ASSEMBLY IN SERVICE MANHOLE DETAIL
105	LDWL TUNNEL AND CASING DETAILS FOR WATER LINES 24" & LARGER
106	STANDARD LDWL EXCAVATION AND BACKFILL
CATHODIC PROTECTION	
107	WATER LINE CATHODIC PROTECTION SCHEDULES (SHEET 1 OF 2)
108	WATER LINE CATHODIC PROTECTION SCHEDULES (SHEET 2 OF 2)
109	WATER LINE CATHODIC PROTECTION DETAILS (SHEET 1 OF 10)
110	WATER LINE CATHODIC PROTECTION DETAILS (SHEET 2 OF 10)
111	WATER LINE CATHODIC PROTECTION DETAILS (SHEET 3 OF 10)
112	WATER LINE CATHODIC PROTECTION DETAILS (SHEET 4 OF 10)
113	WATER LINE CATHODIC PROTECTION DETAILS (SHEET 5 OF 10)
114	WATER LINE CATHODIC PROTECTION DETAILS (SHEET 6 OF 10)
115A	WATER LINE CATHODIC PROTECTION DETAILS (SHEET 7 OF 10)
115B	WATER LINE CATHODIC PROTECTION DETAILS (SHEET 8 OF 10)
115C	WATER LINE CATHODIC PROTECTION DETAILS (SHEET 9 OF 10)
115D	WATER LINE CATHODIC PROTECTION DETAILS (SHEET 10 OF 10)
STANDARD DETAILS	
116	SMALL DIAMETER WATER LINE DETAILS
117	STANDARD SANITARY SEWER DETAILS SHEET 1 OF 2
118	STANDARD SANITARY SEWER DETAILS SHEET 2 OF 2
119	STANDARD STORM SEWER DETAILS SHEET 1 OF 3
120	STANDARD STORM SEWER DETAILS SHEET 2 OF 3
121	STANDARD STORM SEWER DETAILS SHEET 3 OF 3
PAVEMENT AND SIDEWALK DETAILS	
122	STREET CUT AND PAVEMENT REPAIRS DETAILS SHEET 1 OF 2
123	STREET CUT AND PAVEMENT REPAIRS DETAILS SHEET 2 OF 2
124	PROPOSED SIDEWALK THROUGH DRIVEWAY WITH EXCESSIVE ELEVATION DIFFERENCE
125	PROPOSED SIDEWALK THROUGH DRIVEWAY WITH MINIMAL ELEVATION DIFFERENCE
126	CURB, CURB AND GUTTER, AND HEADER DETAILS
127	TYPICAL CURB AND RAMP DETAILS
STANDARD PAVEMENT MARKING DETAILS	
128	STANDARD PAVEMENT MARKING DETAILS (SHEET 1 OF 6)
129	STANDARD PAVEMENT MARKING DETAILS (SHEET 2 OF 6)
130	STANDARD PAVEMENT MARKING DETAILS (SHEET 3 OF 6)
131	STANDARD PAVEMENT MARKING DETAILS (SHEET 4 OF 6)
132	STANDARD PAVEMENT MARKING DETAILS (SHEET 5 OF 6)
133	STANDARD PAVEMENT MARKING DETAILS (SHEET 6 OF 6)
STANDARD SIGNING DETAILS	
134	STANDARD SIGNAGE DETAILS (SHEET 1 OF 2)
135	STANDARD SIGNAGE DETAILS (SHEET 2 OF 2)
136	GROUND MOUNTED SIGN SIZES
137	TYPICAL CITY OF HOUSTON SIGNS (SHEET 1 OF 2)
138	TYPICAL CITY OF HOUSTON SIGNS (SHEET 2 OF 2)
139	SUMMARY OF SMALL SIGNS
TRAFFIC CONTROL	
140	TCP NOTES AND CHANNELIZING DEVICES AND BARRICADES TCP–01
141	GREENBRIAR DR. – TCP PHASE – 1 SHEET 1 OF 4 TCP–02
142	GREENBRIAR DR. – TCP PHASE – 1 SHEET 2 OF 4 TCP–03
143	GREENBRIAR DR. – TCP PHASE – 1 SHEET 3 OF 4 TCP–04
144	GREENBRIAR DR. – TCP PHASE – 1 SHEET 4 OF 4 TCP–05
145	GREENBRIAR DR. – TCP PHASE – 2 TCP–06
146	GREENBRIAR DR. – TCP PHASE – 3 TCP–07
147	GREENBRIAR DR. – TCP PHASE – 4 SHEET 1 OF 2 TCP–08
148	GREENBRIAR DR. – TCP PHASE – 4 SHEET 2 OF 2 TCP–09
149	GREENBRIAR DR. – TCP PHASE – 5 SHEET 1 OF 2 TCP–10
150	GREENBRIAR DR. – TCP PHASE – 5 SHEET 2 OF 2 TCP–11
151	DETOUR 1 TCP–12
152	DETOUR 2 TCP–13
153	DETOUR 3 TCP–14
154	DETOUR 4 TCP–15
TREE PROTECTION PLAN	
155	TREE PROTECTION PLAN SHEET 1 OF 7
156	TREE PROTECTION PLAN SHEET 2 OF 7
157	TREE PROTECTION PLAN SHEET 3 OF 7
158	TREE PROTECTION PLAN SHEET 4 OF 7
159	TREE PROTECTION PLAN SHEET 5 OF 7
160	TREE PROTECTION PLAN SHEET 6 OF 7
161	TREE PROTECTION PLAN SHEET 7 OF 7
STORM WATER POLLUTION AND PREVENTION PLAN	
162	STORM WATER POLLUTION PREVENTION GENERAL NOTES
163	STORM WATER POLLUTION PREVENTION PLAN – SWPS & METRO EASEMENT STA 0+00 TO STA 17+00
164	STORM WATER POLLUTION PREVENTION PLAN – SWPS & METRO EASEMENT STA 17+00 TO STA 47+00
165	STORM WATER POLLUTION PREVENTION PLAN – SWPS & METRO EASEMENT STA 47+00 TO STA 77+00
166	STORM WATER POLLUTION PREVENTION PLAN – SWPS & METRO EASEMENT STA 77+00 TO STA 107+00
167	STORM WATER POLLUTION PREVENTION PLAN – SWPS & METRO EASEMENT STA 107+00 TO STA 129+00
168	STORM WATER POLLUTION PREVENTION PLAN – SWPS & METRO EASEMENT STA 142+00 TO 158+00
169	STORM WATER POLLUTION PREVENTION PLAN STANDARD DETAILS

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HOUSTON PUBLIC WORKS

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TO METRO CORRIDOR TO SWPS

SHEET INDEX I

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DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 02 OF 169	

EXISTING PLAN VIEW

- WATER METER
- WATER VALVE (GATE)
- WATER VALVE (BUTTERFLY)
- FIRE HYDRANT/FLUSHING VALVE
- TAPPING SLEEVE & VALVE
- REDUCER
- ROUND CONNECTION
- SANITARY SEWER CLEANOUT & MANHOLE
- STORM SEWER MANHOLE
- STORM SEWER INLETS
- CULVERT PIPE AND HEADWALL
- TOP OF CURB ELEVATION
- GUTTER ELEVATION
- TOP OF PAVEMENT ELEVATION
- CONTOUR LINE
- ROW LINE
- PROPERTY LINE
- LOT LINES
- EASEMENT LINE
- CENTER LINE OF ROW
- TRANSIT LINE
- EDGE OF DITCHES
- CENTER LINE OF DITCHES
- EDGE OF DITCHES
- FENCE LINE, WOOD
- FENCE LINE, CHAIN LINK
- FENCE LINE, BARBED WIRE
- FENCE LINE, HOG WIRE
- EDGE OF CONCRETE
- CURB LINE
- CONCRETE WALK
- EDGE OF ASPHALT
- EDGE OF SHELL OR GRAVEL
- DIMENSION LINE
- AERIAL POWER LINE
- UNDERGROUND POWER LINE
- GAS LINE
- UNKNOWN UNDERGROUND LINE
- OIL PIPELINE
- UNDERGROUND TELECOMM LINE W/VAULT
- AERIAL TELECOMM LINE
- RAILROAD LINE
- WATER LINE
- SANITARY SEWER LINE
- STORM SEWER LINE
- SANITARY SEWER FORCE MAIN
- RECLAIMED WATER LINE
- NON–POTABLE WATER LINE
- GAS METER
- GAS VALVE
- PROPANE LINE
- STEAM LINE
- MISC UNDERGROUND PIPELINE LABLE

PROPOSED PLAN VIEW

- WATER METER
- WATER VALVE (GATE)
- WATER VALVE (BUTTERFLY)
- FIRE HYDRANT/FLUSHING VALVE
- TAPPING SLEEVE & VALVE
- REDUCER
- ROUND CONNECTION
- SANITARY SEWER CLEANOUT & MANHOLE
- STORM SEWER MANHOLE
- STORM SEWER INLETS
- CULVERT PIPE AND HEADWALL
- TOP OF CURB ELEVATION
- GUTTER ELEVATION
- TOP OF PAVEMENT ELEVATION
- CONTOUR LINE
- ROW LINE
- PROPERTY LINE
- LOT LINES
- EASEMENT LINE
- CENTER LINE OF ROW
- TRANSIT LINE
- EDGE OF DITCHES
- CENTER LINE OF DITCHES
- EDGE OF DITCHES
- FENCE LINE, WOOD
- FENCE LINE, CHAIN LINK
- FENCE LINE, BARBED WIRE
- FENCE LINE, HOG WIRE
- EDGE OF CONCRETE
- CURB LINE
- CONCRETE WALK
- EDGE OF ASPHALT
- EDGE OF SHELL OR GRAVEL
- DIMENSION LINE
- AERIAL POWER LINE
- UNDERGROUND POWER LINE
- GAS LINE
- UNKNOWN UNDERGROUND LINE
- OIL PIPELINE
- UNDERGROUND TELCOMM LINE W/ VAULT
- AERIAL TELECOMM LINE
- RAILROAD LINE
- WATER LINE
- SANITARY SEWER LINE
- STORM SEWER LINE
- SANITARY SEWER FORCE MAIN
- RECLAIMED WATER LINE
- NON–POTABLE WATER LINE
- GAS METER
- GAS VALVE
- PROPANE LINE
- STEAM LINE
- MISC UNDERGROUND PIPELINE LABLE
- MATCH LINE

EXISTING PLAN VIEW

- PAVING HEADER
- BUILDING, RESIDENTIAL
- BUILDING, COMMERCIAL
- TREE
- HEDGE
- IRON PIPE OR IRON ROD MONUMENT
- POINT OF INTERSECTION (PI)
- POINT OF CURVE (PC)
- POINT OF TANGENCY (PT)
- POWER POLE
- POWER POLE W/DOWN GUY

EXISTING PROFILE VIEW

- NORTH OR EAST PROPERTY LINE
- SOUTH OR WEST PROPERTY LINE
- NORTH OR EAST CURB
- SOUTH OR WEST CURB
- NORTH OR EAST DITCH
- SOUTH OR WEST DITCH
- NORTH OR EAST NATURAL GROUND
- SOUTH OR WEST NATURAL GROUND
- NORTH OR EAST CULVERT
- SOUTH OR WEST CULVERT
- CENTERLINE OF ROW
- CENTERPOINT ENERGY CONDUIT
- GAS LINE
- WESTERN UNION
- AT&T CONDUIT
- WATER LINE
- SANITARY SEWER LINE
- STORM SEWER LINE
- SANITARY SEWER FORCE MAIN
- RECLAIMED WATER LINE
- NON–POTABLE WATER LINE
- CENTERPOINT ENERGY MANHOLE
- AT&T MANHOLE
- WATER LINE MANHOLE
- SANITARY SEWER MANHOLE & CLEANOUT
- STORM SEWER MANHOLE
- STORM SEWER INLET

PROPOSED PLAN VIEW

- PAVING HEADER
- BUILDING, RESIDENTIAL
- BUILDING, COMMERCIAL
- TREE
- HEDGE
- IRON PIPE OR IRON ROD MONUMENT
- POINT OF INTERSECTION (PI)
- POINT OF CURVE (PC)
- POINT OF TANGENCY (PT)
- POWER POLE
- POWER POLE W/DOWN GUY

PROPOSED PROFILE VIEW

- NORTH OR EAST PROPERTY LINE
- SOUTH OR WEST PROPERTY LINE
- NORTH OR EAST CURB
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- NORTH OR EAST NATURAL GROUND
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- RECLAIMED WATER LINE
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- CENTERPOINT ENERGY MANHOLE
- AT&T MANHOLE
- WATER LINE MANHOLE
- SANITARY SEWER MANHOLE & CLEANOUT
- STORM SEWER MANHOLE
- STORM SEWER INLET

MISC STANDARD ELEMENTS

- COH NORTH ARROW
- COH BAR SCALE (SCALE: 1"=20')
- DETAIL/SECTION TITLE (VIEW TITLE, SCALE: 1:1)
- SECTION CALLOUT
- DETAIL CALLOUT
- ACCESS MANWAY
- COMBINATION A/V
- CRITICAL LOCATE
- TOWER

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HOUSTON PUBLIC WORKS

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SHEET NO. 03 OF 169	

ABBREVIATIONS:

&	AND
@	AT
AB	ALL BELL
AC	ACRE / ASBESTOS CEMENT
AI/VR	AIR INLET / VACUUM RELIEF
APPROX	APPROXIMATELY
ASPH	ASPHALT
AVE	AVENUE
℄	BASELINE
B/B	BACK TO BACK
BC	BACK OF CURB
BFV	BUTTERFLY VALVE
BL	BUILDING LINE
BLDG	BUILDING
BLVD	BOULEVARD
℄	CENTER LINE
C/C	CENTER TO CENTER
CGMP	CORRUGATED GALVANIZED METAL PIPE
CMP	CORRUGATED METAL PIPE
CIP	CAST IRON PIPE
CLR	CLEARANCE
CO	CLEAN OUT
COH	CITY OF HOUSTON
CONC	CONCRETE
CONSTR	CONSTRUCTION
CP	CONTROL POINTS
CPEE	CENTERPOINT ENERGY ELECTRIC
CPEG	CENTERPOINT ENERGY GAS
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DR	DRIVE
DWG	DRAWING
DWY	DRIVEWAY
E	EAST
EL	ELEVATION
EP	EDGE OF PAVEMENT
E/R	END OF RADIUS
ESMT	EASEMENT
EXST	EXISTING
FC	FACE OF CURB
F/F	FACE TO FACE
FH	FIRE HYDRANT
℄	FLOW LINE
FM	FORCE MAIN
FT	FEET
GPS	GLOBAL POSITIONING SYSTEM
GV	GATE VALVE
GV&B	GATE VALVE AND BOX
HCFCD	HARRIS COUNTY FLOOD CONTROL DISTRICT
HDPE	HIGH-DENSITY POLYETHYLENE
HGL	HYDRAULIC GRADE LINE
HP	HIGH PRESSURE
INV EL	INVERT ELEVATION
IP	INTERMEDIATE PRESSURE
IR	IRON ROD

ABBREVIATIONS:

J-BOX	JUNCTION BOX
JT	JOINT
JUNCT	JUNCTION
LF	LINEAR FEET
LN	LANE
LPT	LOW POINT
LT	LEFT
LS	LIFT STATION
MAX	MAXIMUM
METRO	METROPOLITAN TRANSIT AUTHORITY
MH	MANHOLE
MIN	MINIMUM
MON	MONUMENT
N	NORTH
NA	NOT APPLICABLE
NAVD	NORTH AMERICAN VERTICAL DATUM
NG	NATURAL GROUND
NO	NUMBER
NTS	NOT TO SCALE
OCC	ZERO CURB CUT
OS	OFFSET
OH	OVERHEAD
PC	POINT OF CURVE
PCC	POINT OF COMPOUND CURVATURE
PCCP	PRESTRESSED CONCRETE CYLINDER PIPE
PERM	PERMANENT
PGL	PROFILE GRADE LINE
PI	POINT OF INTERSECTION
PL	PROPERTY LINE
PNT	POINT
PPCA	POTENTIALLY PETROLEUM CONTAMINATED AREA
PRC	POINT OF REVERSE
PROP	PROPOSED
PSI	POUND PER SQUARE INCH
PT	POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE PIPE / POINT OF VERTICAL CURVATURE
PVMT	PAVEMENT
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY

ABBREVIATIONS:

Ⓡ	RECORD DRAWING
R	RADIUS
RCB	REINFORCED CONCRETE BOX
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
REINF	REINFORCED
REM	REMOVABLE
RJ	RESTRAINED JOINT
ROW	RIGHT OF WAY
RR	RAILROAD
RRPM	REFLECTIVE REMOVABLE PAVEMENT MARKERS
RT	RIGHT
S	SOUTH
SAN	SANITARY
SCHED	SCHEDULE
SF	SQUARE FEET
SHT	SHEET
SSE	SANITARY SEWER EASEMENT
ST	STREET
STA	STATION
STD	STANDARD
STL	STEEL
STM	STORM
SWBT	SOUTHWESTERN BELL TELEPHONE
SWR	SEWER
SY	SQUARE YARD
TAN	TANGENT
TBM	TEMPORARY BENCHMARK
TEMP	TEMPORARY
TOB	TOP OF BANK
TOC	TOP OF CURB
TOP	TOP OF PAVEMENT
TOS	TOP OF STACK
TS&V	TAPPING SLEEVE AND VALVE
TXDOT	TEXAS DEPARTMENT OF TRANSPORTATION
TYP	TYPICAL
UE	UTILITY EASEMENT
UGND	UNDERGROUND
VC	VERTICAL CURVE
VPI	VERTICAL POINT OF INTERSECTION
W	WEST
W/	WITH
WL	WATER LINE
WLE	WATER LINE EASEMENT
WM	WATER METER
WP	WOOD POLE
WSEL	WATER SURFACE ELEVATION
WV	WATER VALVE
WWTP	WASTE WATER TREATMENT PLANT

NO.	DATE	REVISION	APP.

NOTICE:
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS SIGNATURE DOES NOT FULFILL YOUR OBLIGATION TO CALL 811

VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

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TBPE REGISTRATION NO. F-533

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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

ABBREVATIONS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 04 OF 169	

CITY OF HOUSTON PUBLIC WORKS
GENERAL NOTES– INSIDE CITY LIMITS

1.UNLESS OTHERWISE NOTED AND APPROVED ON DRAWINGS, CONSTRUCT CIVIL INFRASTRUCTURE IN ACCORDANCE WITH THE EFFECTIVE EDITION OF THE HOUSTON PUBLIC WORKS STANDARD CONSTRUCTION SPECIFICATIONS, STANDARD CONSTRUCTION DETAILS, AND SUPPLEMENTS, ADDENDA AND AMENDMENTS THERETO. THE LATEST EDITION OF THE ABOVE PUBLICATIONS CAN BE FOUND AT: HTTP://WWW.HOUSTONPERMITTINGCENTER.ORG/OFFICE–CITY–ENGINEER/DESIGN–AND–CONSTRUCTION–STANDARDS.

2.THE DESIGN MUST BE CONSISTENT WITH THE EFFECTIVE EDITION OF HOUSTON PUBLIC WORKS INFRASTRUCTURE DESIGN MANUAL AND TCEQ (TEXAS COMMISSION ON ENVIRONMENTAL QUALITY) REQUIREMENTS.

3.THE GEOTECHNICAL INVESTIGATION FOR THIS PROJECT WAS CONDUCTED IN ACCORDANCE WITH CHAPTER 11 OF THE LATEST EDITION OF THE PUBLICATION INFRASTRUCTURE DESIGN MANUAL, PUBLISHED BY HOUSTON PUBLIC WORKS. SOILS REPORT WAS PREPARED BY [GEOTECHNICAL ENGINEERING FIRM] REPORT NO. [NO. OF REPORT], DATED [DATE OF REPORT].

4.UTILITIES PRESENTED ON THESE DRAWINGS ARE SHOWN BASED ON THE BEST AVAILABLE INFORMATION. CONTRACTOR SHALL VERIFY THE EXACT LOCATIONS IN THE FIELD PRIOR TO COMMENCING CONSTRUCTION. CONTRACTOR SHALL NOTIFY TEXAS ONE CALL AT 713–223–4567/811 OR 800–344–8377 AND LONE STAR NOTIFICATION CENTER AT 800–669–8344 AT LEAST 48 HOURS BEFORE PROCEEDING WITH ANY EXCAVATION. UTILITIES MARKED WITHIN THE PUBLIC RIGHT OF WAY OR IN EASEMENTS SHALL COMPLY WITH TAC TITLE 16, PART 1, CHAPTER 18, RULE §18.6 AND THE AMERICAN PUBLIC WORKS ADMINISTRATION (APWA) UNIFORM COLOR CODE.

5.CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGES TO EXISTING WATER, WASTEWATER, STORM WATER LINES AND TRAFFIC CONTROL DEVICES. DAMAGES SHALL BE REPAIRED IN ACCORDANCE WITH THE EFFECTIVE EDITION OF HOUSTON PUBLIC WORKS, STANDARD CONSTRUCTION SPECIFICATIONS FOR WASTEWATER COLLECTION SYSTEM, WATER LINES, STORM DRAINAGE, STREET PAVING, AND TRAFFIC AND STANDARD CONSTRUCTION DETAILS FOR WASTEWATER COLLECTION SYSTEMS, WATER LINES, STORM DRAINAGE, STREET PAVING, AND TRAFFIC, REFERENCED ABOVE AND SUPPLEMENTS, ADDENDA AND AMENDMENTS THERETO, AT NO ADDITIONAL COST TO THE CITY OF HOUSTON.

6.CONTRACTOR SHALL NOTIFY THE OFFICE OF THE CITY ENGINEER, HOUSTON PUBLIC WORKS @ 832–394–9098 OR VIA FAX AT 832–395–4424 FOR INSPECTION AT LEAST 48 HOURS PRIOR TO COMMENCING CONSTRUCTION.

7.ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION AND ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO EXISTING CONDITIONS OR BETTER AND TO THE SATISFACTION OF THE OWNING AUTHORITY.

8.CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT ROOT SYSTEMS OF SHRUBS, PLANTS AND TREES ALONG THE AREA OF EXCAVATION.

9.CONTRACTOR SHALL COMPLY WITH LATEST EDITION OF OSHA REGULATIONS AND THE STATE OF TEXAS LAWS CONCERNING EXCAVATION.

10.CONTRACTOR SHALL MAINTAIN A SET OF REDLINE DRAWINGS AND RECORD AS–BUILT CONDITIONS DURING CONSTRUCTION. THESE AS–BUILT DRAWINGS WILL BE SUBMITTED TO THE DESIGN CONSULTANT WHO WILL MAKE THE CHANGES ON THE ORIGINAL TRACINGS, LABEL EACH SHEET IN THE SET AS "RECORD DRAWINGS", AND RETURN IT TO THE OFFICE OF THE CITY ENGINEER.

CITY OF HOUSTON PUBLIC WORKS
WATER CONSTRUCTION NOTES

1.ALL 4" THROUGH 12" WATER LINE TO BE AWWA C–900 PVC DR–18 BLUE PRESSURE RATED WATER MAIN WITH 2" AND SMALLER WATER SERVICE LINE TO BE CONTINUOUS TYPE K COPPER TUBING PER COH STANDARD SPECIFICATION SECTION 02503. ALL 4" THRU 54" DI PIPE WATER LINES SHALL BE AWWA C151 WITH INSIDE LINING WITH AWWA C104 AND DOUBLE WRAPPED WITH 8–MIL POLYETHYLENE SHEETS.

2.CONCRETE THRUST BLOCKS SHALL BE PROVIDED AS NECESSARY TO PREVENT PIPE MOVEMENT. USE RESTRAINED JOINTS WHERE PREVENTING PIPE MOVEMENT IS NECESSARY DUE TO THRUST.

3.ALL WATER LINES UNDER PROPOSED OR FUTURE PAVING AND TO A POINT OF ONE (1) FOOT BACK OF ALL PROPOSED OR FUTURE CURBS SHALL BE ENCASED IN BANK SAND TO 12" OVER PIPE AND BACKFILLED WITH CEMENT STABILIZED SAND TO WITHIN ONE (1) FOOT OF SUBGRADE.

4.ALL WATER LINE AND SEWER LINE CROSSINGS SHALL BE CONSTRUCTED PER CITY OF HOUSTON AND TCEQ REGULATIONS.

5.ALL WATER VALVES SHALL BE SUPPLIED AND INS TALLED IN ACCORDANCE WITH THE LATEST EDITION OF AWWA C–500 AND SHALL BE OF THE RESILIENT SEAT TYPE.

6.ALL WATER LINES TO BE DISINFECTED IN CONFORMANCE WITH AWWA C–651 AND THE TEXAS STATE DEPARTMENT OF HEALTH. AT LEAST ONE BACTERIOLOGICAL SAMPLE SHALL BE COLLECTED FOR EVERY 1,000 LINEAR FEET OF WATER LINE AND SHALL BE REPEATED IF CONTMINATION PERSISTS.

7.ALL BELOW GRADE VALVES SHALL BE GASKETED, HUB–END GATE VALVES WITH A CAST IRON BOX, EXCEPT WHERE FLANGES ARE CALLED OUT ON THE PLANS.

8.4" THRU 12" FITTINGS SHALL BE CEMENT MORTAR LINED COMPACT DUCTILE IRON PRESSURE FITTINGS PER ANSI A21.53, OR PUSH ON FITTINGS PER ANSI A21.10 PRESSURE RATED AT 250 PSIG.

9.HYDROSTATIC TESTING: ALL WATER PIPE SHALL BE TESTED FOR LEAKAGE IN ACCORDANCE WITH THE LATEST CITY OF HOUSTON STANDARD CONSTRUCTION SPECIFICATIONS. TESTS ARE TO BE PERFORMED ON THE ENTIRE FOOTAGE OF WATER PIPE INCLUDED IN THE PROJECT.

10.ALL WATER LINES TO HAVE 4' MINIMUM COVER TO FINISHED GRADE AND MINIMUM 12" CLEARANCE TO OTHER UTILITIES AT CROSSING UNLESS OTHERWISE NOTED ON PLANS. ALL WATER LINE INSTALLED OVER 8' DEEP SHALL UTILIZE RESTRAINED JOINT FITTINGS.

11.CONTRACTOR SHALL KEEP WATER PIPE CLEAN AND CAPPED (OR OTHERWISE EFFECTIVELY COVERED) OPEN PIPE ENDS TO EXCLUDE INSECTS, ANIMALS OR OTHER SOURCES OF CONTAMINATION FROM UNFINISHED LINES AT TIMES WHEN CONSTRUCTION IS NOT IN PROGRESS.

GRADING NOTES

1.GENERAL CONTRACTOR AND ALL SUBCONTRACTORS SHALL VERIFY THE SUITABILITY OF ALL EXISTING AND PROPOSED SITE CONDITIONS INCLUDING GRADES AND DIMENSIONS BEFORE STARTING CONSTRUCTION. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES.

2.BEFORE STARTING CONSTRUCTION, CONTRACTOR SHALL VERIFY BENCHMARK ELEVATION AND NOTIFY ENGINEER IF ANY DISCREPANCY AND/OR CONFLICT IS FOUND.

3.CONTRACTOR SHALL ENSURE THERE IS POSITIVE DRAINAGE FROM THE PROPOSED BUILDINGS AND NO PONDING IN PAVED AREAS, AND SHALL NOTIFY ENGINEER IF ANY GRADING DISCREPANCIES ARE FOUND IN THE EXISTING AND PROPOSED GRADES PRIOR TO PLACEMENT OF PAVEMENT OR UTILITIES.

4.CONTRACTOR SHALL PROTECT ALL MANHOLE COVERS, VALVE COVERS, VAULT LIDS, FIRE HYDRANTS, POWER POLES, GUY WIRES, AND TELEPHONE BOXES THAT ARE TO REMAIN IN PLACE AND UNDISTURBED DURING CONSTRUCTION.

5.ALL EXISTING CONCRETE PAVING, SIDEWALK, AND CURB DEMOLITION SHALL BE REMOVED AND DISPOSED OF BY CONTRACTOR. DISPOSAL SHALL BE AT AN APPROVED OFF–SITE, LAWFUL LOCATION, UNLESS DIRECTED OTHERWISE BY THE OWNER.

CITY OF HOUSTON PUBLIC WORKS
SANITARY SEWERS CONSTRUCTION NOTES

1.ALL SEWERS SHALL BE SUBJECT TO A STANDARD EXFILTRATION TEST. TESTS ARE TO BE PERFORMED ON THE TOTAL FOOTAGE OF SEWER LINE INCLUDED IN THE PROJECT. REQUIREMENTS OF TEXAS ADMINISTRATIVE CODE, TITLE 30 CHAPTER 217, "DESIGN CRITERIA FOR DOMESTIC WASTEWATER SYSTEMS" SHALL GOVERN WHERE CONFLICTS EXIST EXCEPT WHERE CITY REQUIREMENTS ARE MORE STRINGENT.

2.ALL MANHOLES ARE TO BE PER CITY OF HOUSTON STANDARD DETAILS DRAWING NUMBERS 02082–01, 02082–02, 02082N–02, 02082–03, AND 02082N–03 UNLESS OTHERWISE NOTED. USE THE LATEST VERSION AS APPLICABLE.

3.SANITARY SEWER MANHOLES WILL HAVE BEDDING AND BACKFILL PER CITY OF HOUSTON STANDARD DETAILS DRAWING NO. 02317–08 UNLESS OTHERWISE NOTED.

4.THE SANITARY SEWER PVC PIPE SHALL BE ASTM D 3034 TYPE PSM SDR 26 GRAVITY SEWER PIPE, ASTM D2241 SDR 26 PRESSURE RATED SEWER PIPE OR AWWA C–900 DR–18 GREEN PVC PRESSURE RATED SEWER PIPE BASED ON CONSTRUCTION CONDITION REQUIREMENT AND CONFORMING TO ASTM D1784 AND CITY OF HOUSTON STANDARD SPECIFICATION SECTION 02506 POLYVINYL CHLORIDE PIPE.

5.WHEN SS PRESSURE RATED PVC PIPE IS USED ON WATERLINE (WL) CROSSING UNDER CONDITION 1 OF COH IDM TABLE 7.3, THE SAME TYPE OF D2241 SDR 26 PVC PIPE OR C–900 GREEN DR–18 PVC GREEN PRESSURED TO BE UTILIZING IN–BETWEEN TWO SS MH'S. OR TO UTILIZE A DI TRANSITION ADAPTER FOR THE CONNECTING OF ASTM D–3034 PVC GRAVITY PIPE TO DI–OD AWWA C–900 PVC PIPE CENTERED AT WL WHEN CONNECTING TWO DIFFERENT TYPES OF PVC PIPES FOR SEWER CONSTRUCTION.

6.AWWA C–900 DR–18 PVC PIPE USES EITHER AWWA C900 DR–18 PVC FITTINGS OR DIP FITTINGS.

7.ALL SANITARY SEWER LINES UNDER PROPOSED OR FUTURE PAVEMENT AND TO A POINT ONE (1) FOOT BACK OF ALL PROPOSED OR FUTURE CURBS SHALL HAVE BEDDING PER CITY OF HOUSTON STANDARD DETAILS DRAWING NUMBERS 02317–01, 02317–02, OR 02317–03 AS APPLICABLE, WITH 1 ½ SACK CEMENT/CY STABILIZED SAND BACKFILL UP TO THE BOTTOM OF THE PAVEMENT SUBGRADE. 100 PSI PERFORMANCE RESULTS ARE STILL REQUIRED.

8.ALL NEW SANITARY SEWERS CROSSING WATER LINES WITH A CLEARANCE BETWEEN 12 INCHES AND 9 FEET SHALL HAVE A MINIMUM OF ONE 18' JOINT OF DUCTILE IRON OR (GREEN) C900 PVC PIPE MEETING ASTM SPECIFICATION D2241 CENTERED ON WATER LINE. WHEN WATER LINE IS BELOW SANITARY SEWER, PROVIDE MINIMUM 2 FOOT SEPARATION.

9.CONTRACTOR SHALL PROVIDE A MINIMUM HORIZONTAL CLEARANCE OF 9' FEET BETWEEN WATER LINES AND SANITARY SEWER MANHOLES AND LINES.

10.SANITARY SEWER MANHOLE RIMS OUTSIDE OF PROPOSED PAVING WILL BE SET 3" – 6" ABOVE THE SURROUNDING LEVEL FINISHED GRADE AFTER PAVING WITH SLOPED BACKFILL ADDED FOR STORM WATER TO DRAIN AWAY FROM MANHOLE RIM.

11.IN WET STABLE TRENCH AREAS USE BEDDING PER CITY OF HOUSTON STANDARD DETAILS DRAWING NUMBER 02317–02.

12.DEFLECTION TEST: DEFLECTION TESTS SHALL BE PERFORMED ON ALL FLEXIBLE AND SEMI–RIGID SEWER PIPE. THE TEST SHALL BE CONDUCTED AFTER THE FINAL BACKFILL HAS BEEN IN PLACE AT LEAST 30 DAYS. NO PIPE SHALL EXCEED A DEFLECTION OF 5% IF THE DEFLECTION TEST IS TO BE RUN USING A RIGID MANDREL, IT SHALL HAVE A DIAMETER EQUAL TO 95% OF THE INSIDE DIAMETER OF THE PIPE. THE TEST SHALL BE PERFORMED AS PER 30 TAC 217.57 LATEST AMENDMENT AND WITHOUT MECHANICAL PULLING DEVICES. NO BALL–TYPE MANDREL IS ALLOWED.

13.INFILTRATION, EXFILTRATION OR LOW–PRESSURE AIR TEST: EITHER OF THE FOLLOWING TESTS SHALL BE PERFORMED AS PER TAC, TITLE 30 217.57 WITHIN THE SPECIFIED TOLERANCES ON ALL GRAVITY SEWERS.

A.INFILTRATION OR EXFILTRATION TEST: TOTAL LEAKAGE AS DETERMINED BY A HYDROSTATIC HEAD TEST SHALL NOT EXCEED 50 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER 24 HOURS AT A MINIMUM TEST HEAD OF TWO (2) FEET.

B.LOW–PRESSURE AIR TEST: PERFORM TEST ACCORDING TO UNI–B–6–90 OR OTHER APPROPRIATE PROCEDURES. FOR SECTIONS OF PIPE LESS THAN 36" (INCH) AVERAGE INSIDE DIAMETER, THE MINIMUM ALLOWABLE TIME FOR PRESSURE DROP FROM 3.5 P.S.I.G. TO 2.5 P.S.I.G. SHALL BE AS FOLLOWS:

6" 340 SECONDS OR 0.855(L) FOR TEST LENGTHS GREATER THAN 398'
8" 454 SECONDS OR 1.520(L) FOR TEST LENGTHS GREATER THAN 298'
10" 567 SECONDS OR 2.374(L) FOR TEST LENGTHS GREATER THAN 239'
12" 680 SECONDS OR 3.419(L) FOR TEST LENGTHS GREATER THAN 199'
15" 850 SECONDS OR 5.342(L) FOR TEST LENGTHS GREATER THAN 159'
18" 1020 SECONDS OR 7.693(L) FOR TEST LENGTHS GREATER THAN 133'

WHERE L = LENGTH OF LINE OF SAME PIPE SIZE IN FEET.

14."SAN. S. E." INDICATES "SANITARY SEWER EASEMENT"

15.FOR SANITARY MANHOLE (MH) RIMS SET INSIDE OF OR @ CURB & GUTTER PAVEMENT AND/OR BELOW T.C., MH RIMS WILL BE SET FLUSHED WITH AN ABUTTING PAVED SURFACE. THE (VALCUN, NEENAH OR EQUAL) HEAVY DUTY BOLTED SOLID MH COVER SHALL BE PROPERLY (AND SECURELY) ATTACHED AND SEALED TO ITS COMPATIBLE GASKETED FRAME BY USING BOTH A NEOPRENE GASKET AND (AT LEAST) 4 COUNTER–SUNK HEX–HEAD COARSE THREADED ½"–13 UNC STAINLESS STEEL BOLTS. THE HEAVY DUTY FRAME MH COVER SHALL BE SOLID (NO AIR HOLES). SAID FRAME SHALL BE BOTH EMBEDDED INTO THE MH'S TOP ALSO SECURELY ANCHORED TO THE UNDERLYING MH STRUCTURE WITH EITHER SECURELY ATTACHED EMBEDDED ANCHOR BOLTS OR THE CONCRETE MH'S EXPOSED REBARS WELDED TO THE FRAME OR OTHER EQUALLY SECURED METHODS TO PREVENT MH COVER/FRAME BLOW–OFFS/EJECTIONS.

CITY OF HOUSTON PUBLIC WORKS
STORM CONSTRUCTION NOTES

1.STORM SEWER SHALL BE REINFORCED CONCRETE PIPE (C–76, CLASS III), AND SHALL BE INSTALLED, BEDDED, AND BACK FILLED IN ACCORDANCE WITH THE CITY OF HOUSTON DRAWING NOS. 2317–02, 02317–3, 02317–05, 02317–06, AND 02317–07 (JULY 2019) AS APPLICABLE UNLESS OTHERWISW SHOWN ON THE DRAWINGS.

2.ALL STORM SEWER CONSTRUCTED IN SIDELOT EASMENT SHALL BE R.C.P (C–76, CLASSIII) AND SHALL BE EMBEDDED IN ACCORDANCE WITH THE CITY OF HOUSTON DRAWING NOS. 02317–02, 02317–03, 02317–05, 02317–06, AND 02317–07 AS APPLICABLE.

3.ALL SEWER UNDER PROPOSED OR FUTURE PAVEMENT AND TO A POINT ONE (1) FOOT BACK OF ALL PROPOSED OR FUTURE CURBS SHALL BE BACKFILLED WITH 1–1/2 SACK CEMENT/C.Y. STABLIZED SAND TO WITHIN ONE (1) FOOT OF SUBGRADE. THE REMAINING DEPTH OF TRENCH SHALL BE BACKFILLED WITH SUITABLE EARTH MATERIAL.

4.ALL TRENCH BACKFILL SHALL BE IN 8" LIFTS, WITH TESTS TAKEN AT 100 FOOT INTERVALS IN EACH LIFT, AND MECHNICALLY COMPACTED TO A DENSITY OF NOT LESS THAN 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE STANDARD PROCTOR COMACTION TEST (ASTM D–698/AASHTO T99).

5.CIRCULAR AND ELLIPTICAL REINFORCED CONCRETE PIPE SHALL BE INSTALLED USING RUBBER GASKET JOINT CONFORMING TO ASTM C443 AND ASTM C877 RESPECTIVELY.

6.ALL STORM SEWER PIPES AND INLET LEADS SHALL BE 24" AND LARGER R.C.P. (C–76, CLASSIII).

7.ALL PRPOSED PIPE STUB–OUTS FROM MANHOLES AND INLET LEADS ARE TO BE PLUGGED WITH 8" BRICK WALLS UNLESS OTHERWISE NOTED.

8.MINIMUM HORIZONTAL CLEARANCE BETWEEN ANY STORM PIPE AND BOX SHALL BE AT LEAST 48–INCHES FROM EXTERIOR OF THE STORM PIPE OR BOX TO THE EXTERIOR OF THE EXISTING OR PROPOSED PUBLIC OR PRIVATE UTILITY AND OTHER APPURTENANCES. MINIMUM VERTICAL CLEARANCE BETWEEN ANY STORM PIPE AND BOX SHALL BE AT LEAST 24–INCHES FROM EXTERIOR OF THE STORM PIPE OR BOX TO THE EXTERIOR OF THE EXISTING OR PROPOSED PUBLIC OR PRIVATE UTILITY AND OTHER APPURTENANCES.

9.ADJUST MANHOLE COVERS TO GRADE CONFORMING TO REQUIREMENTS OF SECTION 02086–ADJUSTING MANHOLES, INLETS, AND VALAVE BOXES TO GRADE.

10.THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING, MAINTAINING, AND RESTORING ANY BACK SLOPE DRAINAGE SYSTEM DISTURBED AS A RESULT OF THIS WORK.

11.ALL DITCHES SHALL BE GRADED TO PROPOSED ELEVATIONS TO INSURE PROPER DRAINAGE. ALL OUTFALLS SHALL BE PROPERLY BACKFILLED AND COMPACTED. ALL DISTURBED AREA SHALL BE REGRADED, SEEDED, AND FERTILIZED.

12.ALL DRIVEWAYS WILL BE LOCATED TO AVOID EXISTING CURB INLET STRUCTURES.

NO.	DATE	REVISION	APP.

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

GENERAL CONSTRUCTION NOTES

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 05 OF 169	

PRIVATE UTILITY NOTES:

AT&T TEXAS/ SWBT FACILITIES:

1. THE LOCATIONS OF AT&T TEXAS/SWBT FACILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. HE AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND UTILITIES.
2. THE CONTRACTOR SHALL CALL 1–800–344–8377 (TEXAS 811) A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD LOCATED.
3. WHEN EXCAVATING WITHIN EIGHTEEN INCHES (18") OF THE INDICATED LOCATION OF AT&T TEXAS/SWBT FACILITIES, ALL EXCAVATIONS MUST BE ACCOMPLISHED USING NON–MECHANIZED EXCAVATION PROCEDURES. WHEN BORING, THE CONTRACTOR SHALL EXPOSE THE AT&T TEXAS/SWBT FACILITIES.
4. WHEN AT&T TEXAS/SWBT FACILITIES ARE EXPOSED, THE CONTRACTOR WILL PROVIDE SUPPORT TO PREVENT DAMAGE TO THE CONDUIT DUCTS OR CABLES. WHEN EXCAVATING NEAR TELEPHONE POLES THE CONTRACTOR SHALL BRACE THE POLE FOR SUPPORT.
5. THE PRESENCE OR ABSENCE OF AT&T TEXAS/SWBT UNDERGROUND CONDUIT FACILITIES OR BURIED CABLE FACILITIES SHOWN ON THESE PLANS DOES NOT MEAN THAT THERE ARE NO DIRECT BURIED CABLES OR OTHER CABLES IN CONDUIT IN THE AREA.
6. PLEASE CONTACT THE AT&T TEXAS DAMAGE PREVENTION MANAGER ROOSEVELT LEE JR. AT (713) 567–4552 OR EMAIL HIM AT RL7259@ATT.COM, IF THERE ARE QUESTIONS ABOUT BORING OR EXCAVATING NEAR OUR AT&T TEXAS/SWBT FACILITIES.

CENTERPOINT ENERGY NOTES:

CAUTION: UNDERGROUND GAS FACILITIES

1. THE CONTRACTOR SHALL CONTACT THE UTILITY COORDINATING COMMITTEE AT 1–800–545–6005 OR 811 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE MAIN AND SERVICE LINES FIELD LOCATED.
   –WHEN CENTERPOINT ENERGY PIPE LINE MARKINGS ARE NOT VISIBLE, CALL 713–945–8036 OR 713–945–8037 (7:00 AM TO 4:30 PM) FOR STATUS OF LINE LOCATION REQUEST BEFORE EXCAVATION BEGINS.
   –WHEN EXCAVATING WITHIN EIGHTEEN INCHES (18") OF THE INDICATED LOCATION OF CENTERPOINT ENERGY FACILITIES, ALL EXCAVATION MUST BE ACCOMPLISHED USING NON–MECHANIZED EXCAVATION PROCEDURES.
   –WHEN CENTERPOINT ENERGY FACILITIES ARE EXPOSED, SUFFICIENT SUPPORT MUST BE PROVIDED TO THE FACILITIES TO PREVENT EXCESSIVE STRESS ON THE PIPING.
   –FOR EMERGENCIES REGARDING GAS LINES CALL 713–659–3552 OR 713–207–4200
2. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND FACILITIES.

WARNING: OVERHEAD ELECTRICAL LINES:

1. OVERHEAD LINES MAY EXIST ON THE PROPERTY. THE LOCATION OF OVERHEAD LINES HAS NOT BEEN SHOWN ON THESE DRAWINGS AS THE LINES ARE CLEARLY VISIBLE, BUT YOU SHOULD LOCATE THEM PRIOR TO BEGINNING ANY CONSTRUCTION. TEXAS LAW, SECTION 752, HEALTH & SAFETY CODE FORBIDS ACTIVITIES THAT OCCUR IN CLOSE PROXIMITY TO HIGH VOLTAGE LINES, SPECIFICALLY:
   –ANY ACTIVITY WHERE PERSONS OR THINGS MAY COME WITHIN SIX (6) FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES; AND
   –OPERATING A CRANE, DERRICK, POWER SHOVEL, DRILLING RIG, PILE DRIVER, HOISTING EQUIPMENT, OR SIMILAR APPARATUS WITHIN 10 FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES.
2. PARTIES RESPONSIBLE FOR THE WORK, INCLUDING CONTRACTORS, ARE LEGALLY RESPONSIBLE FOR THE SAFETY OF CONSTRUCTION WORKERS UNDER THIS LAW. THIS LAW CARRIES BOTH CRIMINAL AND CIVIL LIABILITY. TO ARRANGE FOR LINES TO BE TURNED OFF OR REMOVED CALL CENTERPOINT ENERGY AT 713–207–2222.

ACTIVITIES ON/OR ACROSS CENTERPOINT ENERGY FEE OR EASEMENT PROPERTY

1. NO APPROVAL TO USE, CROSS, OR OCCUPY NO CENTERPOINT FEE OR EASEMENT PROPERTY IS GIVEN. IF YOU NEED TO USE CENTERPOINT PROPERTY, PLEASE CONTACT OUR SURVEYING AND RIGHT OF WAY DIVISION AT (713) 207–6348 OR (713) 207–5769

WARNING: UNDERGROUND ELECTRICAL UTILITIES

THE CONTRACTOR SHALL CONTACT THE UTILITY COORDINATING COMMITTEE AT 1–800–545–6005 OR 811 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE MAIN AND SERVICE LINES FIELD LOCATED.

1. ALL INFORMATION CONCERNING TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTORS ARE RESPONSIBLE MAKING THEIR OWN DETERMINATIONS AS TO TYPE AND LOCATION OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. THE CONTRACTOR SHALL VERIFY LOCATION OF UNDERGROUND PIPELINES, CONDUITS, AND STRUCTURES BY CONTACTING OWNERS OF UNDERGROUND UTILITIES OR BY EXCAVATING IN ADVANCE OF CONSTRUCTION.
2. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE EXACT LOCATION OF ALL UTILITIES WHEN AND WHERE THEY FALL IN THE PATH OF CONSTRUCTION.
3. THE CONTRACTOR IS ALSO RESPONSIBLE FOR CONTACTING THE UTILITY COORDINATING COMMITTEE AT (713) 223–4567 AND TEXAS ONE CALL AT 1–800–245–4545, FORTY–EIGHT (48) HOURS PRIOR TO ANY CONSTRUCTION.
4. THE LOCATION OF ANY CENTERPOINT ENERGY UTILITIES ARE SHOWN IN APPROXIMATE WAY ONLY THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. THEY AGREE TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND UTILITIES.
5. ALL PROPOSED FACILITIES SHALL MAINTAIN 12" CLEAR FROM ALL EXISTING UTILITIES.

STANDARD NOTES FOR CONSTRUCTION DRAWINGS (HCFCD):

1. OBTAIN AND COMPLY WITH ALL APPLICABLE CITY, COUNTY, STATE, AND FEDERAL PERMITS AND APPROVALS, WITH ASSISTANCE FROM ENGINEER, IF NECESSARY. OBTAIN PERMIT (CERTIFICATION) FROM HARRIS COUNTY ENGINEER TO ENTER HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT–OF–WAY.
2. NOTIFY THE HARRIS COUNTY FLOOD CONTROL DISTRICT'S PROPERTY MANAGEMENT DEPARTMENT IN WRITING AT LEAST 48 HOURS PRIOR TO CONSTRUCTION. SUBMIT THE HCFCD 48 HOUR PRE–CONSTRUCTION NOTIFICATION FORM, A COPY OF THE APPROVED CONSTRUCTION DRAWINGS, AND A COPY OF THE CORPS OF ENGINEERS INDIVIDUAL SECTION 404 PERMIT, IF APPLICABLE, TO HCFCD, 9900 NORTHWEST FREEWAY, HOUSTON, TEXAS 77092, ATTN: PROPERTY MANAGEMENT DEPT. BY HAND DELIVERY, OR FAX TO 713–684–4129 (FAX NUMBER).
3. ENGINEER SHALL SUBMIT CERTIFICATION LETTER AND RECORD DRAWINGS TO THE HARRIS COUNTY FLOOD CONTROL DISTRICT'S PROPERTY MANAGEMENT DEPARTMENT REQUESTING INSPECTION 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.
4. PROTECT, MAINTAIN, AND RESTORE EXISTING BACKSLOPE DRAINAGE SYSTEMS.
5. BACKSLOPE SWALE AND INTERCEPTOR STRUCTURE ELEVATIONS AND LOCATIONS SHOWN ON PLANS ARE APPROXIMATE. FINAL ELEVATIONS AND LOCATIONS SHALL BE FIELD VERIFIED BY THE ENGINEER PRIOR TO INSTALLATION.
6. ESTABLISH TURF GRASS ON ALL DISTURBED AREAS WITHIN THE CHANNEL OR DETENTION RIGHT–OF–WAY, EXCEPT THE CHANNEL BOTTOM AND WHERE STRUCTURAL EROSION MEASURES ARE USED. MINIMUM ACCEPTANCE CRITERIA ARE 75% COVERAGE OF LIVE BERMUDA GRASS AND NO EROSION OR RILLS DEEPER THAN 4".
7. BACKFILL IN ACCORDANCE WITH THE HARRIS COUNTY FLOOD CONTROL DISTRICT STANDARD SPECIFICATION, SECTION 02315 – EXCAVATING AND BACKFILLING, OR EQUIVALENT.
8. EXCAVATE CHANNEL FLOWLINE TO DESIGN ELEVATION AS SHOWN ON PLANS AND DOWNSTREAM, AS NECESSARY, TO ENSURE NO WATER REMAINS IN THE FACILITY (STORM SEWER, LATERAL CHANNEL, OR DRY BOTTOM DETENTION BASIN) DURING NORMAL WATER SURFACE CONDITIONS IN THE CHANNEL, SO THE FACILITY WILL FUNCTION AS INTENDED. FOR WET BOTTOM DETENTION BASINS, ENSURE NO WATER IS ABOVE THE DESIGN LEVEL IN THE WET BOTTOM DURING NORMAL WATER SURFACE CONDITIONS IN THE CHANNEL.
9. MAINTAIN FLOW IN CHANNEL DURING CONSTRUCTION AND RESTORE CHANNEL TO ORIGINAL CONDITION.
10. REMOVE ALL EXCAVATED MATERIAL FROM THE HARRIS COUNTY FLOOD CONTROL DISTRICT OR DRAINAGE RIGHT–OF–WAY. NO FILL IS TO BE PLACED WITHIN A DESIGNATED FLOOD PLAIN AREA WITHOUT FIRST OBTAINING A FILL PERMIT FROM THE APPROPRIATE JURISDICTIONAL AUTHORITY.

GENERAL NOTES – METRO:

1. CONTRACTOR SHALL NOTIFY METRO AT 713–615–6195 TWO WEEKS PRIOR TO DISTURBING EXISTING BUS STOP.
2. CONTRACTOR SHALL COORDINATE WITH METRO TO REMOVE EXISTING AMENITIES.
3. BUS STOPS SHALL CONSTRUCTED PER CITY OF HOUSTON INFRASTRUCTURE DESIGN MANUAL AND MEET CURRENT ADA REQUIREMENTS.

TUNNELING WORK NOTES:

1. REFER TO SPECIFICATION SECTION 01110 FOR WORK SEQUENCE AND INGRESS AND EGRESS REQUIREMENTS.
2. REFER TO SPECIFICATION SECTIONS 02400 AND 02401 FOR TUNNEL SHAFT REQUIREMENTS.
3. REFER TO SPECIFICATION SECTION 02425 FOR PRIMARY LINER REQUIREMENT.
4. REFER TO SPECIFICATION SECTION 02441LD FOR MICROTUNNELING REQUIREMENTS.
5. REFER TO SPECIFICATION SECTION 02431 FOR GROUTING REQUIREMENTS.
6. REFER TO SPECIFICATION SECTION 02517 FOR WATER LINE INSTALLATION REQUIREMENTS FOR TUNNEL APPLICATIONS.
7. REFER TO SPECIFICATION 01110 FOR SPECIAL CENTERPOINT REQUIREMENTS WITHIN THEIR EASEMENT AND AROUND CENTERPOINT ASSETS.
8. CONTRACTOR TO COORDINATE WITH CYNTHIA MARTINEZ WITH CENTERPOINT ENERGY AT 713–207–6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
9. CONTRACTOR WILL BE REQUIRED TO PROTECT ADJACENT UTILITIES TO ALL TUNNEL SHAFTS AND TUNNEL EXCAVATION, SEE SPECIFICATION SECTIONS 01110 AND 02441LD FOR FURTHER REQUIREMENTS.
10. REFER TO SPECIFICATION SECTION 02424 FOR GEOTECHNICAL INSTRUMENTATION AND MONITORING REQUIREMENTS FOR EACH CROSSING.
11. TUNNELING ACTIVITIES WILL BE LIMITED TO 0800–1700 HOURS EACH DAY. SHIFT WORK MAY BE CONSIDERED WITH WRITTEN REQUEST BY CONTRACTOR, BUT IS NOT GUARANTEED.
12. WORK WITHIN THE CENTERPOINT EASEMENT WILL BE STRICTLY LIMITED TO THE TEMPORARY CONSTRUCTION EASEMENTS AS SHOWN IN THE CONTRACT DOCUMENTS.
13. ALL WORK WITHIN CENTERPOINT EASEMENTS WILL STRICTLY ADHERE TO CENTERPOINT SPECIFICATION SECTION 007–231–79.
14. REFER TO SHEETS 143 TO 157 FOR TRAFFIC CONTROL REQUIREMENTS ALONG GREENBRIAR.
15. CONTRACTOR WILL BE REQUIRED TO PROVIDE A TRAFFIC RATED COVER FOT TUNNEL SHAFTS LOCATED WITHIN THE ROW ALONG GREENBRIAR, SEE SPECIFICATION SECTIONS 01110 AND 02441LD FOR FURTHER DETAILS.
16. TUNNELING AROUND CENTEPOINT LATTICE TOWERS WILL BE STRICTLY MONITORED AND CONTRACTOR SHALL ENSURE NO EXCAVATION IS PERFORMED WITHIN THE MINIMUM REQUIREMENTS OUTLINED IN SPECIFICATION SECTION 007–231–79.
17. TUNNELING ABOVE THE GROUNDWATER LEVEL MAY BE DONE IN ACCORDANCE WITH SPECIFICATION SECTION 02425 AND 02445.

NO.	DATE	REVISION	APP.

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VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

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713–953–4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F–533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P–6329

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

GENERAL NOTES
(SHEET 1 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 06 OF 169	

CITY OF HOUSTON PUBLIC WORKS
TRAFFIC NOTES

CONTRACTOR OR OWNER SHALL SUBMIT TRAFFIC CONTROL PLANS WITH THE MOBILITY PERMIT APPLICATION. THE PLANS SHALL BE DRAWN TO SCALE AND SEALED BY A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF TEXAS.

THE GENERAL NOTES THAT SHALL BE INCLUDED ON THE TRAFFIC CONTROL PLAN CAN BE FOUND IN CHAPTER 15 (15.12 TRAFFIC CONTROL PLAN) OF THE CITY OF HOUSTON'S (CITY) INFRASTRUCTURE DESIGN MANUAL (IDM). BELOW ARE SEVERAL KEY NOTES FROM THE IDM TO BE AWARE OF:

1. THE CONTRACTOR SHALL PROVIDE AND INSTALL TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH PART VI OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD) LATEST EDITION WITH REVISIONS DURING THE ENTIRE CONSTRUCTION PERIOD.
2. NO WORK SHALL BE PERFORMED IN RESIDENTIAL AREAS FROM 7:00PM TO 7:00AM.
3. CONTRACTOR SHALL MAINTAIN APPROVED NUMBER OF LANES OF TRAFFIC IN EACH DIRECTION DURING CONSTRUCTION WORKING HOURS. TRAFFIC CONTROL PLANS SHALL INCLUDE ONE-WAY AND/OR DETOUR PLANS. CONTRACTOR SHALL MAINTAIN ADA COMPLAINT PEDESTRIAN ACCESS TO BUS STOPS AND ADEQUATE BUS ACCESS TO THE BUS STOP.
4. CONTRACTOR SHALL COVER OPEN PAVEMENT EXCAVATIONS FOR MINOR UTILITY WORK WITH ANCHORED STEEL PLATES DURING NON-WORKING HOURS, OPEN LANES FOR NORMAL TRAFFIC FLOW WHEN FEASIBLE.
5. CONTRACTOR SHALL SECURE ROADWAY/SIDEWALK/STREET/BICYCLE FACILITY PERMITS AS DESCRIBED IN CITY OF HOUSTON ORDINANCE, CHAPTER 40 – STREETS & SIDEWALKS, SECTION 40-361 FROM HOUSTON PERMITTING CENTER (MOBILITY PERMIT SECTION AT HTTPS://GEOHUB.HOUSTONTX.GOV) BEFORE IMPLEMENTING THE TRAFFIC CONTROL PLAN. THE APPLICATION MUST BE SUBMITTED AT LEAST TEN BUSINESS DAYS PRIOR TO THE IMPLEMENTATION OF THE TRAFFIC CONTROL PLAN AND/OR BEGINNING CONSTRUCTION WORK. THE CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL PLANS, CONSTRUCTION SEQUENCING, AND CONSTRUCTION SCHEDULE WITH THE APPLICATION.
6. CONTRACTOR SHALL HAVE APPROVED TRAFFIC CONTROL PLAN AND PERMIT AT THE JOB SITE FOR INSPECTION AT ALL TIMES
7. ACCESS TO DRIVEWAYS ADJACENT TO THE CONSTRUCTION WORK ZONE SHALL BE MAINTAINED AT ALL TIMES AS MUCH AS POSSIBLE. ADDITIONAL CONES AND/OR DELINEATORS MAY BE REQUIRED TO DELINEATE THE DRIVEWAY ACCESS ROUTE THROUGH THE CONSTRUCTION WORK ZONE. A MINIMUM OF ONE TRAVEL LANE SHALL BE MAINTAINED ACROSS THE DRIVEWAY, UNLESS PRIOR WRITTEN APPROVAL IS OBTAINED FROM THE CITY OF HOUSTON.
8. ADDITIONAL OFF DUTY POLICE OFFICERS/FLAGGERS MAY BE REQUESTED TO DIRECT TRAFFIC WHEN LANES ARE BLOCKED AT THE DIRECTION OF THE CITY EVEN IF THEY ARE NOT SPECIFICALLY IDENTIFIED ON THE PROJECT PLANS.

CITY OF HOUSTON PUBLIC WORKS
STREET & BRIDGE CONSTRUCTION NOTES

1. FILL AREAS ON PLANS SHALL BE FILLED IN LAYERS NOT EXCEEDING 8" IN DEPTH AND EACH COMPACTED TO NOT LESS THAN 95% STANDARD PROCTOR DENSITY PRIOR TO INSTALLATION OF WATER LINE AND FILL AREA SHALL BE SEEDED AND FERTILIZED WITHIN 10 WORKING DAYS.
2. UTILITY CONTRACTOR SHALL PROVIDE TEMPORARY SILT BARRIER FENCE ON ALL NON-CURBED INLETS WHICH WILL REMAIN IN PLACE AFTER UNDERGROUND CONTRACT IS COMPLETE.
3. CONTRACTOR SHALL PROVIDE SILT BARRIER FENCE ON ALL STAGE 1 CURB INLETS.
4. EXISTING PAVEMENTS, CURBS, DRIVEWAYS, AND SIDEWALKS DAMAGED OR REMOVED DURING CONSTRUCTION SHALL BE REPLACED TO CITY OF HOUSTON STANDARDS, WITH LATEST ADDENDA AND AMENDMENTS THERETO.
5. CONDITION OF THE ROAD AND/OR RIGHT-OF-WAY UPON COMPLETION OF JOB SHALL BE AS GOOD AS OR BETTER THAN PRIOR TO STARTING WORK.
6. EXPOSED 15" OF REINFORCING STEEL AT PROPOSED SAWED JOINT IF NO REINFORCING STEEL EXISTS, USE HORIZONTAL DOWELS. HORIZONTAL DOWELS SHALL BE #6 BARS 24" LONG 24" C-C DRILLED AND EMBEDDED 8" INTO THE CENTER OF THE EXISTING SLAB WITH "PO ROC" OR EQUAL.
7. WHEELCHAIR RAMPS SHALL BE INSTALLED IN ACCORDANCE WITH CITY OF HOUSTON STANDARDS AT ALL INTERSECTIONS WHERE SIDEWALKS EXIST AND THE EXISTING CURB OR SIDEWALK IS DAMAGED OR REMOVED DURING CONSTRUCTION.
8. PRIOR TO STREET CONSTRUCTION, THE CONTRACTOR SHALL CONTACT HOUSTON PUBLIC WORKS AT (PHONE) 832-394-9578 AND COMPLY WITH ALL REQUIREMENTS FOR THE ISSUANCE OF NECESSARY PERMITS/WORK ORDERS FOR STREET CONSTRUCTION.
9. DOUBLE REFLECTORIZED BLUE TRAFFIC MARKERS SHALL BE PLACED 6-INCHES OFFSET OF THE CENTERLINE OF ALL FIRE HYDRANT LOCATIONS BY THE PAVING CONTRACTOR. HYDRANTS LOCATED AT INTERSECTIONS SHALL HAVE A BUTTON PLACED ON EACH STREET.

CITY OF HOUSTON PUBLIC WORKS
SWPPP CONSTRUCTION NOTES

1. CONTRACTOR SHALL IMPLEMENT INLET PROTECTION DEVICES AND REINFORCED FILTER FABRIC BARRIER ALONG ROAD AND SIDE DITCHES AT LOCATIONS SHOWN ON THE TYPICAL STORM WATER POLLUTION PREVENTION (SWPP) PLANS TO KEEP SILT AND OR EXCAVATED MATERIALS FROM ENTERING INTO THE STORM WATER INLETS AND DITCHES EVENTUALLY POLLUTING THE RECEIVING STORM.
2. DURING THE EXCAVATION PHASE OF THE PROJECT, CONTRACTOR SHALL SCHEDULE THE WORK IN SHORT SEGMENTS SO THAT EXCAVATION MATERIAL CAN BE QUICKLY HAULED AWAY FROM THE SITE AND TO PREVENT IT FROM STAYING UNCOLLECTED ON THE EXISTING PAVEMENT. ANY LOOSE EXCAVATED MATERIAL WHICH FALLS ON PAVEMENTS OR DRIVEWAYS SHALL BE SWEPT BACK INTO THE EXCAVATED AREA.
3. CONTRACTOR SHALL CLEAN UP THE EXISTING STREET INTERSECTIONS AND DRIVEWAYS DAILY, AS NECESSARY, TO REMOVE ANY EXCESS MUD, SILT OR ROCK TRACKED FORM THE EXCAVATED AREA.
4. CONTRACTOR SHALL FOLLOW GOOD HOUSEKEEPING PRACTICES DURING THE CONSTRUCTION OF THE PROJECT, ALWAYS CLEANING UP DIRT AND LOOSE MATERIAL AS CONSTRUCTION PROGRESSES.
5. CONTRACTOR TO INSPECT AND MAINTAIN THE AREAS LISTED BELOW AT LEAST ONCE EVERY FOURTEEN (14) CALENDAR DAYS AND WITHIN 24 HOURS OF THE END OF A STORM EVENT OF 0.5 INCHES OR GREATER.

   •DISTURBED AREAS OF THE CONSTRUCTION SITE THAT HAVE NOT BEEN FINALLY STABILIZED.
   •AREAS USED FOR STORAGE OF MATERIALS THAT ARE EXPOSED TO PRECIPITATION.
   •STRUCTURAL CONTROL MEASURES.
   •LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE.
6. CONTRACTOR TO BE RESPONSIBLE TO MAINTAIN EXISTING DITCHES AND OR CULVERTS FOR UNOBSTRUCTED DRAINAGE AT ALL TIMES. WHERE SODDING IS DISTURBED BY EXCAVATION ON BACKFILLING OPERATIONS, SUCH AREAS SHALL BE REPLACED BY SEEDING OR SODDING. SLOPES 4:1 OR STEEPER SHALL BE REPLACED BY BLOCK SODDING.

NO.	DATE	REVISION	APP.

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VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

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CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

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Approved for AT&T underground conduit facilities only.
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ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

GENERAL NOTES
(SHEET 2 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 07 OF 169	

KEY NOTES

ONLY APPLICABLE IF CALLED FOR ON PLANS

SITE WORK/PAVING KEYNOTES

1. CLEARING AND GRUBBING WITHIN THE PROPOSED LDWL EASEMENT AND TCE IN ACCORDANCE WITH SPECIFICATION SECTION 02233.
2. HYDROMULCH SEEDING WITHIN THE PROPOSED LDWL EASEMENT AND TCE IN ACCORDANCE WITH SPECIFICATION SECTION 02921
3. REGRADE DITCH IN ACCORDANCE WITH SPECIFICATION SECTION 02315
4. REMOVE AND REPLACE GRAVEL
5. REMOVE AND REPLACE CHAIN LINK FENCE
6. REMOVE EXISTING REINFORCED CONCRETE PAVEMENT, W OR W/O ASPHAT, INCLUDING CURB AND GUTTER
7. REMOVE MONOLITHIC CONCRETE CURB AND GUTTER
8. REMOVE AND REPLACE ASPHALTIC PAVEMENT WITH OR WITHOUT BASE
9. REMOVE AND REPLACE SIDEWALK
10. REMOVE EXISTING DRIVEWAY, ALL THICKNESSES AND TYPES

STORM SEWER KEYNOTES

11. REMOVE TYPE A GRATE INLET
12. REMOVE TYPE B/BB INLET
13. REMOVE EXISTING 18–INCH DIAMETER STORM SEWER
14. REMOVE EXISTING 24–INCH DIAMETER STORM SEWER
15. REMOVE EXISTING 30–INCH DIAMETER STORM SEWER

SANITARY SEWER KEYNOTES

16. REMOVE AND REPLACE 8–INCH DIAMETER SANITARY SEWER

WATER LINE NOTES

17. REMOVE AND REPLACE 6–INCH DIAMETER WATER LINE
18. REMOVE AND REPLACE 8–INCH DIAMETER WATER LINE
19. REMOVE AND REPLACE 12–INCH DIAMETER WATER LINE
20. REMOVE AND REPLACE 36–INCH DIAMETER WATER LINE
21. ADJUST EXISTING WATER METER BOX OR VALVE BOX TO GRADE, REPLACE ALL DAMAGED OR MISSING PARTS
22. ADJUST MANHOLE RIM TO GRADE

MISCELLANOUS NOTES

23. CRITICAL LOCATE PER COH SPEC 02317

NO.	DATE	REVISION	APP.

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

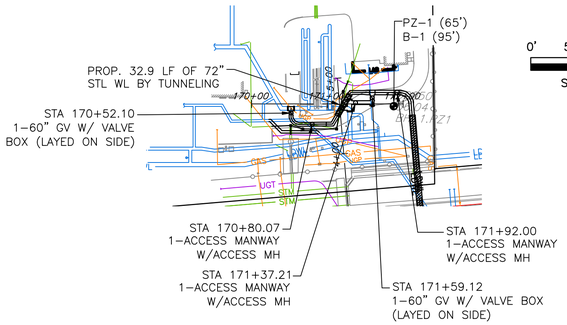
72–INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

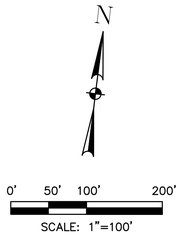
KEY NOTES

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 08 OF 169	

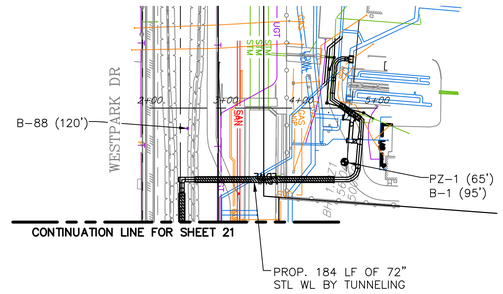
NO.	DATE	REVISION	APP.

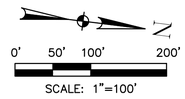
PLAN & PROFILE
SHEET 17 & 18
STA 170+00 TO STA 172+00





PLAN & PROFILE
SHEET 19,20 & 21
STA 2+00 TO STA 5+00





LEGEND

●	BORING LOCATION
PZ-X (X')	PIEZOMETER NO. & (DEPTH, FT.)
B-X (X')	BORING NO. & (DEPTH, FT.)

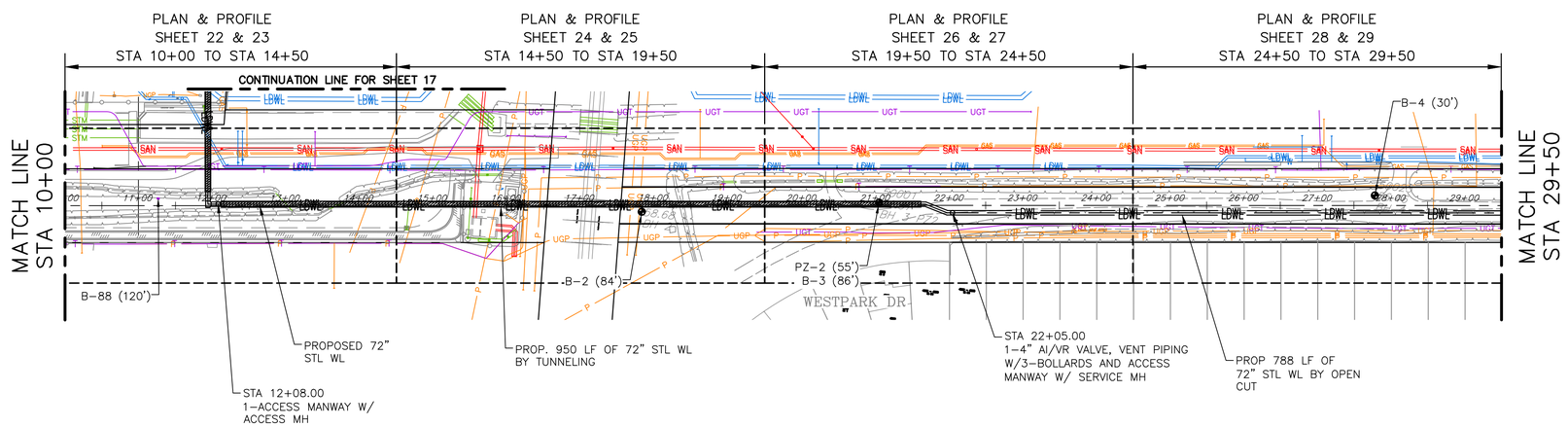
BORING LOCATION		
BORING NUMBER	NORTHING	EASTING
B-1	13830689.37	3095503.61
B-2	13830540.92	3096138.80
B-3	13830592.73	3096456.98
B-4	13830684.83	3097123.95
B-5	13830726.38	3097540.34
B-6	13830781.19	3097984.69
B-7	13830808.88	3098258.43
B-8	13830889.71	3098781.12

PLAN & PROFILE
SHEET 22 & 23
STA 10+00 TO STA 14+50

PLAN & PROFILE
SHEET 24 & 25
STA 14+50 TO STA 19+50

PLAN & PROFILE
SHEET 26 & 27
STA 19+50 TO STA 24+50

PLAN & PROFILE
SHEET 28 & 29
STA 24+50 TO STA 29+50

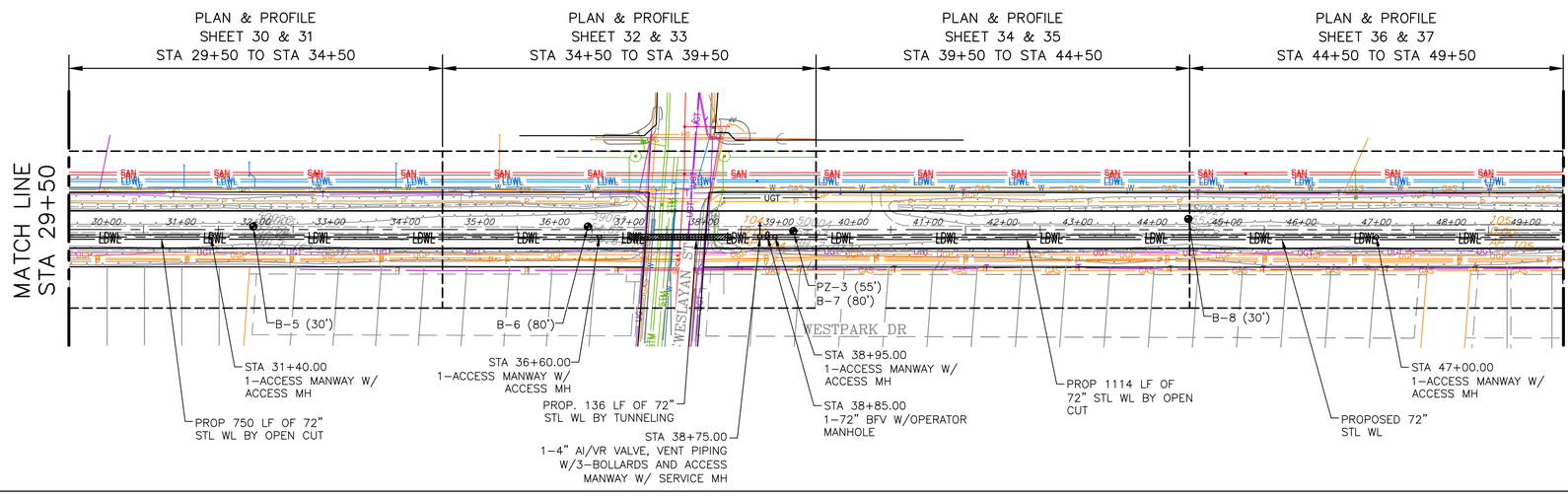


PLAN & PROFILE
SHEET 30 & 31
STA 29+50 TO STA 34+50

PLAN & PROFILE
SHEET 32 & 33
STA 34+50 TO STA 39+50

PLAN & PROFILE
SHEET 34 & 35
STA 39+50 TO STA 44+50

PLAN & PROFILE
SHEET 36 & 37
STA 44+50 TO STA 49+50



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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

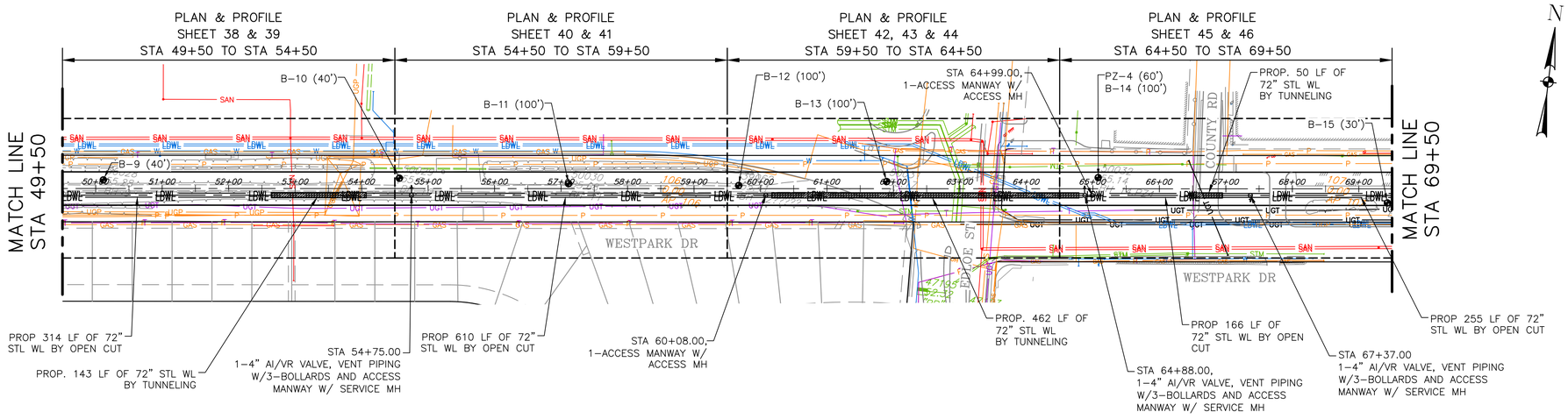
LAYOUT SHEET 1 OF 3

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=100'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 09 OF 169	

0' 50' 100' 200'

SCALE: 1"=100'

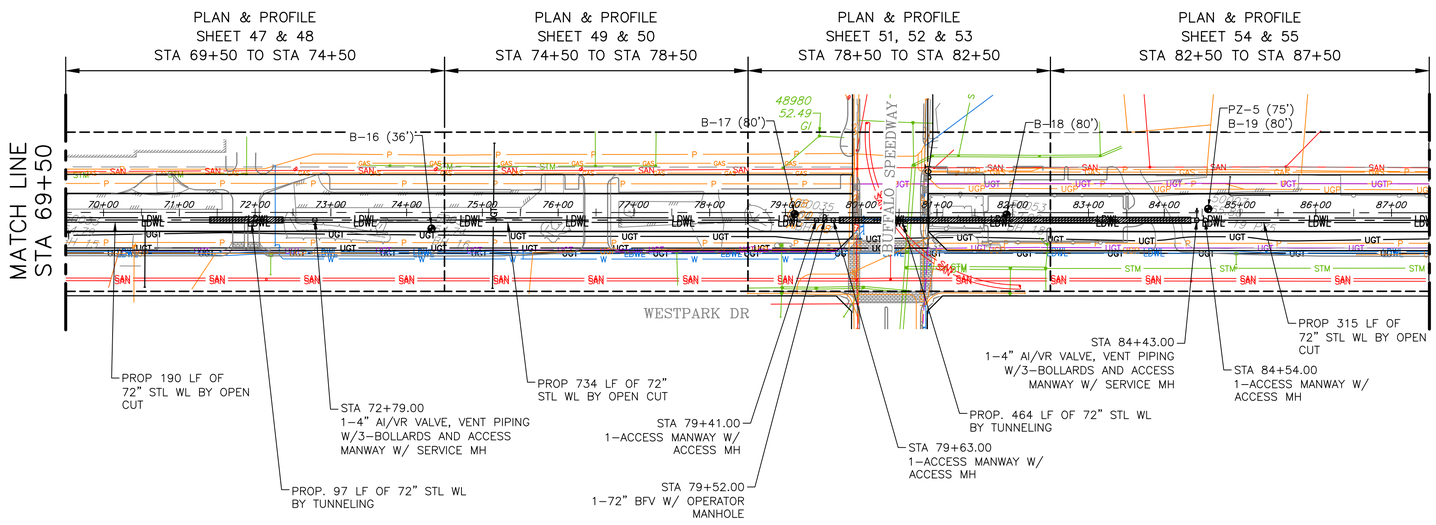
NO.	DATE	REVISION	APP.



LEGEND

●	BORING LOCATION
PZ-X (X')	PIEZOMETER NO. & (DEPTH, FT.)
B-X (X')	BORING NO. & (DEPTH, FT.)

BORING LOCATION		
BORING NUMBER	NORTHING	EASTING
B-9	13830956.96	3099340.35
B-10	13831014.01	3099782.05
B-11	13831037.00	3100035.63
B-12	13831065.69	3100289.92
B-13	13831098.72	3100510.05
B-14	13831143.63	3100825.14
B-15	13831159.07	3101261.47
B-16	13831218.84	3101747.78
B-17	13831296.50	3102221.01
B-18	13831330.09	3102498.77
B-19	13831370.22	3102762.03



ARCADIS

ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

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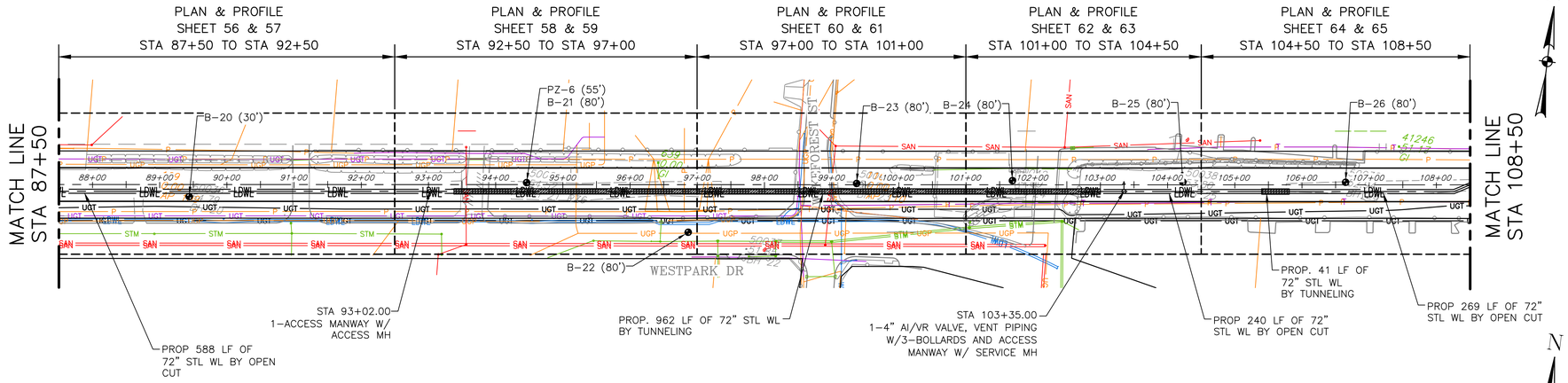
CITY OF HOUSTON

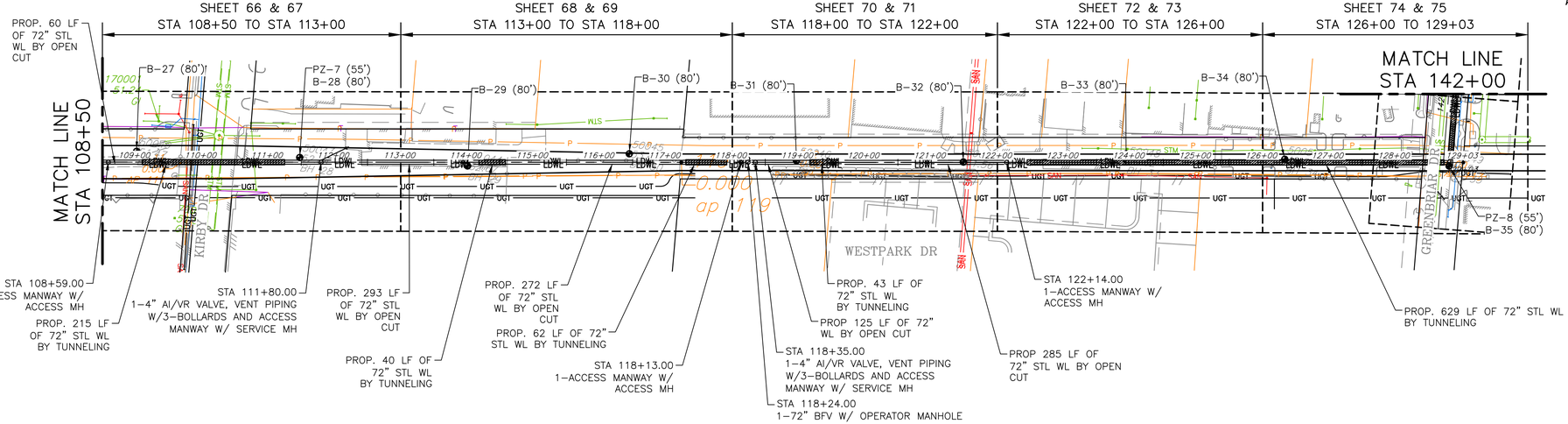
HOUSTON PUBLIC WORKS

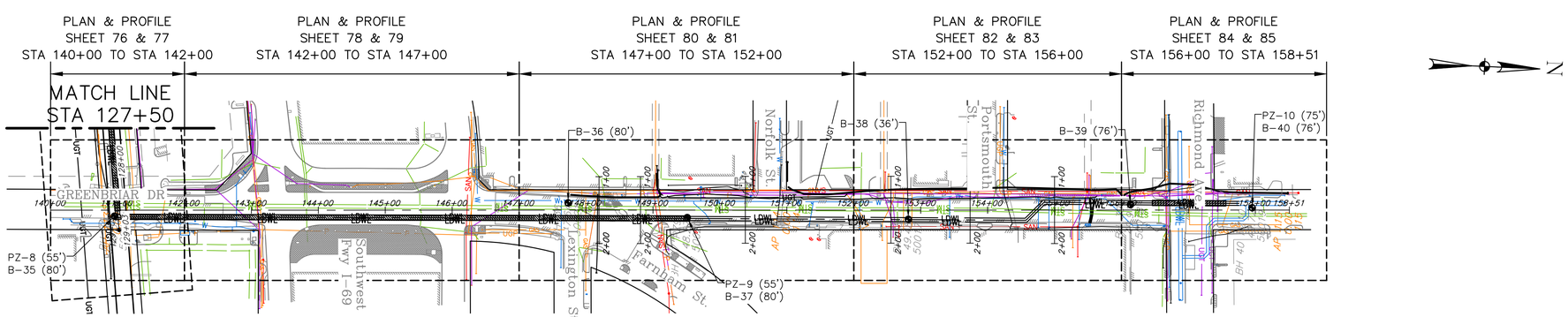
72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

LAYOUT SHEET 2 OF 3

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=100'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 10 OF 169	







0' 50' 100' 200'
SCALE: 1"=100'

N

LEGEND

- PZ-X (X') — BORING LOCATION, PIEZOMETER NO. & (DEPTH, FT.)
- B-X (X') — BORING NO. & (DEPTH, FT.)

APP.	REVISION	NO.	DATE

BORING LOCATION		
BORING NUMBER	NORTHING	EASTING
B-20	13831406.96	3103246.95
B-21	13831489.06	3103742.82
B-22	13831431.04	3104079.45
B-23	13831547.94	3104230.43
B-24	13831580.57	3104459.98
B-25	13831609.51	3104712.00
B-26	13831638.80	3104952.40
B-27	13831680.07	3105185.81
B-28	13831701.01	3105431.23
B-29	13831719.44	3105684.12
B-30	13831767.46	3105923.96
B-31	13831788.16	3106175.47
B-32	13831816.91	3106425.58
B-33	13831850.04	3106668.80
B-34	13831880.32	3106906.18
B-35	13831900.56	3107153.55
B-36	13832576.83	3107102.72
B-37	13832755.67	3107116.61
B-38	13833085.83	3107104.18
B-39	13833416.27	3107067.18
B-40	13833598.25	3107063.48

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

LAYOUT SHEET 3 OF 3

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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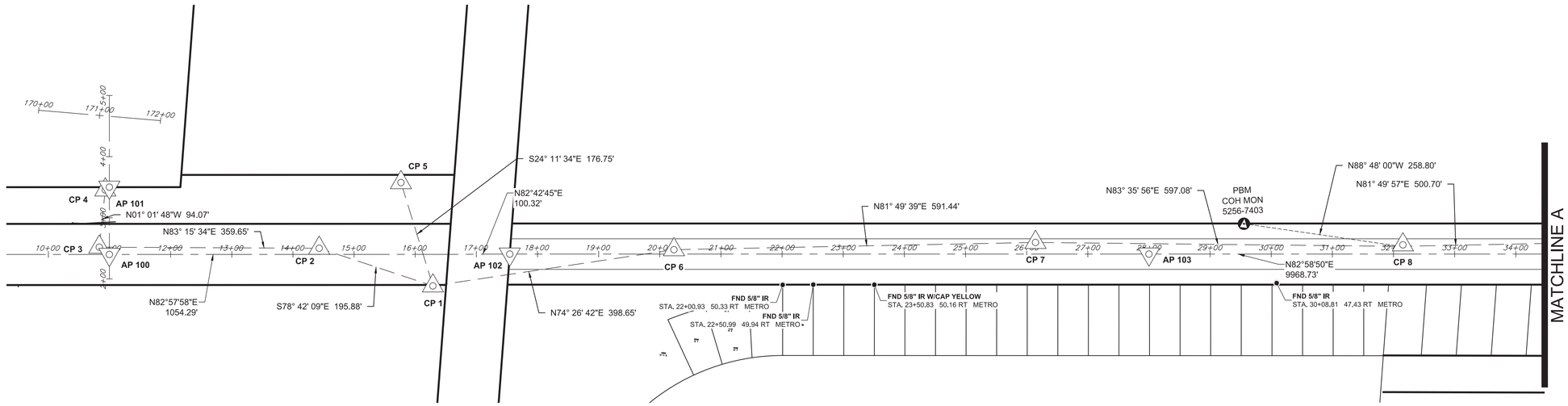
DRAWING SCALE	
1"=100'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 11 OF 169	



NOTES:

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GRID COORDINATES/SCALE FACTOR = SURFACE COORDINATES.

HORIZONTAL COORDINATES BASED ON GPS FIELD DATA COLLECTED JANUARY, 2024.

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PROJECT BENCH MARK:

STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT 5256-7403 A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.
ELEVATION = 56.29' (NAVD 88, GEOID 18)

AMANI ENGINEERING, INC.
11011 RICHMOND AVENUE, SUITE 700
HOUSTON, TEXAS 77042
TEL: (713) 270-5700
Texas Registered Engineering Firm No. F-4528
Texas Registered Surveying Firm No.100282-00

SURVEYED BY: AMANI
FB NO. P-6329

INTERIM REVIEW ONLY
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WILLIAM H. REIMER III, R.P.L.S.
Surveyor
4044
Registration Number
12/11/2024
Date

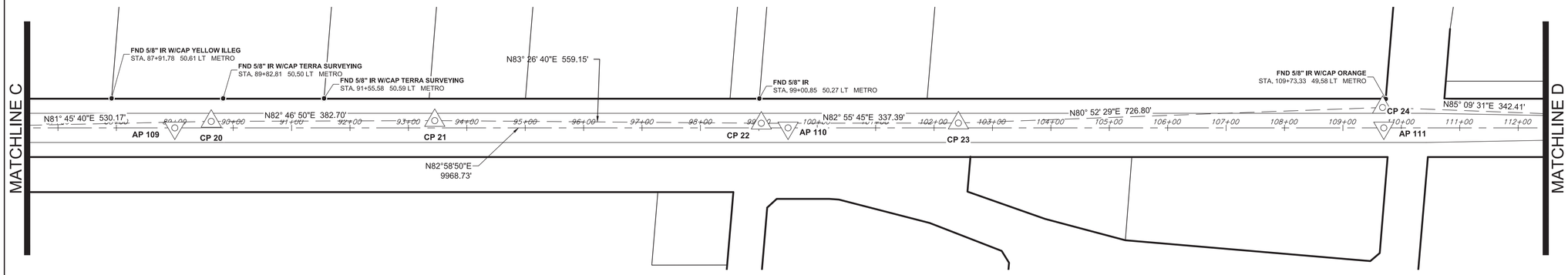
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

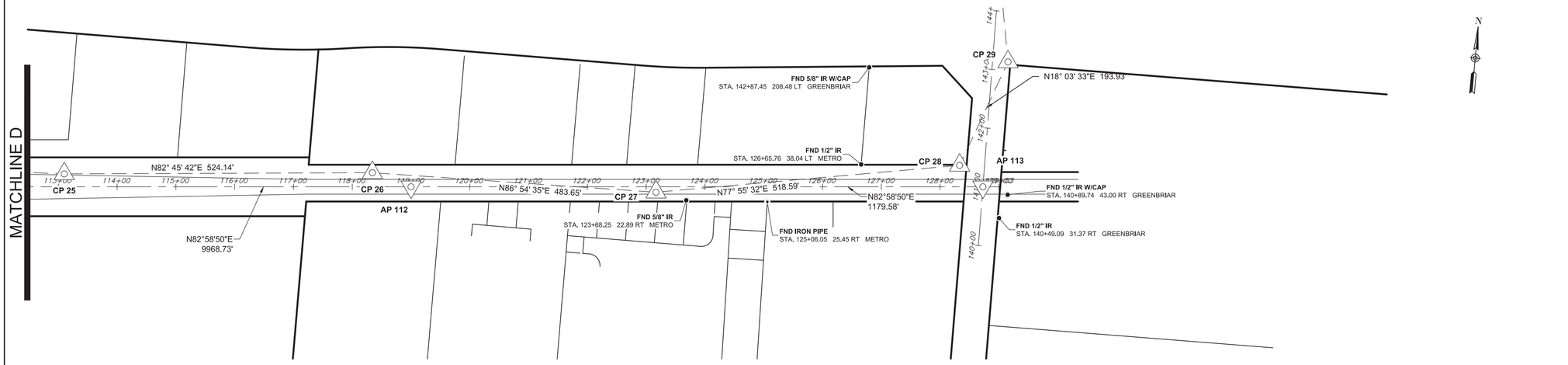
72 INCH WATERLINE ALONG GREENBRIAR DR. FROM METRO CORRIDOR TO SWPS

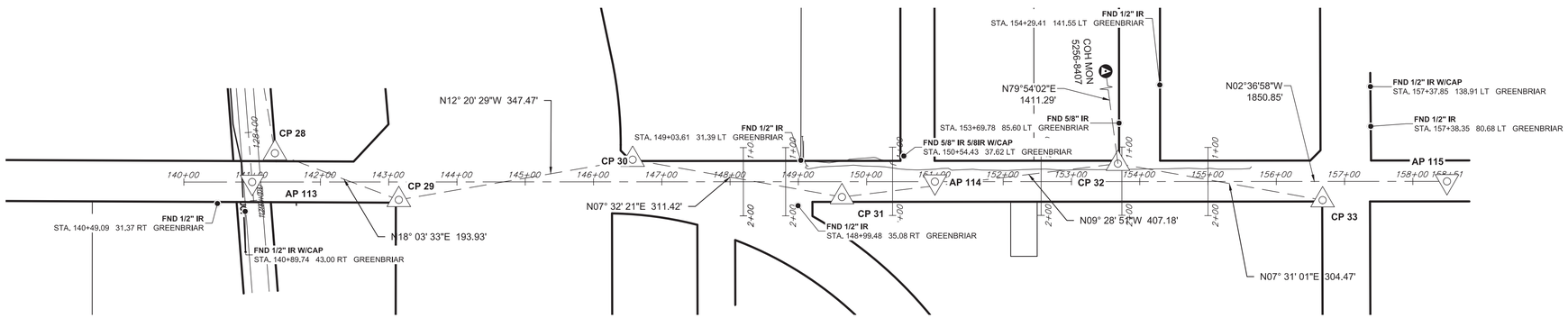
SURVEY CONTROL MAP
SHEET 1 of 5

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1" = 100'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 12 OF 169	

0 1 2 3 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS







100 50 0 100
SCALE IN FEET
22 X 34 1" = 100'

NO.	DATE	REVISION	APP.

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FB NO. P-6329

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72 INCH WATERLINE ALONG GREENBRIAR DR. FROM METRO CORRIDOR TO SWPS

SURVEY CONTROL MAP
SHEET 2 of 5

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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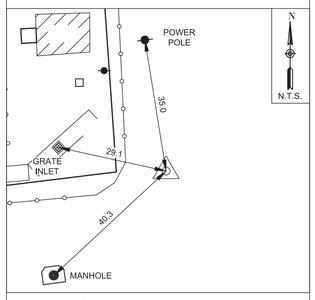
DRAWING SCALE	
1" = 100'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 13 OF 169	

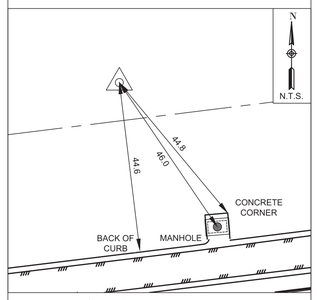
0 1 2 3 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

CP 1 -- 5/8" IR /CAP



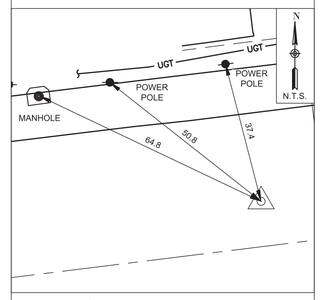
STA. 16 28.83' 51.55' RT
METRO BASELINE

CP 2 -- 5/8" IR /CAP



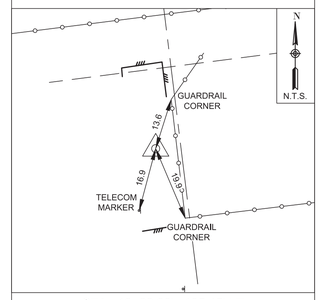
STA. 14 42.89' 10.06' LT
METRO BASELINE

CP 3 -- 5/8" IR /CAP



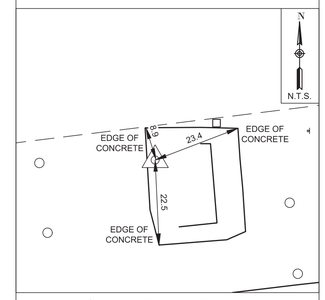
STA. 10 83.25' 11.90' LT
METRO BASELINE

CP 4 -- MAG NAIL



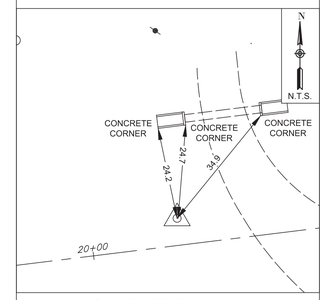
STA. 10 93.08' 105.45' LT
METRO BASELINE

CP 5 -- X-CUT



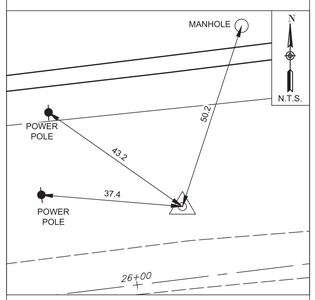
STA. 15 76.69' 117.33' LT
METRO BASELINE

CP 6 -- 5/8" IR /CAP



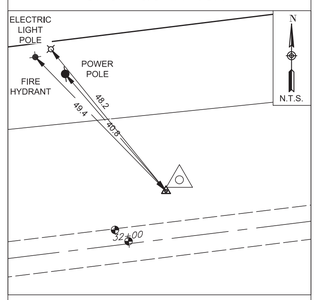
STA. 20 23.08' 7.14' LT
METRO BASELINE

CP 7 -- 5/8" IR /CAP



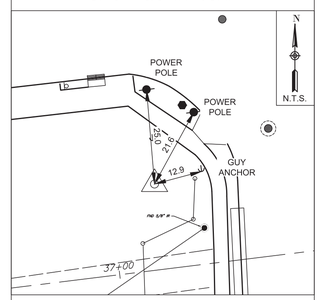
STA. 26 14.40' 19.05' LT
METRO BASELINE

CP 8 -- 5/8" IR /CAP



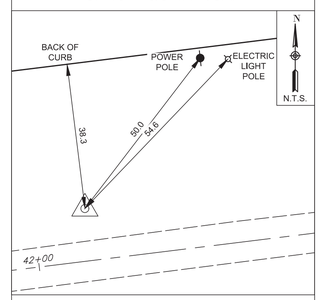
STA. 32 11.45' 12.60 LT
METRO BASELINE

CP 9 -- 5/8" IR /CAP



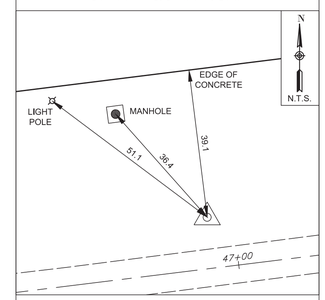
STA. 37 12.05' 22.63' LT
METRO BASELINE

CP 10 -- 5/8" IR /CAP



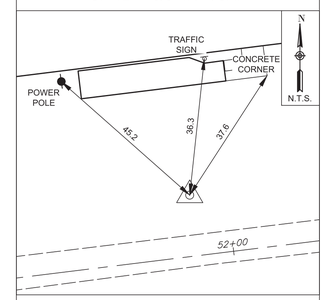
STA. 42 13.84' 13.84' LT
METRO BASELINE

CP 11 -- 5/8" IR /CAP



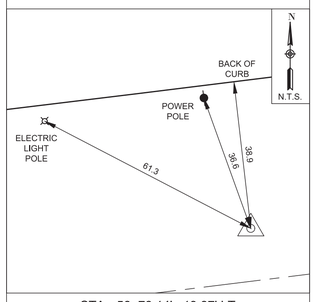
STA. 46 93.26' 13.52' LT
METRO BASELINE

CP 12 -- 5/8" IR /CAP



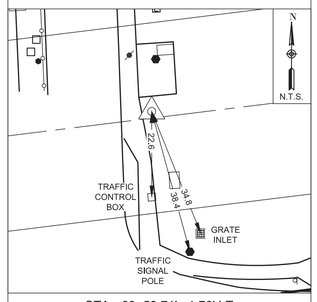
STA. 51 90.31' 16.12' LT
METRO BASELINE

CP 13 -- 5/8" IR /CAP



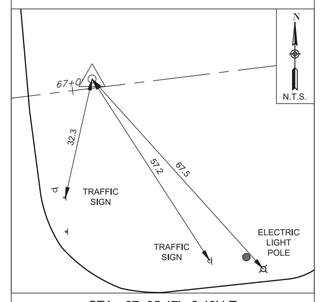
STA. 56 78.14' 13.87' LT
METRO BASELINE

CP 14 -- 5/8" IR /CAP



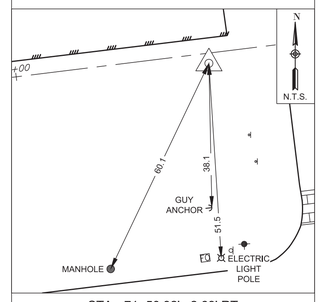
STA. 63 59.71' 1.76' LT
METRO BASELINE

CP 15 -- 5/8" IR /CAP



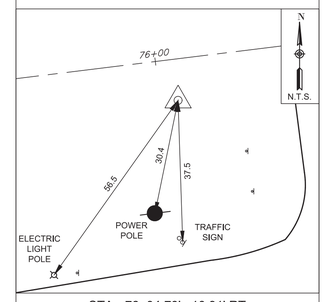
STA. 67 05.47' 2.43' LT
METRO BASELINE

CP 16 -- 5/8" IR /CAP



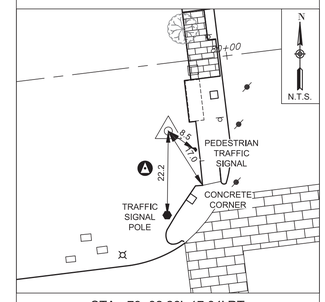
STA. 71 50.92' 2.69' RT
METRO BASELINE

CP 17 -- 5/8" IR /CAP



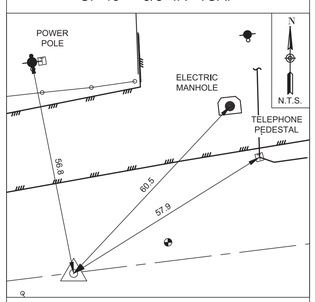
STA. 76 04.70' 10.91' RT
METRO BASELINE

CP 18 -- 5/8" IR /CAP



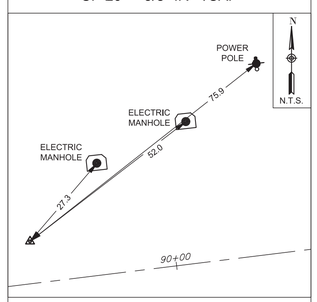
STA. 79 82.26' 17.84' RT
METRO BASELINE

CP 19 -- 5/8" IR /CAP



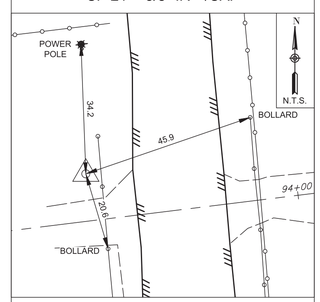
STA. 84 32.33' 0.15' RT
METRO BASELINE

CP 20 -- 5/8" IR /CAP



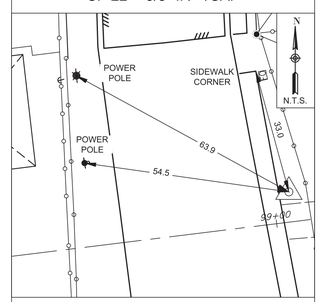
STA. 89 62.39' 11.13' LT
METRO BASELINE

CP 21 -- 5/8" IR /CAP



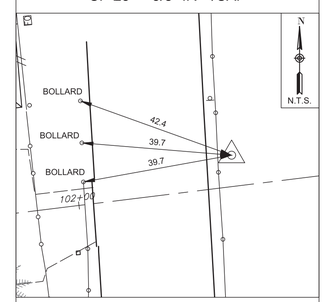
STA. 93 45.09' 12.46' LT
METRO BASELINE

CP 22 -- 5/8" IR /CAP



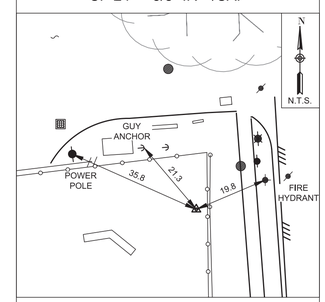
STA. 99 04.22' 7.94' RT
METRO BASELINE

CP 23 -- 5/8" IR /CAP



STA. 102 41.61' 8.24' LT
METRO BASELINE

CP 24 -- 5/8" IR /CAP



STA. 109 67.91' 34.94' LT
METRO BASELINE

NO.	DATE	REVISION	APP.

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12/11/2024
Date

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

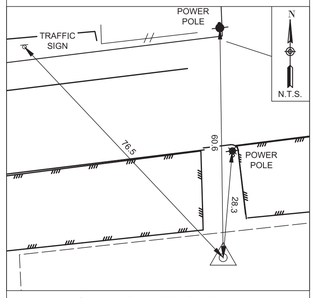
72 INCH WATERLINE ALONG GREENBRIAR DR. FROM METRO CORRIDOR TO SWPS

SURVEY CONTROL MAP
SHEET 3 of 5

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
N.T.S.	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 14 OF 169	

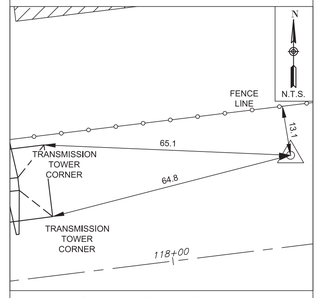
ORIGINAL SCALE IN INCHES
FOR REDUCED PLANS
0 1 2 3

CP 25 -- 5/8" IR /CAP



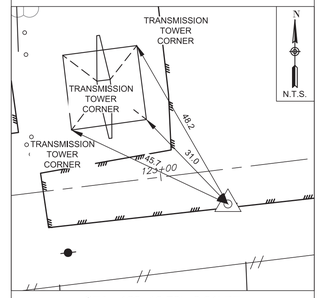
STA. 113 10.08' 21.93' LT
METRO BASELINE

CP 26 -- 5/8" IR /CAP



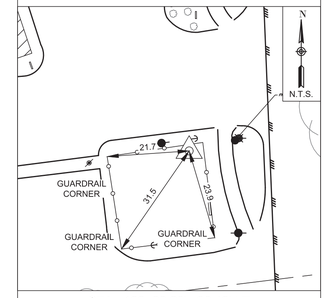
STA. 118 34.21' 23.93' LT
METRO BASELINE

CP 27 -- MAG NAIL



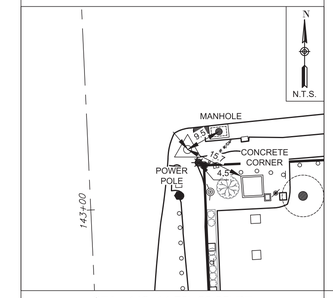
STA. 123 16.72' 9.21' RT
METRO BASELINE

CP 28 -- 5/8" IR /CAP



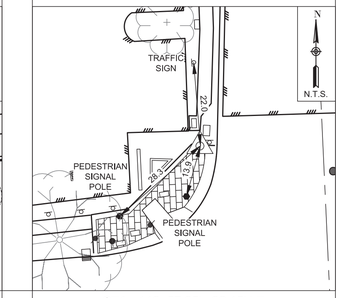
STA. 128 33.29' 36.48' LT
METRO BASELINE

CP 29 -- X-CUT



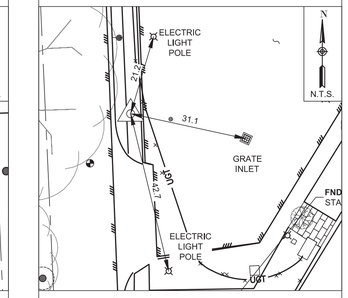
STA. 143 14.78' 26.25' RT
GREENBRIAR BASELINE

CP 30 -- X-CUT



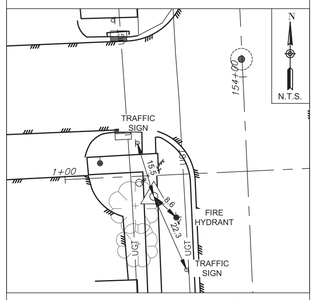
STA. 146 57.25' 32.45' LT
GREENBRIAR BASELINE

CP 31 -- X-CUT



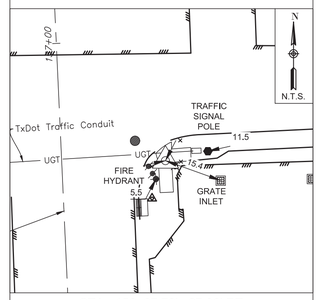
STA. 149 63.79' 22.46' RT
GREENBRIAR BASELINE

CP 32 -- X-CUT



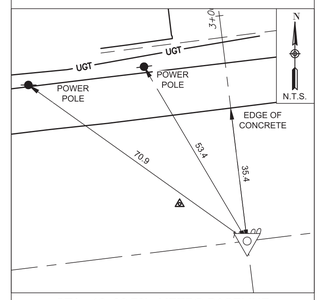
STA. 153 68.05' 26.20' LT
GREENBRIAR BASELINE

CP 33 -- X-CUT



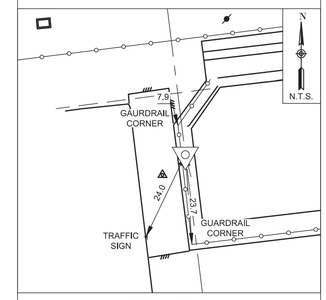
STA. 156 67.78' 27.36' RT
GREENBRIAR BASELINE

AP 100 -- 5/8" IR /CAP



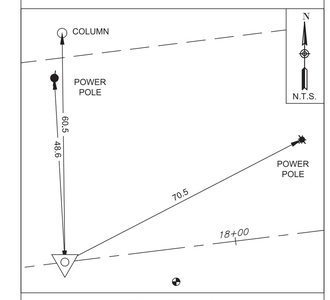
STA. 10 99.73' METRO BASELINE
STA. 2 40.11' SWPS BASELINE

AP 101 -- X-CUT



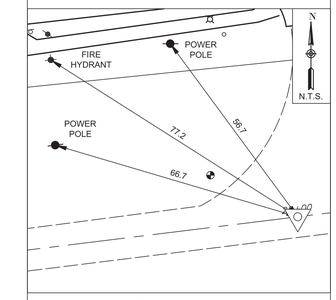
STA. 3 50.10'
SWPS BASELINE

AP 102 -- 5/8" IR /CAP



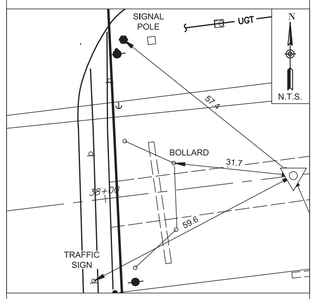
STA. 17 54.61'
METRO BASELINE

AP 103 -- 5/8" IR /CAP



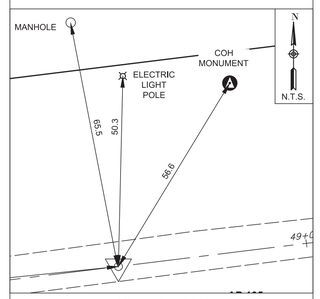
STA. 28 00.00'
METRO BASELINE

AP 104 -- 5/8" IR /CAP



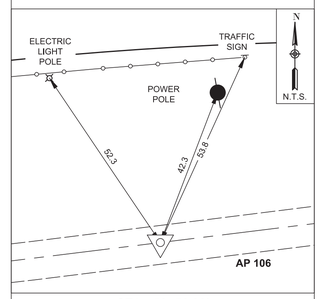
STA. 38 50.00'
METRO BASELINE

AP 105 -- 5/8" IR /CAP



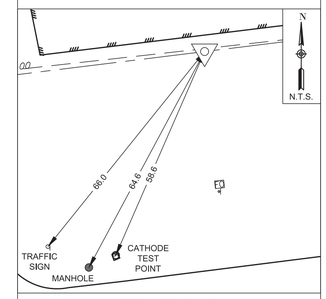
STA. 48 50.00'
METRO BASELINE

AP 106 -- 5/8" IR /CAP



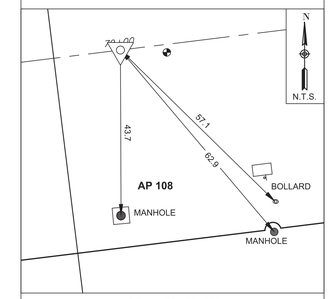
STA. 58 50.00'
METRO BASELINE

AP 107 -- 5/8" IR /CAP



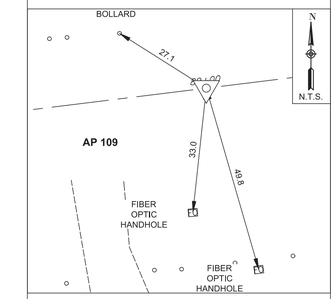
STA. 68 50.00'
METRO BASELINE

AP 108 -- 5/8" IR /CAP



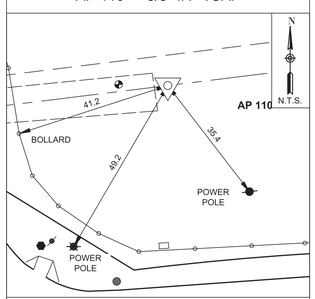
STA. 79 00.00'
METRO BASELINE

AP 109 -- 5/8" IR /CAP



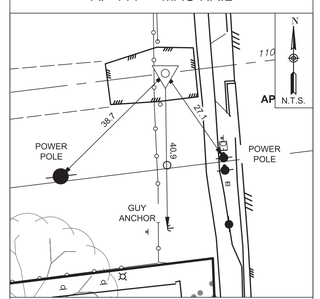
STA. 89 00.00'
METRO BASELINE

AP 110 -- 5/8" IR /CAP



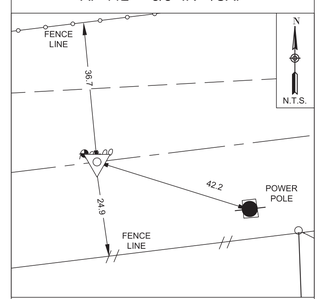
STA. 99 50.00'
METRO BASELINE

AP 111 -- MAG NAIL



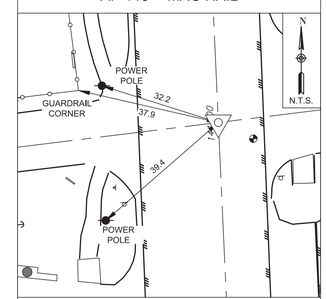
STA. 109 70.00'
METRO BASELINE

AP 112 -- 5/8" IR /CAP



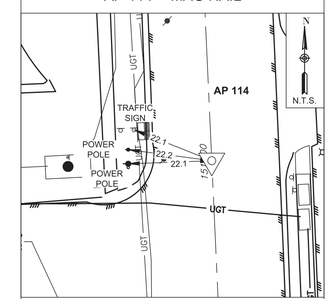
STA. 119 00.00'
METRO BASELINE

AP 113 -- MAG NAIL



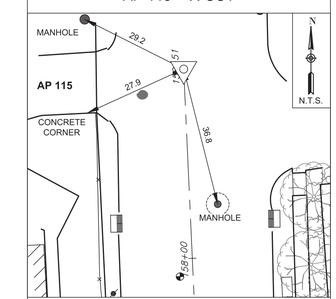
STA. 128 72.83' METRO BASELINE
STA. 140 99.99' GREENBRIAR BASELINE

AP 114 -- MAG NAIL



STA. 151 00.00'
GREENBRIAR BASELINE

AP 115 -- X-CUT



STA. 158 50.00'
GREENBRIAR BASELINE

NOTES:

ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE (4204) NORTH AMERICAN DATUM OF 1983 (2011 ADJ) 2010 EPOCH. COORDINATES SHOWN HEREON ARE GRID VALUES AND ALL DISTANCES SHOWN ARE SURFACE VALUES. THE COMBINED SCALE FACTOR IS 0.99988823.

GRID COORDINATES/SCALE FACTOR = SURFACE COORDINATES.

HORIZONTAL COORDINATES BASED ON GPS FIELD DATA COLLECTED JANUARY, 2024.

ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) GEOID 18. ALL CONTROL NETWORK ELEVATIONS ARE TIED TO THE PROJECT BENCH MARK USING DIFFERENTIAL LEVELING.

PROJECT BENCH MARK:
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT 5256-7403 A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.
ELEVATION = 56.29' (NAVD 88, GEOID 18)

NO.	DATE	REVISION	APP.

AMANI ENGINEERING, INC.
11011 RICHMOND AVENUE, SUITE 700
HOUSTON, TEXAS 77042
TEL: (713) 270-5700
Texas Registered Engineering Firm No. F-4528
Texas Registered Surveying Firm No.100282-00

INTERIM REVIEW ONLY
DOCUMENT INCOMPLETE; NOT INTENDED FOR PERMIT, BIDDING, OR CONSTRUCTION

WILLIAM H. REIMER III, R.P.L.S.
Surveyor
4044
Registered Number
12/11/2024
Date

SURVEYED BY: AMANI
FB NO. P-6329

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72 INCH WATERLINE ALONG GREENBRIAR DR. FROM METRO CORRIDOR TO SWPS

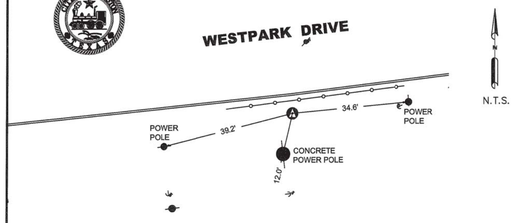
SURVEY CONTROL MAP
SHEET 4 of 5

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
N.T.S.	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 15 OF 169	

0 1 2 3 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

CITY OF HOUSTON

CITY SURVEY 5256-7403
SITE CONTROL MONUMENT



Project WBS# S-000900-0136-3
Texas Coordinate System of 1983,
South Central Zone, U. S. Survey Feet
X= 3,096,948.88
Y= 13,829,196.18

Lat.= N 29° 43' 38.7624"
Lon.= W 95° 26' 38.2150"

Keymap Page: 492W
Orthometric Elevation = 56.29
Ellipsoid Height= -33.40
Geoid: GEOID 18
Datum Source & Adjustment:
2-HR STATIC GPS OBSERVATION
MADE ON MONUMENT ON 11/15/2023

Reference Frame Used: NAD_83(2011)(EPOCH: 2010.0000)
Vertical Adjustment used: NAVD 88 GEOID18
General Location: LOCATED SOUTH OF WESTPARK DR. APPROXIMATELY 770 FEET WEST OF WESTLAYAN RD INTERSECTION.

Date Set: DECEMBER 20, 2005 Type of Mark: COH BRASS DISK

3 Nearest project control points (bearings and distances stated below):
1. CP #8, 5/8 IRON ROD SET CAPPED "AMANI", S 88° 48' 00" E, 258.80'
2. CP #7, 5/8 IRON ROD SET CAPPED "AMANI", S 77° 51' 49" W, 342.26'
3. CP #9, 5/8 IRON ROD SET CAPPED "AMANI", N 85° 01' 09" E, 757.23'

NOTE:
1. Bearings are grid bearings.
2. Combined Factor (C.F)= 0.99988823.

Surface= Grid
C.F.

Surveyed By: Amani Engineering, Inc.
11011 Richmond Avenue, Suite 700
Houston, TX 77042
Tel. (713)270-5700
Texas Registered Survey Firm 10028200

STATE OF TEXAS REGISTERED CHRISTINA I. WEAVER 6753 PROFESSIONAL LAND SURVEYOR 6.4.24

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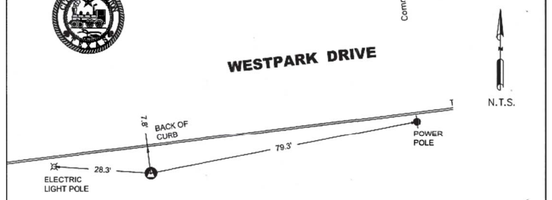
CITY OF HOUSTON

CITY SURVEY 5256-7603
SITE CONTROL MONUMENT



Project WBS# S-000900-0136-3
Texas Coordinate System of 1983,
South Central Zone, U. S. Survey Feet
X= 3,098,864.63
Y= 13,829,426.91

Lat.= N 29° 43' 40.4686"
Lon.= W 95° 26' 16.4154"

Keymap Page: 492W
Orthometric Elevation = 54.03
Ellipsoid Height= -35.65
Geoid: GEOID 18
Datum Source & Adjustment:
2-HR STATIC GPS OBSERVATION
MADE ON MONUMENT ON 01/26/2024

Reference Frame Used: NAD_83(2011)(EPOCH: 2010.0000)
Vertical Adjustment used: NAVD 88 GEOID18
General Location: LOCATED SOUTH OF WESTPARK DR. APPROXIMATELY 1105 FEET EAST OF WESTLAYAN RD' INTERSECTION.

Date Set: DECEMBER 20, 2005 Type of Mark: COH BRASS DISK

3 Nearest project control points (bearings and distances stated below):
1. CP #11, 5/8 IRON ROD SET CAPPED "AMANI", S 73° 49' 16" W, 194.32'
2. CP #12, 5/8 IRON ROD SET CAPPED "AMANI", N 88° 17' 00" E, 306.52'
3. CP #10, 5/8 IRON ROD SET CAPPED "AMANI", S 80° 22' 10" W, 671.96'

NOTE:
1. Bearings are grid bearings.
2. Combined Factor (C.F)= 0.99988839.

Surface= Grid
C.F.

Surveyed By: Amani Engineering, Inc.
11011 Richmond Avenue, Suite 700
Houston, TX 77042
Tel. (713)270-5700
Texas Registered Survey Firm 10028200

STATE OF TEXAS REGISTERED CHRISTINA I. WEAVER 6753 PROFESSIONAL LAND SURVEYOR 3.19.24

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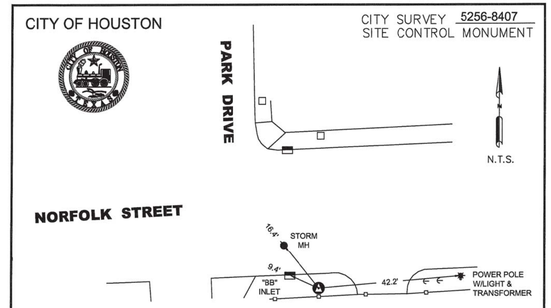
CITY OF HOUSTON

CITY SURVEY 5256-8407
SITE CONTROL MONUMENT



Project WBS# S-000900-0136-3
Texas Coordinate System of 1983,
South Central Zone, U. S. Survey Feet
X= 3,105,323.74
Y= 13,831,376.77

Lat.= N 29° 43' 57.8104"
Lon.= W 95° 25' 2.5073"

Keymap Page: 492Y
Orthometric Elevation = 50.69
Ellipsoid Height= -38.98
Geoid: GEOID 18
Datum Source & Adjustment:
2-HR STATIC GPS OBSERVATION
MADE ON MONUMENT ON 03/01/2024

Reference Frame Used: NAD_83(2011)(EPOCH: 2010.0000)
Vertical Adjustment used: NAVD 88 GEOID18
General Location: LOCATED SOUTHEAST OF THE INTERSECTION OF NORFOLK STREET AND PARK DRIVE.

Date Set: MARCH 01, 2024 Type of Mark: COH BRASS DISK

3 Nearest project control points (bearings and distances stated below):
1. CP #25, 5/8 IRON ROD SET CAPPED "AMANI", S 03° 52' 03" W, 1189.97'
2. CP #26, 5/8 IRON ROD SET CAPPED "AMANI", S 21° 24' 47" E, 1204.35'
3. CP #24, 5/8 IRON ROD SET CAPPED "AMANI", S 19° 06' 48" W, 1287.11'

NOTE:
1. Bearings are grid bearings.
2. Combined Factor (C.F)= 0.99988913.

Surface= Grid
C.F.

Surveyed By: Amani Engineering, Inc.
11011 Richmond Avenue, Suite 700
Houston, TX 77042
Tel. (713)270-5700
Texas Registered Survey Firm 10028200

STATE OF TEXAS REGISTERED CHRISTINA I. WEAVER 6753 PROFESSIONAL LAND SURVEYOR 9.12.24

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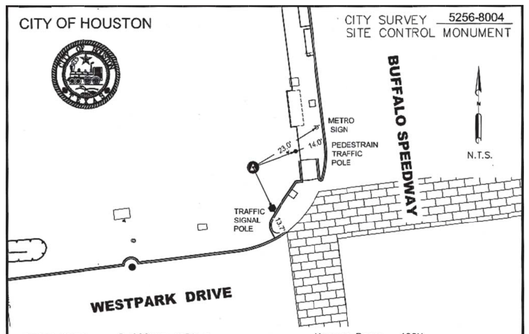
CITY OF HOUSTON

CITY SURVEY 5256-8004
SITE CONTROL MONUMENT



Project WBS# S-000900-0136-3
Texas Coordinate System of 1983,
South Central Zone, U. S. Survey Feet
X= 3,101,939.73
Y= 13,829,733.72

Lat.= N 29° 43' 42.5762"
Lon.= W 95° 25' 41.4448"

Keymap Page: 492X
Orthometric Elevation = 54.11
Ellipsoid Height= -35.55
Geoid: GEOID 18
Datum Source & Adjustment:
2-HR STATIC GPS OBSERVATION
MADE ON MONUMENT ON 01/27/2024

Reference Frame Used: NAD_83(2011)(EPOCH: 2010.0000)
Vertical Adjustment used: NAVD 88 GEOID18
General Location: LOCATED AT THE NORTHWEST CORNER OF THE INTERSECTION OF WESTPARK DRIVE BUFFALO SPEEDWAY.

Date Set: FEBRUARY 04, 2015 Type of Mark: COH BRASS DISK

3 Nearest project control points (bearings and distances stated below):
1. CP #18, 5/8 IRON ROD SET CAPPED "AMANI", N 31° 54' 20" E, 11.58'
2. CP #17, 5/8 IRON ROD SET CAPPED "AMANI", S 85° 26' 40" E, 370.63'
3. CP #19, 5/8 IRON ROD SET CAPPED "AMANI", N 79° 38' 25" E, 458.12'

NOTE:
1. Bearings are grid bearings.
2. Combined Factor (C.F)= 0.99988845.

Surface= Grid
C.F.

Surveyed By: Amani Engineering, Inc.
11011 Richmond Avenue, Suite 700
Houston, TX 77042
Tel. (713)270-5700
Texas Registered Survey Firm 10028200

STATE OF TEXAS REGISTERED CHRISTINA I. WEAVER 6753 PROFESSIONAL LAND SURVEYOR 6.7.24

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CP	GRID NORTHING	GRID EASTING	ELE.	DESCRIPTION	STATION	BASELINE
1	13,828,933.27	3,095,644.93	54.89	5/8" IR w/Cap	**16+28.83; 51.55' RT**	**METRO**
2	13,828,971.64	3,095,452.87	56.46	5/8" IR w/Cap	**14+42.89; 10.06' LT**	**METRO**
3	13,828,929.43	3,095,095.74	55.79	5/8" IR w/Cap	**10+83.25; 11.90' LT**	**METRO**
4	13,829,023.48	3,095,094.05	55.74	Mag Nail	**10+93.08; 105.45' LT**	**METRO**
5	13,829,094.47	3,095,572.51	56.78	X-Cut	**15+76.69; 117.33' LT**	**METRO**
6	13,829,040.16	3,096,028.94	56.72	5/8" IR w/Cap	**20+23.08; 7.14' LT**	**METRO**
7	13,829,124.23	3,096,614.31	56.48	5/8" IR w/Cap	**26+14.40; 19.05' LT**	**METRO**
8	13,829,190.79	3,097,207.60	56.68	5/8" IR w/Cap	**32+11.45; 12.60' LT**	**METRO**
9	13,829,261.91	3,097,703.16	55.07	5/8" IR w/Cap	**37+12.05; 22.63' LT**	**METRO**
10	13,829,314.51	3,098,202.21	55.01	5/8" IR w/Cap	**42+13.84; 13.84' LT**	**METRO**
11	13,829,372.77	3,098,678.03	55.25	5/8" IR w/Cap	**46+93.26; 13.52' LT**	**METRO**
12	13,829,436.09	3,099,170.98	54.77	5/8" IR w/Cap	**51+90.31; 16.12' LT**	**METRO**
13	13,829,493.46	3,099,655.37	54.98	5/8" IR w/Cap	**56+78.14; 13.87' LT**	**METRO**
14	13,829,564.73	3,100,333.24	55.20	5/8" IR w/Cap	**63+59.71; 1.76' LT**	**METRO**
15	13,829,607.64	3,100,676.28	55.75	5/8" IR w/Cap	**67+05.47; 2.43' LT**	**METRO**
16	13,829,657.00	3,101,118.98	55.18	5/8" IR w/Cap	**71+50.92; 2.69' RT**	**METRO**
17	13,829,704.28	3,101,570.31	54.76	5/8" IR w/Cap	**76+04.70; 10.91' RT**	**METRO**
18	13,829,743.55	3,101,945.85	54.48	5/8" IR w/Cap	**79+82.28; 17.84' RT**	**METRO**
19	13,829,816.09	3,102,390.33	55.05	5/8" IR w/Cap	**84+32.33; 0.15' RT**	**METRO**
20	13,829,892.06	3,102,914.97	55.09	5/8" IR w/Cap	**89+62.39; 11.13' LT**	**METRO**
21	13,829,940.15	3,103,294.60	54.98	5/8" IR w/Cap	**93+45.09; 12.46' LT**	**METRO**
22	13,830,003.97	3,103,850.03	54.86	5/8" IR w/Cap	**99+04.22; 7.94' LT**	**METRO**
23	13,830,045.50	3,104,184.82	54.33	5/8" IR w/Cap	**102+41.61; 8.24' LT**	**METRO**
24	13,830,160.75	3,104,902.34	52.01	5/8" IR w/Cap	**109+67.91; 34.94' LT**	**METRO**
25	13,830,189.65	3,105,243.49	53.32	5/8" IR w/Cap	**113+10.08; 21.93' LT**	**METRO**
26	13,830,255.68	3,105,763.39	53.20	5/8" IR w/Cap	**118+34.21; 23.93' LT**	**METRO**
27	13,830,281.75	3,106,246.28	51.62	Mag Nail	**123+16.72; 9.21' RT**	**METRO**
28	13,830,390.22	3,106,753.34	49.66	5/8" IR w/Cap	**128+33.29; 36.48' LT**	**METRO**
29	13,830,574.57	3,106,813.45	47.62	X-Cut	**143+14.78; 26.25' RT**	**GREENBRIAR**
30	13,830,913.97	3,106,739.19	47.80	X-Cut	**146+57.25; 32.45' LT**	**GREENBRIAR**
31	13,831,222.67	3,106,780.05	48.67	X-Cut	**149+63.79; 22.46' RT**	**GREENBRIAR**
32	13,831,624.24	3,106,712.99	49.47	X-Cut	**153+68.05; 26.20' LT**	**GREENBRIAR**
33	13,831,926.06	3,106,752.81	49.93	X-Cut	**156+67.78; 27.36' RT**	**GREENBRIAR**

AP	GRID NORTHING	GRID EASTING	DESCRIPTION	STATION	BASELINE
100	13,828,919.64	3,095,113.56	5/8" IR w/Cap	10+99.73	METRO
101	13,829,028.80	3,095,100.10	X-CUT	3+50.10	SWPS
102	13,829,000.27	3,095,763.38	5/8" IR w/Cap	17+54.61	METRO
103	13,829,128.01	3,096,800.82	5/8" IR w/Cap	28+00.00	METRO
104	13,829,256.33	3,097,842.96	5/8" IR w/Cap	38+50.00	METRO
105	13,829,378.51	3,098,835.23	5/8" IR w/Cap	48+50.00	METRO
106	13,829,500.70	3,099,827.62	5/8" IR w/Cap	58+50.00	METRO
107	13,829,622.89	3,100,820.02	5/8" IR w/Cap	68+50.00	METRO
108	13,829,751.20	3,101,862.03	5/8" IR w/Cap	79+00.00	METRO
109	13,829,873.39	3,102,854.42	5/8" IR w/Cap	89+00.00	METRO
110	13,830,001.69	3,103,896.44	5/8" IR w/Cap	99+50.00	METRO
111	13,830,126.33	3,104,908.68	MAG NAIL	109+70.00	METRO
112	13,830,239.97	3,105,831.60	5/8" IR w/Cap	119+00.00	METRO
113	13,830,358.85	3,106,797.03	MAG NAIL	128+72.83	METRO
114	13,831,357.69	3,106,751.39	MAG NAIL	151+00.00	GREENBRIAR
115	13,832,107.68	3,106,717.13	X-CUT	158+50.00	GREENBRIAR

NO.	DATE	REVISION	APP.

NOTES:

ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE (4204) NORTH AMERICAN DATUM OF 1983 (2011 ADJ) 2010 EPOCH. COORDINATES SHOWN HEREON ARE GRID VALUES AND ALL DISTANCES SHOWN ARE SURFACE VALUES. THE COMBINED SCALE FACTOR IS 0.99988823.

GRID COORDINATES/SCALE FACTOR = SURFACE COORDINATES.

HORIZONTAL COORDINATES BASED ON GPS FIELD DATA COLLECTED JANUARY, 2024.

ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) GEOID 18. ALL CONTROL NETWORK ELEVATIONS ARE TIED TO THE PROJECT BENCH MARK USING DIFFERENTIAL LEVELING.

PROJECT BENCH MARK:
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT 5256-7403 A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.
ELEVATION = 56.29' (NAVD 88, GEOID 18)

AMANI ENGINEERING, INC.
11011 RICHMOND AVENUE, SUITE 700
HOUSTON, TEXAS 77042
TEL: (713) 270-5700
Texas Registered Engineering Firm No. F-4528
Texas Registered Surveying Firm No.100282-00

SURVEYED BY: AMANI
FB NO. P-6329

INTERIM REVIEW ONLY
DOCUMENT INCOMPLETE; NOT INTENDED FOR PERMIT, BIDDING, OR CONSTRUCTION

WILLIAM H. REIMER III, R.P.L.S.
Surveyor
4044
Registration Number
12/11/2024
Date

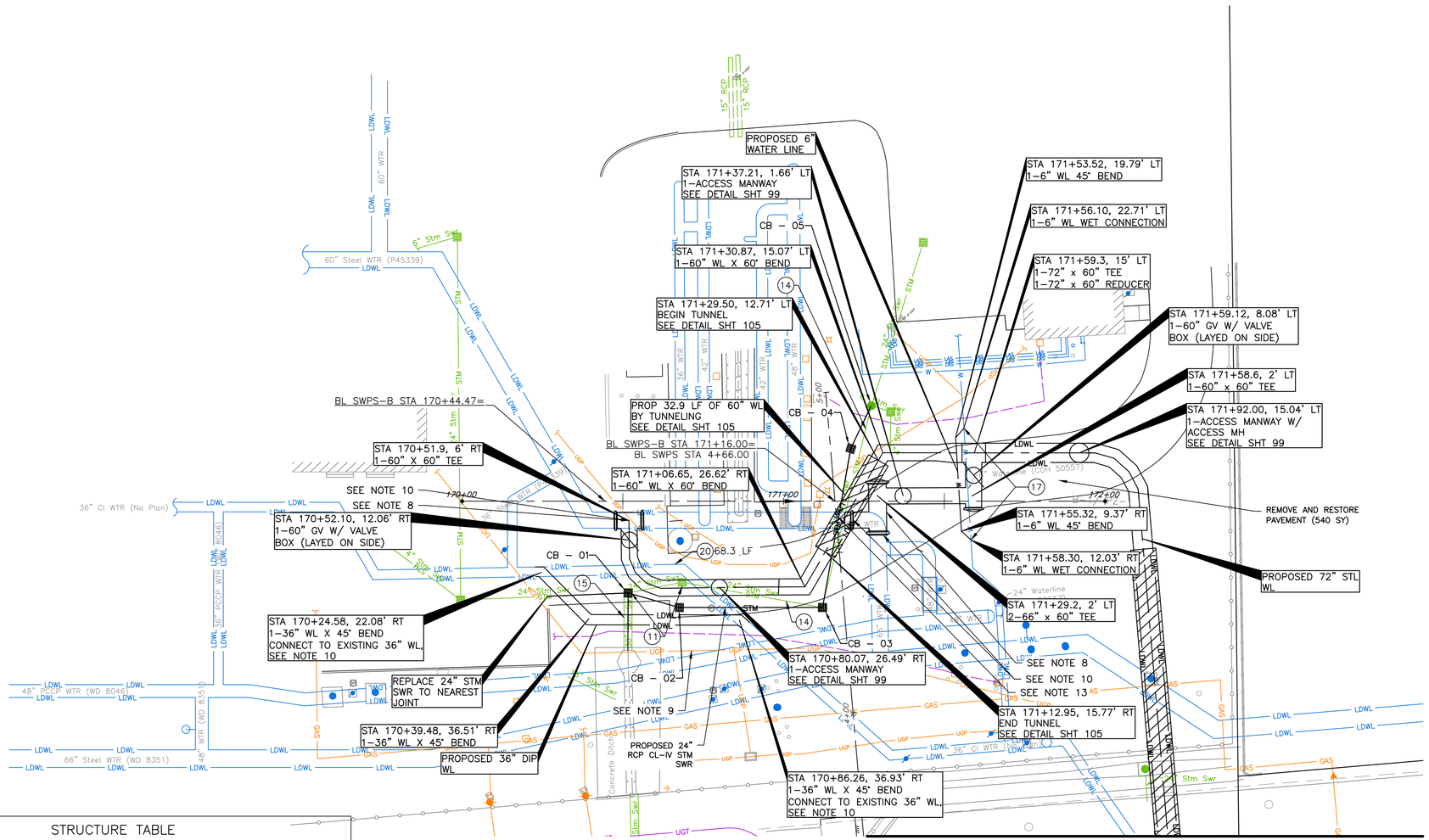
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72 INCH WATERLINE ALONG GREENBRIAR DR. FROM METRO CORRIDOR TO SWPS

SURVEY CONTROL MAP
SHEET 5 of 5

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
N.T.S.	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 16 OF 169	

0 1 2 3 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS



STRUCTURE TABLE

STRUCTURE NAME:	STRUCTURE TYPE	STATIONING	DETAILS:
CB – 01	STORM SEWER JUNCTION BOX WITH GRATE TOP	STA 0+50.46 –13.21' LT	RIM = 55.48 SUMP = 51.15 INV IN = 51.55 W INV IN = 51.56 E INV OUT = 51.40 S
CB – 02	STORM SEWER JUNCTION BOX WITH GRATE TOP	STA 0+70.44 –6.83' LT	RIM = 55.53 SUMP = 51.44 INV IN = 51.69 E INV OUT = 51.59 W
CB – 03	STORM SEWER JUNCTION BOX WITH GRATE TOP	STA 1+14.35 0.13' RT	RIM = 55.20 SUMP = 51.78 INV IN = 51.88 N INV OUT = 51.78 W
CB – 04	STORM SEWER JUNCTION BOX WITH GRATE TOP	STA 1+64.67 –0.65' LT	RIM = 55.59 SUMP = 51.96 INV IN = 52.08 NE INV OUT = 51.98 S
CB – 05 CONNECT PROP 24" STM SWR TO EXISTING MH	STORM SEWER JUNCTION BOX WITH GRATE TOP	STA 1+79.34 0.89' RT	RIM = 55.66 SUMP = 51.86 INV OUT = 52.11 SW

SEE SHEET 18 FOR PROFILE VIEW

SEE SHEET 19
FOR CONTINUATION

NOTES:

1. CONTRACTOR IS TO PROTECT IN PLACE EXISTING WATERLINE PIPING WITHIN THE SWPS PROPERTY.
2. PIPE MATERIAL WITHIN LIMITS OF SWPS PROPERTY TO BE STEEL. RESTRAIN ALL JOINTS.
3. CONTRACTOR TO COORDINATE WITH CYNTHIA RODRIGUES WITH CENTERPOINT ENERGY AT 713–207–6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
4. CONTRACTOR WILL BE REQUIRED TO PROTECT ADJACENT UTILITIES TO ALL TUNNEL SHAFTS AND TUNNEL EXCAVATION, SEE SPECIFICATION SECTIONS 01110 AND 02441LD FOR FURTHER REQUIREMENTS.
5. CONTRACTOR TO REFER TO SHEET 06 FOR TUNNELING WORK NOTES.
6. RESTORE THE SITE INCLUDING LANDSCAPING TO THE CONDITION EXISTING BEFORE CONSTRUCTION, OR BETTER, PER THE REQUIREMENTS OF SECTION 01145 USE OF PREMISES.
7. REPAIR PAVED AREAS PER THE REQUIREMENTS OF SECTION 02951 PAVEMENT REPAIR AND RESTORATION.
8. REFER TO SHEET 90 FOR DETAILS REGARDING THE CONNECTIONS TO EXISTING PIPING, PROPOSED VALVES, AND PROPOSED BENDS THAT CORRESPOND WITH THOSE CONNECTIONS.
9. CONTRACTOR TO PROTECT IN PLACE EXISTING ELECTRICAL DUCT BANK WITHIN THE SWPS PROPERTY.
10. CONTRACTOR TO FIELD VERIFY LOCATION OF EXISTING WATER LINES AT CONNECTIONS AND MAKE NECESSARY ADJUSTMENTS TO THE LINE AND GRADE TO ASSURE PROPER TIE–IN
11. CONNECT EXISTING 66" WATER LINE TO PROPOSED WATERLINE VIA FLANGED ADAPTER.
12. SEE 01110–SUMMARY OF WORK FOR SHUTDOWN AND CONSTRUCTION SEQUENCING.
13. CONTRACTOR TO FIELD VERIFY EXISTING 24" STORM WATER PIPE CROSSING THE 60" WATER LINE CONNECTION. CONSTRUCT PROPOSED 24" STORM WATER PIPE TO AVOID CONFLICT WITH THE 60" WATER LINE.

N

0' 10' 20' 40'

1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

- CRITICAL LOCATE PER COH SPEC 02317.
- (XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256–7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

NOTICE:
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS SIGNATURE DOES NOT FULFILL YOUR OBLIGATION TO CALL 811

VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713–953–4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F–533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P–6329

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CITY OF HOUSTON

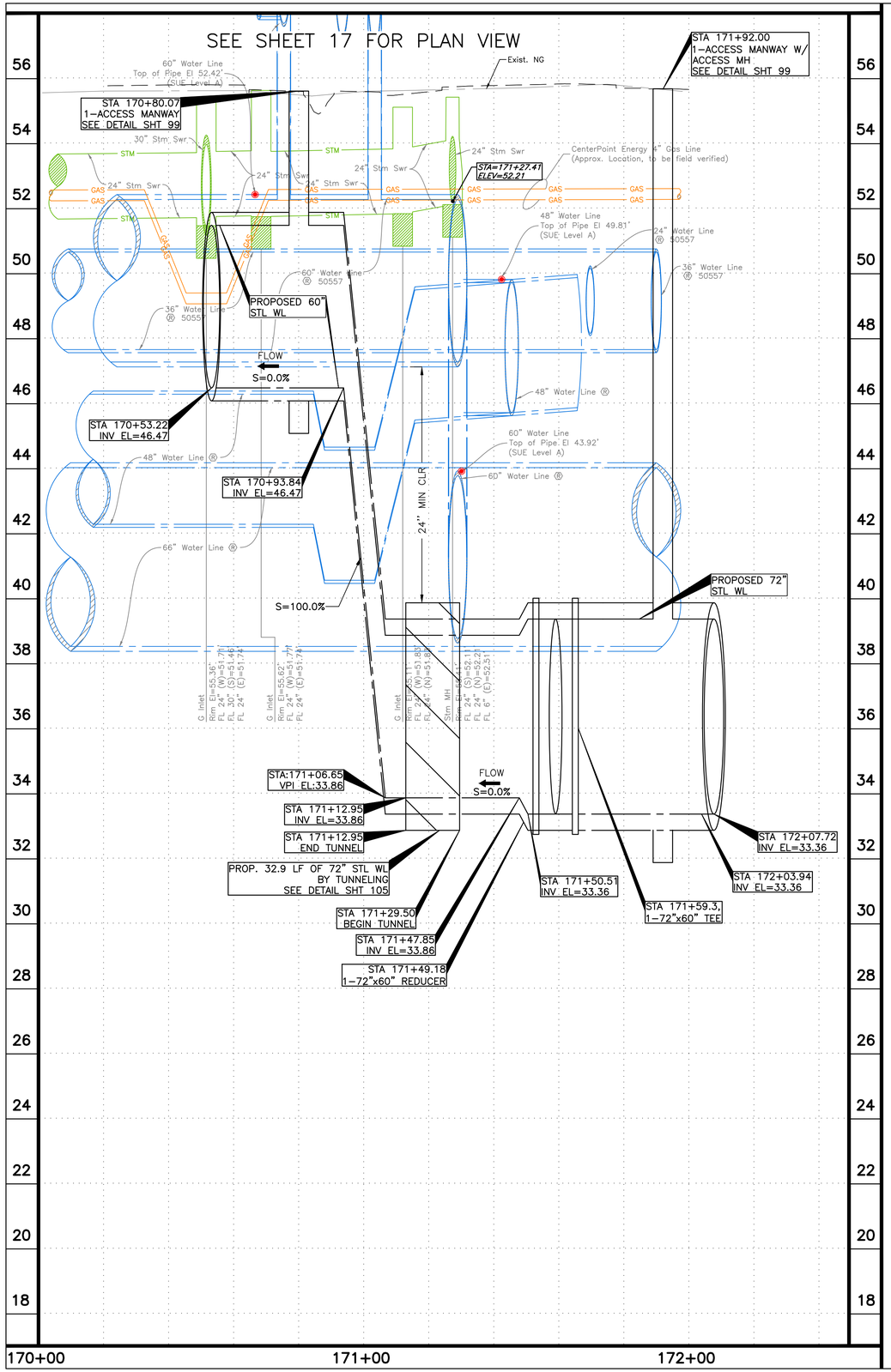
HOUSTON PUBLIC WORKS

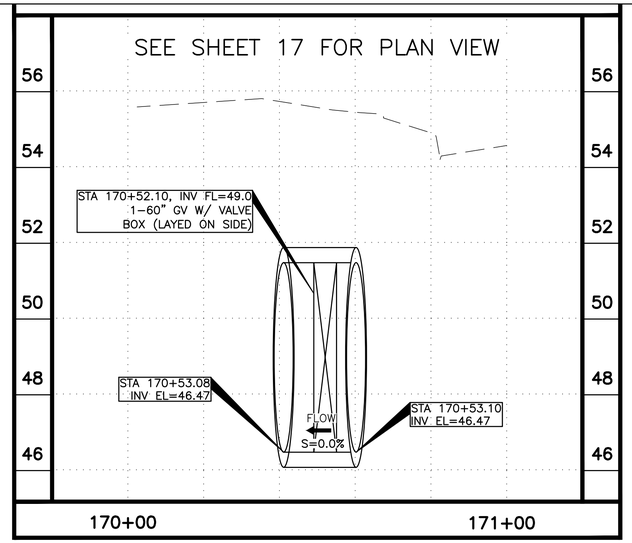
72–INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

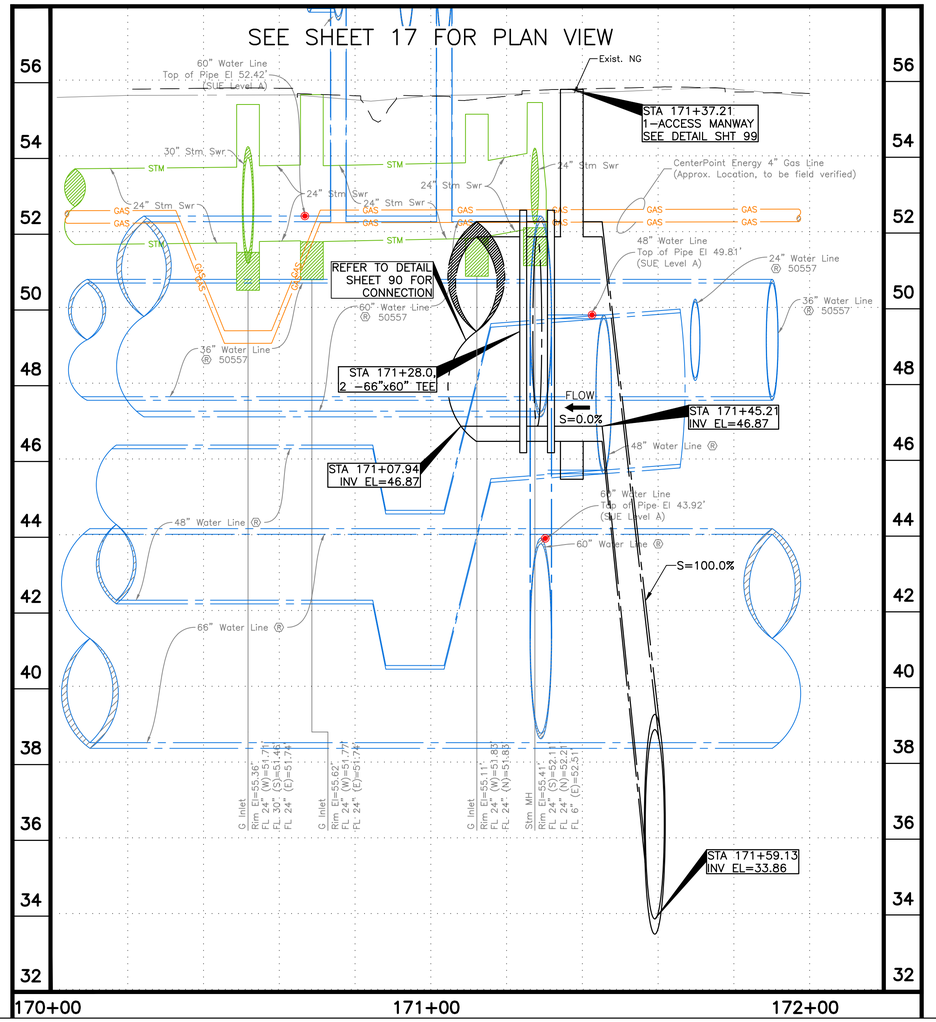
PLAN VIEW
STA 170+00 TO STA 172+00
YARD PIPING AT SWPS

(SHEET 01 OF 66)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"–20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 17 OF 169	







HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

NOTES:

1. FOR UTILITIES ON PUMP STATION SITE, SEE PLAN VIEW.

NOTICE:
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VERIFICATION OF PRIVATE UTILITY LINES

Date

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Signature valid for six months.

Date

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Date

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Signature valid for one year.

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ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

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CITY OF HOUSTON

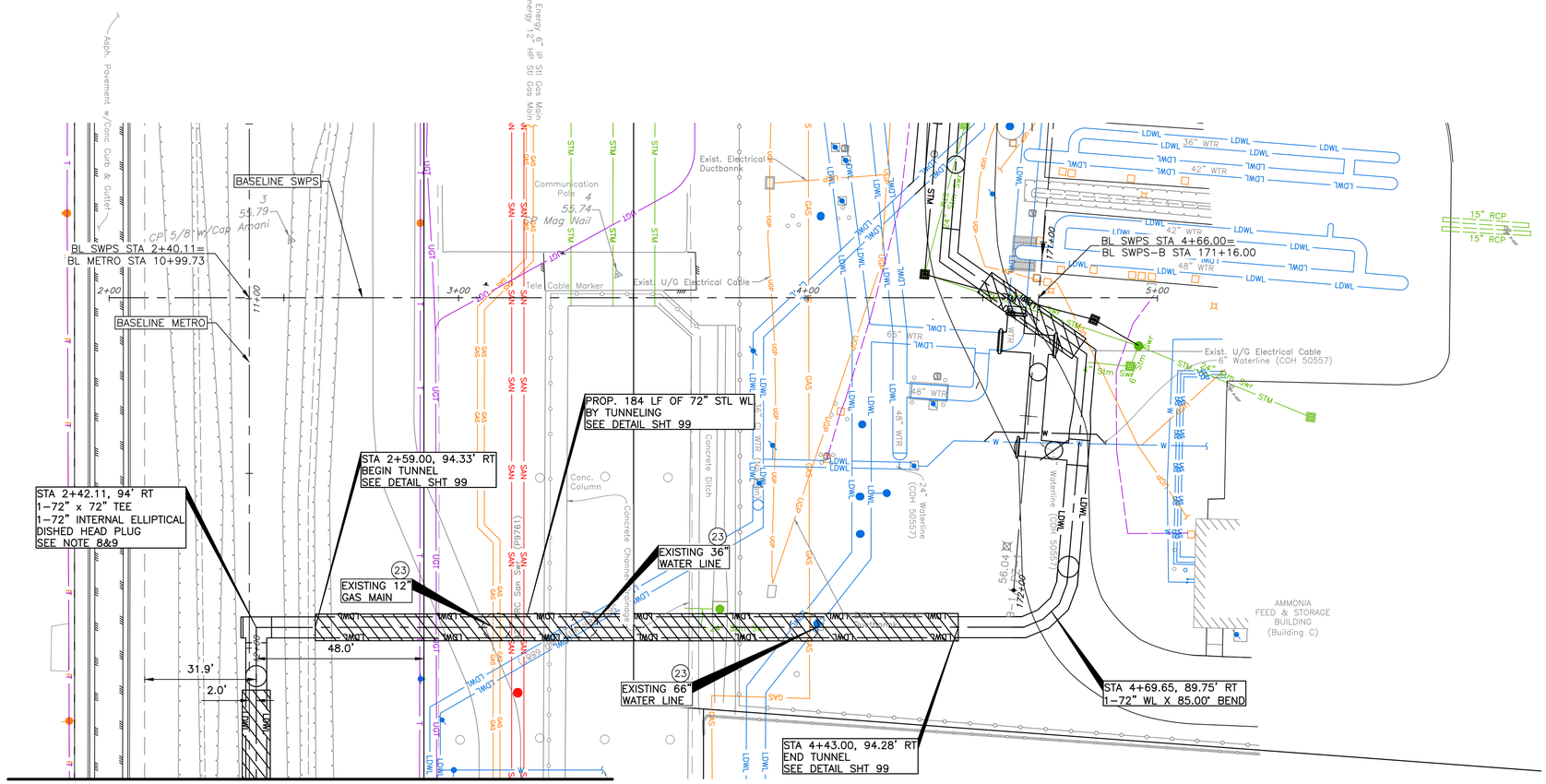
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 170+00 TO STA 172+00
YARD PIPING AT SWPS

(SHEET 02 OF 66)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 18 OF 169	



SEE SHEET 22
FOR CONTINUATION

SEE SHEET 20 & 21 FOR PROFILE VIEW

NOTES:

1. CONTRACTOR IS TO PROTECT IN PLACE EXISTING WATERLINE PIPING WITHIN THE SWPS PROPERTY.
2. PIPE MATERIAL WITHIN LIMITS OF SWPS PROPERTY TO BE STEEL. RESTRAIN ALL JOINTS.
3. CONTRACTOR TO COORDINATE WITH CYNTHIA RODRIGUES WITH CENTERPOINT ENERGY AT 713-207-6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
4. CONTRACTOR WILL BE REQUIRED TO PROTECT ADJACENT UTILITIES TO ALL TUNNEL SHAFTS AND TUNNEL EXCAVATION, SEE SPECIFICATION SECTIONS 01110 AND 02441LD FOR FURTHER REQUIREMENTS.
5. CONTRACTOR TO REFER TO SHEET 06 FOR TUNNELING WORK NOTES.
6. RESTORE THE SITE INCLUDING LANDSCAPING TO THE CONDITION EXISTING BEFORE CONSTRUCTION, OR BETTER, PER THE REQUIREMENTS OF SECTION 01145 USE OF PREMISES.
7. REPAIR PAVED AREAS PER THE REQUIREMENTS OF SECTION 02951 PAVEMENT REPAIR AND RESTORATION.
8. THE 72" X 72" TEE SHALL HAVE A MINIMUM WALL THICKNESS OF 0.5 INCHES.
9. PROVIDE AN ELLIPTICAL DISHED HEAD PLUG WITH A MINIMUM THICKNESS OF 0.5 INCHES, BUTT WELDED TO THE END OF THE TEE AS DETAILED. THE HEAD MUST BE SHOP-LINED WITH CEMENT MORTAR TO MATCH THE INTERIOR PIPE LINING AND DESIGNED PER ASME BOILER & PRESSURE VESSEL CODE, SECTION VIII, DIVISION 1 (LATEST EDITION). WELD THE DISHED HEAD PLUG TO THE PIPE IN THE FACTORY AND SUBMIT DESIGN CALCULATIONS AND DETAILS TO THE PROJECT MANAGER FOR REVIEW.

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

(XX) CRITICAL LOCATE PER COH SPEC 02317.

(XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256-7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F-3691

TUNNELING DESIGN
THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF BRENT LINDELOF, TX PE# 117075. NOT FOR BIDDING, PERMIT, OR CONSTRUCTION PURPOSES.

NOTICE:
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VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

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Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

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ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

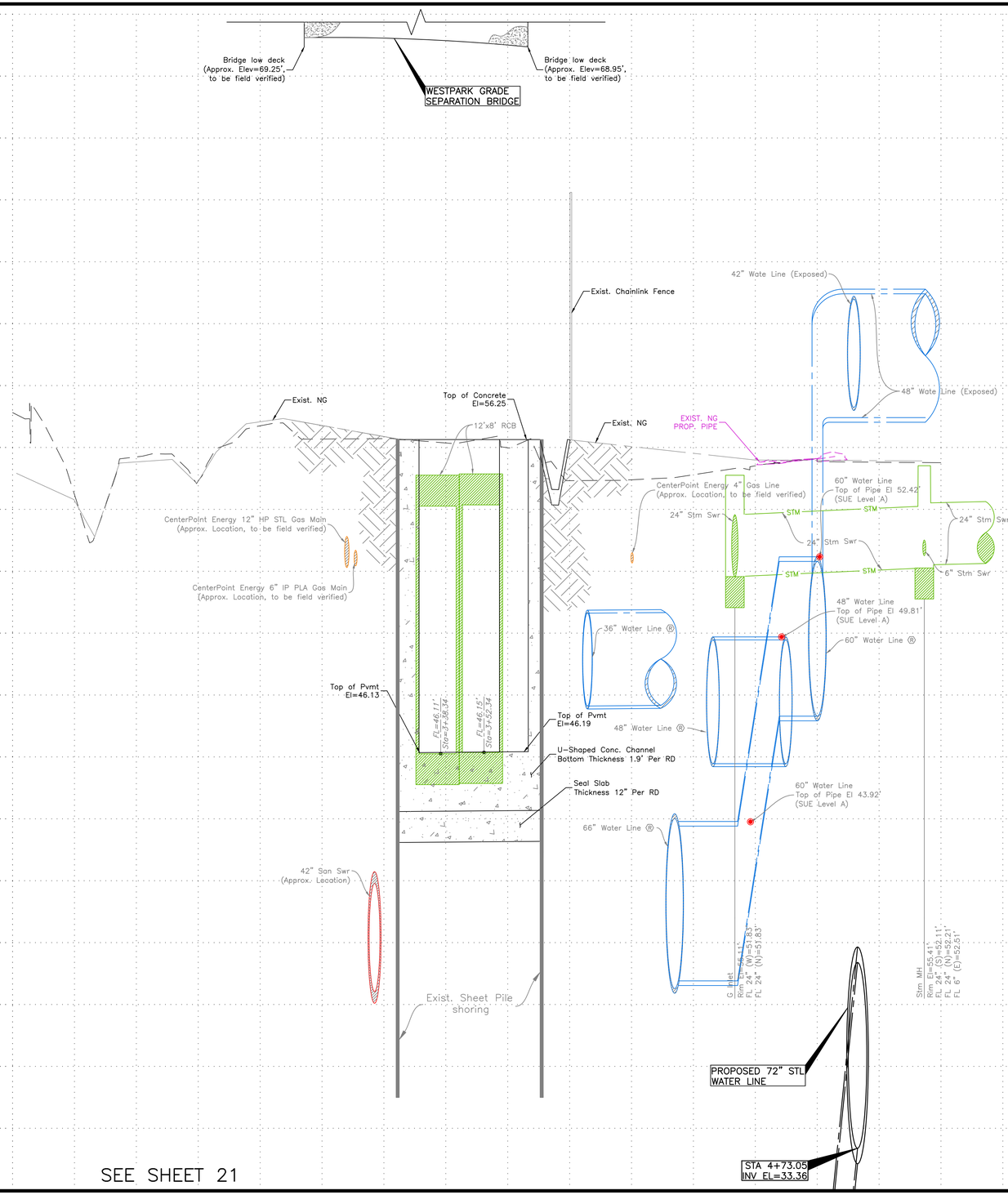
72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 2+00 TO STA 5+00
WESTPARK BRIDGE CROSSING

(SHEET 03 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 19 OF 169	

SEE SHEET 19 FOR PLAN VIEW



SEE SHEET 21

MATCH LINE ELEV. 32

2+00 3+00 4+00 5+00

HORIZ. 0' 10' 20' 40' 1"=20'

VERT. 0' 1' 2' 4' 1"=2'

NO.	DATE	REVISION	APP.

NOTES:

1. FOR UTILITIES ON PUMP STATION SITE, SEE PLAN VIEW.

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F-3691

TUNNELING DESIGN

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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

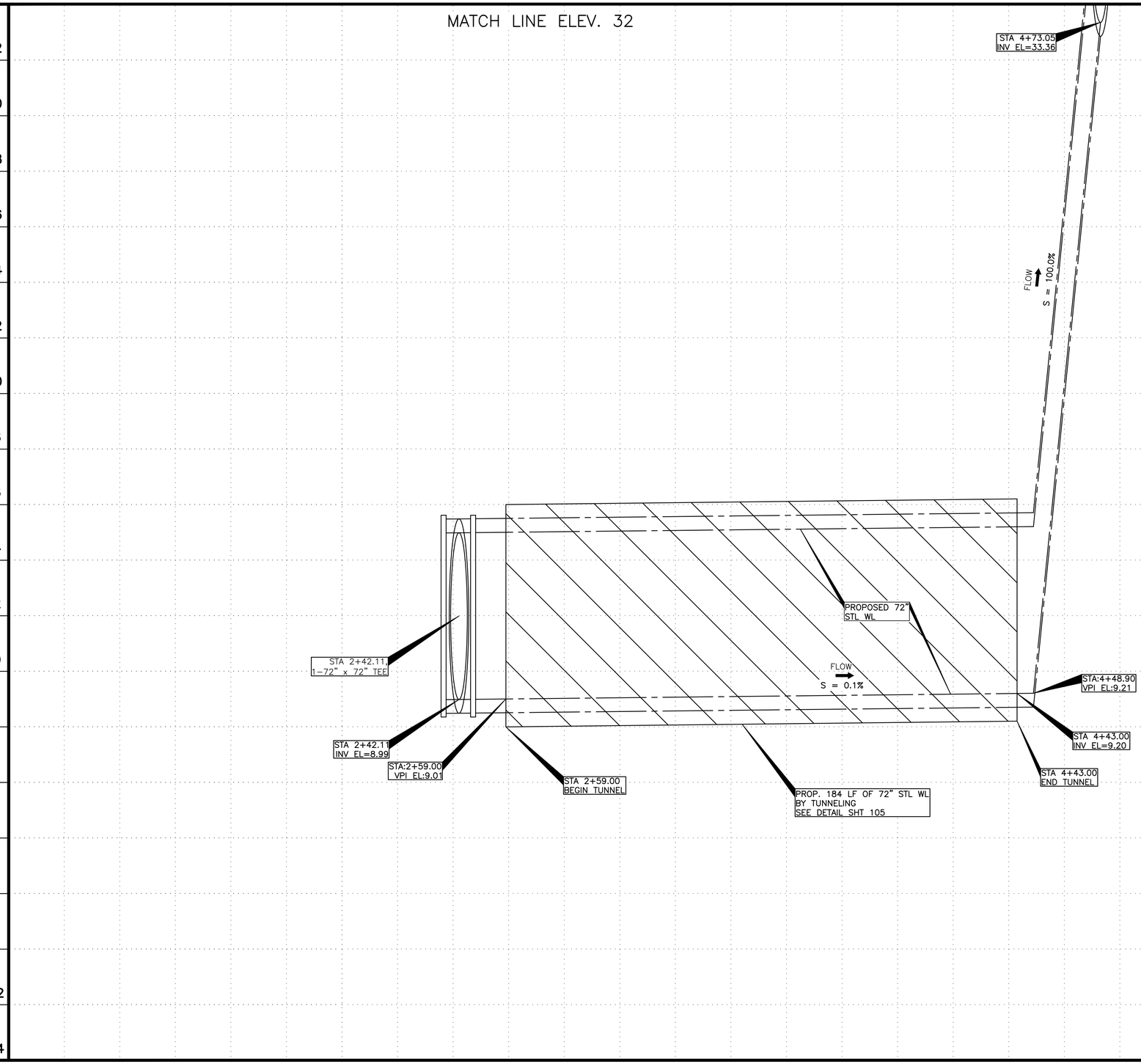
PROFILE VIEW
STA 2+00 TO STA 5+00
WESTPARK BRIDGE CROSSING

(SHEET 04 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 20 OF 169	

SEE SHEET 20

MATCH LINE ELEV. 32



SEE SHEET 19 FOR PLAN VIEW

HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

NOTES:

1. FOR UTILITIES ON PUMP STATION SITE, SEE PLAN VIEW.

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F-3691

TUNNELING DESIGN

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF BRENT LINDELOF, TX PE# 117075. NOT FOR BIDDING, PERMIT, OR CONSTRUCTION PURPOSES.

NOTICE:

FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS SIGNATURE DOES NOT FULFILL YOUR OBLIGATION TO CALL 811

VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF JAIPAL MUSKU, TX PE# 108774. NOT FOR BIDDING, PERMIT, OR CONSTRUCTION PURPOSES.

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

CITY OF HOUSTON

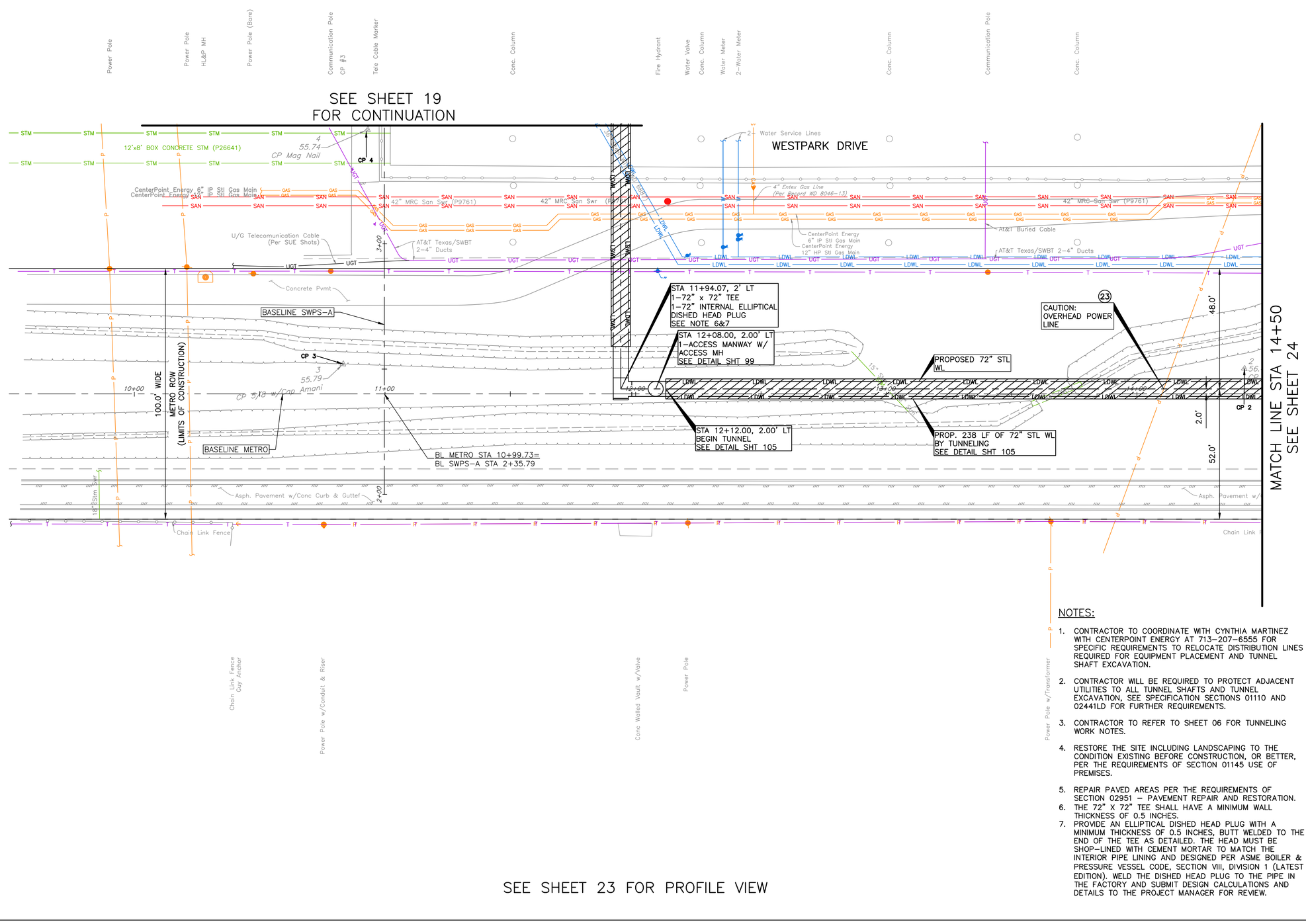
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 2+00 TO STA 5+00
WESTPARK BRIDGE CROSSING

(SHEET 05 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 21 OF 169	



SEE SHEET 23 FOR PROFILE VIEW

TBM:
CP– 02 AT STA 14+42.89
10.06' RT, EL. 56.46
CP– 03 AT STA 10+83.25
11.90' LT, EL. 55.79
CP– 04 AT STA 10+93.08
105.45' LT, EL. 55.74

N

HORIZ. 0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

( ) CRITICAL LOCATE PER COH SPEC 02317.

(XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256–7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

NOTES:

1. CONTRACTOR TO COORDINATE WITH CYNTHIA MARTINEZ WITH CENTERPOINT ENERGY AT 713–207–6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
2. CONTRACTOR WILL BE REQUIRED TO PROTECT ADJACENT UTILITIES TO ALL TUNNEL SHAFTS AND TUNNEL EXCAVATION, SEE SPECIFICATION SECTIONS 01110 AND 02441LD FOR FURTHER REQUIREMENTS.
3. CONTRACTOR TO REFER TO SHEET 06 FOR TUNNELING WORK NOTES.
4. RESTORE THE SITE INCLUDING LANDSCAPING TO THE CONDITION EXISTING BEFORE CONSTRUCTION, OR BETTER, PER THE REQUIREMENTS OF SECTION 01145 USE OF PREMISES.
5. REPAIR PAVED AREAS PER THE REQUIREMENTS OF SECTION 02951 – PAVEMENT REPAIR AND RESTORATION.
6. THE 72" X 72" TEE SHALL HAVE A MINIMUM WALL THICKNESS OF 0.5 INCHES.
7. PROVIDE AN ELLIPTICAL DISHED HEAD PLUG WITH A MINIMUM THICKNESS OF 0.5 INCHES, BUTT WELDED TO THE END OF THE TEE AS DETAILED. THE HEAD MUST BE SHOP–LINED WITH CEMENT MORTAR TO MATCH THE INTERIOR PIPE LINING AND DESIGNED PER ASME BOILER & PRESSURE VESSEL CODE, SECTION VIII, DIVISION 1 (LATEST EDITION). WELD THE DISHED HEAD PLUG TO THE PIPE IN THE FACTORY AND SUBMIT DESIGN CALCULATIONS AND DETAILS TO THE PROJECT MANAGER FOR REVIEW.

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE,
3RD FLOOR HOUSTON, TX 77065
281–994–7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F–3691

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VERIFICATION OF PRIVATE UTILITY LINES

Date

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Signature valid for six months.

Date

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Date

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Signature valid for one year.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713–953–4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F–533

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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P–6329

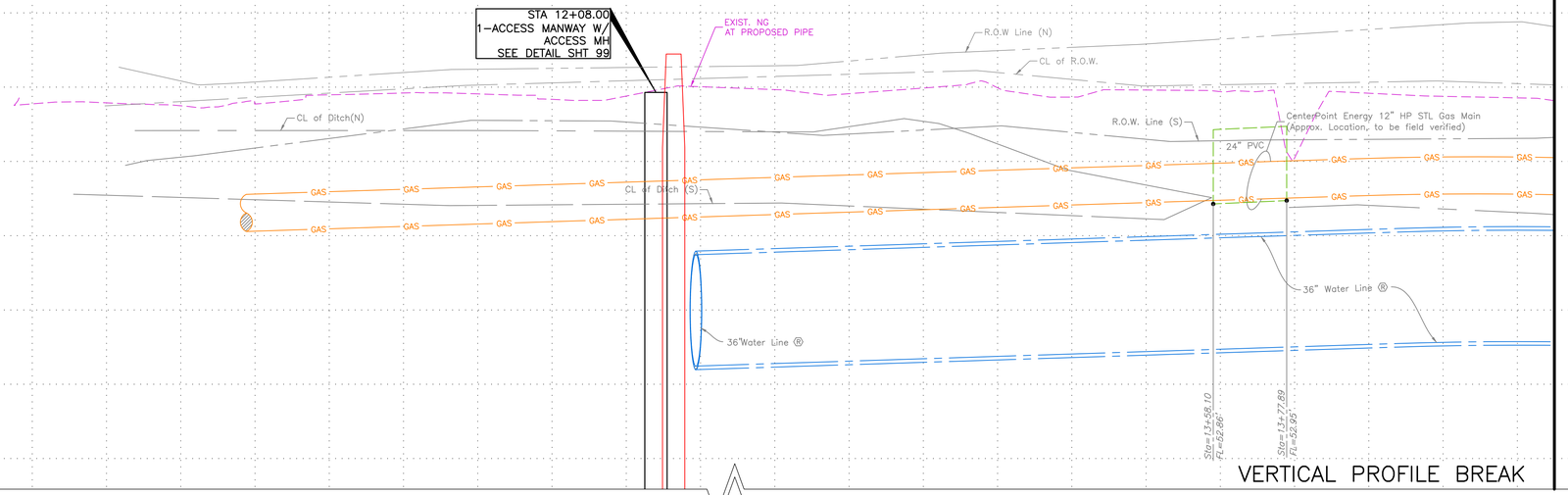
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

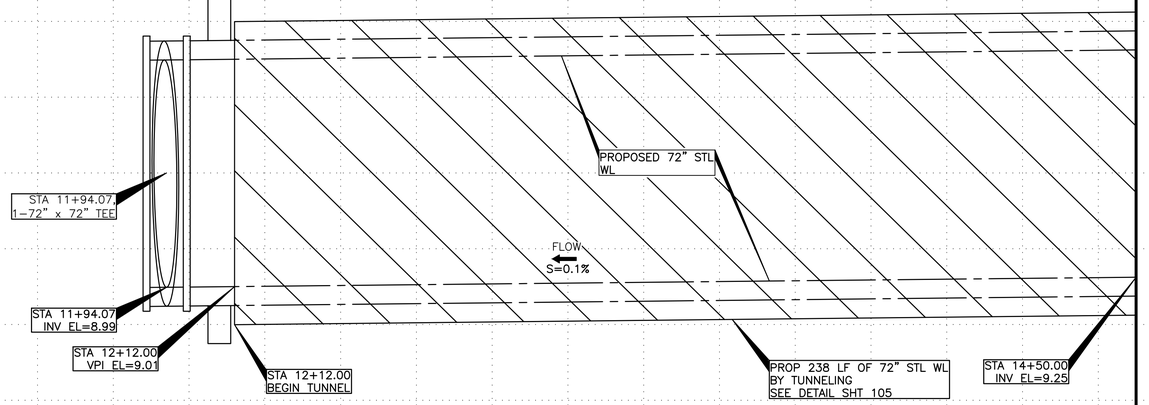
72–INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 10+00 TO STA 14+50
METRO WESTPARK DR ROW

(SHEET 06 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"–20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 22 OF 169	





10+00 11+00 12+00 13+00 14+00 14+50

HORIZ. 0' 10' 20' 40' 1"=20'

VERT. 0' 1' 2' 4' 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES 1999 2024 25
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F-3691

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Date

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Date

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HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

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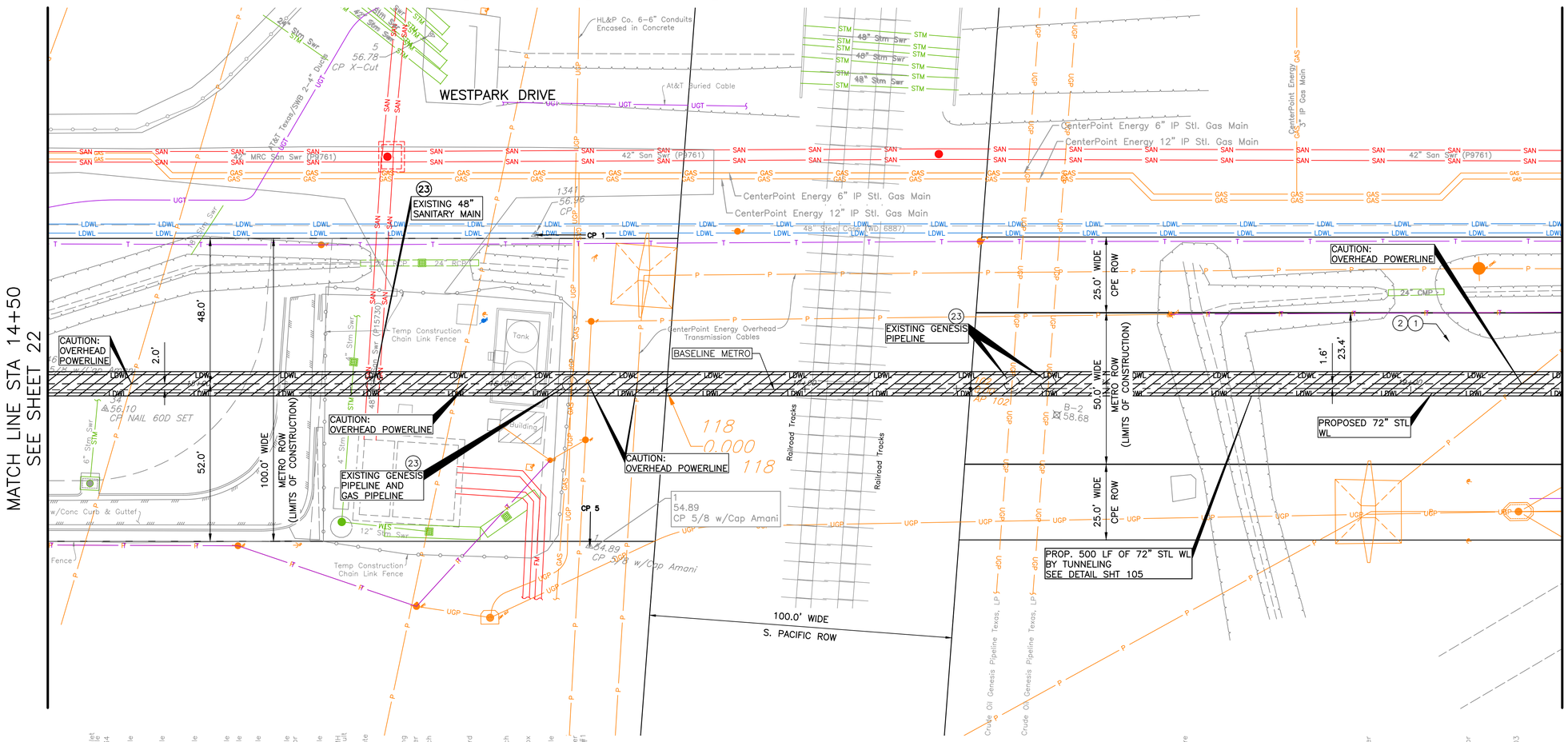
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 10+00 TO STA 14+50
METRO WESTPARK DR ROW

(SHEET 07 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 23 OF 169	



SEE SHEET 25 FOR PROFILE VIEW

NOTES:

1. CONTRACTOR TO COORDINATE WITH CYNTHIA MARTINEZ WITH CENTERPOINT ENERGY AT 713–207–6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
2. CONTRACTOR WILL BE REQUIRED TO PROTECT ADJACENT UTILITIES TO ALL TUNNEL SHAFTS AND TUNNEL EXCAVATION, SEE SPECIFICATION SECTIONS 01110 AND 02441LD FOR FURTHER REQUIREMENTS.
3. THE APPLICANT OR CONTRACTOR MUST CALL THE RAILROAD "CALL BEFORE YOU DIG"HOTLINE (1–800–336–9193) TO ARRANGE FOR A RAILROAD–SPECIFIC UNDERGROUND CABLE LOCATE OR EXPLORATION BEFORE ANY WORK OR EXCAVATION COMMENCES. THE CONTRACTOR SHALL COORDINATE ALL CONSTRUCTION ACTIVITIES DIRECTLY WITH UPRR. CONTACT KERIN BRISTOW AT 402–544–8536.
4. NO EXCAVATING OR OTHER CONSTRUCTION ACTIVITY SHALL BE CONDUCTED IN THE IMMEDIATE VICINITY OF THE PIPELINES IN THE ABSENCE OF A GENESIS REPRESENTATIVE. THE CONTRACTOR SHALL COORDINATE ALL CONSTRUCTION ACTIVITIES DIRECTLY WITH GENESIS ENERGY. CONTACT ROBERT FINDLEY AT ROBERT.FINDLEY@GENLP.COM
5. CONTRACTOR TO REFER TO SHEET 06 FOR TUNNELING WORK NOTES.
6. RESTORE THE SITE INCLUDING LANDSCAPING TO THE CONDITION EXISTING BEFORE CONSTRUCTION, OR BETTER, PER THE REQUIREMENTS OF SECTION 01145 USE OF PREMISES.

TBM:
CP– 01 AT STA 16+28.83
51.55' RT, EL. 54.89
CP– 05 AT STA 15+76.69
117.33' LT, EL. 56.78

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

( ) CRITICAL LOCATE PER COH SPEC 02317.

(XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256–7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281–994–7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F–3691

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VERIFICATION OF PRIVATE UTILITY LINES

Date

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Signature valid for six months.

Date

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Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713–953–4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F–533

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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P–6329

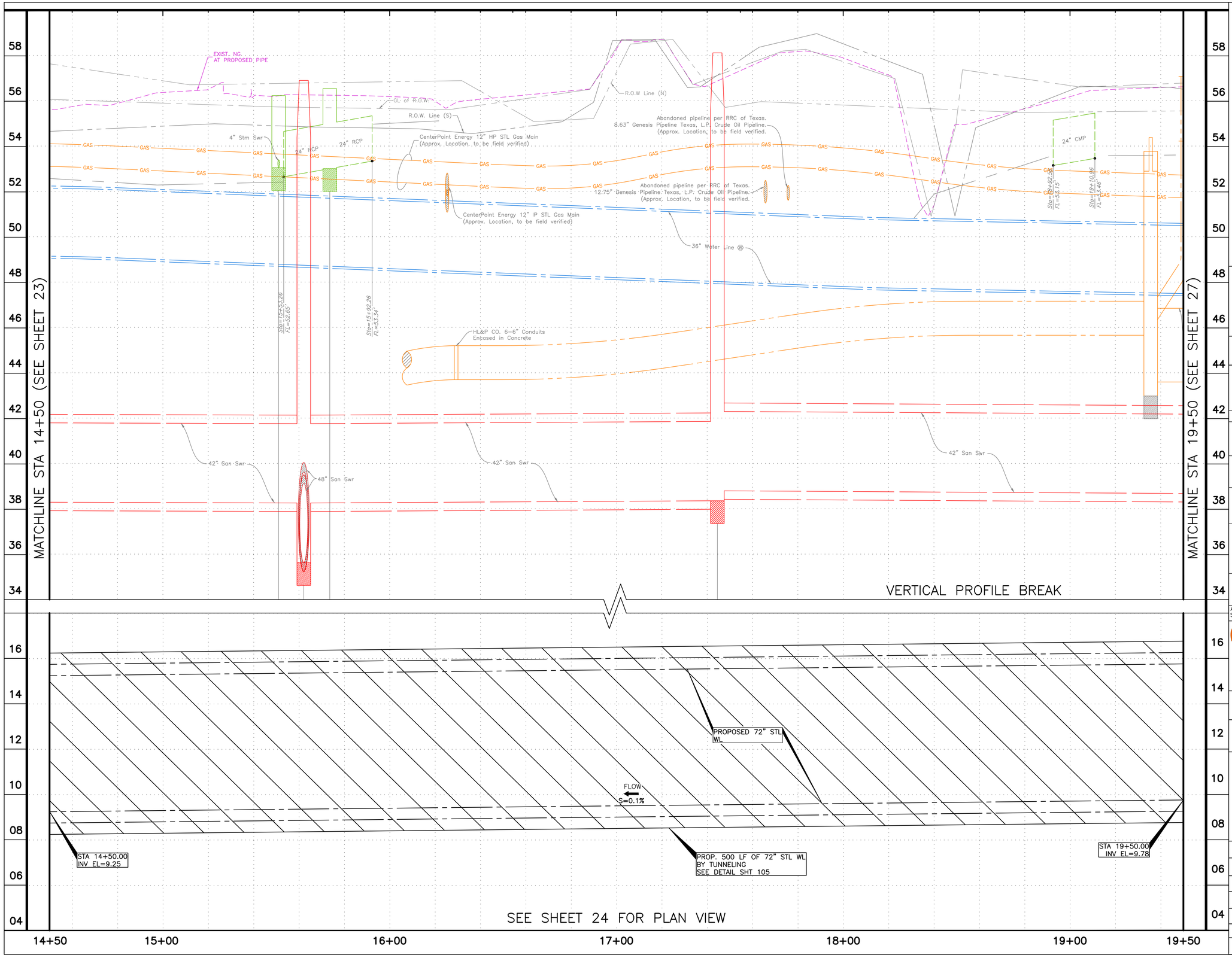
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 14+50 TO STA 19+50
METRO WESTPARK DR ROW

(SHEET 08 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"–20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 24 OF 169	



HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
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CITY OF HOUSTON

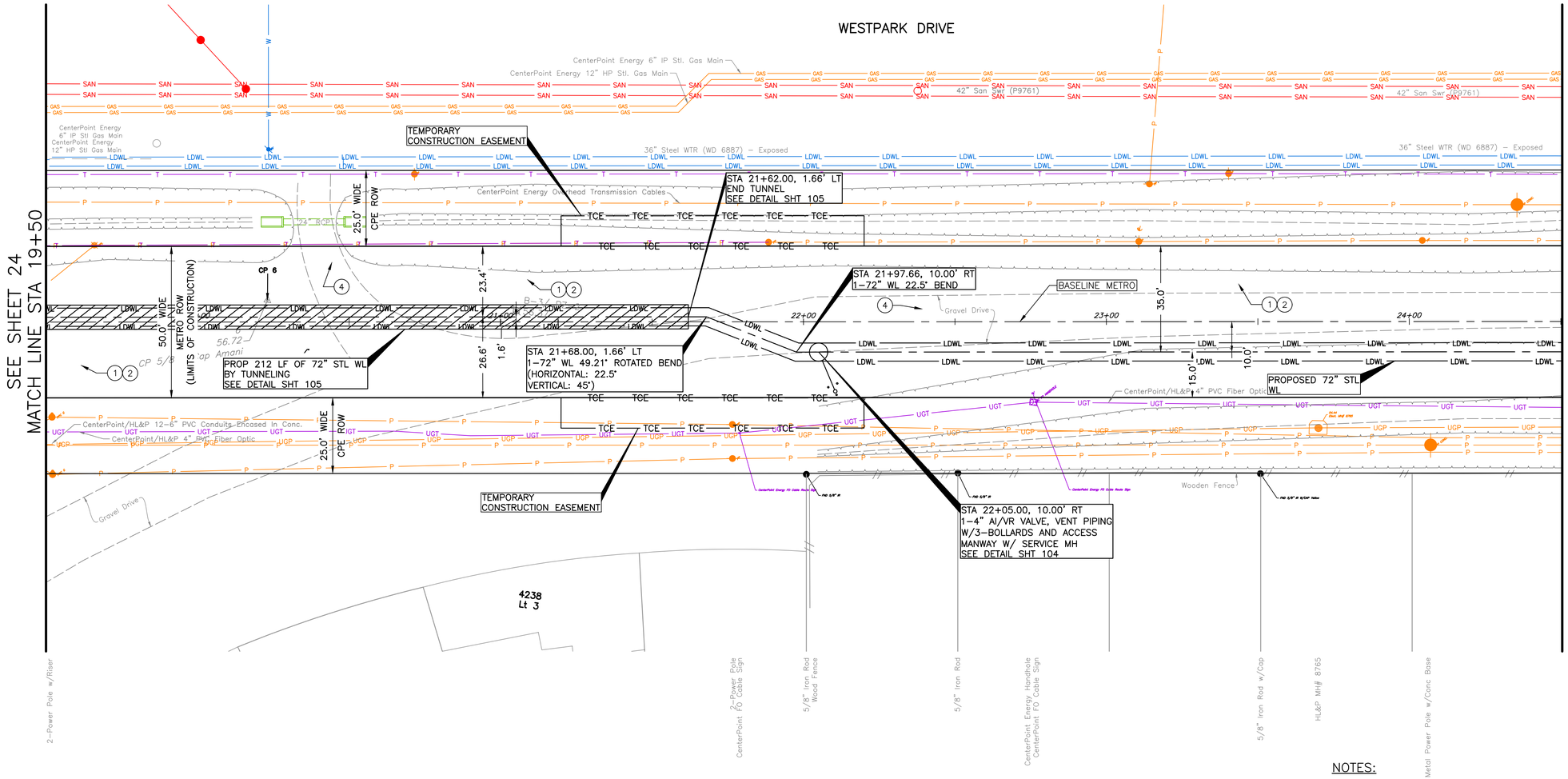
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 14+50 TO STA 19+50
METRO WESTPARK DR ROW

(SHEET 09 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 25 OF 169	



SEE SHEET 27 FOR PROFILE VIEW

TBM:
CP– 06 AT STA 20+23.08
7.14' LT, EL. 56.72

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

( ) CRITICAL LOCATE PER COH SPEC 02317.

(XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256–7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

BRIERLEY ASSOCIATES
Creating Space Underground
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713–953–4800 WWW.ARCADIS.COM
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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

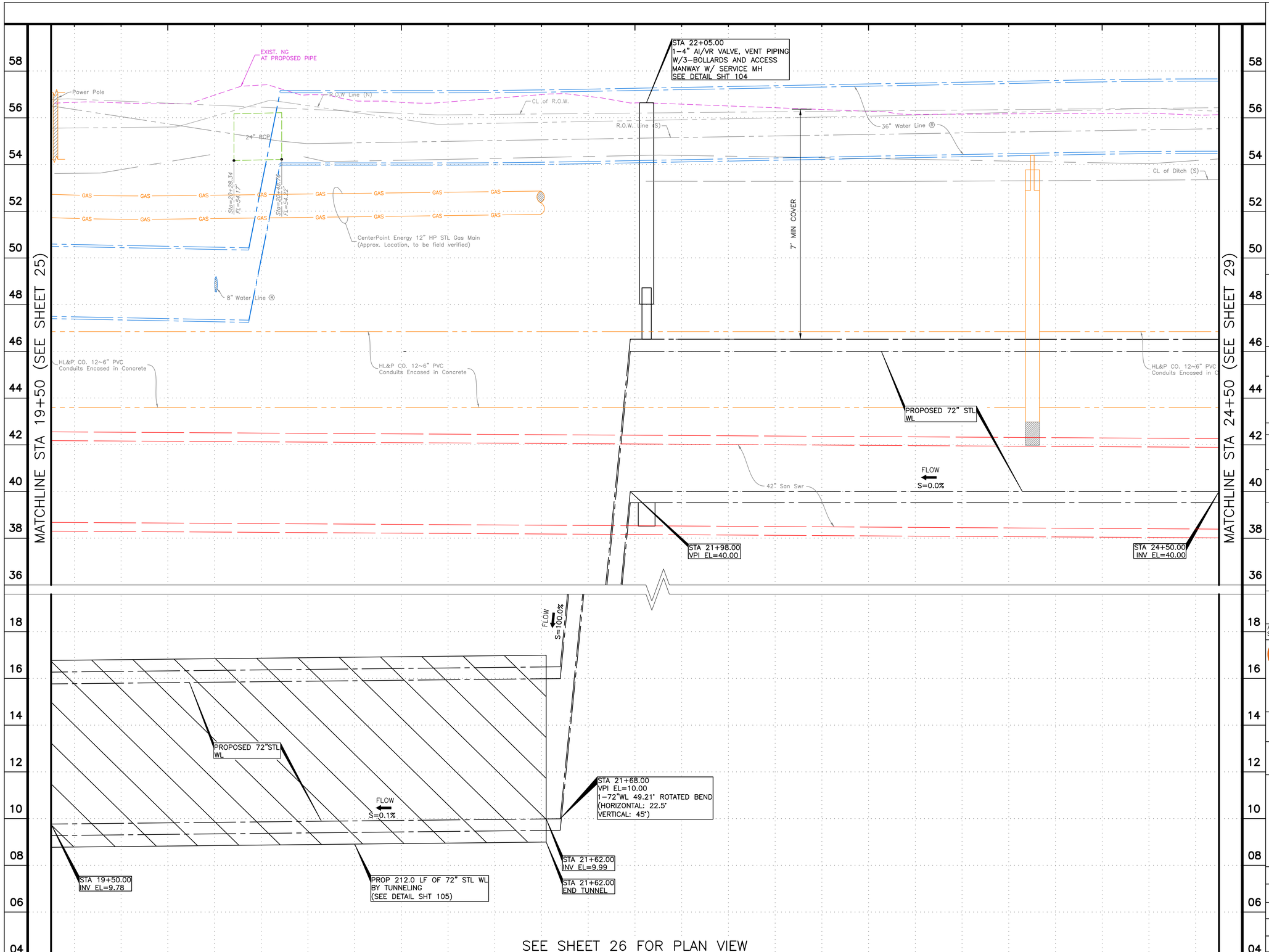
PLAN VIEW
STA 19+50 TO STA 24+50
METRO WESTPARK DR ROW

(SHEET 10 OF 69)

NOTES:

1. CONTRACTOR TO COORDINATE WITH CYNTHIA MARTINEZ WITH CENTERPOINT ENERGY AT 713–207–6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
2. RESTORE THE SITE INCLUDING LANDSCAPING TO THE CONDITION EXISTING BEFORE CONSTRUCTION, OR BETTER, PER THE REQUIREMENTS OF THE SECTION 01145 USE OF PREMISES.
3. REPAIR PAVED AREA AS PER THE REQUIREMENTS OF SECTION 02951 – PAVEMENT REPAIR AND RESTORATION.

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"–20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 26 OF 169	



HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

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Creating Space Underground
BRIERLEY ASSOCIATES
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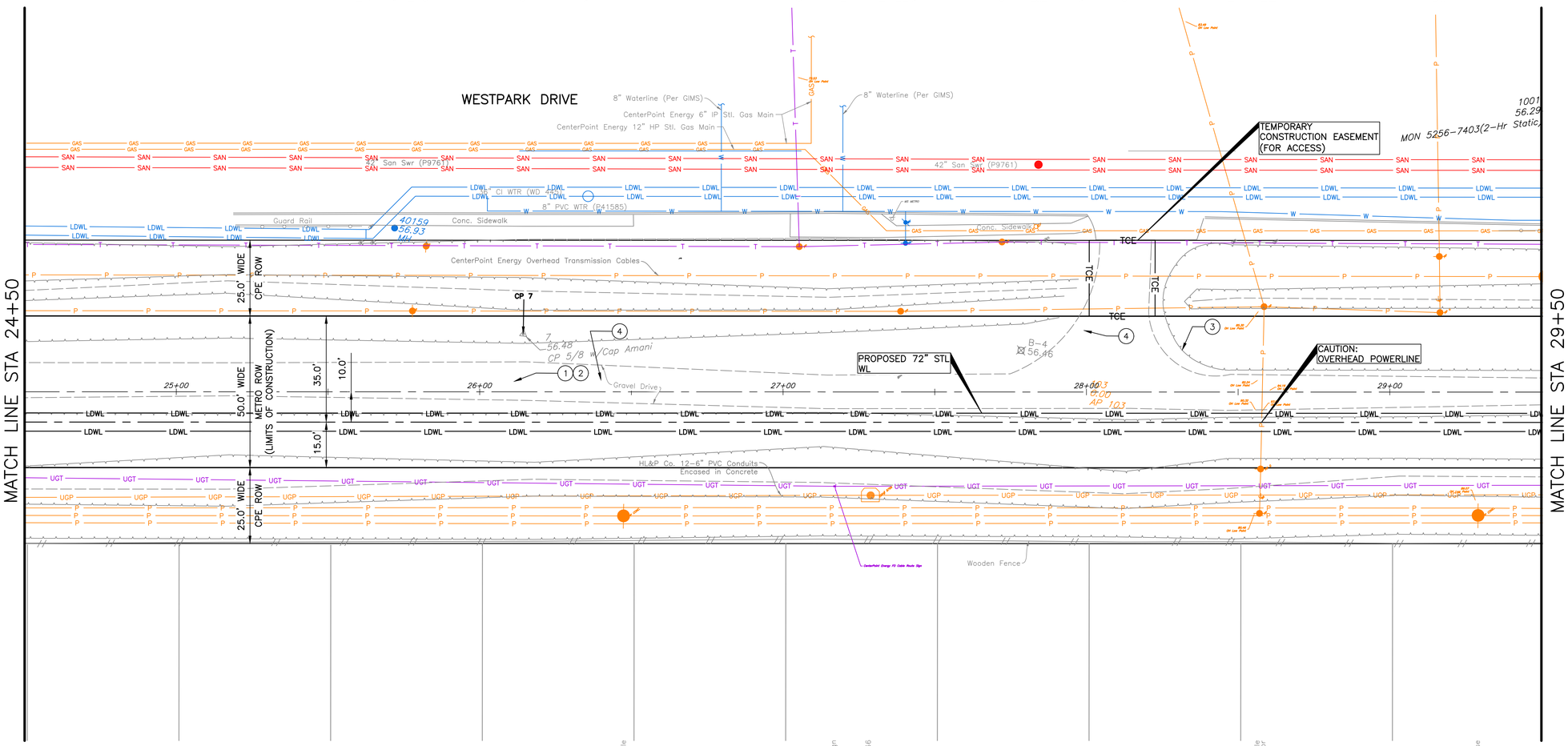
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 19+50 TO STA 24+50
METRO WESTPARK DR ROW

(SHEET 11 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 27 OF 169	



SEE SHEET 29 FOR PROFILE VIEW

TBM:
CP– 07 AT STA 26+14.40
19.05' LT, EL. 56.48

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

- ( ) CRITICAL LOCATE PER COH SPEC 02317.
- (XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256–7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

NOTES:

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ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713–953–4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F–533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P–6329

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF JAIPAL MUSKU, TX PE# 108774. NOT FOR BIDDING, PERMIT, OR CONSTRUCTION PURPOSES.

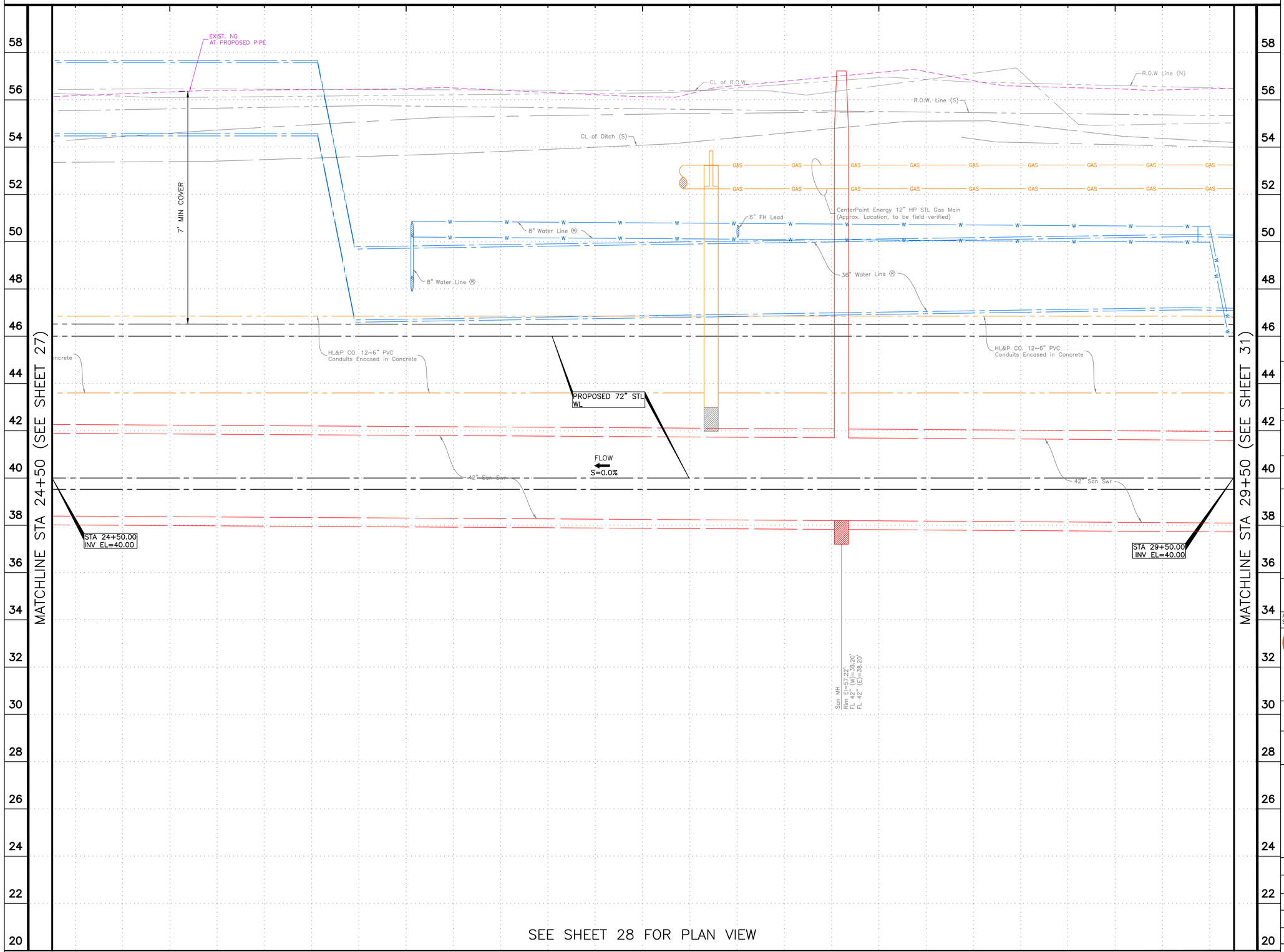
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 24+50 TO STA 29+50
METRO WESTPARK DR ROW

(SHEET 12 OF 66)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"–20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 28 OF 169	



HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

NOTICE:
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS SIGNATURE DOES NOT FULFILL YOUR OBLIGATION TO CALL 811

VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

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Signature valid for one year.

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 24+50 TO STA 29+50
METRO WESTPARK DR ROW

(SHEET 13 OF 66)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 29 OF 169	

TBM:
CP– 08 AT STA 32+11.45
12.60' LT, EL. 56.68

N

0' 10' 20' 40'
1"=20'

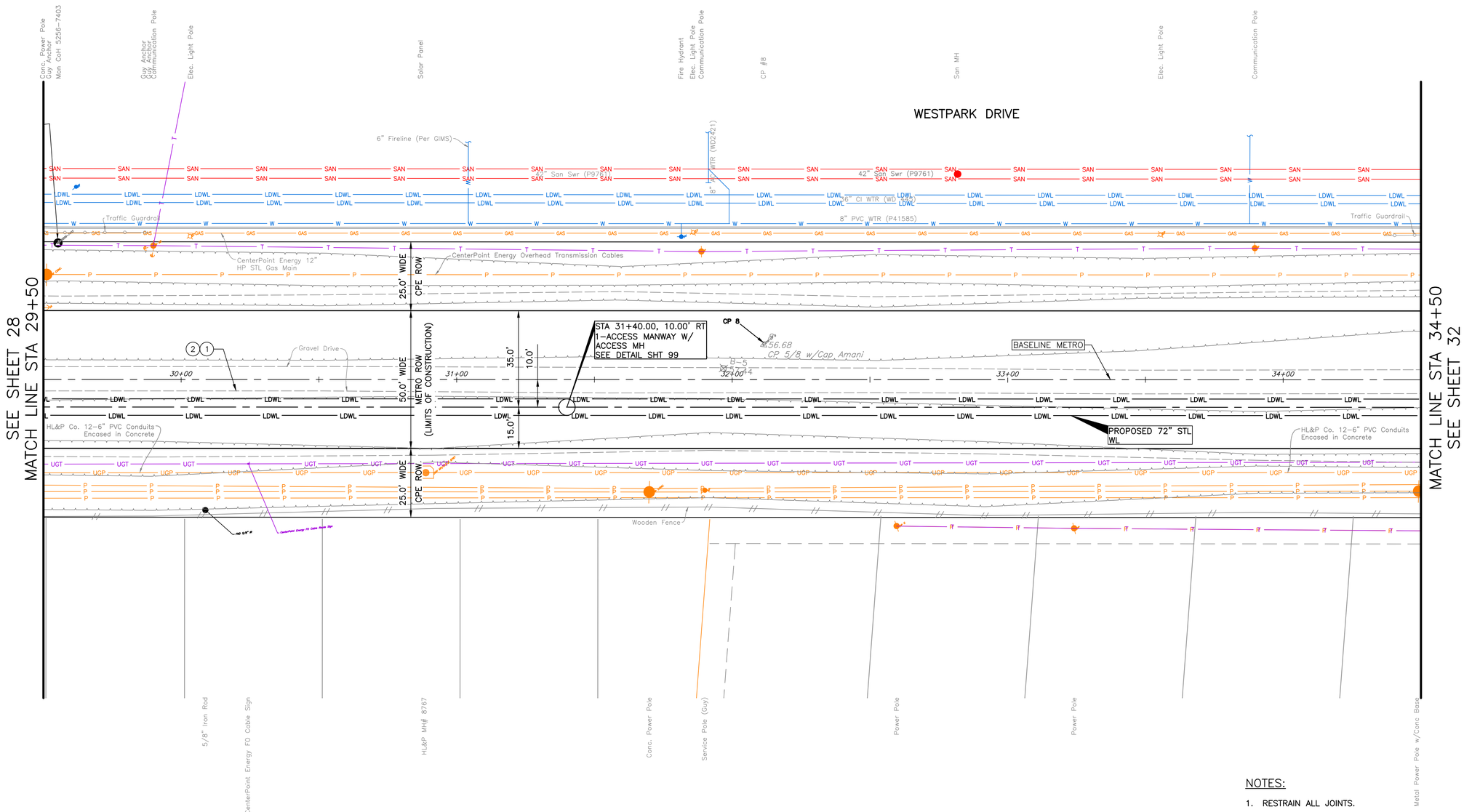
NO.	DATE	REVISION	APP.

LEGEND:

- CRITICAL LOCATE PER COH SPEC 02317.
- (XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256–7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)



SEE SHEET 31 FOR PROFILE VIEW

NOTES:

1. RESTRAIN ALL JOINTS.
2. CONTRACTOR TO COORDINATE WITH CYNTHIA MARTINEZ WITH CENTERPOINT ENERGY AT 713–207–6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
3. REPLACE OR RECONSTRUCT SITE AFFECTED OR ALTERED BY THE WORK IN PUBLIC OR PRIVATE PROPERTY, INCLUDING BUT NOT LIMITED TO PAVEMENT, DRIVEWAYS, SIDEWALKS, FENCES, AND LANDSCAPING PER THE REQUIREMENTS OF SECTION 01145 USE OF PREMISES, 01740 SITE RESTORATION, AND 02951 PAVEMENT REPAIR AND RESTORATION.

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Date

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Date

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FB NO. P–6329

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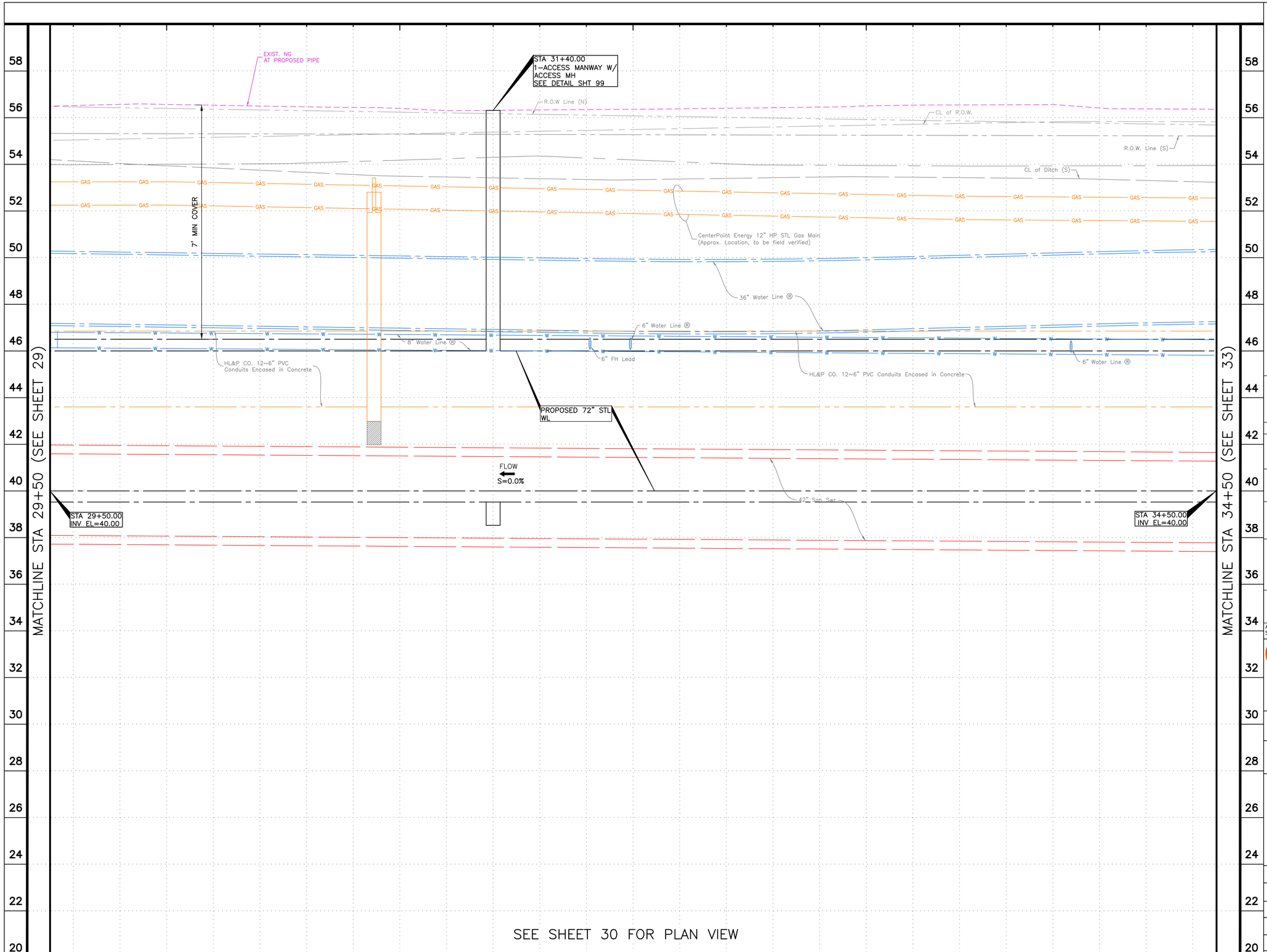
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 29+50 TO STA 34+50
METRO WESTPARK DR ROW

(SHEET 14 OF 66)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"–20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 30 OF 169	



HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

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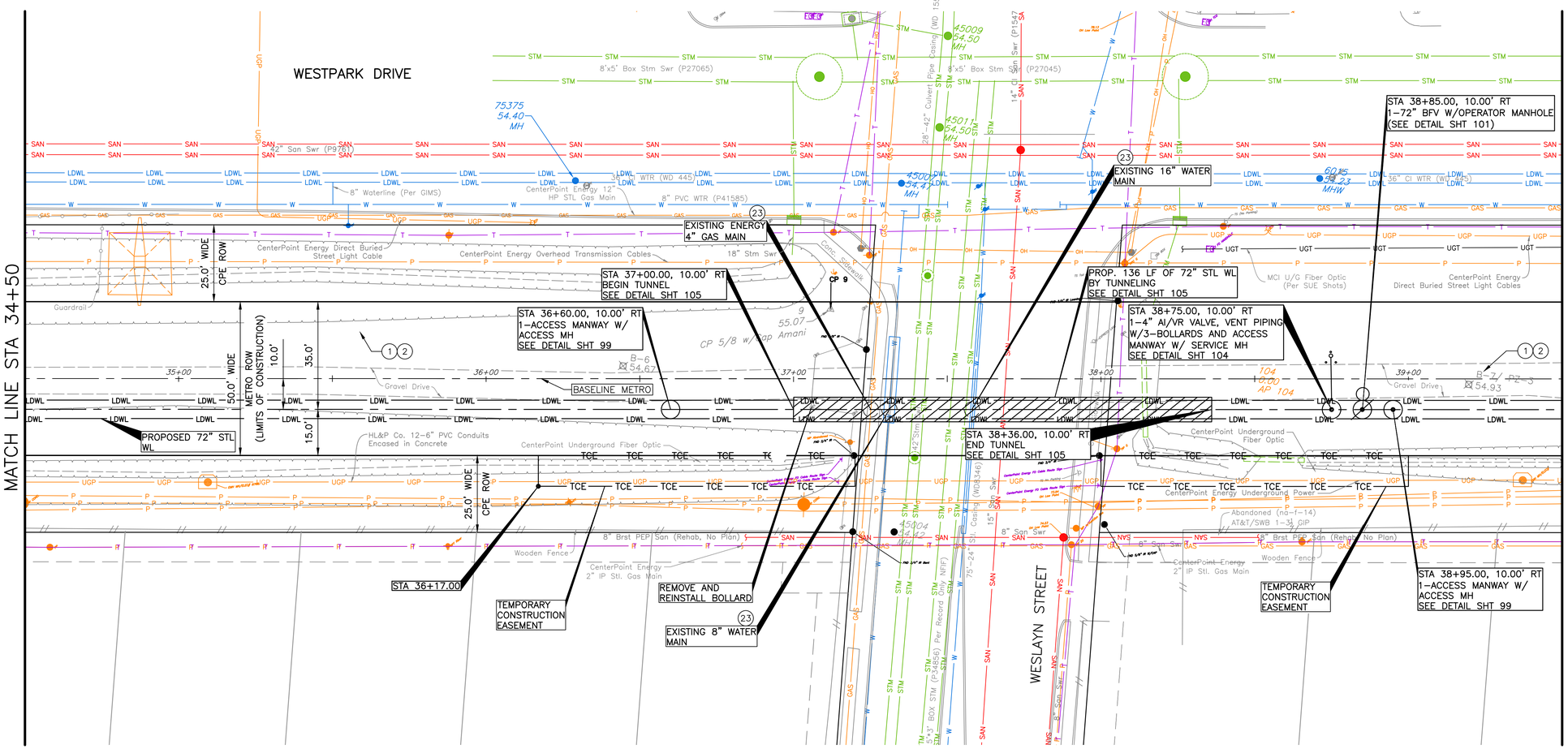
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 29+50 TO STA 34+50
METRO WESTPARK DR ROW

(SHEET 15 OF 66)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 31 OF 169	



SEE SHEET 33 FOR PROFILE VIEW

TBM:
CP– 09 AT STA 37+12.05
22.63' LT, EL. 55.07

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

( ) CRITICAL LOCATE PER COH SPEC 02317.

(XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256–7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

NOTES:

1. CONTRACTOR TO COORDINATE WITH CYNTHIA MARTINEZ WITH CENTERPOINT ENERGY AT 713–207–6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
2. CONTRACTOR WILL BE REQUIRED TO PROTECT ADJACENT UTILITIES TO ALL TUNNEL SHAFTS AND TUNNEL EXCAVATION, SEE SPECIFICATION SECTIONS 01110 AND 02441LD FOR FURTHER REQUIREMENTS.
3. CONTRACTOR TO REFER TO SHEET 06 FOR TUNNELING WORK NOTES.
4. THE DIMENSION REPRESENTS THE DISTANCE FROM THE STRUCTURE TO THE EDGE OF THE TRENCH FOR OPEN CUT OR OUTSIDE OF CASING FOR TUNNELING.
5. REPLACE OR RECONSTRUCT SITE AFFECTED OR ALTERED BY THE WORK IN PUBLIC OR PRIVATE PROPERTY, INCLUDING BUT NOT LIMITED TO PAVEMENT, DRIVEWAYS, SIDEWALKS, FENCES, AND LANDSCAPING PER THE REQUIREMENTS OF SECTION 01145 USE OF PREMISES, 01740 SITE RESTORATION, AND 02951 PAVEMENT REPAIR AND RESTORATION.

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281–994–7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F–3691

TUNNELING DESIGN

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF BRENT LINDELOF, TX PE# 117075. NOT FOR BIDDING, PERMIT, OR CONSTRUCTION PURPOSES.

NOTICE:
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VERIFICATION OF PRIVATE UTILITY LINES

Date

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Signature valid for six months.

Date

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Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713–953–4800 WWW.ARCADIS.COM
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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P–6329

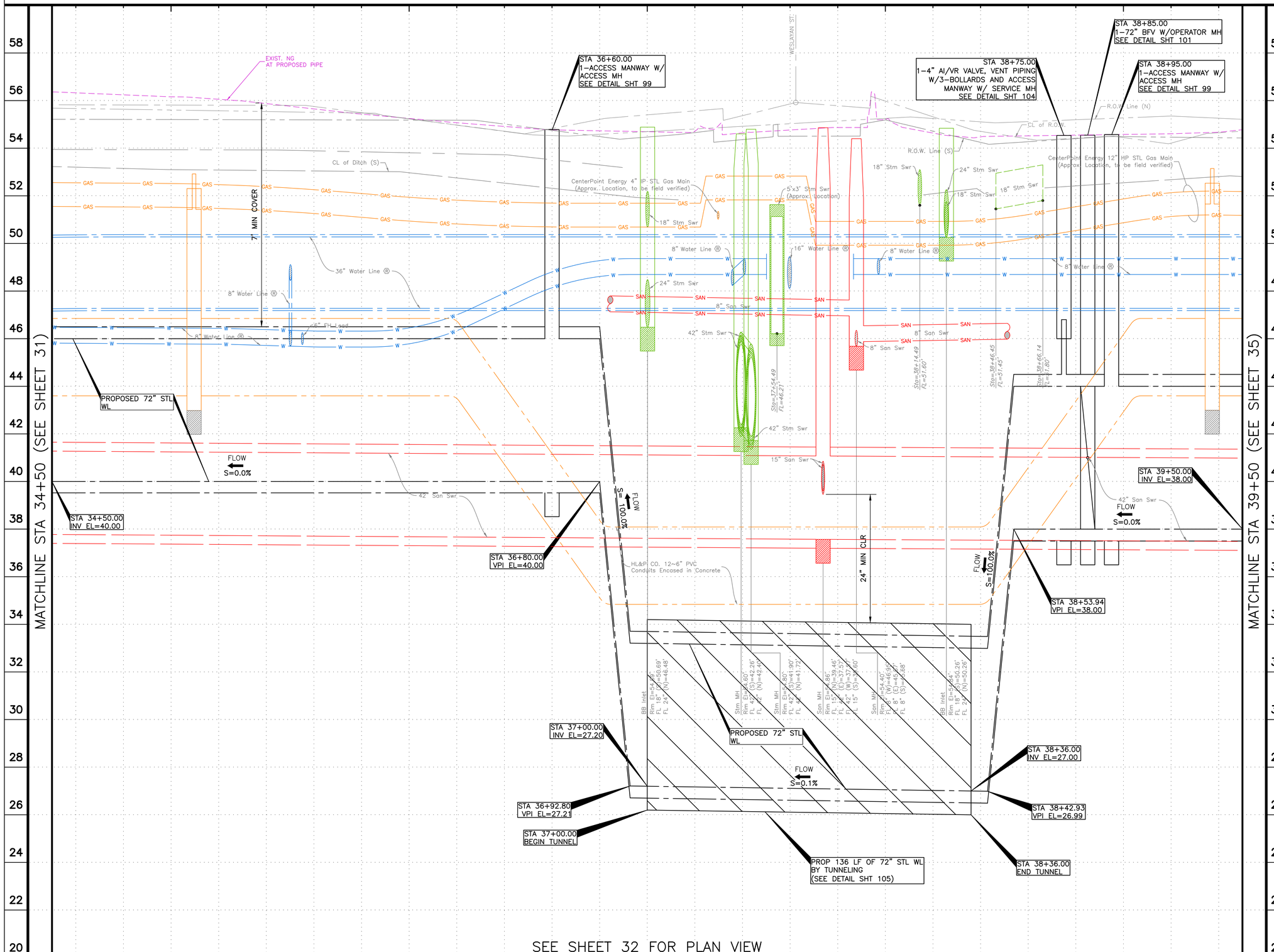
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 34+50 TO STA 39+50
METRO WESTPARK DR ROW
& WESLAYAN ST

(SHEET 16 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"–20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 32 OF 169	



SEE SHEET 32 FOR PLAN VIEW

HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
1300 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F-3691

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 34+50 TO STA 39+50
METRO WESTPARK DR ROW
& WESLAYAN ST

(SHEET 17 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 33 OF 169	

TBM:
CP– 10 AT STA 42+13.84
13.84' LT, EL. 55.01

N

0' 10' 20' 40'
1"=20'

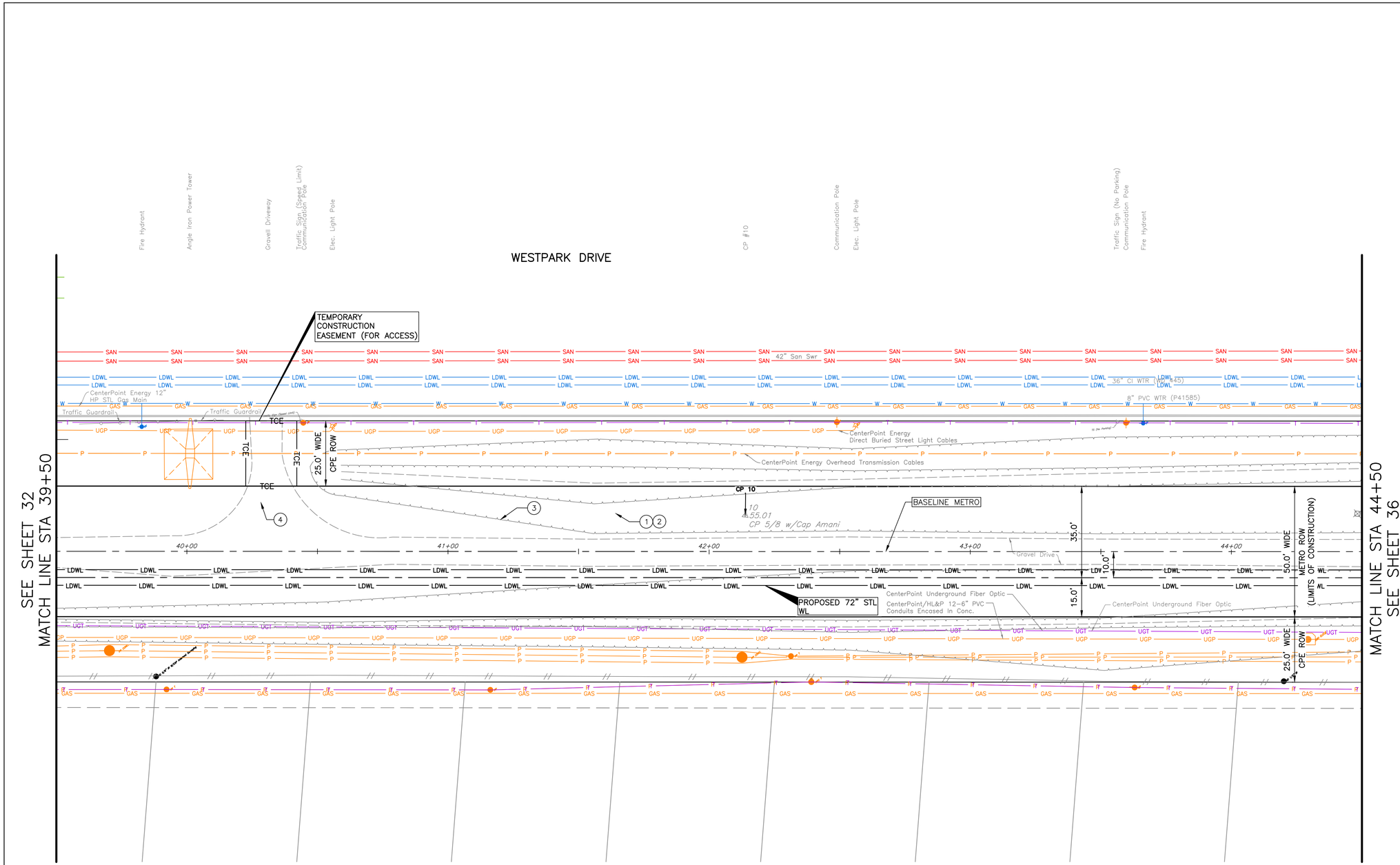
NO.	DATE	REVISION	APP.

LEGEND:

- CRITICAL LOCATE PER COH SPEC 02317.
- (XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256–7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)



SEE SHEET 35 FOR PROFILE VIEW

NOTES:

1. RESTRAIN ALL JOINTS.
2. CONTRACTOR TO COORDINATE WITH CYNTHIA MARTINEZ WITH CENTERPOINT ENERGY AT 713–207–6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
3. THE DIMENSION REPRESENTS THE DISTANCE FROM THE STRUCTURE TO THE EDGE OF THE TRENCH FOR OPEN CUT OR OUTSIDE OF CASING FOR TUNNELING.
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Date

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Date

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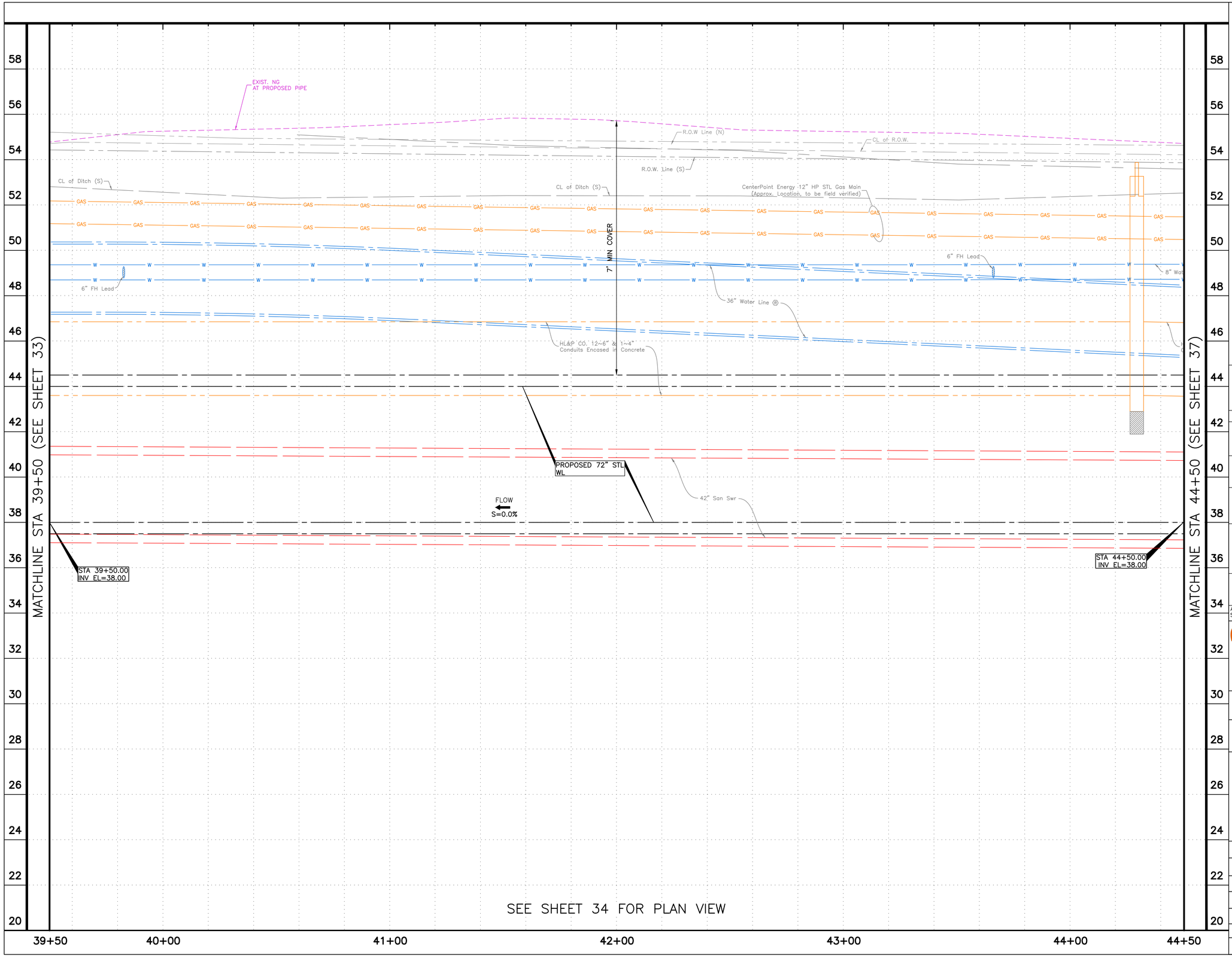
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 39+50 TO STA 44+50
METRO WESTPARK DR ROW

(SHEET 18 OF 66)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"–20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 34 OF 169	



SEE SHEET 34 FOR PLAN VIEW

HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

NOTICE:

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CITY OF HOUSTON

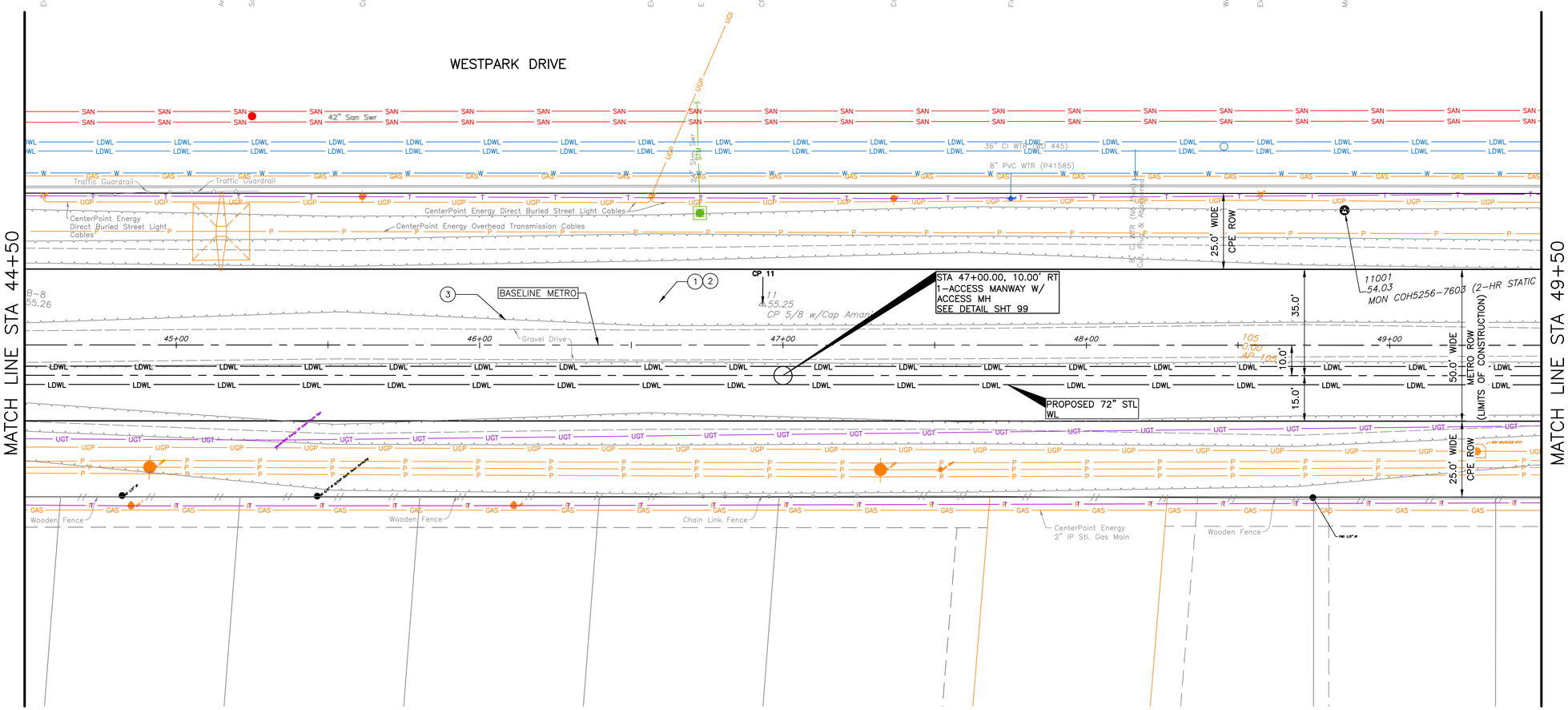
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 39+50 TO STA 44+50
METRO WESTPARK DR ROW

(SHEET 19 OF 66)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 35 OF 169	



SEE SHEET 37 FOR PROFILE VIEW

TBM:
CP- 11 AT STA 46+93.26
13.52' LT, EL. 55.25

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

- ◌ CRITICAL LOCATE PER COH SPEC 02317.
- (XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
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NOTES:

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TBPE REGISTRATION NO. F-533

SURVEYED BY:
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FB NO. P-6329

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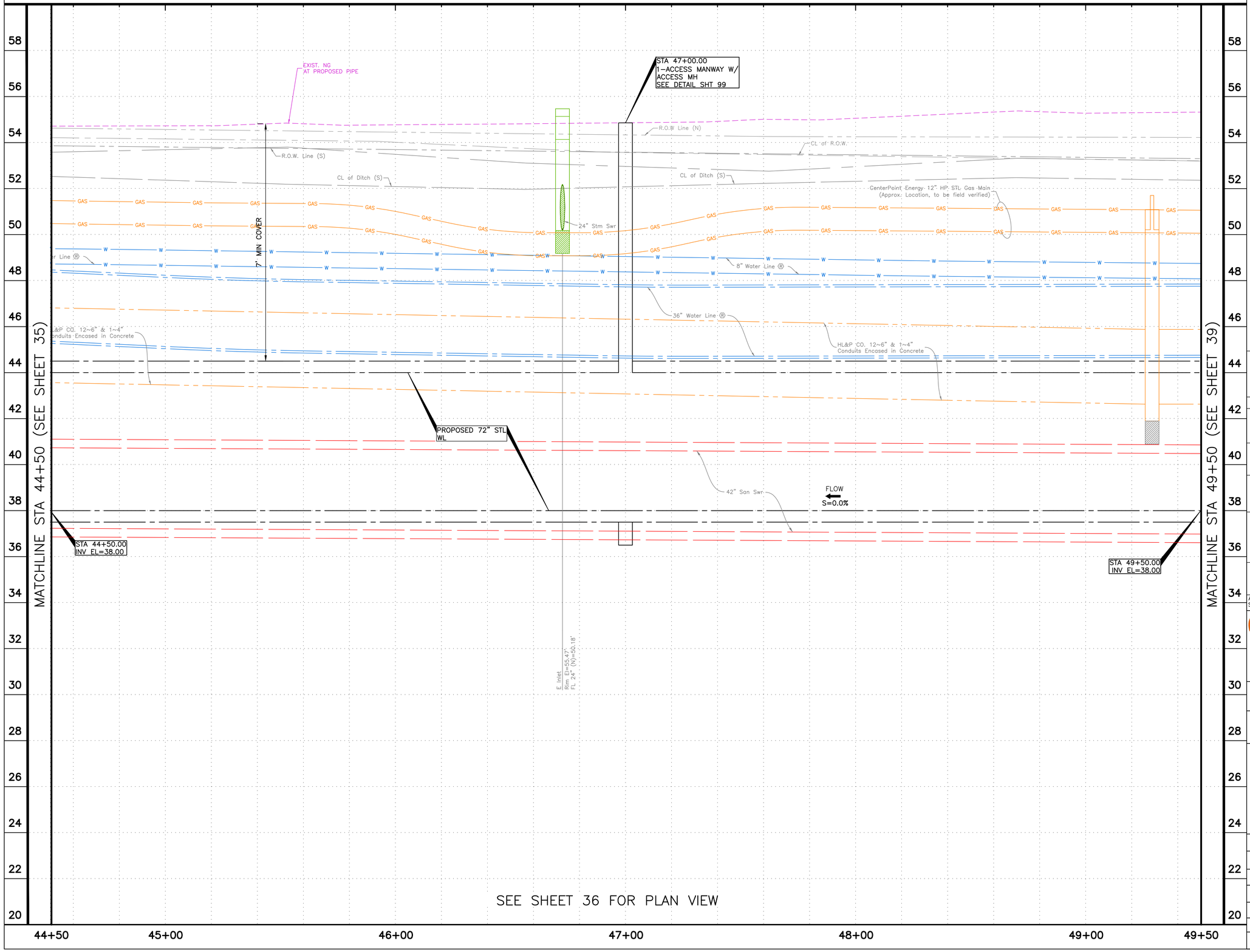
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 44+50 TO STA 49+50
METRO WESTPARK DR ROW

(SHEET 20 OF 66)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 36 OF 169	



HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

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Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

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CITY OF HOUSTON

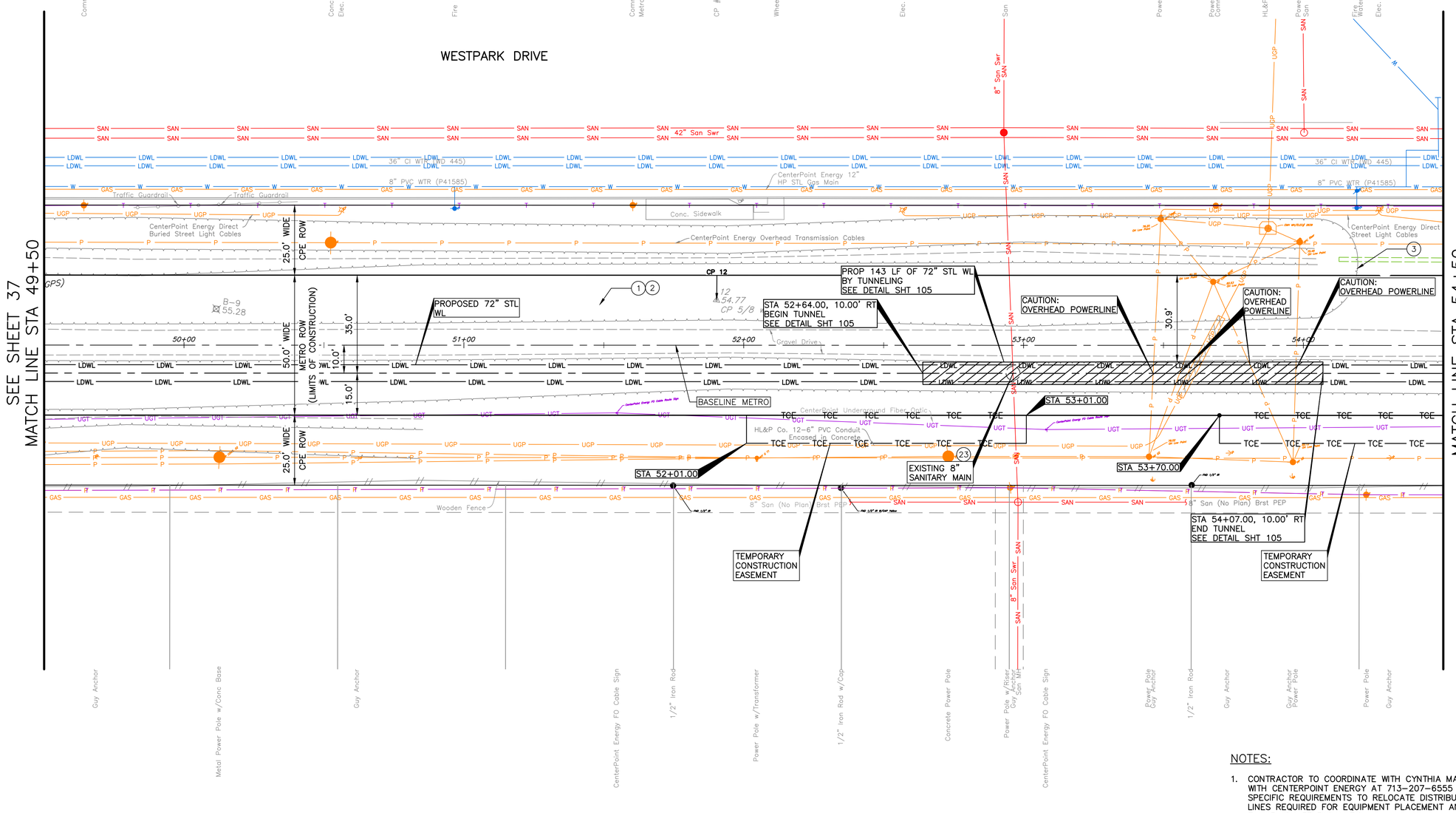
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 44+50 TO STA 49+50
METRO WESTPARK DR ROW

(SHEET 21 OF 66)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 37 OF 169	



SEE SHEET 39 FOR PROFILE VIEW

TBM:
CP– 12 AT STA 51+90.31
16.12' LT, EL. 54.77

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

- CRITICAL LOCATE PER COH SPEC 02317.
- (XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256–7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

NOTES:

1. CONTRACTOR TO COORDINATE WITH CYNTHIA MARTINEZ WITH CENTERPOINT ENERGY AT 713–207–6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
2. REPLACE OR RECONSTRUCT SITE AFFECTED OR ALTERED BY THE WORK IN PUBLIC OR PRIVATE PROPERTY, INCLUDING BUT NOT LIMITED TO PAVEMENT, DRIVEWAYS, SIDEWALKS, FENCES, AND LANDSCAPING PER THE REQUIREMENTS OF SECTION 01145 USE OF PREMISES, 01740 SITE RESTORATION, AND 02951 PAVEMENT REPAIR AND RESTORATION.

NOTICE:
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VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713–953–4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F–533

SURVEYED BY:
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FB NO. P–6329

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CITY OF HOUSTON

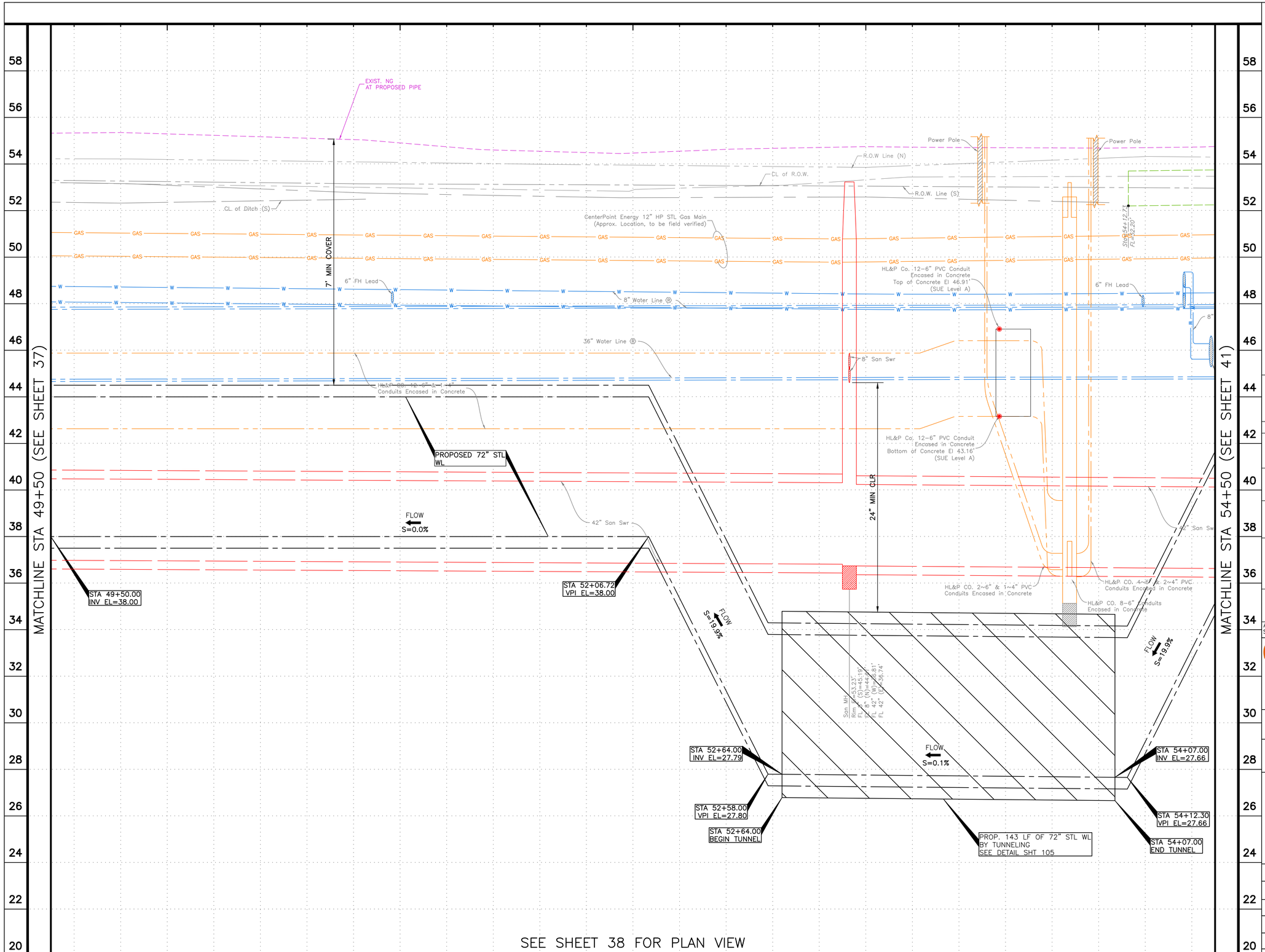
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 49+50 TO STA 54+50
METRO WESTPARK DR ROW

(SHEET 22 OF 66)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"–20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 38 OF 169	



HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

NOTICE:
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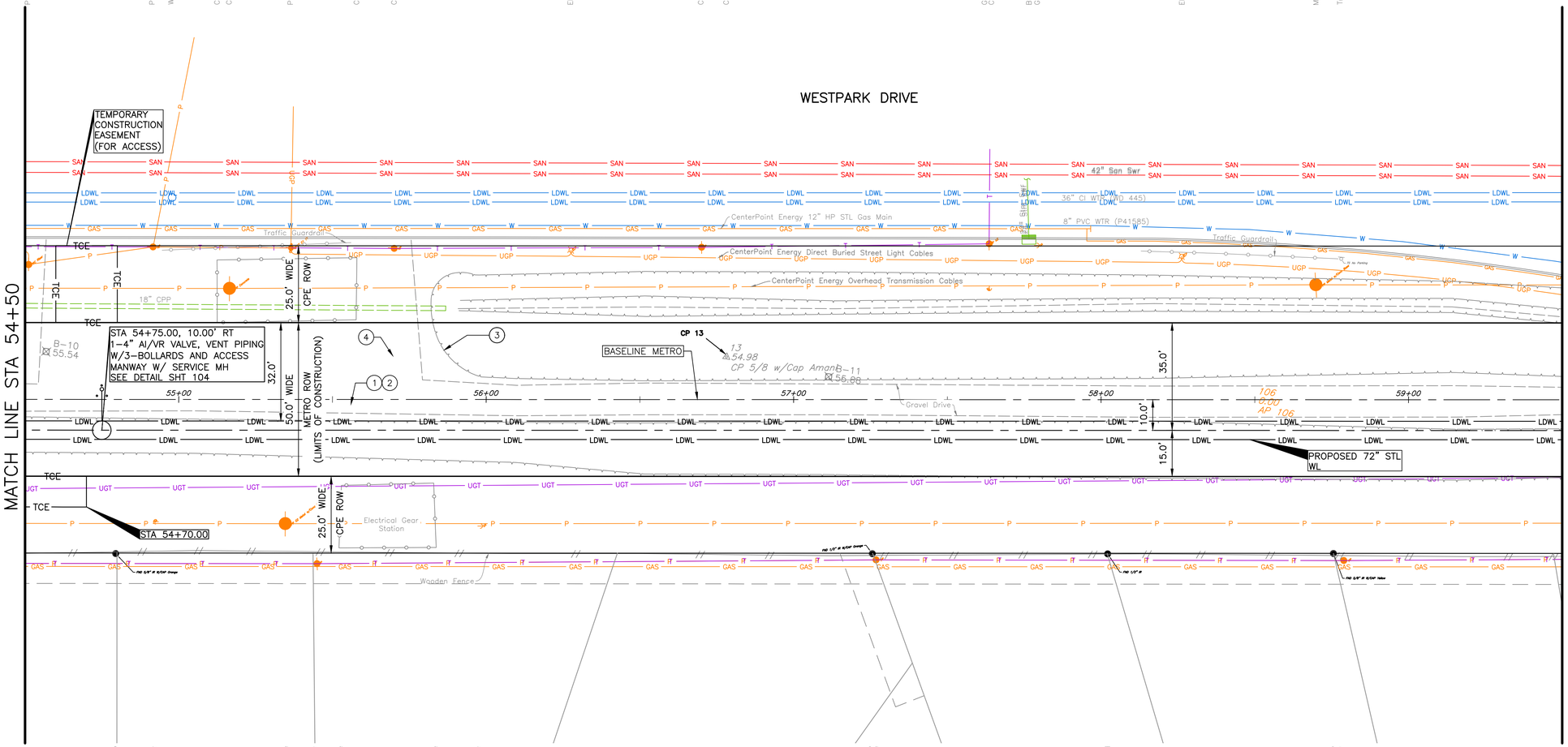
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 49+50 TO STA 54+50
METRO WESTPARK DR ROW

(SHEET 23 OF 66)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 39 OF 169	



SEE SHEET 41 FOR PROFILE VIEW

TBM:
CP- 13 AT STA 56+78.14
13.87' LT, EL. 54.98

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

( ) CRITICAL LOCATE PER COH SPEC 02317.

(XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256-7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F-3691

TUNNELING DESIGN
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Date

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Date

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Signature valid for one year.

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HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

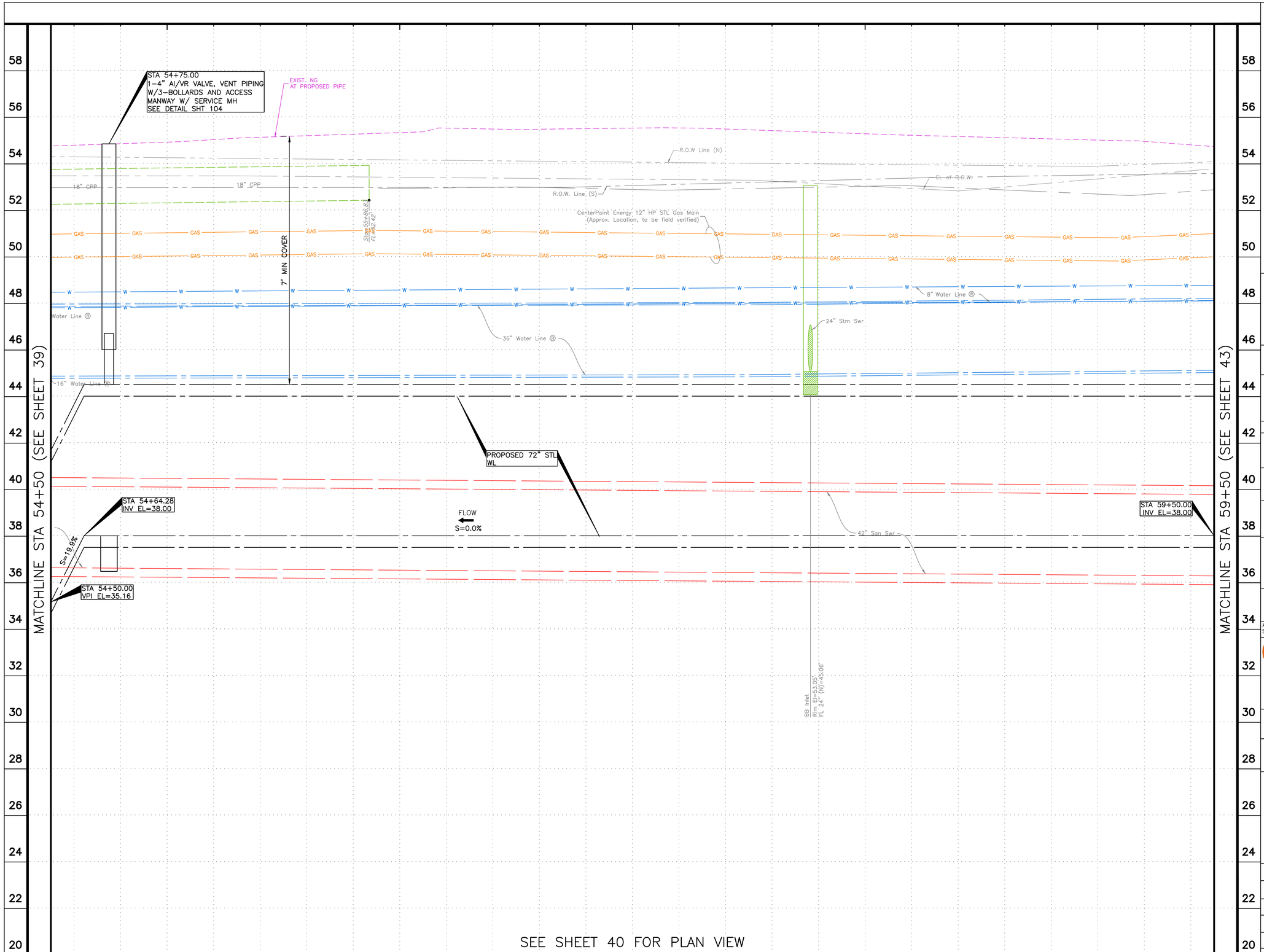
PLAN VIEW
STA 54+50 TO STA 59+50
METRO WESTPARK DR ROW

(SHEET 24 OF 69)

NOTES:

1. CONTRACTOR TO COORDINATE WITH CYNTHIA MARTINEZ WITH CENTERPOINT ENERGY AT 713-207-6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
2. REPLACE OR RECONSTRUCT SITE AFFECTED OR ALTERED BY THE WORK IN PUBLIC OR PRIVATE PROPERTY, INCLUDING BUT NOT LIMITED TO PAVEMENT, DRIVEWAYS, SIDEWALKS, FENCES, AND LANDSCAPING PER THE REQUIREMENTS OF SECTION 01145 USE OF PREMISES, 01740 SITE RESTORATION, AND 02951 PAVEMENT REPAIR AND RESTORATION.

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 40 OF 169	



SEE SHEET 40 FOR PLAN VIEW

HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F-3691

TUNNELING DESIGN

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VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

CITY OF HOUSTON

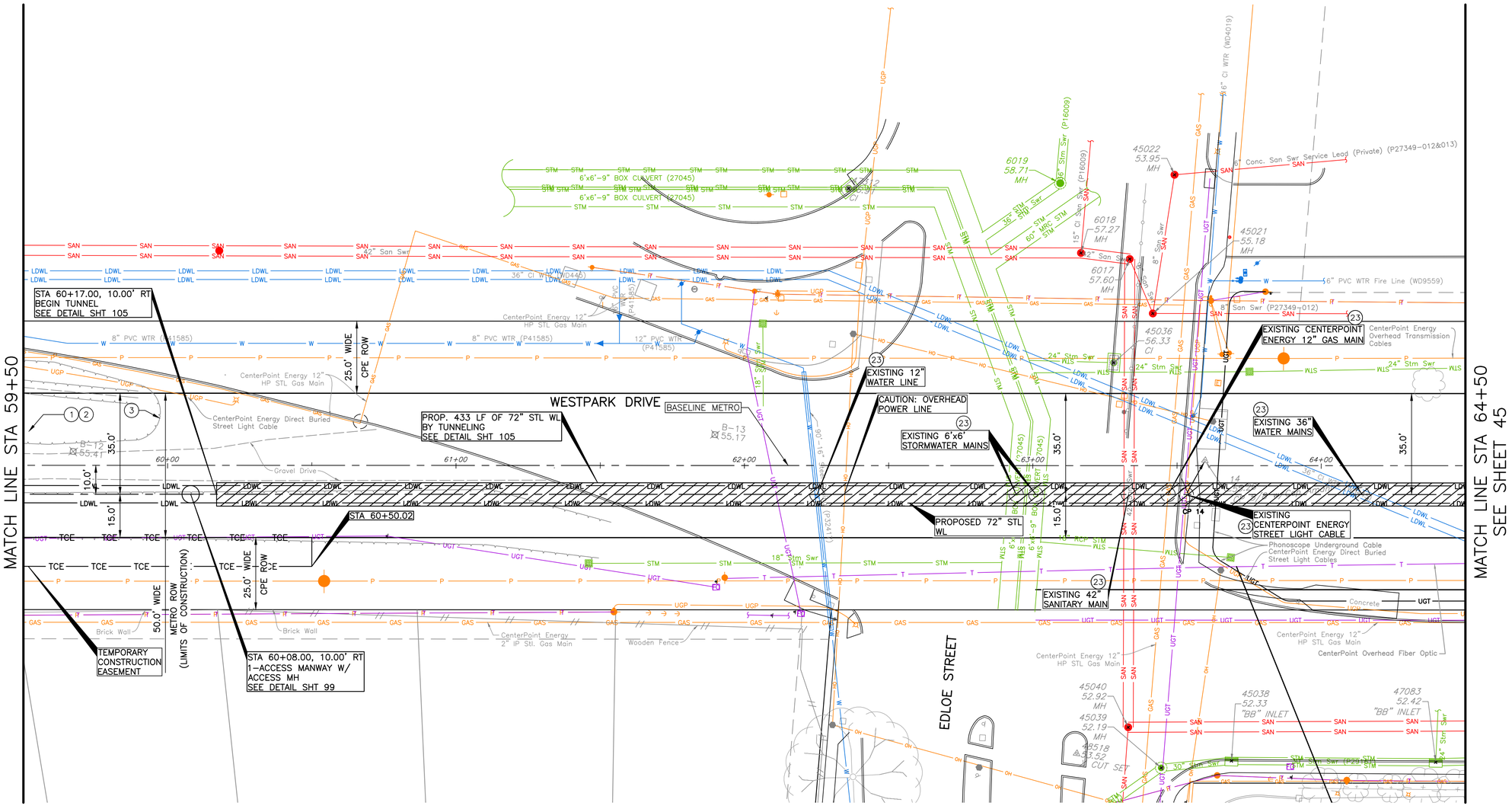
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 54+50 TO STA 59+50
METRO WESTPARK DR ROW

(SHEET 25 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 41 OF 169	



SEE SHEET 43 & 44 FOR PROFILE VIEW

NOTES:

1. RESTRAIN ALL JOINTS.
2. CONTRACTOR TO COORDINATE WITH CYNTHIA MARTINEZ WITH CENTERPOINT ENERGY AT 713-207-6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
3. CONTRACTOR WILL BE REQUIRED TO PROTECT ADJACENT UTILITIES TO ALL TUNNEL SHAFTS AND TUNNEL EXCAVATION, SEE SPECIFICATION SECTIONS 01110 AND 02441LD FOR FURTHER REQUIREMENTS.
4. CONTRACTOR TO REFER TO SHEET 06 FOR TUNNELING WORK NOTES.
5. REPLACE OR RECONSTRUCT SITE AFFECTED OR ALTERED BY THE WORK IN PUBLIC OR PRIVATE PROPERTY, INCLUDING BUT NOT LIMITED TO PAVEMENT, DRIVEWAYS, SIDEWALKS, FENCES, AND LANDSCAPING PER THE REQUIREMENTS OF SECTION 01145 USE OF PREMISES, 01740 SITE RESTORATION, AND 02951 PAVEMENT REPAIR AND RESTORATION.
6. 72"X72" TEE THICKNESS SHOULD BE A MINIMUM OF 0.5 INCHES.
7. PROVIDE 0.5 INCH MIN. THICKNESS ELLIPTICAL DISHED HEAD PLUG BUTT WELDED TO END OF THE TEE AS SHOWN IN DETAIL. HEAD SHOULD BE SHOP LINED WITH CEMENT MORTOR TO MATCH THE INTERIOR PIPE LINING. DESIGN IN ACCORDANCE WITH ASME BOILER & PRESSURE VESSEL CODE, SECTION VIII, DEVISION 1, LATEST EDITION. DISHED HEAD PLUG TO BE WELDED TO PIPE IN FACTORY.SUBMIT DESIGN CALCULATIONS AND DETAILS TO PROJECT MANAGER FOR REVIEW.

TBM:
CP- 14 AT STA 63+59.71
1.76' LT, EL. 55.20

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

( ) CRITICAL LOCATE PER COH SPEC 02317.

(XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256-7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F-3691

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Date

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Signature valid for six months.

Date

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Date

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Signature valid for one year.

ARCADIS
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1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
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SURVEYED BY:
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FB NO. P-6329

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 59+50 TO STA 64+50
METRO WESTPARK DR ROW
& EDLOE ST

(SHEET 26 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"-20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 42 OF 169	

SEE SHEET 42 FOR PLAN VIEW

STA 60+08.00
1-ACCESS MANWAY W/ ACCESS MH
SEE DETAIL SHT 99

EXIST. NG AT PROPOSED PIPE

R.O.W. Line (N)

R.O.W. Line (S)

EDLOE ST.

CL of R.O.W.

CenterPoint Energy 12" HP STL Gas Main (Approx. Location, to be field verified)

CenterPoint Energy 12" HP STL Gas Main (Approx. Location, to be field verified)

CenterPoint Energy 12" HP STL Gas Main (Approx. Location, to be field verified)

8" Water Line ®

36" Water Line ®

12" Water Line ®

16" Water Line ®

6'x6'-9" Stm Swr (Approx. Location)

24" Stm Swr

15" San Swr

42" San Swr

10" San Swr

8" San Swr

PROPOSED 72" STEEL WATER LINE

FLOW
S=0.0%

STA 59+50.00
INV EL=38.00

STA 60+04.50
VPI EL=38.00

Sta=62+94.96
FL=34.46'

Sta=63+02.55
FL=34.46'

San MH
Rim El=57.21'
FL 8" (W)=48.02'
FL 42" (E)=34.84'
FL 15" (N)=39.25'

G. Inlet
Rim El=56.33'
FL 24" (W)=46.67'

San MH
Rim El=57.26'
FL 42" (E)=35.75'
FL 42" (S)=35.75'
FL 10" (S)=36.09'

San MH
Rim El=57.60'
FL 42" (E)=35.72'
FL 42" (S)=35.60'
FL 8" (SE)=44.77'

San MH
Rim El=55.18'
FL 8" (W)=44.54'
FL 8" (E)=44.54'
FL 8" (N)=44.54'

G. Inlet
Rim El=53.64'

G. Inlet
Rim El=54.52'
FL 24" (E)=51.35'
FL 24" (W)=49.06'

SEE SHEET 44
MATCH LINE ELEV. 26

MATCHLINE STA 59+50 (SEE SHEET 41)

MATCHLINE STA 64+50 (SEE SHEET 46)

59+50 60+00 61+00 62+00 63+00 64+00 64+50

64 62 60 58 56 54 52 50 48 46 44 42 40 38 36 34 32 30 28 26

HORIZ. 0' 10' 20' 40' 1"=20'

VERT. 0' 1' 2' 4' 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F-3691

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

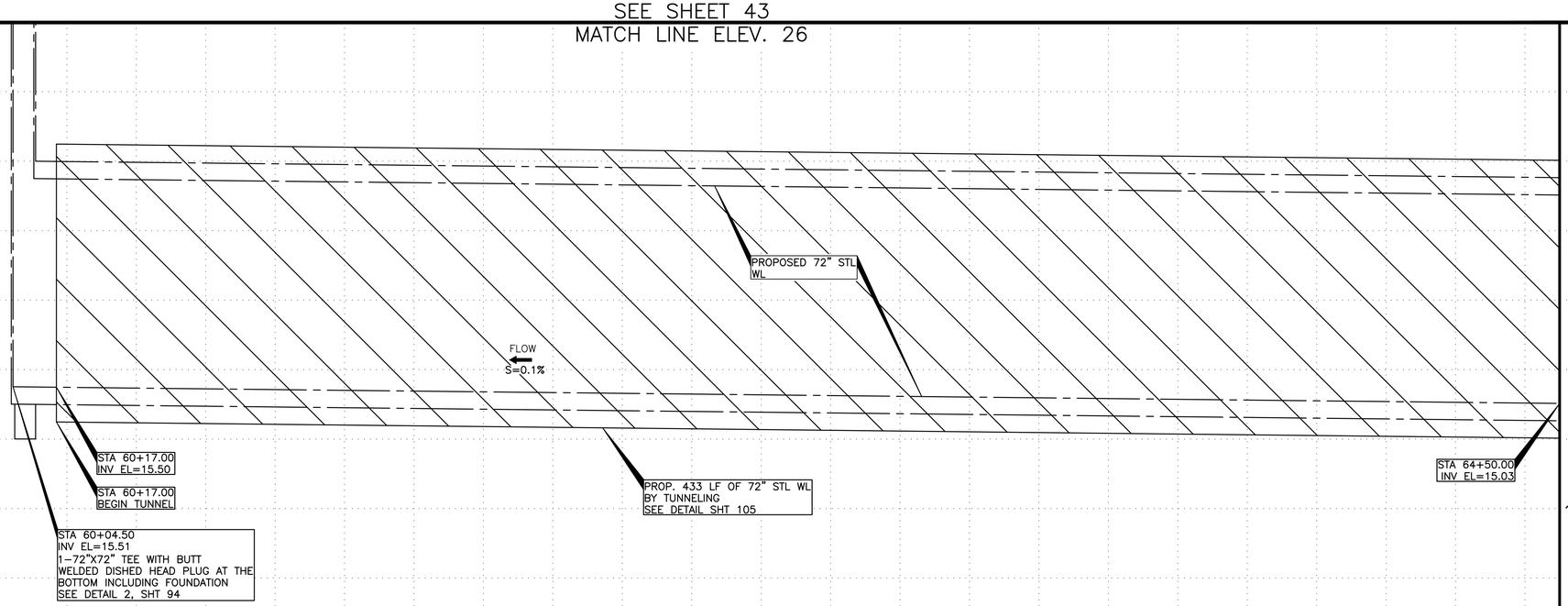
72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 59+50 TO STA 64+50
METRO WESTPARK DR ROW
& EDLOE ST

(SHEET 27 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 43 OF 169	

SEE SHEET 43
MATCH LINE ELEV. 26



MATCHLINE STA 59+50 (SEE SHEET 41)

MATCHLINE STA 64+50 (SEE SHEET 46)

SEE SHEET 42 FOR PLAN VIEW

24 22 20 18 16 14 12 10 08 06 04 02 00 -02 -04 -06 -08 -10 -12 -14

59+50 60+00 61+00 62+00 63+00 64+00 64+50

HORIZ. 0' 10' 20' 40' 1"=20'
VERT. 0' 1' 2' 4' 1"=2'

NO.	DATE	REVISION	APP.

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FB NO. P-6329

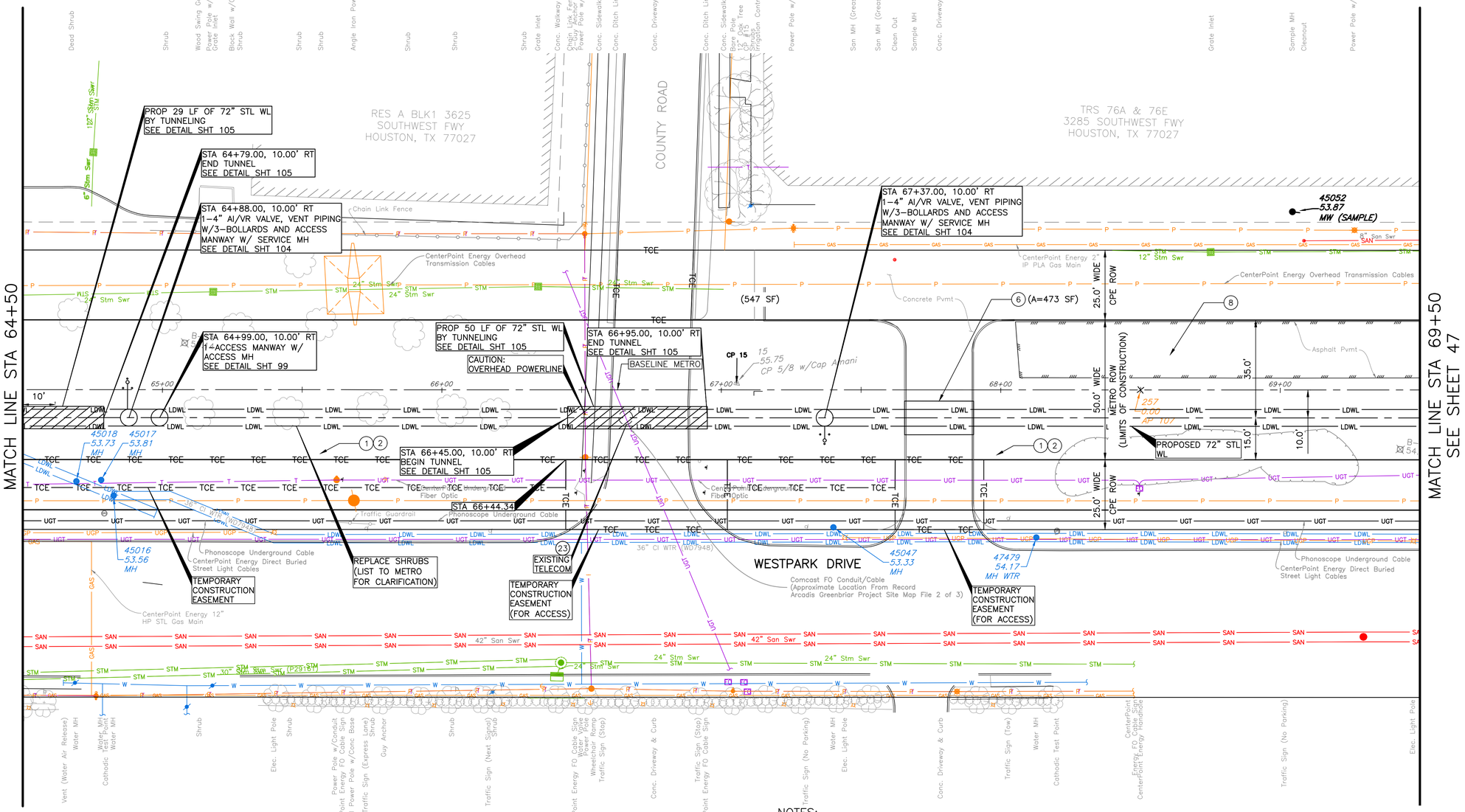
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 59+50 TO STA 64+50
METRO WESTPARK DR ROW
& EDLOE ST

(SHEET 28 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 44 OF 169	



SEE SHEET 46 FOR PROFILE VIEW

NOTES:

1. RESTRAIN ALL JOINTS.
2. CONTRACTOR TO COORDINATE WITH CYNTHIA MARTINEZ WITH CENTERPOINT ENERGY AT 713-207-6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
3. CONTRACTOR WILL BE REQUIRED TO PROTECT ADJACENT UTILITIES TO ALL TUNNEL SHAFTS AND TUNNEL EXCAVATION, SEE SPECIFICATION SECTIONS 01110 AND 02441LD FOR FURTHER REQUIREMENTS.
4. CONTRACTOR TO REFER TO SHEET 06 FOR TUNNELING WORK NOTES.
5. THE DIMENSION REPRESENTS THE DISTANCE FROM THE STRUCTURE TO THE EDGE OF THE TRENCH FOR OPEN CUT OR OUTSIDE OF CASING FOR TUNNELING.
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7. 72"X72" TEE THICKNESS SHOULD BE A MINIMUM OF 0.5 INCHES.
8. PROVIDE 0.5 INCH MIN. THICKNESS ELLIPTICAL DISHED HEAD PLUG BUTT WELDED TO END OF THE TEE AS SHOWN IN DETAIL. HEAD SHOULD BE SHOP LINED WITH CEMENT MORTOR TO MATCH THE INTERIOR PIPE LINING. DESIGN IN ACCORDANCE WITH ASME BOILER & PRESSURE VESSEL CODE, SECTION VIII, DEVISION 1, LATEST EDITION. DISHED HEAD PLUG TO BE WELDED TO PIPE IN FACTORY.SUBMIT DESIGN CALCULATIONS AND DETAILS TO PROJECT MANAGER FOR REVIEW.

TBM:
CP- 15 AT STA 67+05.47
2.43' LT, EL. 55.75

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

( ) CRITICAL LOCATE PER COH SPEC 02317.

(XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256-7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F-3691

TUNNELING DESIGN
THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF BRENT LINDELOF, TX PE# 117075. NOT FOR BIDDING, PERMIT, OR CONSTRUCTION PURPOSES.

NOTICE:
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS SIGNATURE DOES NOT FULFILL YOUR OBLIGATION TO CALL 811

VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF JAIPAL MUSKU, TX PE# 108774. NOT FOR BIDDING, PERMIT, OR CONSTRUCTION PURPOSES.

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

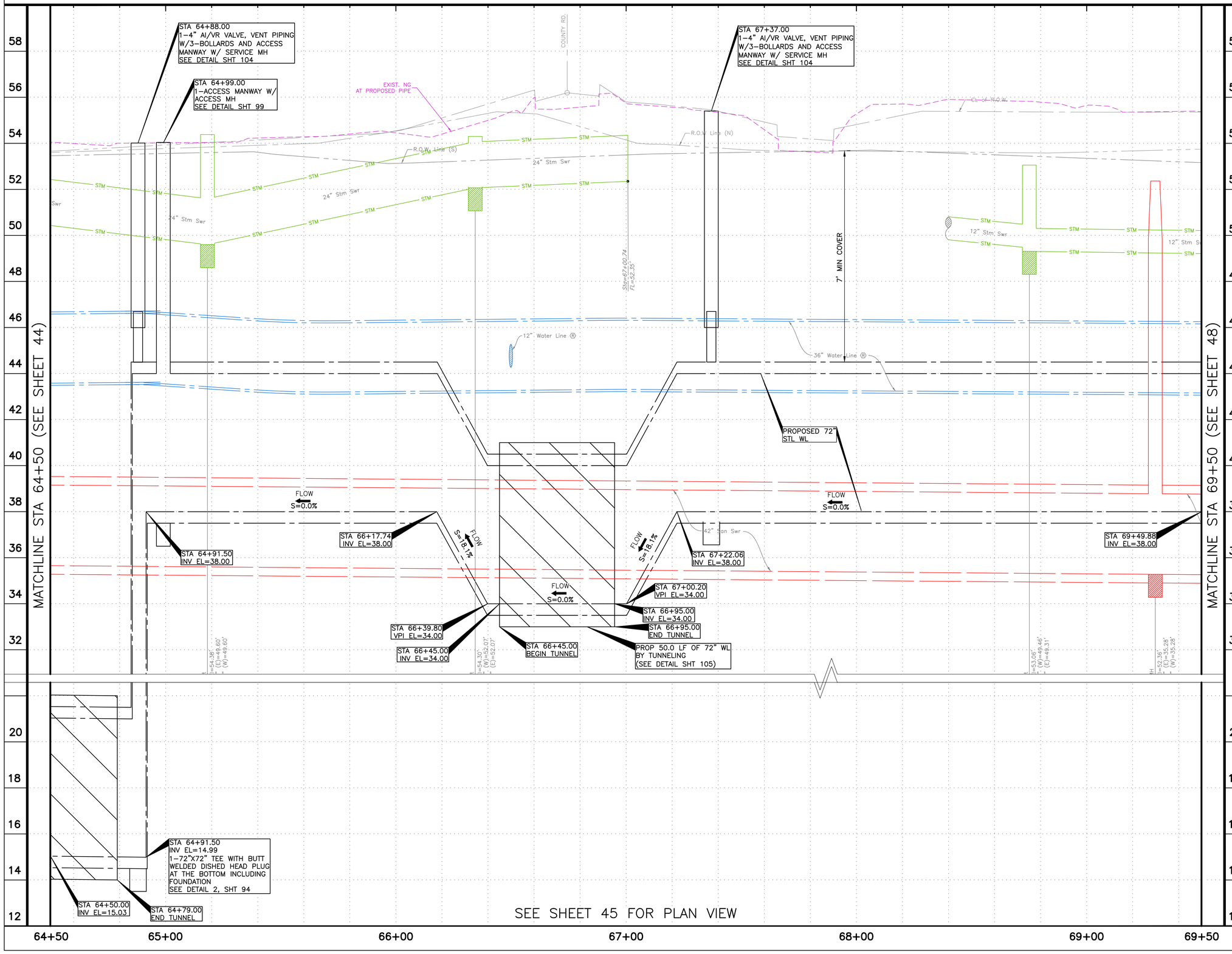
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 64+50 TO STA 69+50
METRO WESTPARK DR ROW
& COUNTY RD

(SHEET 29 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 45 OF 169	



HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES — Creating Space Underground

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TUNNELING DESIGN

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 64+50 TO STA 69+50
METRO WESTPARK DR ROW
& COUNTY RD

(SHEET 30 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 46 OF 169	

TBM:
CP– 16 AT STA 71+50.92
2.69' RT, EL. 55.18

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

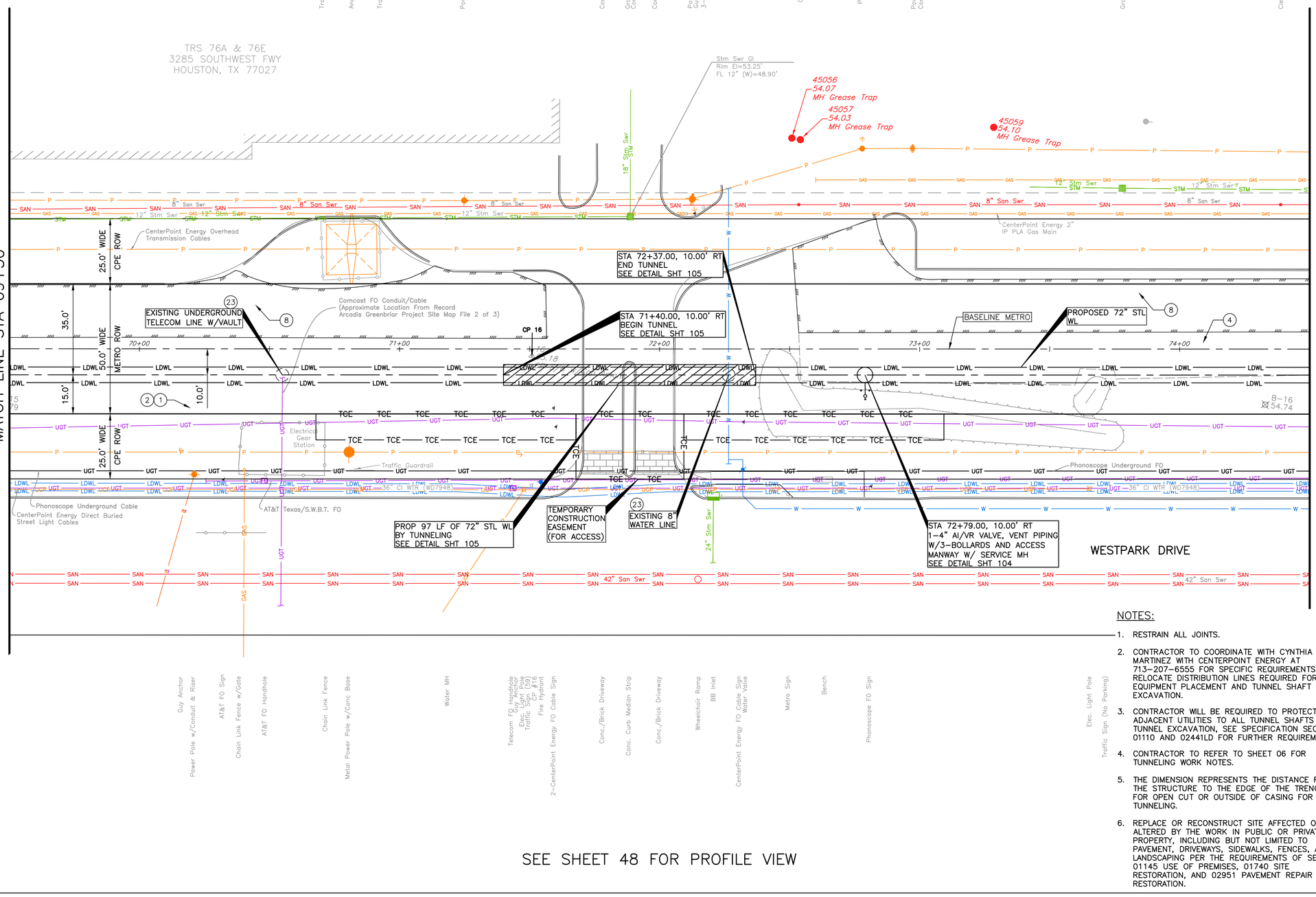
LEGEND:

( ) CRITICAL LOCATE PER COH SPEC 02317.

(XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256–7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)



SEE SHEET 48 FOR PROFILE VIEW

NOTES:

1. RESTRAIN ALL JOINTS.
2. CONTRACTOR TO COORDINATE WITH CYNTHIA MARTINEZ WITH CENTERPOINT ENERGY AT 713–207–6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
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VERIFICATION OF PRIVATE UTILITY LINES

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Signature valid for six months.

Date

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Date

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FB NO. P–6329

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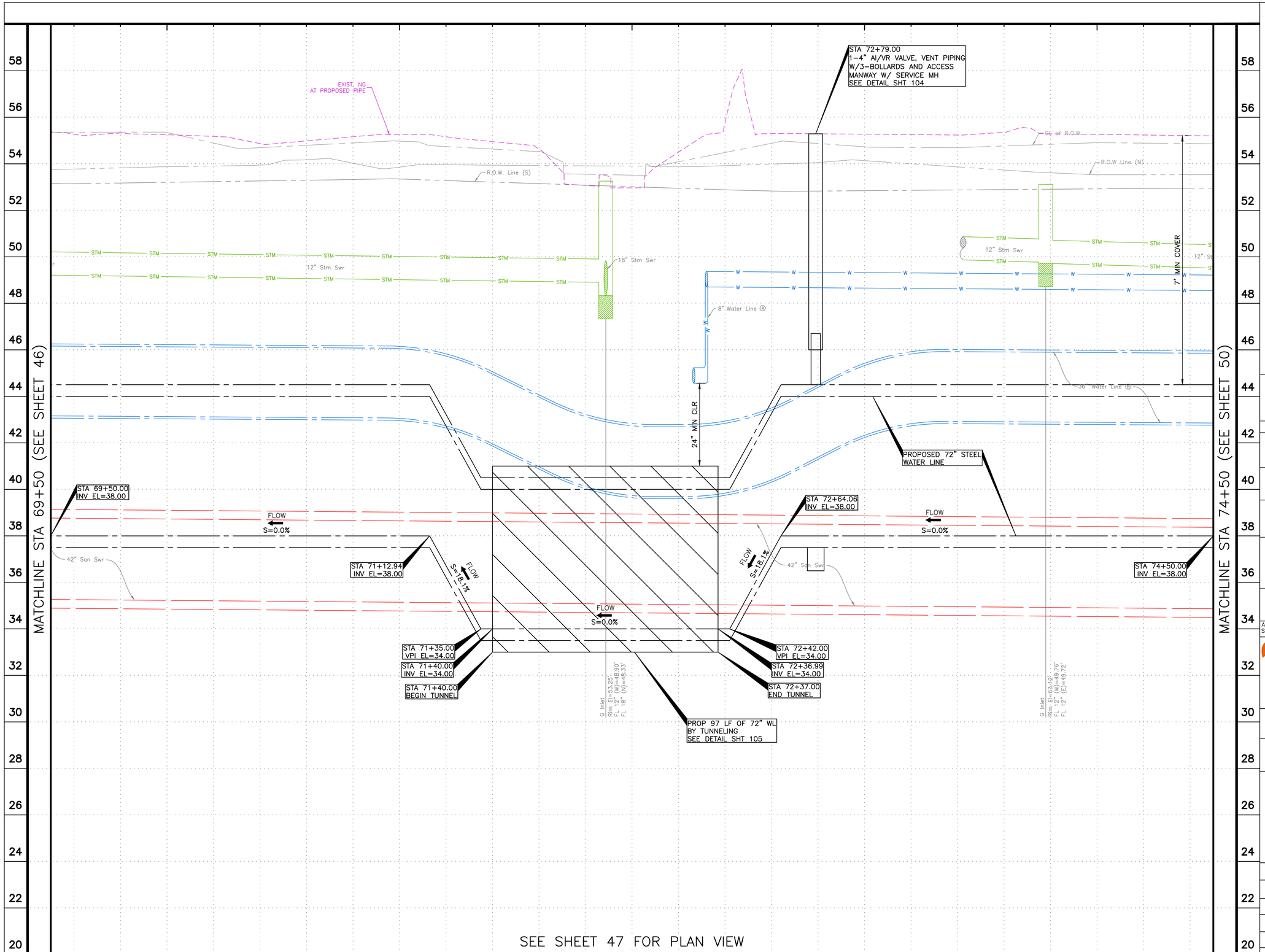
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 69+50 TO STA 74+50
METRO WESTPARK DR ROW

(SHEET 31 OF 66)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"–20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 47 OF 169	



SEE SHEET 47 FOR PLAN VIEW

HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

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Date

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CITY OF HOUSTON

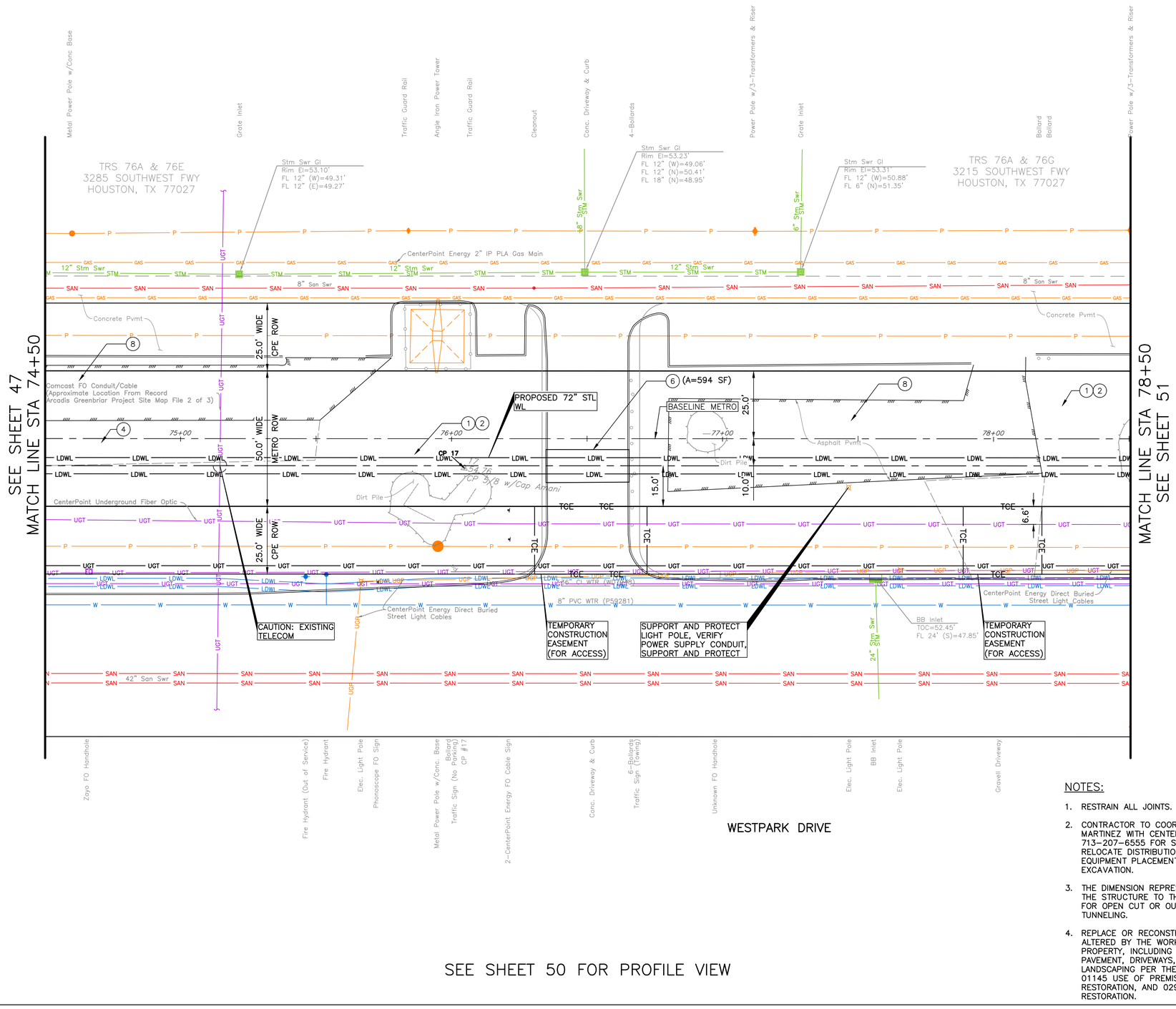
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 69+50 TO STA 74+50
METRO WESTPARK DR ROW

(SHEET 32 OF 66)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 48 OF 169	



SEE SHEET 50 FOR PROFILE VIEW

TBM:
CP– 17 AT STA 76+04.70
10.91' RT, EL. 54.76

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

- ( ) CRITICAL LOCATE PER COH SPEC 02317.
- (XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256–7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

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NOTES:

1. RESTRAIN ALL JOINTS.
2. CONTRACTOR TO COORDINATE WITH CYNTHIA MARTINEZ WITH CENTERPOINT ENERGY AT 713–207–6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
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SURVEYED BY:
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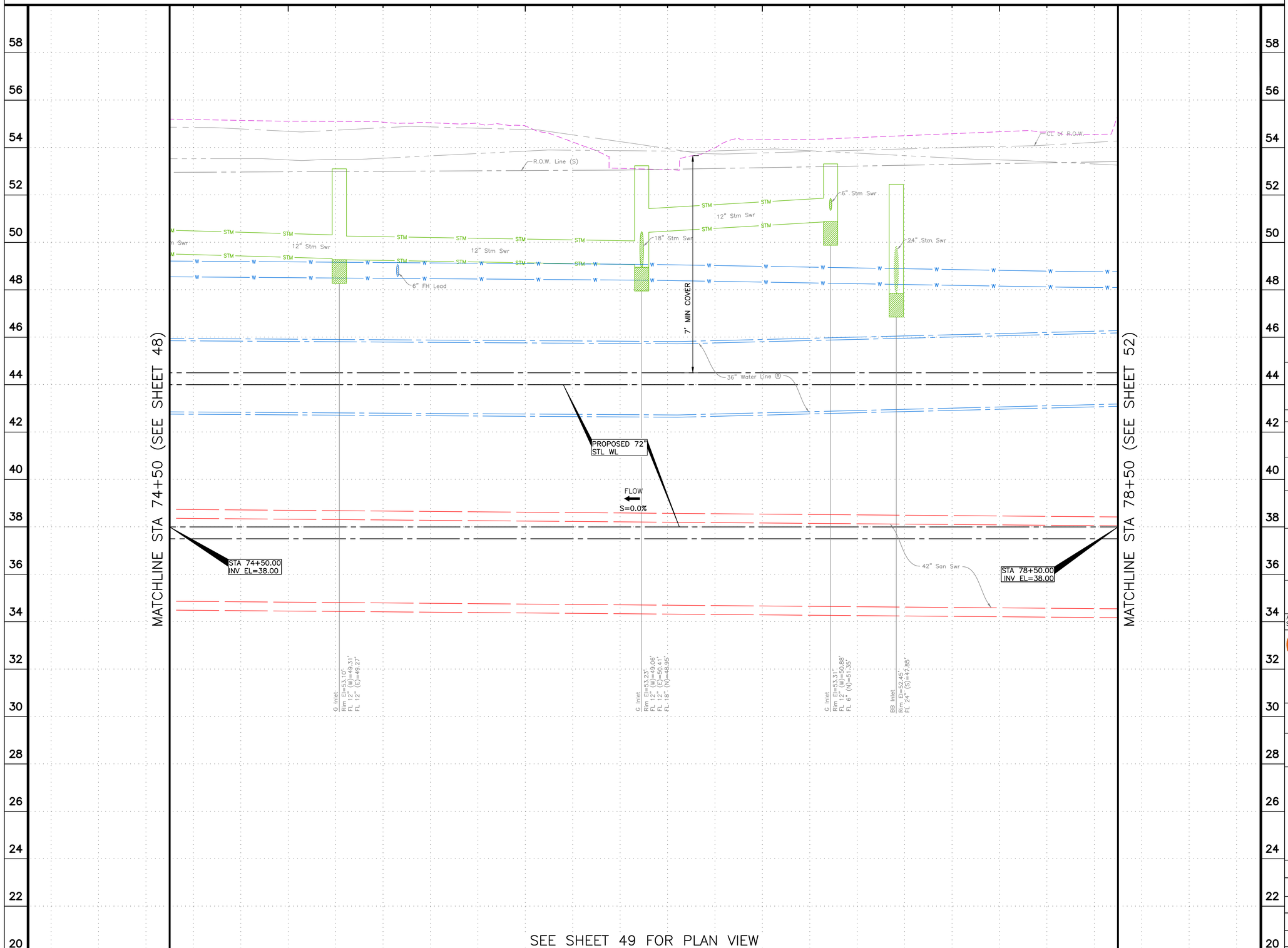
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 74+50 TO STA 78+50
METRO WESTPARK DR ROW

(SHEET 33 OF 66)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"–20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 49 OF 169	



HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

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VERIFICATION OF PRIVATE UTILITY LINES

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713-953-4800 WWW.ARCADIS.COM
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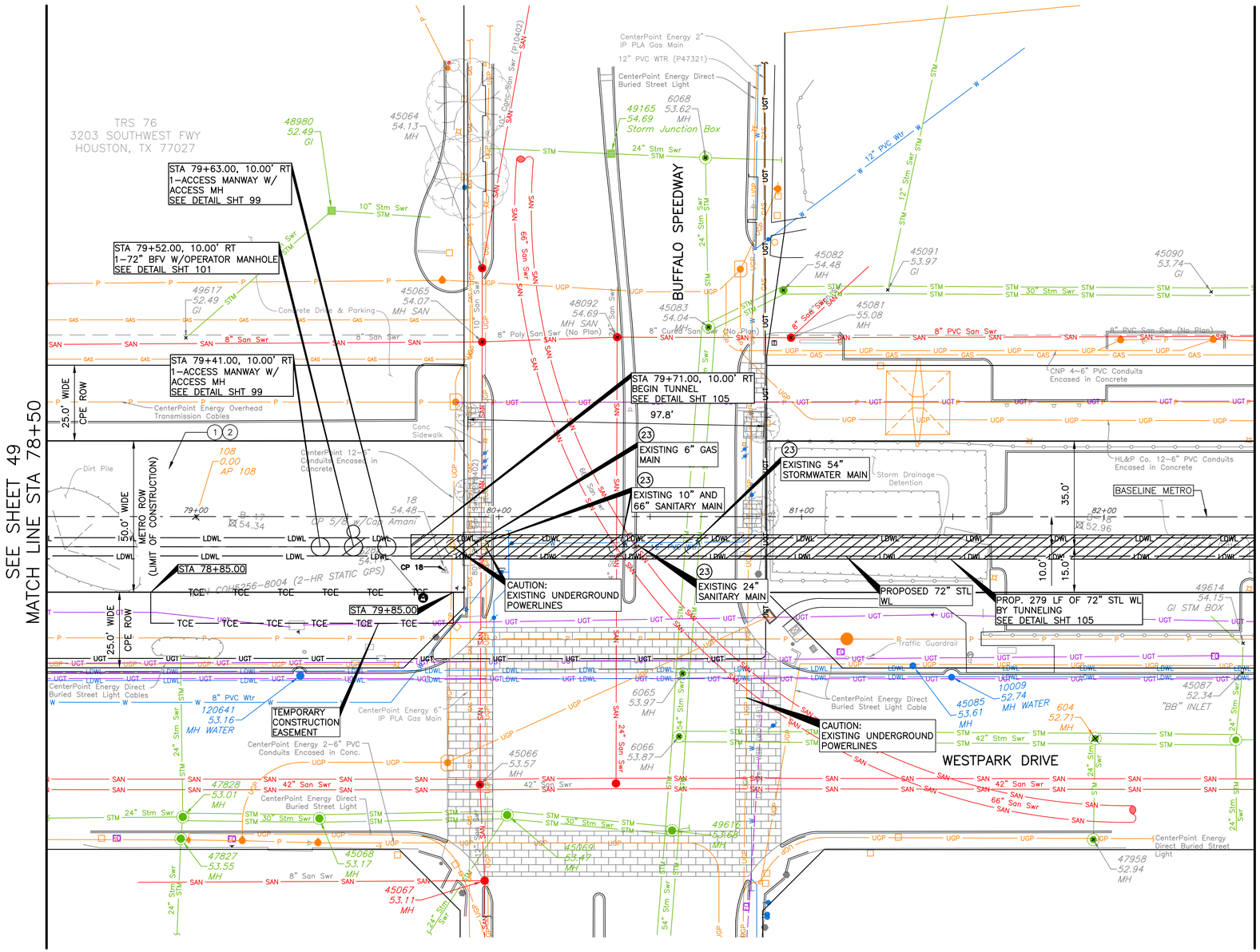
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 74+50 TO STA 78+50
METRO WESTPARK DR ROW

(SHEET 34 OF 66)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 50 OF 169	



SEE SHEET 52 & 53 FOR PROFILE VIEW

TBM:
CP- 18 AT STA 79+82.28
17.84' RT, EL. 54.48

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

(◌) CRITICAL LOCATE PER COH SPEC 02317.

(XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256-7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE,
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Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

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Signature valid for six months.

Date

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Signature valid for one year.

NOTES:

1. RESTRAIN ALL JOINTS.
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8. PROVIDE 0.5 INCH MIN. THICKNESS ELLIPTICAL DISHED HEAD PLUG BUTT WELDED TO END OF THE TEE AS SHOWN IN DETAIL. HEAD SHOULD BE SHOP LINED WITH CEMENT MORTOR TO MATCH THE INTERIOR PIPE LINING. DESIGN IN ACCORDANCE WITH ASME BOILER & PRESSURE VESSEL CODE, SECTION VIII, DEVISION 1, LATEST EDITION. DISHED HEAD PLUG TO BE WELDED TO PIPE IN FACTORY.SUBMIT DESIGN CALCULATIONS AND DETAILS TO PROJECT MANAGER FOR REVIEW.

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1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 78+50 TO STA 82+50
METRO WESTPARK DR ROW
& BUFFALO SPEEDWAY

(SHEET 35 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 51 OF 169	

SEE SHEET 51 FOR PLAN VIEW

MATCHLINE STA 78+50 (SEE SHEET 50)

MATCHLINE STA 82+50 (SEE SHEET 55)

EXIST. NG AT PROPOSED PIPE

STA 79+52.00
1-72" BFV W/OPERATOR MH
SEE DETAIL SHT 101

STA 79+41.00
1-ACCESS MANWAY W/ ACCESS MH
SEE DETAIL SHT 99

STA 79+63.00
1-ACCESS MANWAY W/ ACCESS MH
SEE DETAIL SHT 99

BUFFALO SPEEDWAY

R.O.W Line (N)

Power Pole

Power

10" Stm Swr

CenterPoint Energy 6" IP PLA Gas Main (Approx. Location, to be field verified)

12"Water Line ®

54" Stm Swr

30" Stm Swr

CNP 4-6" PVC Conduits Enclosed in Concrete

24" Stm Swr

HL&P CO. 12-6" PVC Conduits Encased in Concrete

8" Stm Swr

36" Water Line ®

8" San Swr

10" San Swr

12" San Swr

24" San Swr

42" San Swr

FLOW
S=0.0%

STA 78+50.00
INV EL=38.00

STA 79+59.00
INV EL=38.00

G Inlet
Rim El=52.46'
FL 10" (NE)=50.77'

San MH
Rim El=53.52'
FL 10" (N)=41.00'
FL 12" (S)=41.14'
FL 42" (W)=34.43'
FL 42" (E)=34.43'

San MH
Rim El=54.02'
FL 8" (E)=43.29'
FL 10" (S)=41.29'
FL 10" (N)=41.29'
FL 8" (W)=43.29'

San MH
Rim El=53.11'
FL 12" (S)=41.18'
FL 12" (N)=41.18'
FL 8" (W)=42.03'

San MH
Rim El=54.05'
FL 42" (E)=34.47'
FL 42" (W)=34.62'
FL 24" (N)=37.45'

San MH
Rim El=54.69'
FL 8" (W)=43.88'
FL 8" (E)=43.88'
FL 24" (S)=37.32'
FL 24" (N)=38.32'

Stm MH
Rim El=53.97'
FL 54" (S)=44.56'
FL 54" (N)=44.56'

Stm MH
Rim El=54.04'
FL 54" (S)=45.78'
FL 30" (NE)=47.19'
FL 24" (N)=45.78'

San MH
Rim El=55.08'
FL 42" (E)=44.53'
FL 8" (W)=44.28'
FL 8" (NE)=44.71'

BB Inlet
Rim El=52.34'

SEE SHEET 53
MATCH LINE ELEV. 24

78+50 79+00 80+00 81+00 82+00 82+50

0' 10' 20' 40'
HORIZ. 1"=20'
0' 1' 2' 4'
VERT. 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F-3691

TUNNELING DESIGN

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NOTICE:
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS SIGNATURE DOES NOT FULFILL YOUR OBLIGATION TO CALL 811

VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF JAIPAL MUSKU, TX PE# 108774. NOT FOR BIDDING, PERMIT, OR CONSTRUCTION PURPOSES.

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

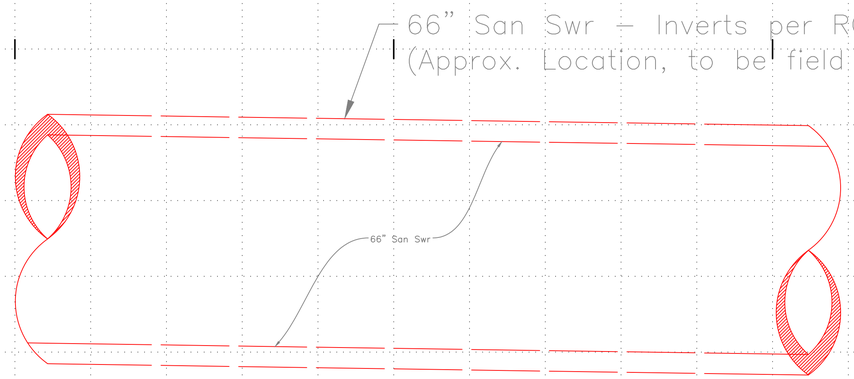
72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

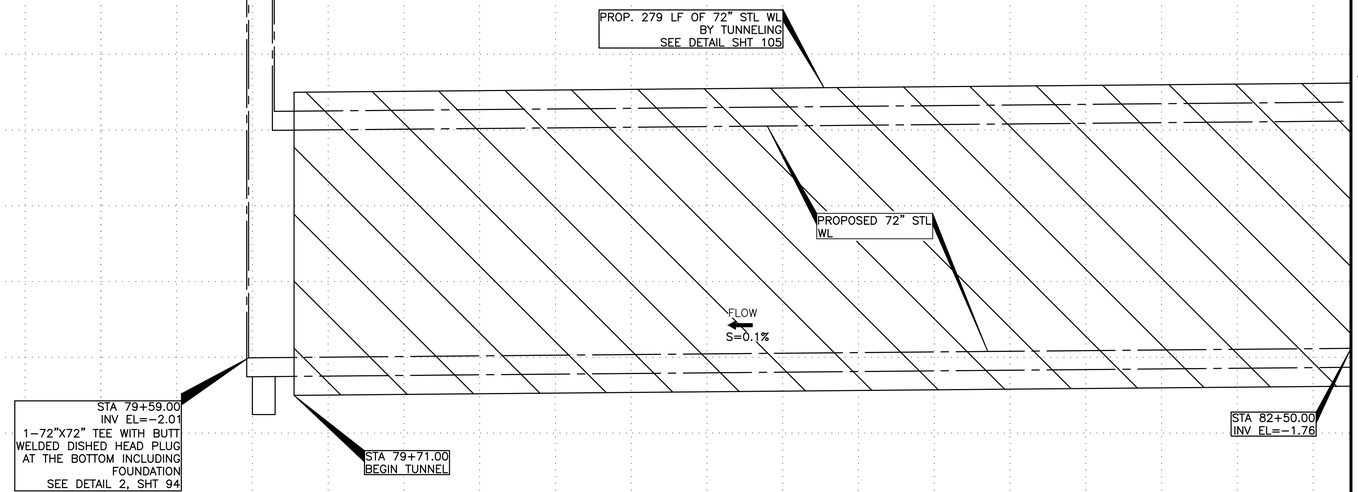
PROFILE VIEW
STA 78+50 TO STA 82+50
METRO WESTPARK DR ROW
& BUFFALO SPEEDWAY

(SHEET 36 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 52 OF 169	

SEE SHEET 52
MATCH LINE ELEV. 24





MATCHLINE STA 78+50 (SEE SHEET 50)

MATCHLINE STA 82+50 (SEE SHEET 55)

SEE SHEET 51 FOR PLAN VIEW

78+50 79+00 80+00 81+00 82+00 82+50

HORIZ. 0' 10' 20' 40' 1"=20'
VERT. 0' 1' 2' 4' 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
1300 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77085
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F-3691

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VERIFICATION OF PRIVATE UTILITY LINES

Date

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Date

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Signature valid for one year.

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ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
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FB NO. P-6329

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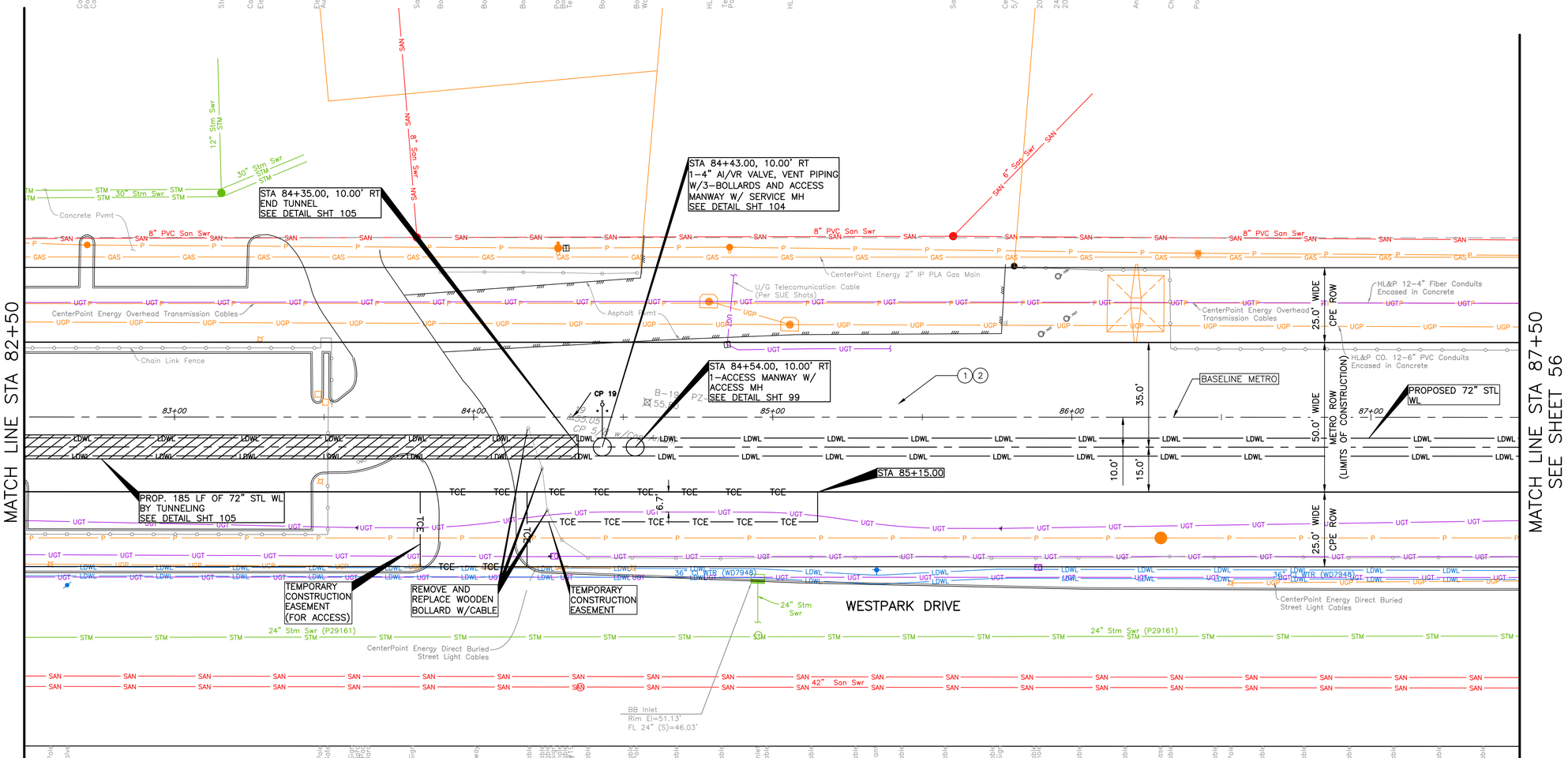
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 78+50 TO STA 82+50
METRO WESTPARK DR ROW
& BUFFALO SPEEDWAY

(SHEET 37 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 53 OF 169	



SEE SHEET 55 FOR PROFILE VIEW

NOTES:

1. RESTRAIN ALL JOINTS.
2. CONTRACTOR TO COORDINATE WITH CYNTHIA RODRIGUES WITH CENTERPOINT ENERGY AT 713-207-6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
3. CONTRACTOR WILL BE REQUIRED TO PROTECT ADJACENT UTILITIES TO ALL TUNNEL SHAFTS AND TUNNEL EXCAVATION, SEE SPECIFICATION SECTIONS 01110 AND 02441LD FOR FURTHER REQUIREMENTS.
4. CONTRACTOR TO REFER TO SHEET 06 FOR TUNNELING WORK NOTES.
5. THE DIMENSION REPRESENTS THE DISTANCE FROM THE STRUCTURE TO THE EDGE OF THE TRENCH FOR OPEN CUT OR OUTSIDE OF CASING FOR TUNNELING.
6. REPLACE OR RECONSTRUCT SITE AFFECTED OR ALTERED BY THE WORK IN PUBLIC OR PRIVATE PROPERTY, INCLUDING BUT NOT LIMITED TO PAVEMENT, DRIVEWAYS, SIDEWALKS, FENCES, AND LANDSCAPING PER THE REQUIREMENTS OF SECTION 01145 USE OF PREMISES, 01740 SITE RESTORATION, AND 02951 PAVEMENT REPAIR AND RESTORATION.
7. 72"X72" TEE THICKNESS SHOULD BE A MINIMUM OF 0.5 INCHES.
8. PROVIDE 0.5 INCH MIN. THICKNESS ELLIPTICAL DISHED HEAD PLUG BUTT WELDED TO END OF THE TEE AS SHOWN IN DETAIL. HEAD SHOULD BE SHOP LINED WITH CEMENT MORTOR TO MATCH THE INTERIOR PIPE LINING. DESIGN IN ACCORDANCE WITH ASME BOILER & PRESSURE VESSEL CODE, SECTION VIII, DEVISION 1, LATEST EDITION. DISHED HEAD PLUG TO BE WELDED TO PIPE IN FACTORY.SUBMIT DESIGN CALCULATIONS AND DETAILS TO PROJECT MANAGER FOR REVIEW.

TBM:
CP- 02 AT STA 14+42.89
10.06' RT, EL. 56.46
CP- 03 AT STA 10+83.25
11.90' LT, EL. 55.79
CP- 04 AT STA 10+93.08
105.45' LT, EL. 55.74

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

(◌) CRITICAL LOCATE PER COH SPEC 02317.

(XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256-7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE,
3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F-3691

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VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

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Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

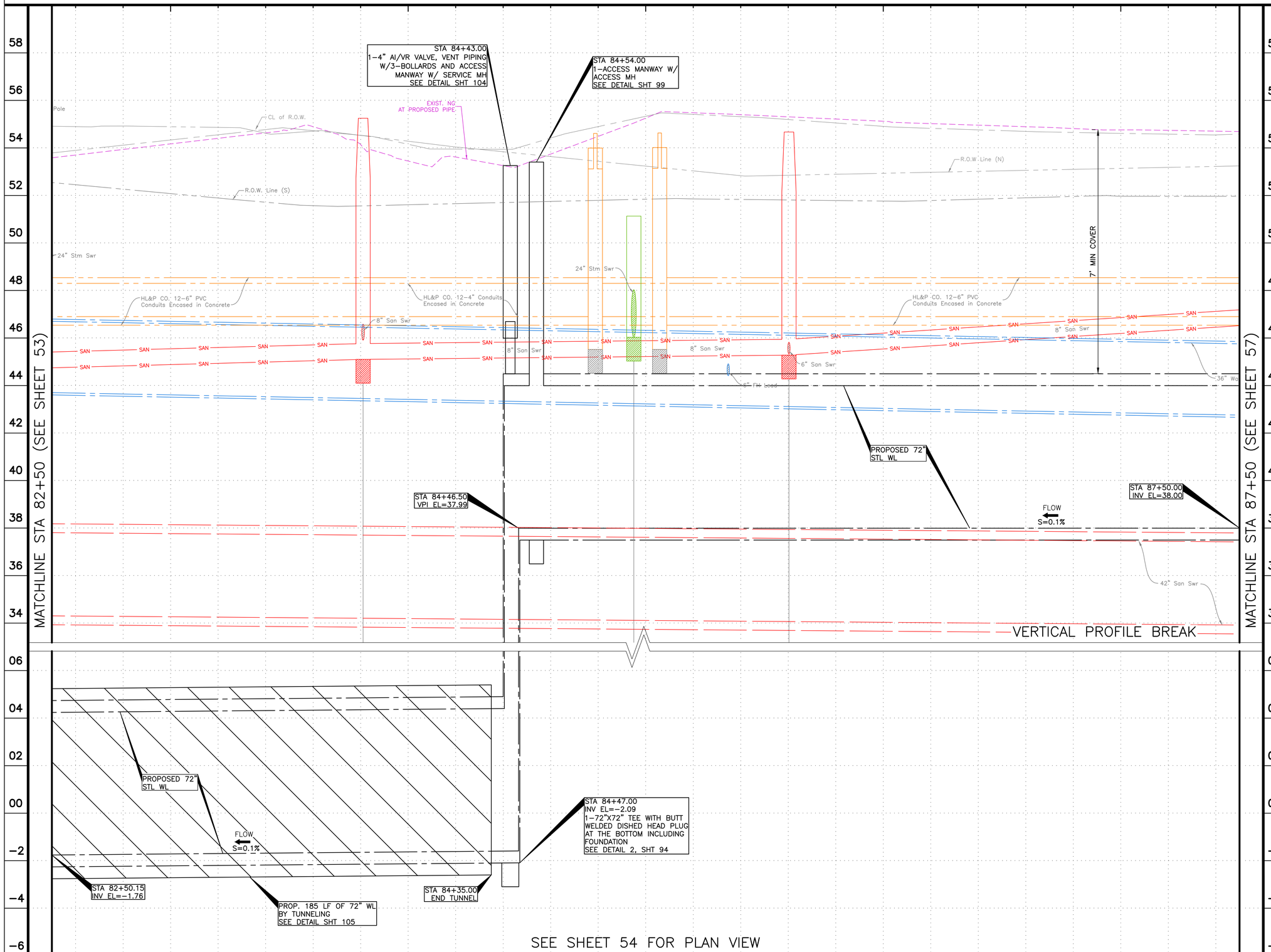
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 82+50 TO STA 87+50
METRO WESTPARK DR ROW

(SHEET 38 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"-20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 54 OF 169	



HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
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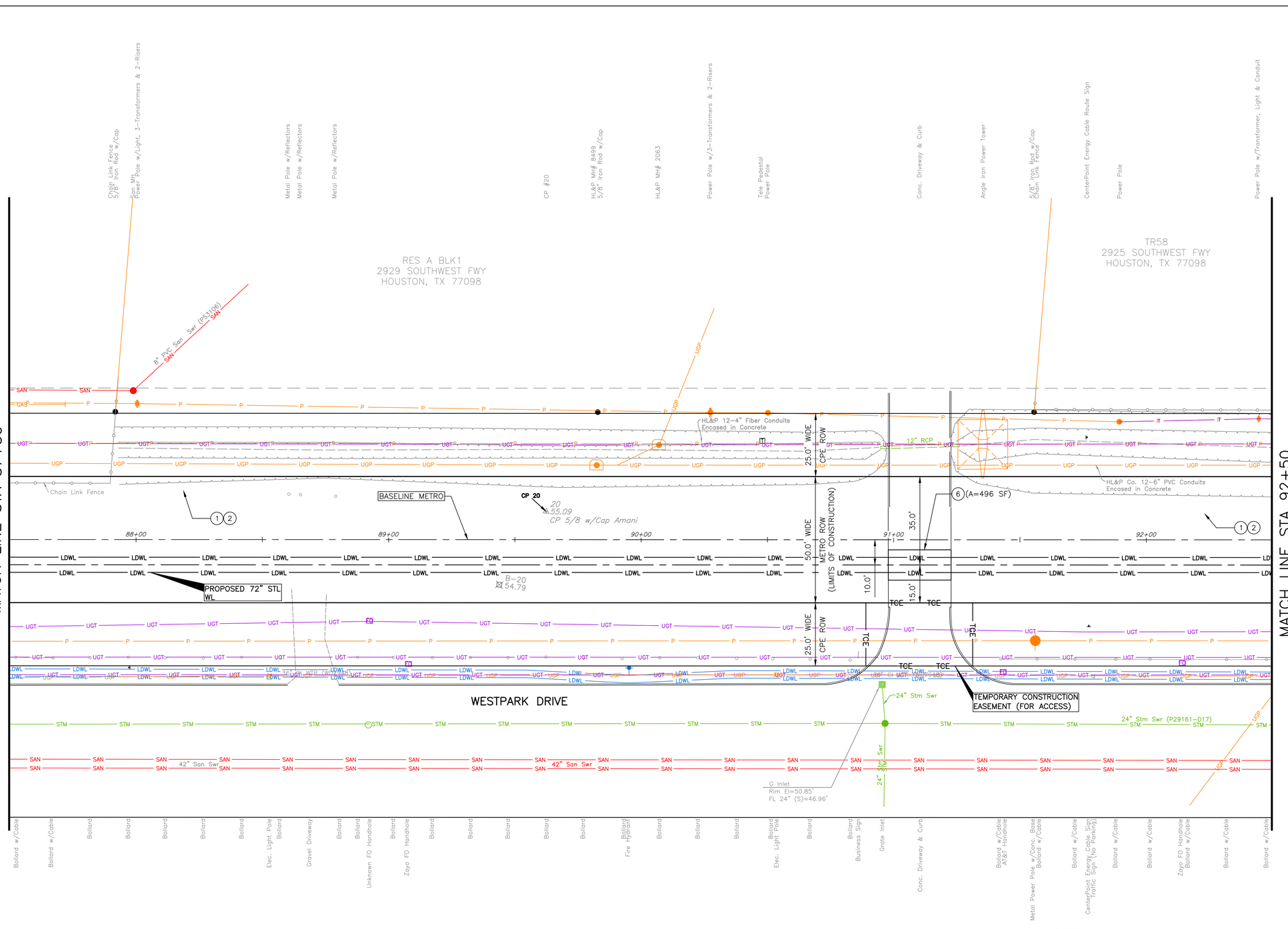
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 82+50 TO STA 87+50
METRO WESTPARK DR ROW

(SHEET 38 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 55 OF 169	



SEE SHEET 57 FOR PROFILE VIEW

TBM:
CP– 20 AT STA 89+62.39
11.13' LT, EL. 55.09

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

- ◌ CRITICAL LOCATE PER COH SPEC 02317.
- (XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256–7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

NOTES:

1. RESTRAIN ALL JOINTS.
2. CONTRACTOR TO COORDINATE WITH CYNTHIA RODRIGUES WITH CENTERPOINT ENERGY AT 713–207–6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
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BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281–994–7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F–3691

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Date

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HOUSTON, TX 77056
713–953–4800 WWW.ARCADIS.COM
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SURVEYED BY:
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FB NO. P–6329

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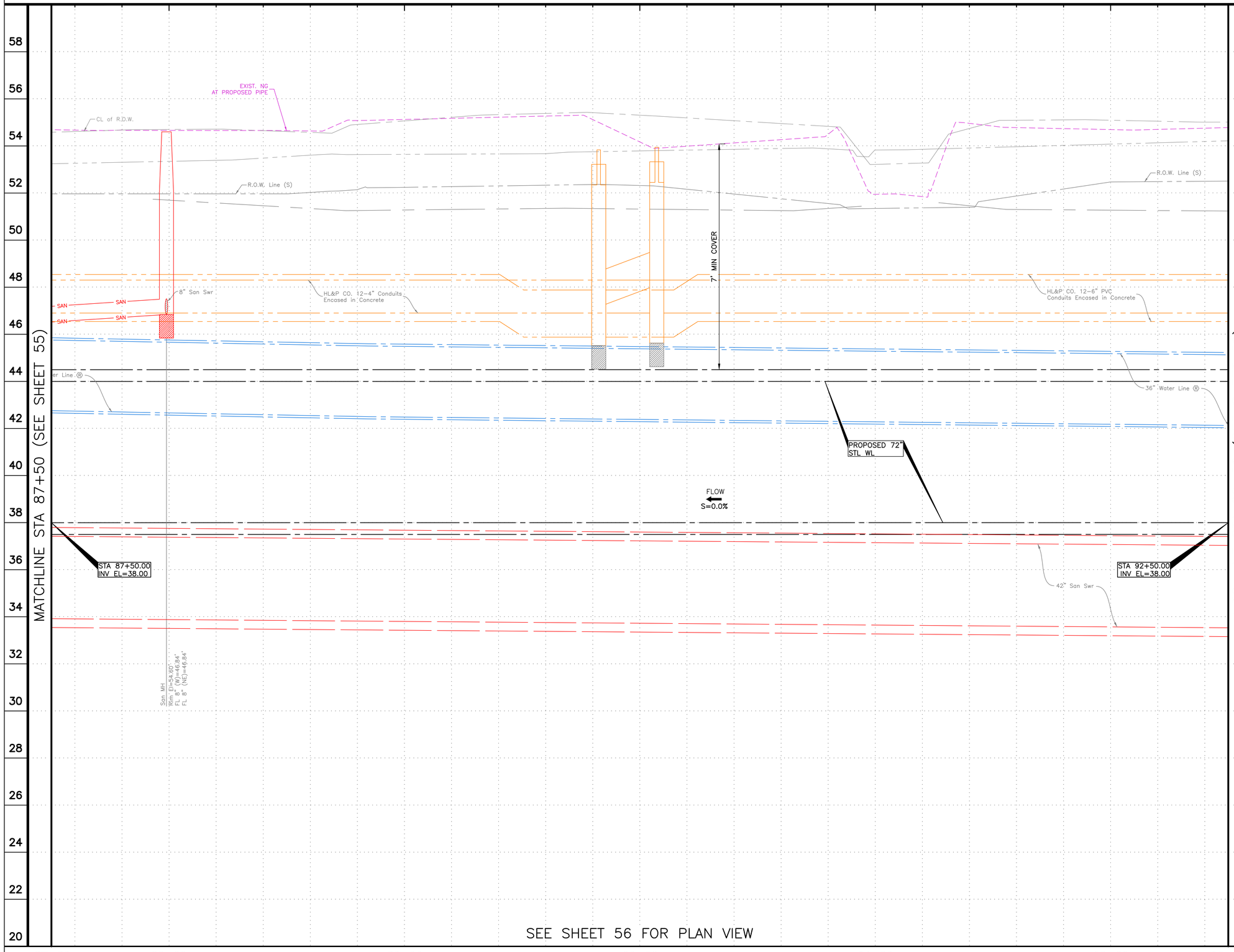
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 87+50 TO STA 92+50
METRO WESTPARK DR ROW

(SHEET 40 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"–20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 56 OF 169	



SEE SHEET 56 FOR PLAN VIEW

HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
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CITY OF HOUSTON

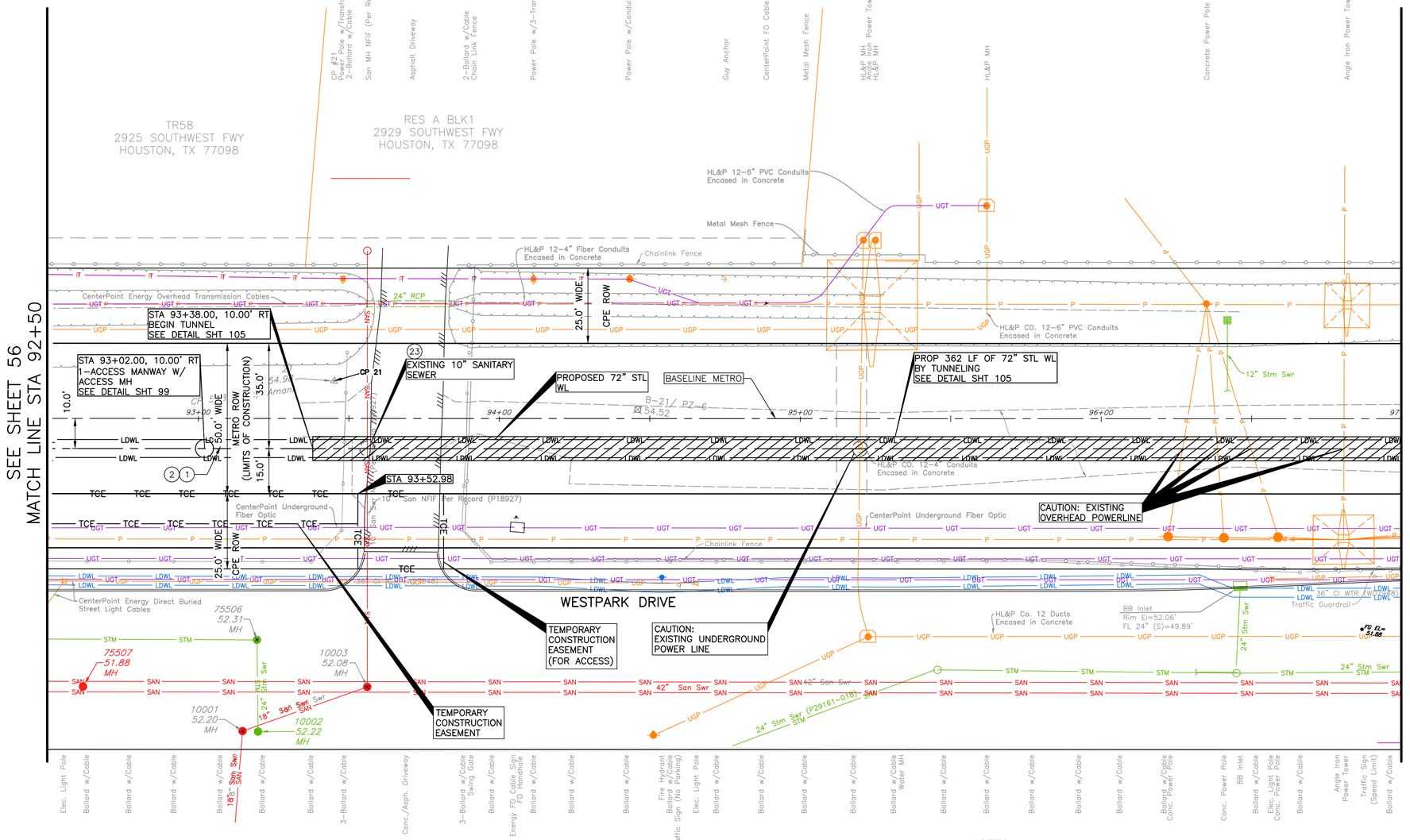
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 87+50 TO STA 92+50
METRO WESTPARK DR ROW

(SHEET 41 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 57 OF 169	



SEE SHEET 59 FOR PROFILE VIEW

NOTES:

1. RESTRAIN ALL JOINTS.
2. CONTRACTOR TO COORDINATE WITH CYNTHIA MARTINEZ WITH CENTERPOINT ENERGY AT 713-207-6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
3. CONTRACTOR WILL BE REQUIRED TO PROTECT ADJACENT UTILITIES TO ALL TUNNEL SHAFTS AND TUNNEL EXCAVATION, SEE SPECIFICATION SECTIONS 01110 AND 02441LD FOR FURTHER REQUIREMENTS.
4. CONTRACTOR TO REFER TO SHEET 06 FOR TUNNELING WORK NOTES.
5. REPLACE OR RECONSTRUCT SITE AFFECTED OR ALTERED BY THE WORK IN PUBLIC OR PRIVATE PROPERTY, INCLUDING BUT NOT LIMITED TO PAVEMENT, DRIVEWAYS, SIDEWALKS, FENCES, AND LANDSCAPING PER THE REQUIREMENTS OF SECTION 01145 USE OF PREMISES, 01740 SITE RESTORATION, AND 02951 PAVEMENT REPAIR AND RESTORATION.
6. THE DIMENSION REPRESENTS THE DISTANCE FROM THE STRUCTURE TO THE EDGE OF THE TRENCH FOR OPEN CUT OR OUTSIDE OF CASING FOR TUNNELING.

TBM:
CP- 21 AT STA 93+45.09
12.46' LT, EL. 54.98

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

( ) CRITICAL LOCATE PER COH SPEC 02317.

(XX) KEY NOTES (SHT 07).

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STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256-7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
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TBPE REGISTRATION NO. F-3691

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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

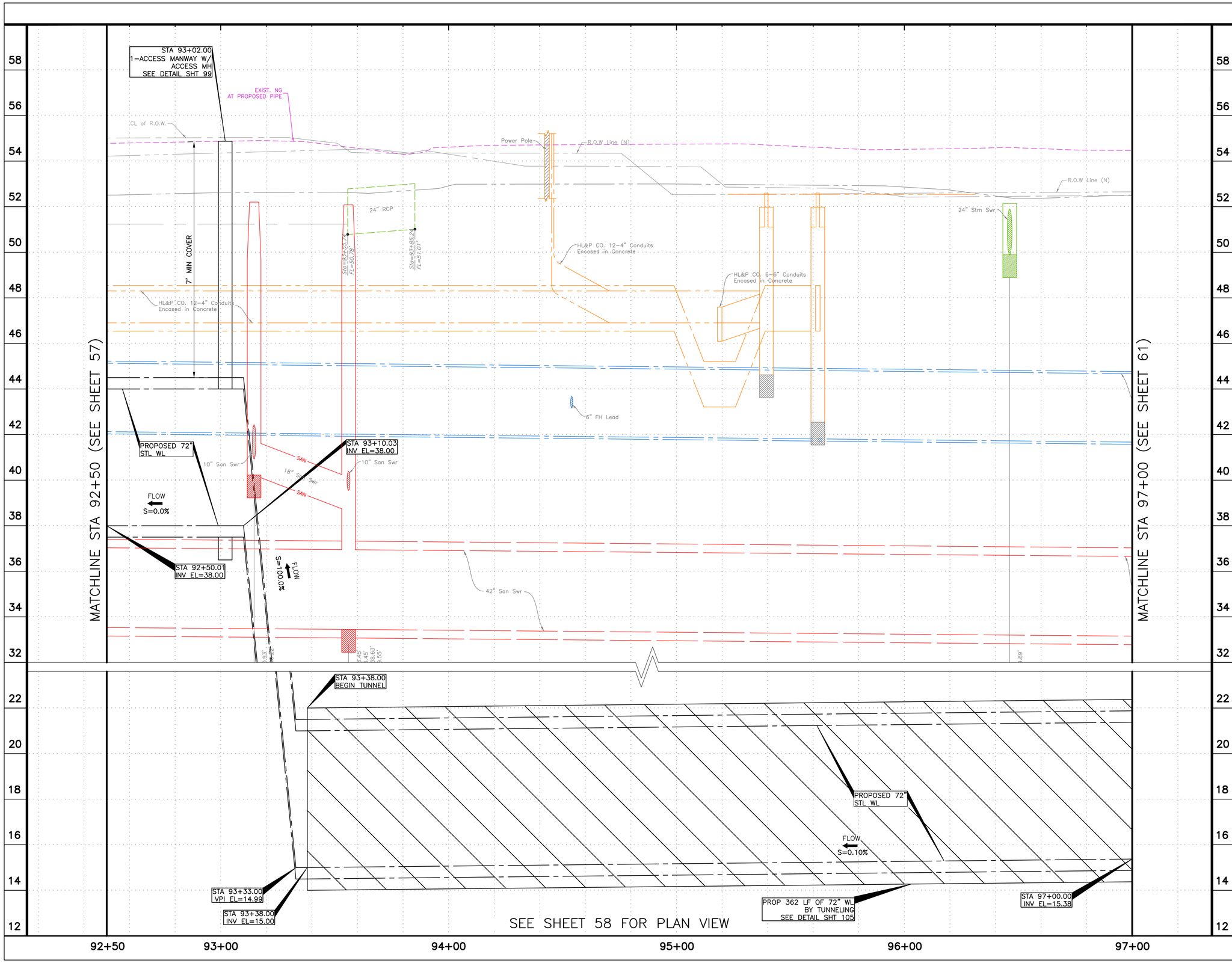
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 92+50 TO STA 97+00
METRO WESTPARK DR ROW

(SHEET 42 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 58 OF 169	



HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES — Creating Space Underground

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Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

ARCADIS

ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

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CITY OF HOUSTON

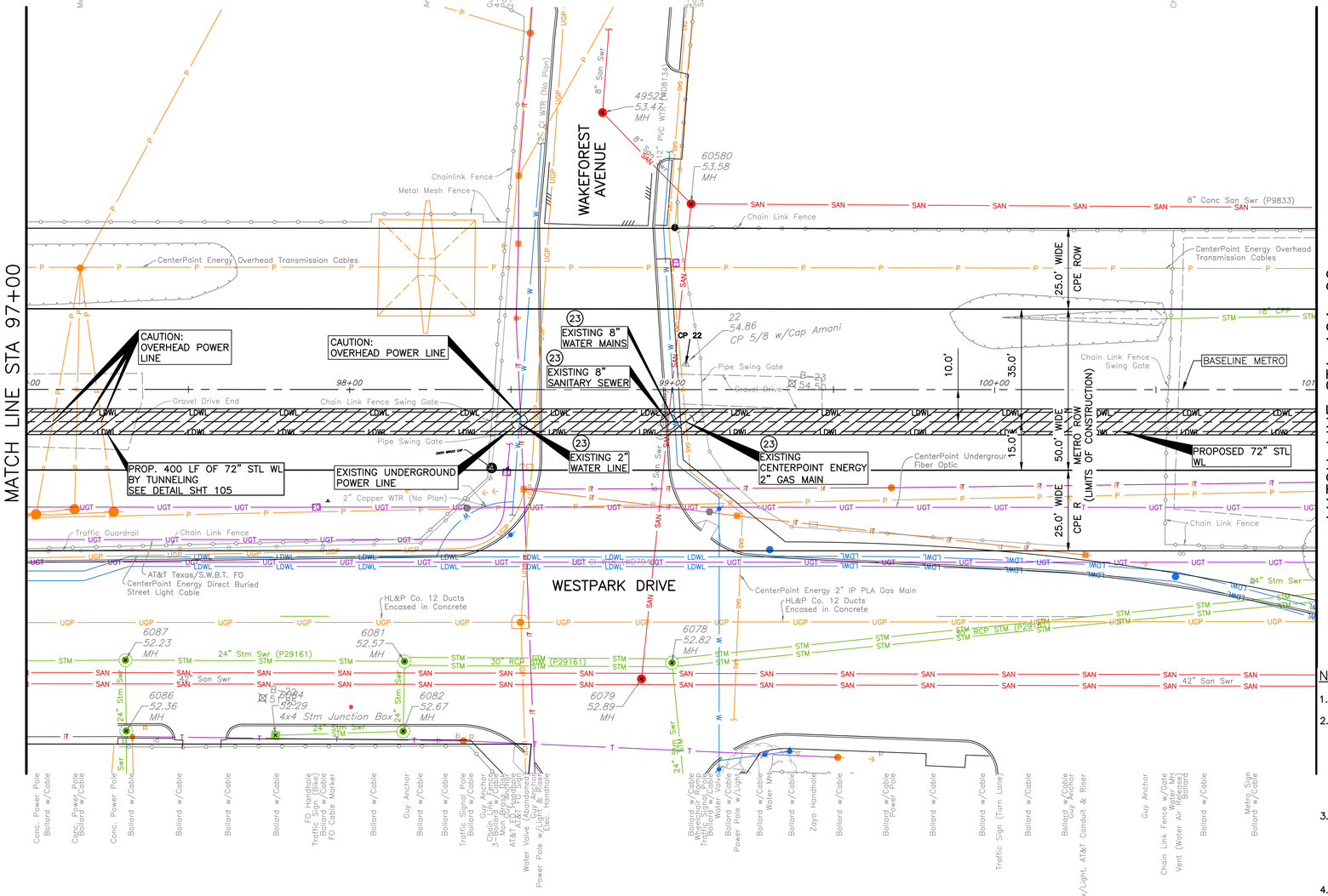
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA TO STA
METRO WESTPARK DR ROW
92+50 97+00

(SHEET 43 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 59 OF 169	



SEE SHEET 61 FOR PROFILE VIEW

TBM:
CP– 22 AT STA 99+04.22
7.94' LT, EL. 54.86

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

- ( ) CRITICAL LOCATE PER COH SPEC 02317.
- (XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256–7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281–994–7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F–3691

TUNNELING DESIGN
THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF BRENT LINDELOF, TX PE# 117075. NOT FOR BIDDING, PERMIT, OR CONSTRUCTION PURPOSES.

NOTICE:
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS SIGNATURE DOES NOT FULFILL YOUR OBLIGATION TO CALL 811

VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713–953–4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F–533

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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P–6329

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

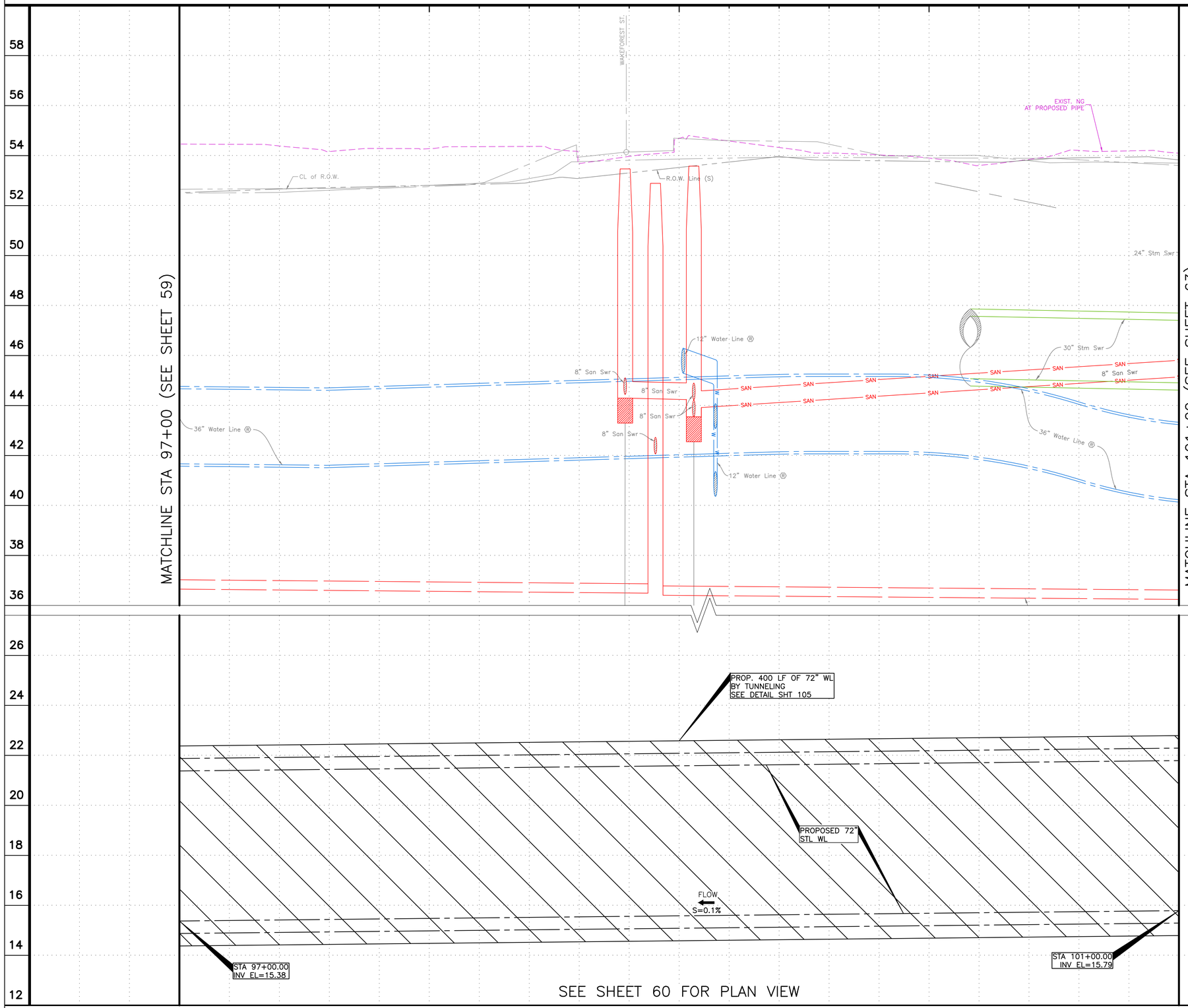
PLAN VIEW
STA TO STA
METRO WESTPARK DR ROW
97+00 101+00

(SHEET 44 OF 69)

NOTES:

1. RESTRAIN ALL JOINTS.
2. CONTRACTOR TO COORDINATE WITH CYNTHIA RODRIGUES WITH CENTERPOINT ENERGY AT 713–207–6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
3. CONTRACTOR WILL BE REQUIRED TO PROTECT ADJACENT UTILITIES TO ALL TUNNEL SHAFTS AND TUNNEL EXCAVATION, SEE SPECIFICATION SECTIONS 01110 AND 02441LD FOR FURTHER REQUIREMENTS.
4. CONTRACTOR TO REFER TO SHEET 06 FOR TUNNELING WORK NOTES.
5. REPLACE OR RECONSTRUCT SITE AFFECTED OR ALTERED BY THE WORK IN PUBLIC OR PRIVATE PROPERTY, INCLUDING BUT NOT LIMITED TO PAVEMENT, DRIVEWAYS, SIDEWALKS, FENCES, AND LANDSCAPING PER THE REQUIREMENTS OF SECTION 01145 USE OF PREMISES, 01740 SITE RESTORATION, AND 02951 PAVEMENT REPAIR AND RESTORATION.
6. THE DIMENSION REPRESENTS THE DISTANCE FROM THE STRUCTURE TO THE EDGE OF THE TRENCH FOR OPEN CUT OR OUTSIDE OF CASING FOR TUNNELING.

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"–20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 60 OF 169	



HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
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Date

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FB NO. P-6329

CITY OF HOUSTON

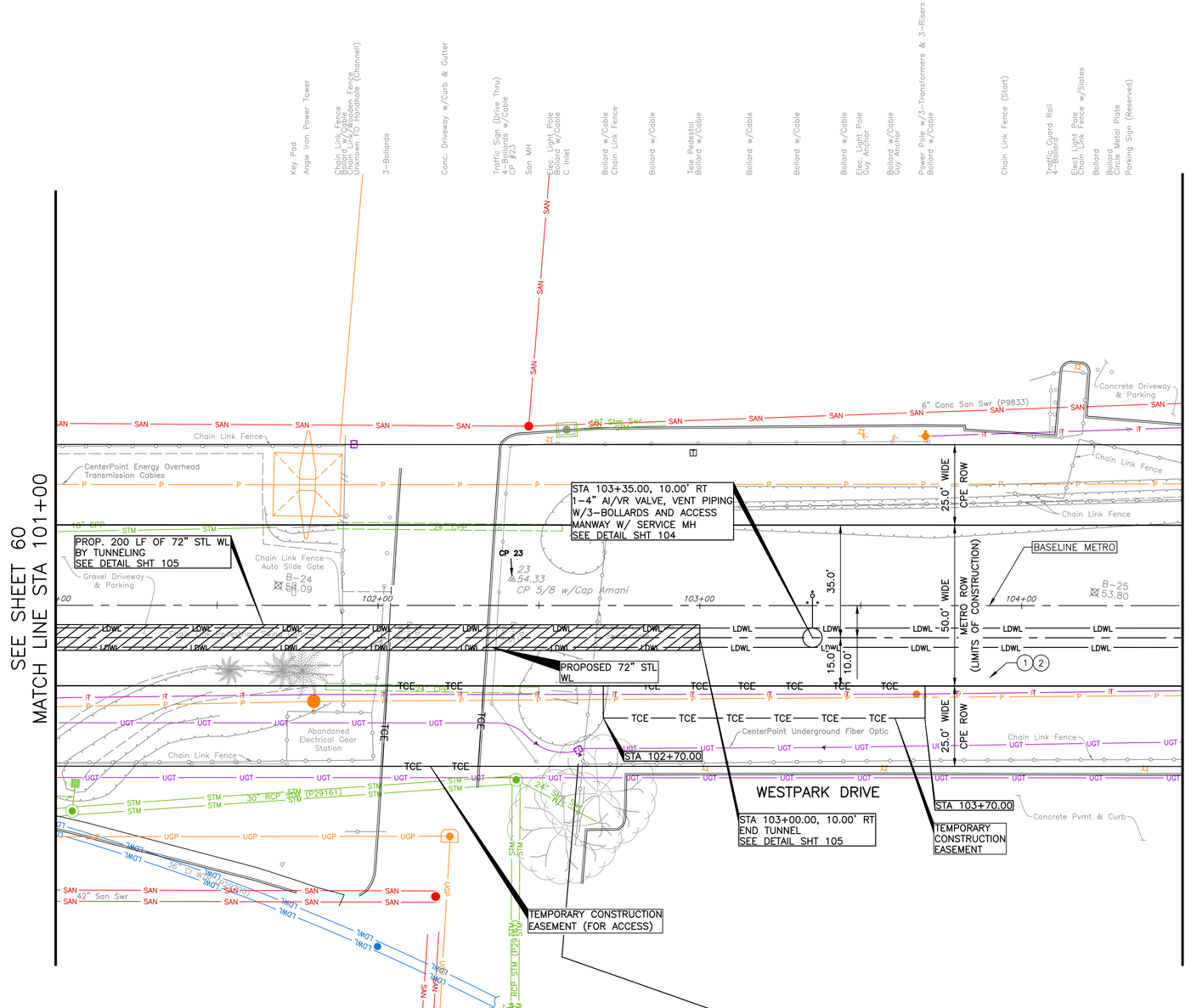
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PROFILE VIEW STA 97+00 TO STA 101+00 METRO WESTPARK DR ROW & WAKEFOREST AVE

(SHEET 45 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 61 OF 169	



SEE SHEET 63 FOR PROFILE VIEW

TBM:
CP– 23 AT STA 102+41.61
8.24' LT, EL. 54.33

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

(◌) CRITICAL LOCATE PER COH SPEC 02317.

(XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256–7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281–994–7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F–3691

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VERIFICATION OF PRIVATE UTILITY LINES

Date

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Signature valid for six months.

Date

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Signature valid for six months.

Date

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Signature valid for one year.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713–953–4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F–533

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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P–6329

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 101+00 TO STA 104+50
METRO WESTPARK DR ROW

(SHEET 46 OF 69)

NOTES:

1. RESTRAIN ALL JOINTS.
2. CONTRACTOR TO COORDINATE WITH CYNTHIA RODRIGUES WITH CENTERPOINT ENERGY AT 713–207–6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION
3. CONTRACTOR WILL BE REQUIRED TO PROTECT ADJACENT UTILITIES TO ALL TUNNEL SHAFTS AND TUNNEL EXCAVATION, SEE SPECIFICATION SECTIONS 01110 AND 02441LD FOR FURTHER REQUIREMENTS.
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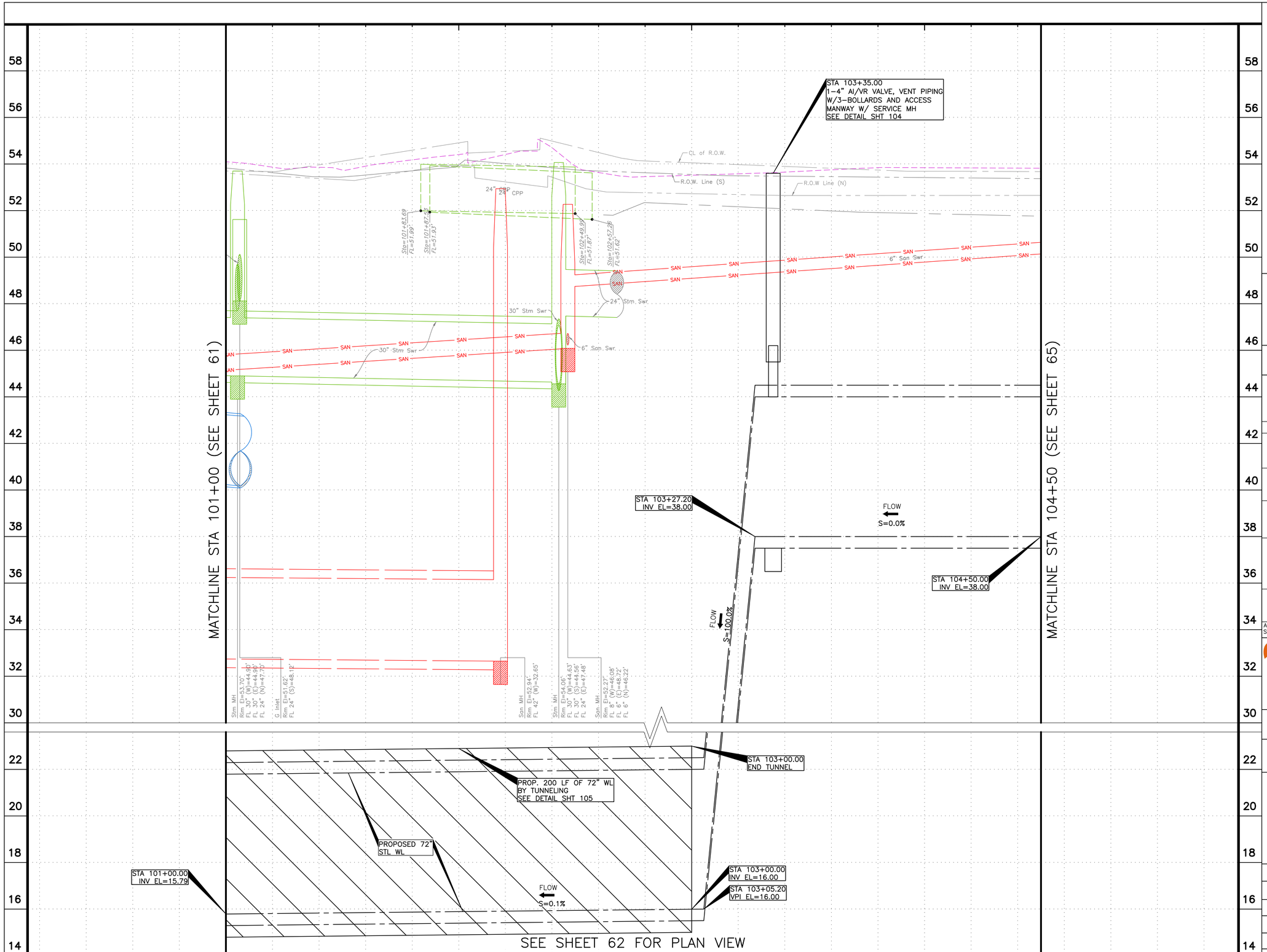
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"–20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 62 OF 169	



HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
1300 WORTHAM CENTER DRIVE,
3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
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Date

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ARCADIS
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1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

CITY OF HOUSTON

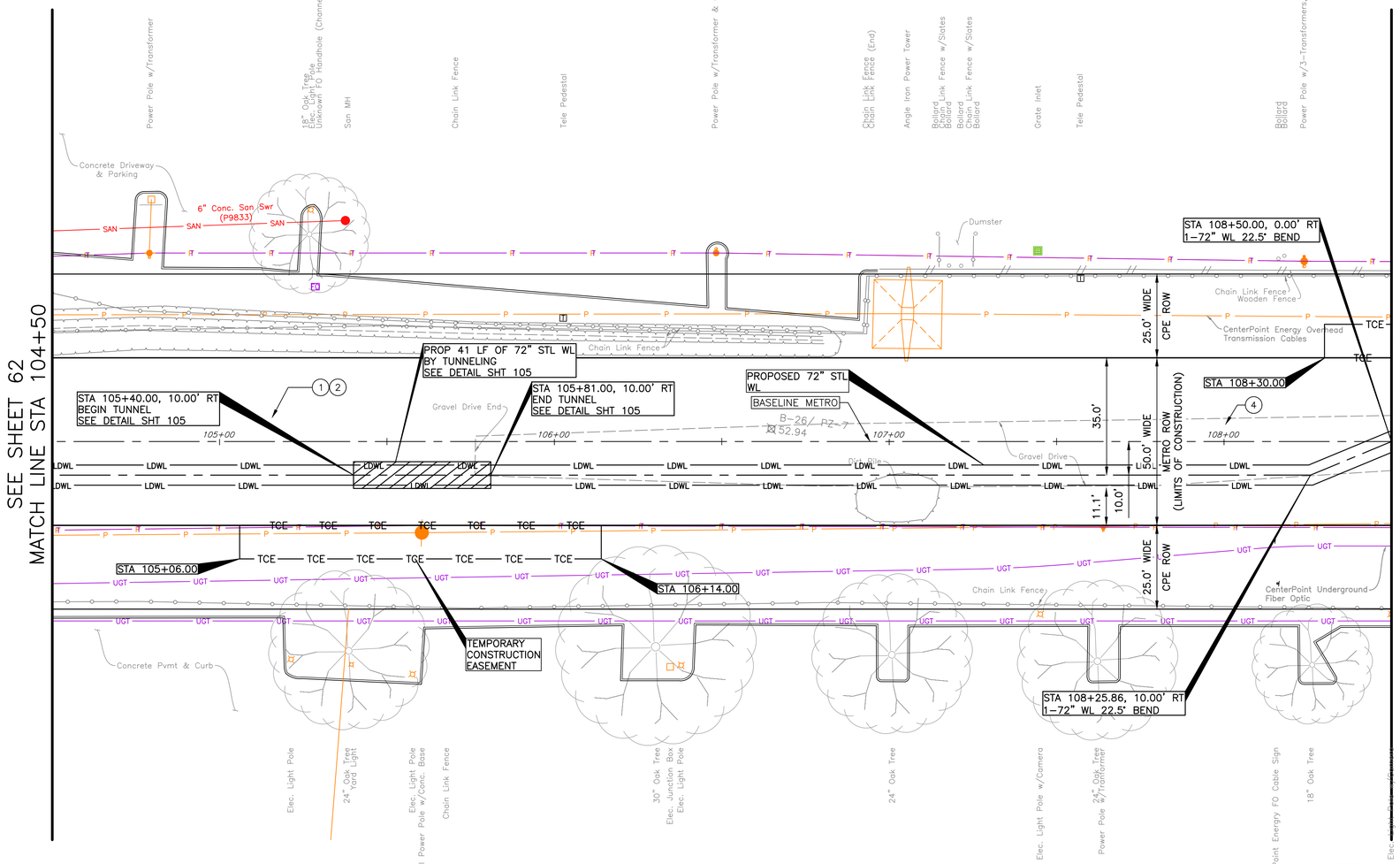
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 101+00 TO STA 104+50
METRO WESTPARK DR ROW

(SHEET 47 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 63 OF 169	



SEE SHEET 65 FOR PROFILE VIEW

NOTES:

1. RESTRAIN ALL JOINTS.
2. CONTRACTOR TO COORDINATE WITH CYNTHIA RODRIGUES WITH CENTERPOINT ENERGY AT 713-207-6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
3. THE DIMENSION REPRESENTS THE DISTANCE FROM THE STRUCTURE TO THE EDGE OF THE TRENCH FOR OPEN CUT OR OUTSIDE OF CASING FOR TUNNELING.
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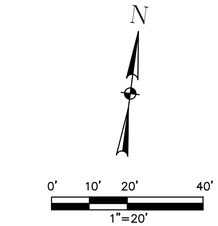

NO.	DATE	REVISION	APP.

LEGEND:

( ) CRITICAL LOCATE PER COH SPEC 02317.

(XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256-7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F-3691

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VERIFICATION OF PRIVATE UTILITY LINES

Date

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Signature valid for six months.

Date

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Signature valid for six months.

Date

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Signature valid for one year.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

CITY OF HOUSTON

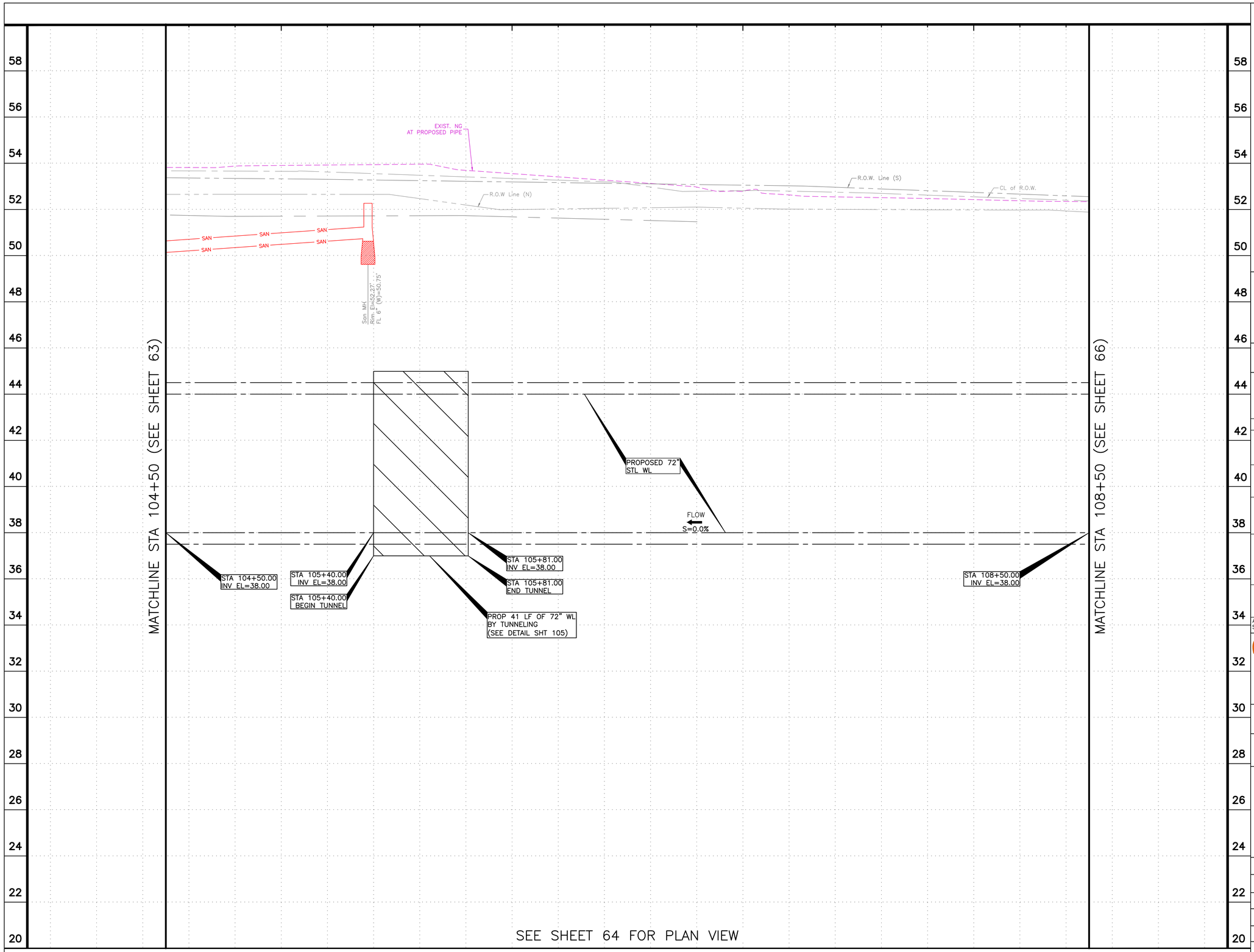
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 104+50 TO STA 108+50
METRO WESTPARK DR ROW

(SHEET 48 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"-20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 64 OF 169	



HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES
Creating Space Underground
1992 25 2024
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
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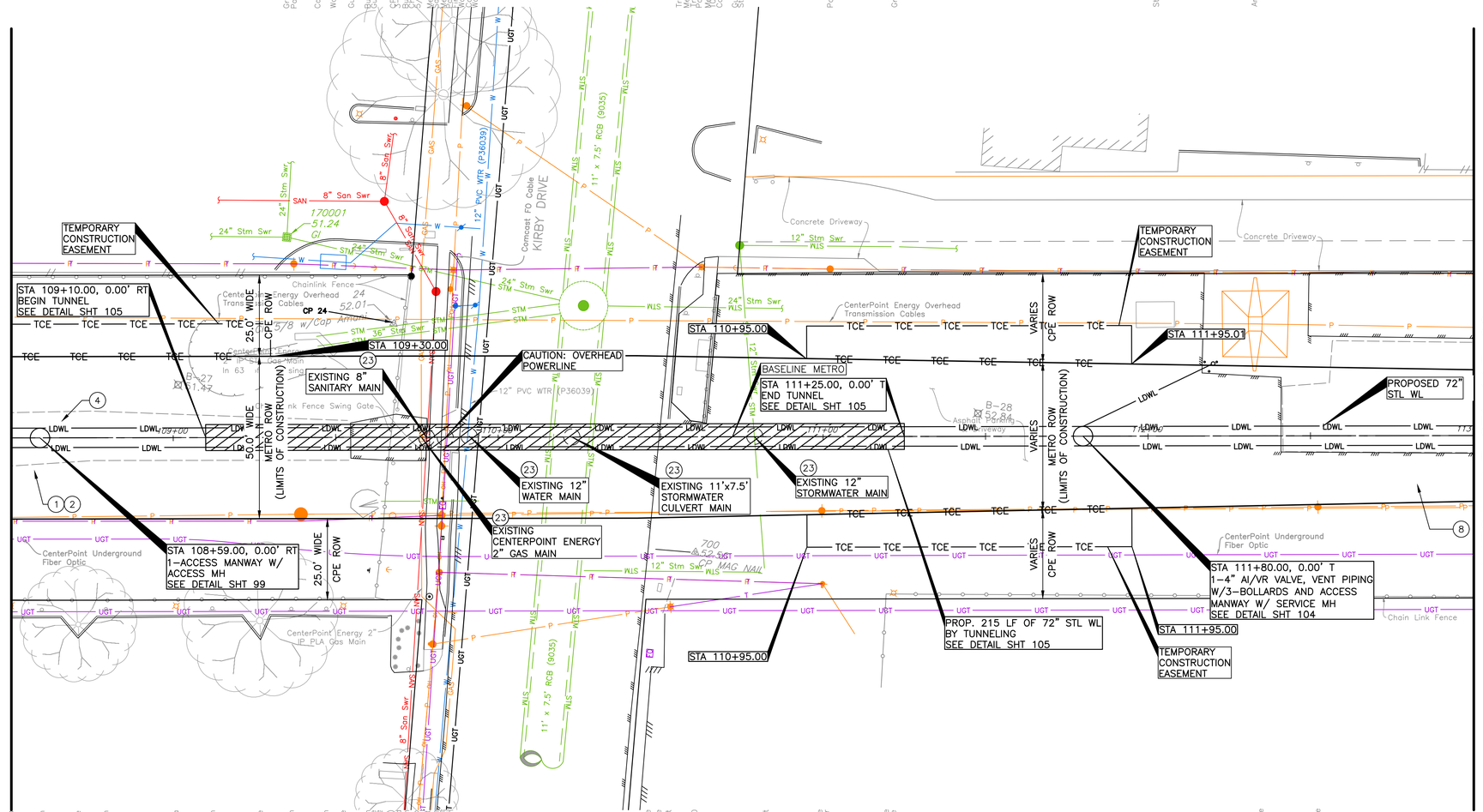
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 104+50 TO STA 108+50
METRO WESTPARK DR ROW

(SHEET 49 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 65 OF 169	



SEE SHEET 67 FOR PROFILE VIEW

TBM:
CP– 24 AT STA 109+67.91
34.94' LT, EL. 52.01

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

(XX) CRITICAL LOCATE PER COH SPEC 02317.

(XX) KEY NOTES (SHT 07).

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ELEVATION = 56.29' (NAVD 88, GEOID 18)

NOTES:

1. RESTRAIN ALL JOINTS.
2. CONTRACTOR TO COORDINATE WITH CYNTHIA RODRIGUES WITH CENTERPOINT ENERGY AT 713–207–6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
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BRIERLEY ASSOCIATES
Creating Space Underground
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13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
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TBPE REGISTRATION NO. F–3691

TUNNELING DESIGN

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FB NO. P–6329

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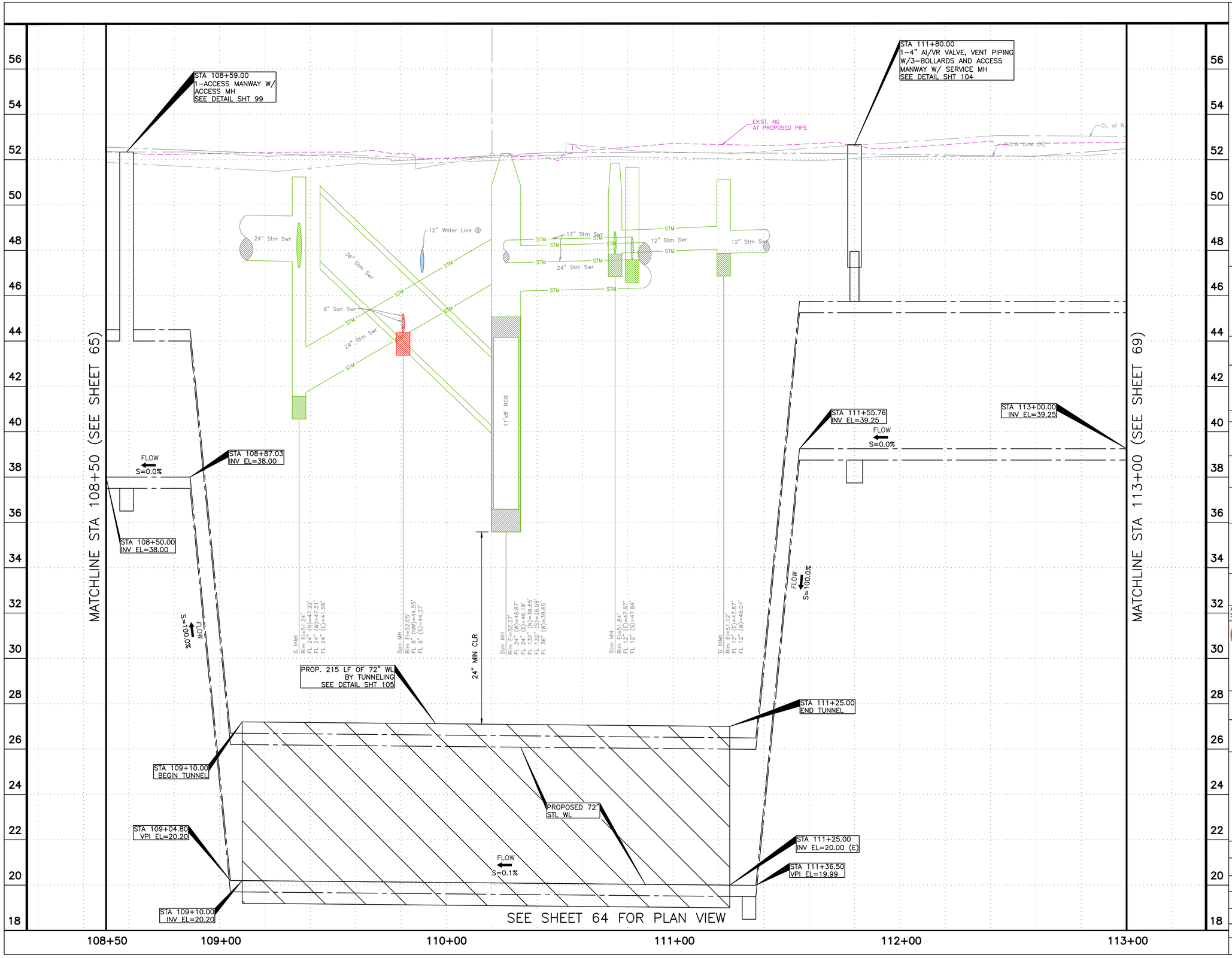
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 108+50 TO STA 113+00
METRO WESTPARK DR ROW
& KIRBY DR

(SHEET 50 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"–20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 66 OF 169	



HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F-3691

TUNNELING DESIGN

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF BRENT LINDELOF, TX PE# 117075. NOT FOR BIDDING, PERMIT, OR CONSTRUCTION PURPOSES.

NOTICE:

FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS SIGNATURE DOES NOT FULFILL YOUR OBLIGATION TO CALL 811

VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF JAIPAL MUSKU, TX PE# 108774. NOT FOR BIDDING, PERMIT, OR CONSTRUCTION PURPOSES.

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

CITY OF HOUSTON

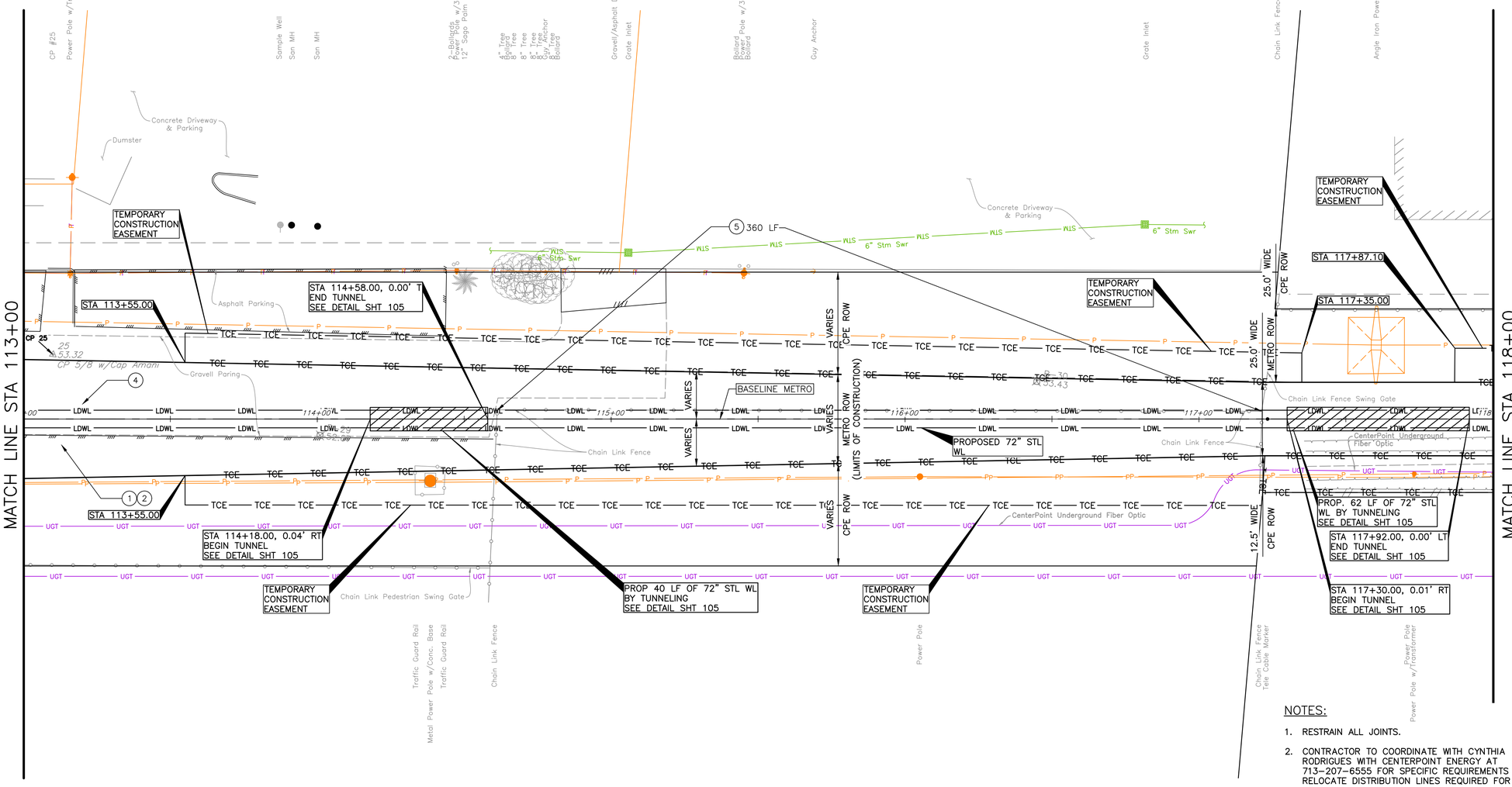
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 108+50 TO STA 113+00
METRO WESTPARK DR ROW
& KIRBY DR

(SHEET 51 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 67 OF 169	



SEE SHEET 69 FOR PROFILE VIEW

TBM:
CP– 25 AT STA 113+10.08
21.93' LT, EL. 53.32

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

- CRITICAL LOCATE PER COH SPEC 02317.
- (XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256–7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

NOTES:

1. RESTRAIN ALL JOINTS.
2. CONTRACTOR TO COORDINATE WITH CYNTHIA RODRIGUES WITH CENTERPOINT ENERGY AT 713–207–6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
3. CONTRACTOR WILL BE REQUIRED TO PROTECT ADJACENT UTILITIES TO ALL TUNNEL SHAFTS AND TUNNEL EXCAVATION, SEE SPECIFICATION SECTIONS 01110 AND 02441LD FOR FURTHER REQUIREMENTS.
4. CONTRACTOR TO REFER TO SHEET 06 FOR TUNNELING WORK NOTES.
5. THE DIMENSION REPRESENTS THE DISTANCE FROM THE STRUCTURE TO THE EDGE OF THE TRENCH FOR OPEN CUT OR OUTSIDE OF CASING FOR TUNNELING.
6. REPLACE OR RECONSTRUCT SITE AFFECTED OR ALTERED BY THE WORK IN PUBLIC OR PRIVATE PROPERTY, INCLUDING BUT NOT LIMITED TO PAVEMENT, DRIVEWAYS, SIDEWALKS, FENCES, AND LANDSCAPING PER THE REQUIREMENTS OF SECTION 01145 USE OF PREMISES, 01740 SITE RESTORATION, AND 02951 PAVEMENT REPAIR AND RESTORATION.

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281–994–7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F–3691

TUNNELING DESIGN

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VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713–953–4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F–533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P–6329

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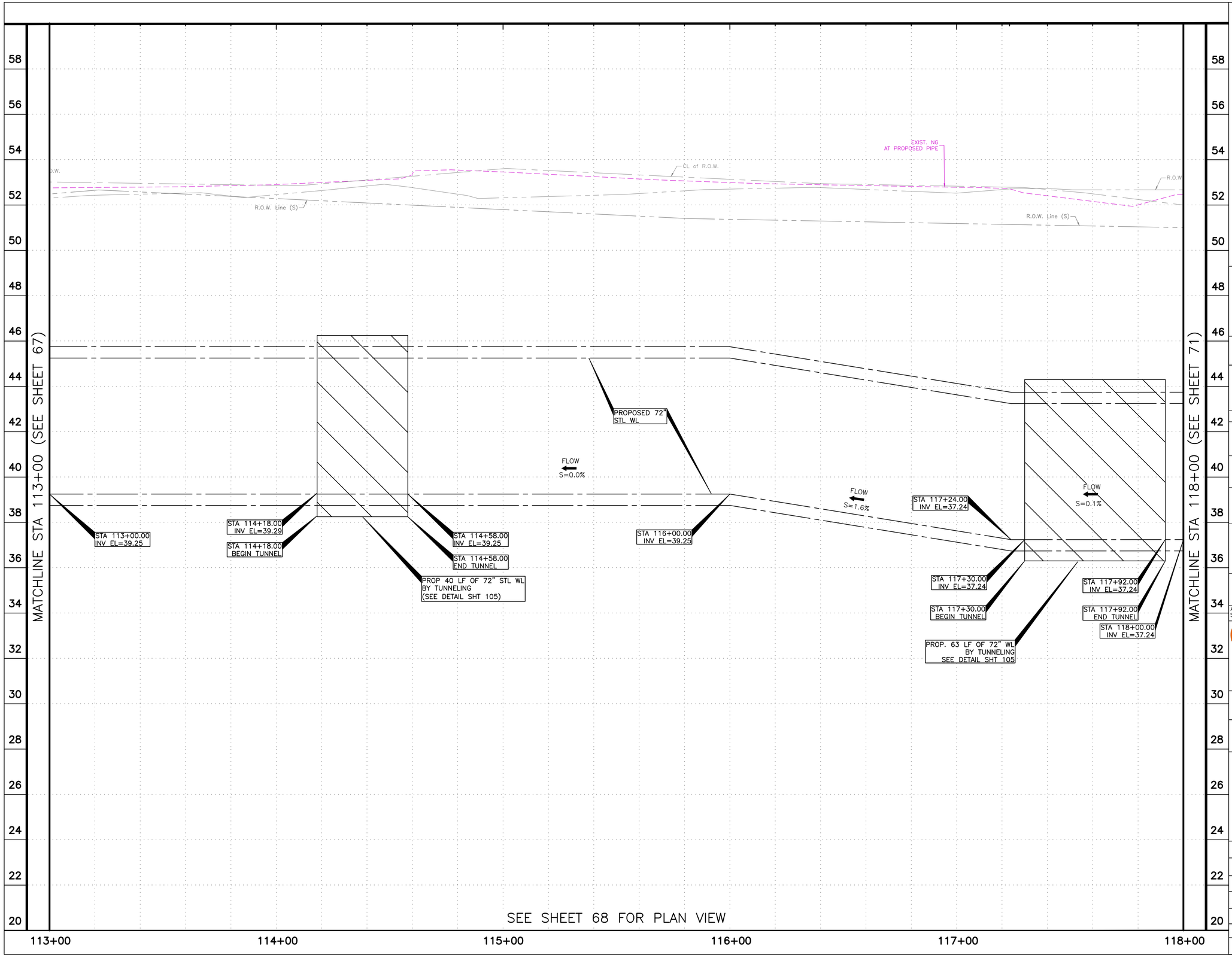
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 113+00 TO STA 118+00
METRO WESTPARK DR ROW

(SHEET 52 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"–20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 68 OF 169	



HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES
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13100 WORTHAM CENTER DRIVE,
3RD FLOOR HOUSTON, TX 77065
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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

CITY OF HOUSTON

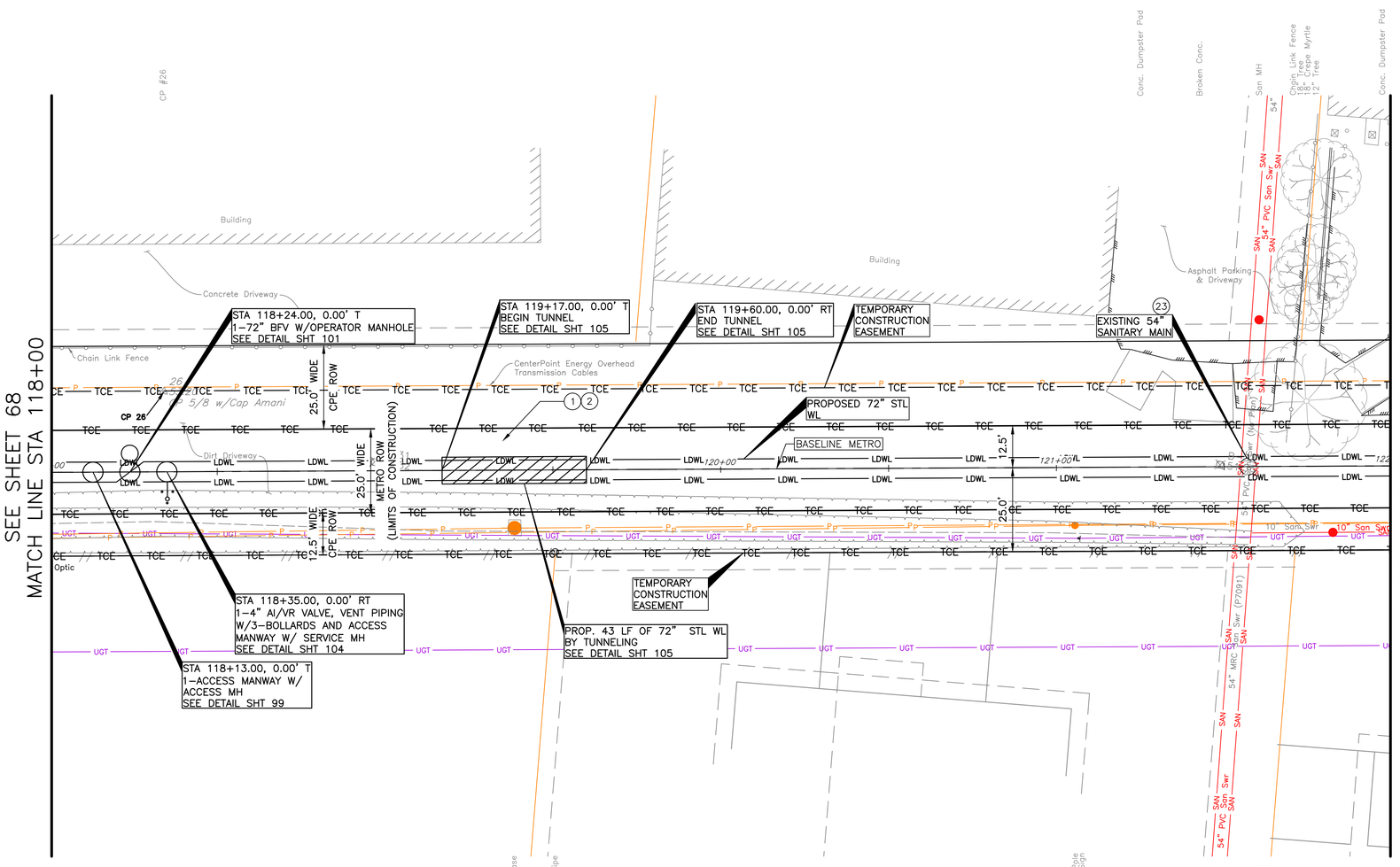
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 113+00 TO STA 118+00
METRO WESTPARK DR ROW

(SHEET 53 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 69 OF 169	



SEE SHEET 71 FOR PROFILE VIEW

TBM:
CP- 26 AT STA 118+34.21
23.93' LT, EL. 53.20

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

- CRITICAL LOCATE PER COH SPEC 02317.
- TCE — TEMPORARY CONSTRUCTION EASEMENT.
- (XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256-7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

NOTES:

1. RESTRAIN ALL JOINTS.
2. CONTRACTOR TO COORDINATE WITH CYNTHIA RODRIGUES WITH CENTERPOINT ENERGY AT 713-207-6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
3. CONTRACTOR WILL BE REQUIRED TO PROTECT ADJACENT UTILITIES TO ALL TUNNEL SHAFTS AND TUNNEL EXCAVATION, SEE SPECIFICATION SECTIONS 01110 AND 02441LD FOR FURTHER REQUIREMENTS.
4. CONTRACTOR TO REFER TO SHEET 06 FOR TUNNELING WORK NOTES.
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BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F-3691

TUNNELING DESIGN

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NOTICE:
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VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

CITY OF HOUSTON

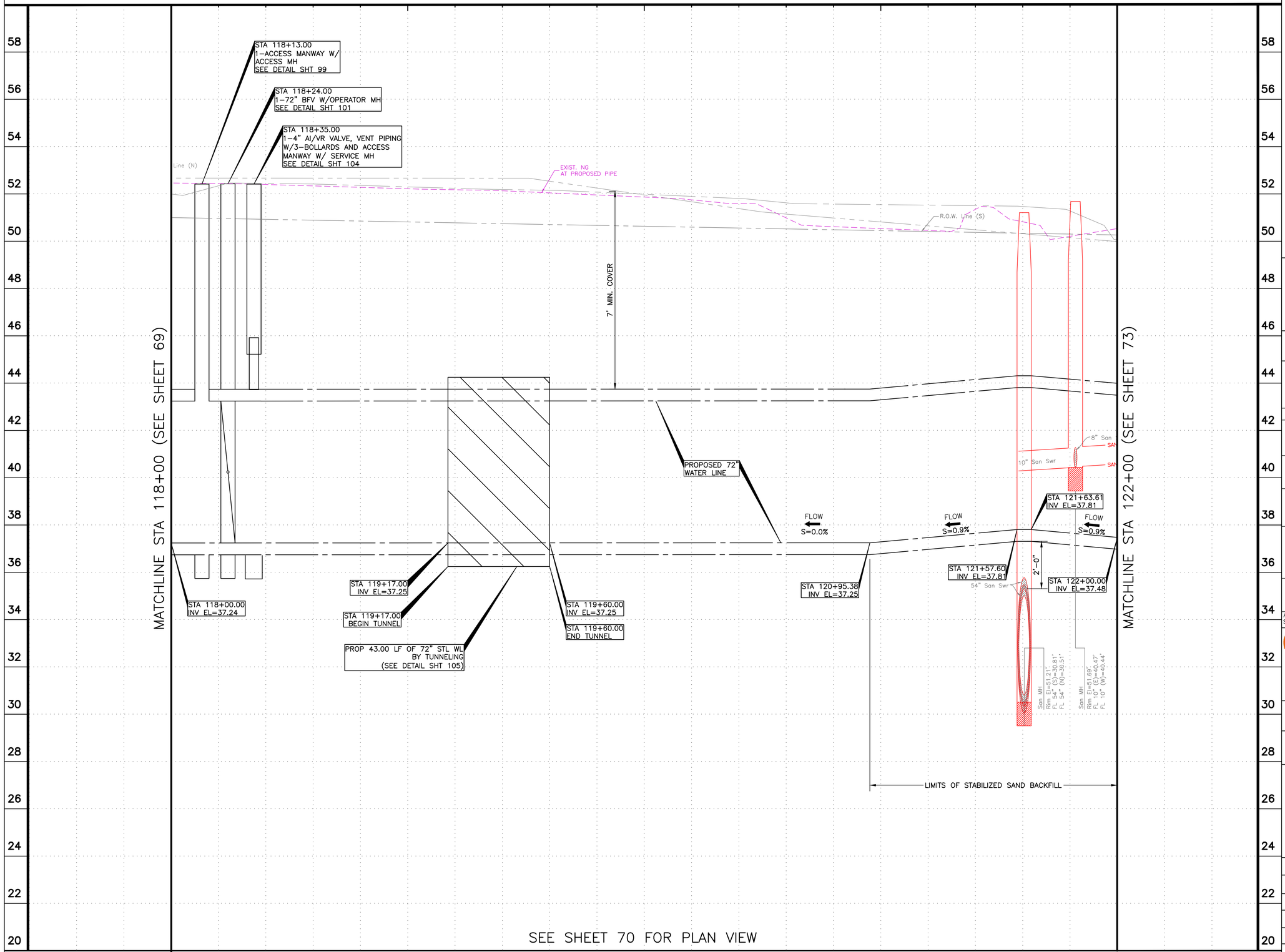
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 118+00 TO STA 122+00
METRO WESTPARK DR ROW

(SHEET 54 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"-20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 70 OF 169	



HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
1300 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
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Date

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FB NO. P-6329

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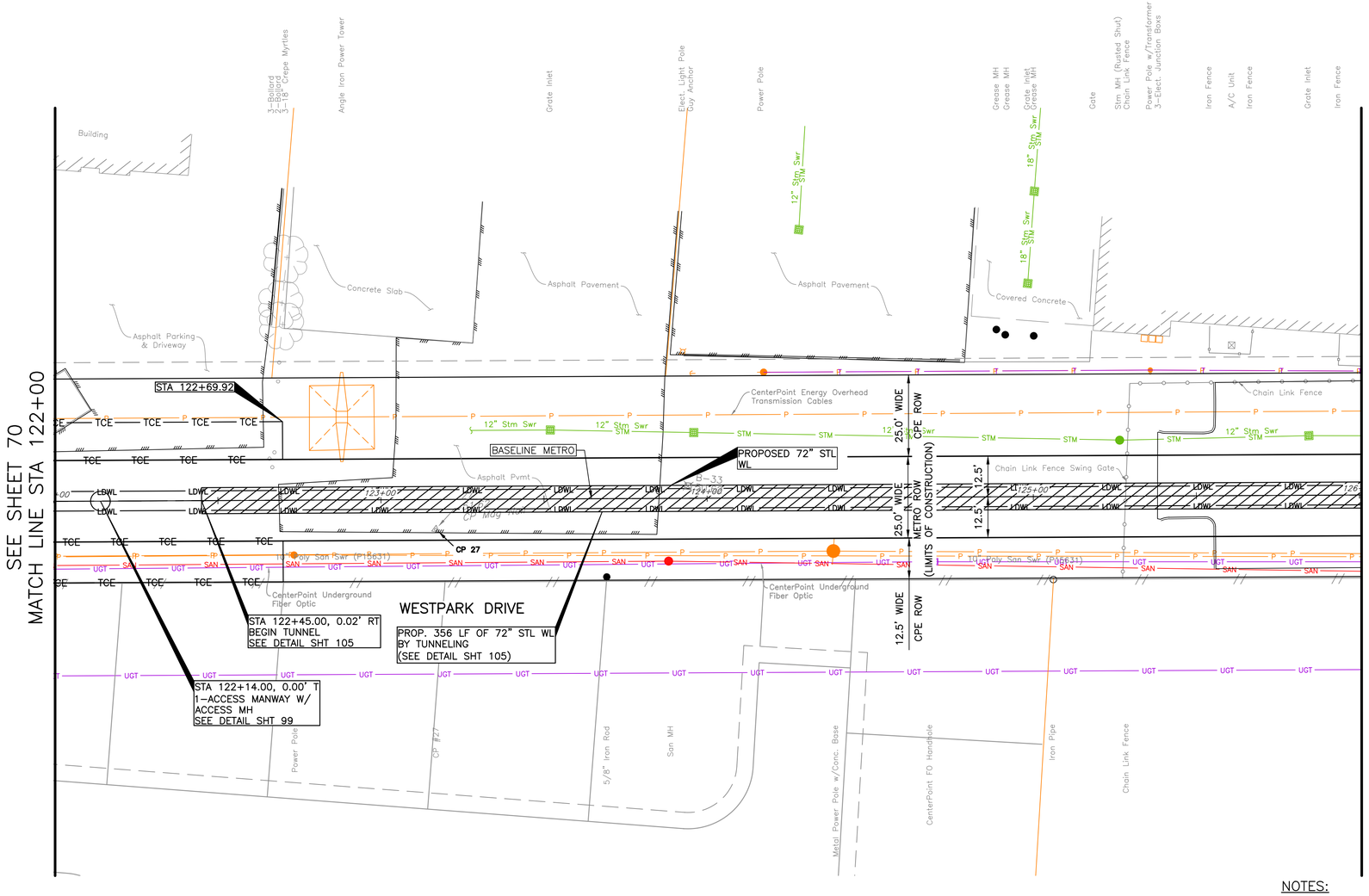
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 118+00 TO STA 122+00
METRO WESTPARK DR ROW

(SHEET 55 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 71 OF 169	



SEE SHEET 73 FOR PROFILE VIEW

NOTES:

1. RESTRAIN ALL JOINTS.
2. CONTRACTOR TO COORDINATE WITH CYNTHIA RODRIGUES WITH CENTERPOINT ENERGY AT 713-207-6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION.
3. CONTRACTOR WILL BE REQUIRED TO PROTECT ADJACENT UTILITIES TO ALL TUNNEL SHAFTS AND TUNNEL EXCAVATION, SEE SPECIFICATION SECTIONS 01110 AND 02441LD FOR FURTHER REQUIREMENTS.
4. CONTRACTOR TO REFER TO SHEET 06 FOR TUNNELING WORK NOTES.
5. REPLACE OR RECONSTRUCT SITE AFFECTED OR ALTERED BY THE WORK IN PUBLIC OR PRIVATE PROPERTY, INCLUDING BUT NOT LIMITED TO PAVEMENT, DRIVEWAYS, SIDEWALKS, FENCES, AND LANDSCAPING PER THE REQUIREMENTS OF SECTION 01145 USE OF PREMISES, 01740 SITE RESTORATION, AND 02951 PAVEMENT REPAIR AND RESTORATION.

N

TBM:
CP- 27 AT STA 123+16.72
9.21' RT, EL. 51.62

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

( ) CRITICAL LOCATE PER COH SPEC 02317.

(XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256-7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

BRIERLEY ASSOCIATES
Creating Space Underground
BRIERLEY ASSOCIATES
13100 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F-3691

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VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

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Date

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Signature valid for one year.

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HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

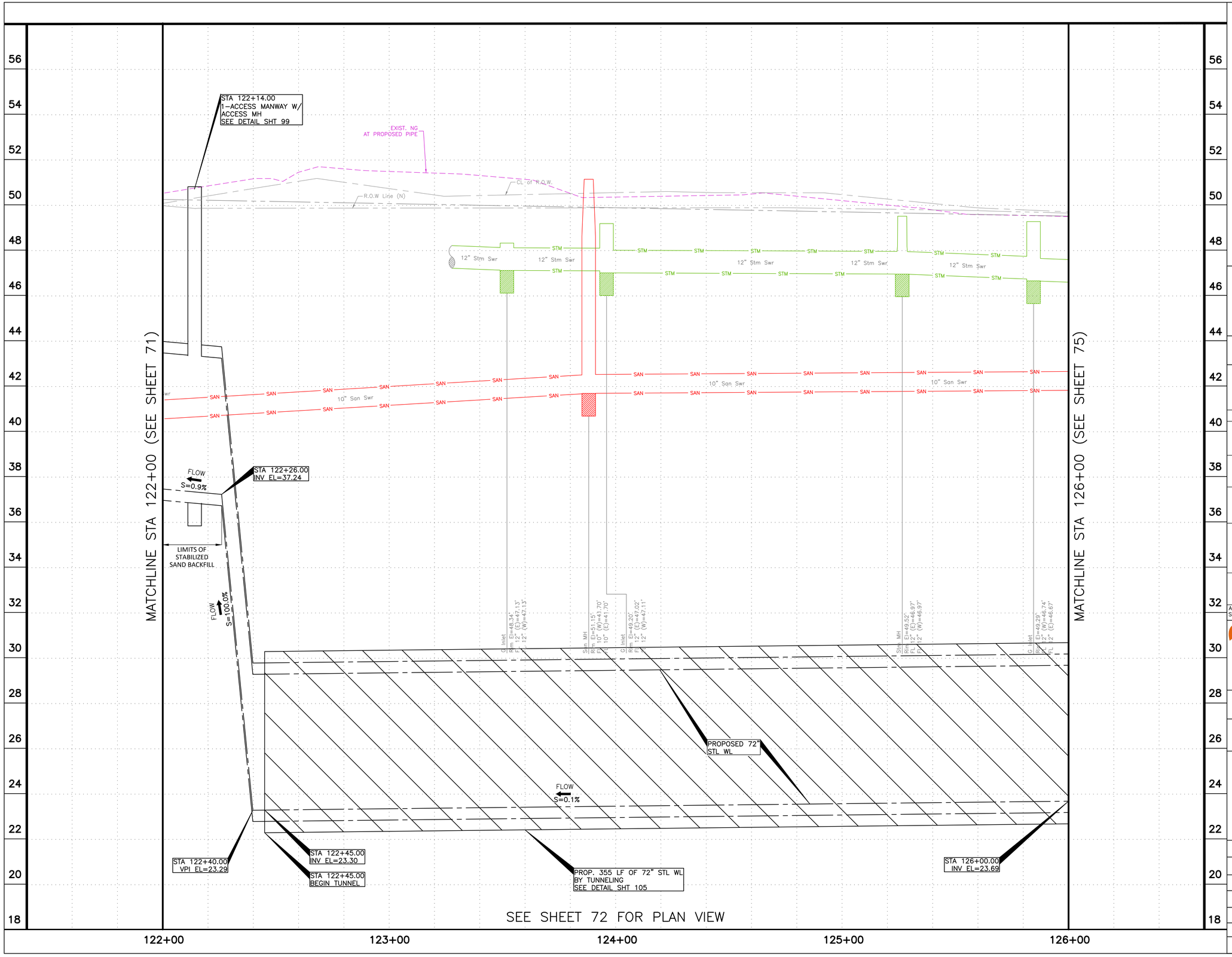
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

PLAN VIEW
STA 122+00 TO STA 126+00
METRO WESTPARK DR ROW

(SHEET 56 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 72 OF 169	



HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES
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CITY OF HOUSTON

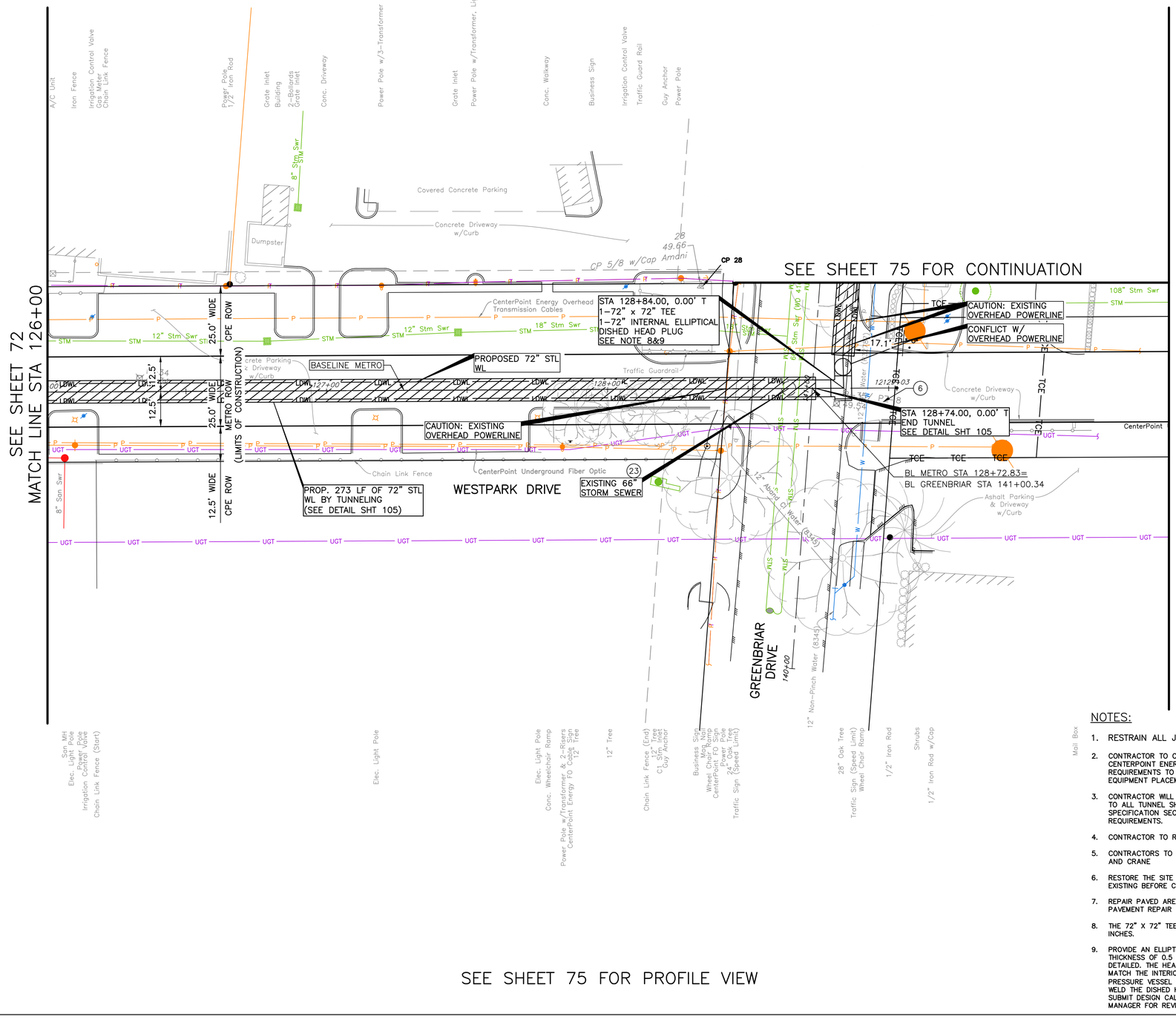
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 122+00 TO STA 126+00
METRO WESTPARK DR ROW

(SHEET 57 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 73 OF 169	



TBM:
CP- 28 AT STA 128+33.29
36.48' LT, EL. 48.66

N

0' 10' 20' 40'
1"=20'

NO.	DATE	REVISION	APP.

LEGEND:

( ) CRITICAL LOCATE PER COH SPEC 02317.

(XX) KEY NOTES (SHT 07).

PROJECT BENCH MARK :
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256-7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

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Date

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Signature valid for six months.

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713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF JAIPAL MUSKU, TX PE# 108774. NOT FOR BIDDING, PERMIT, OR CONSTRUCTION PURPOSES.

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

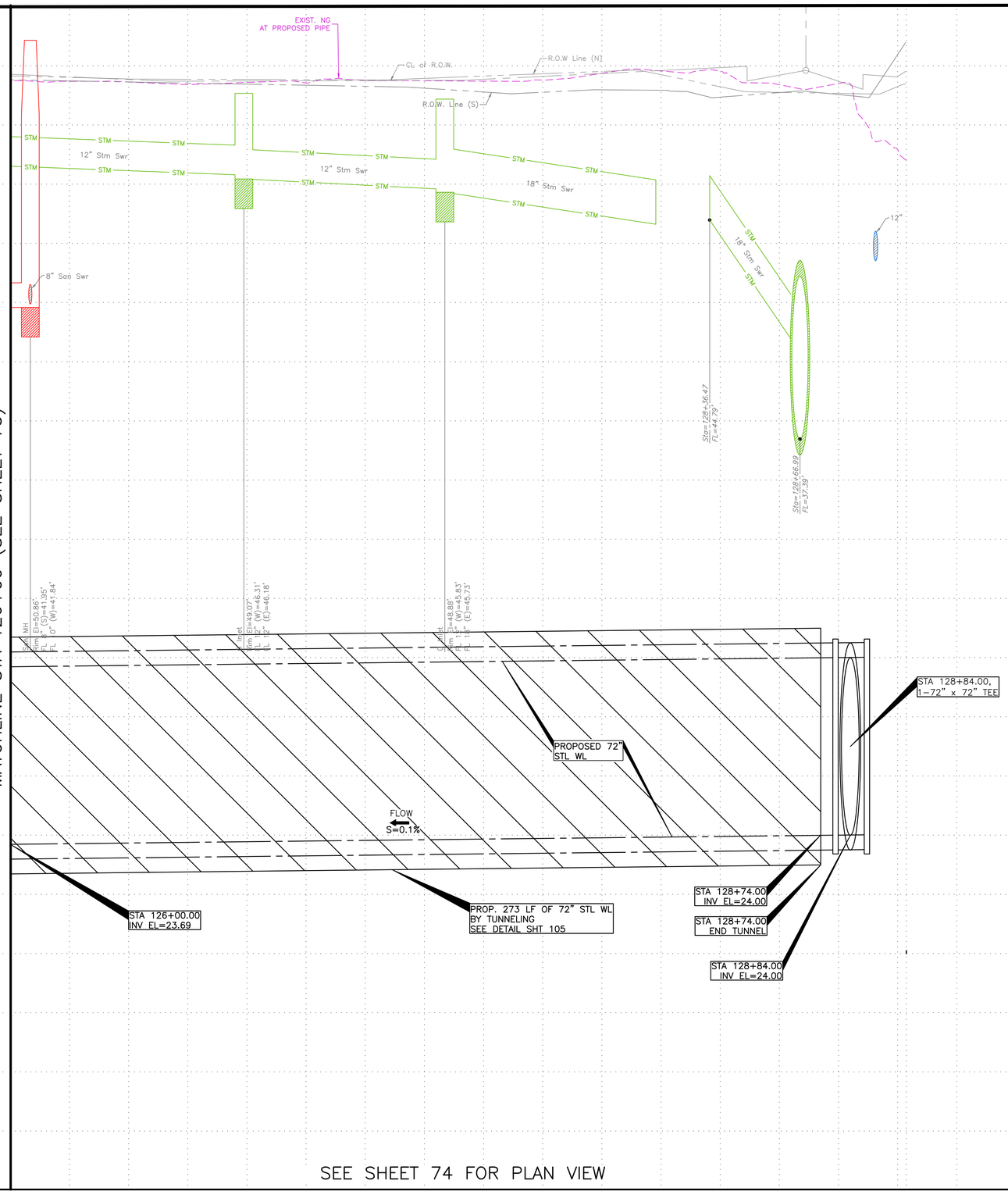
PLAN VIEW
STA 126+00 TO STA 129+03
METRO WESTPARK DR ROW
& GREENBRIAR DR

(SHEET 58 OF 69)

NOTES:

1. RESTRAIN ALL JOINTS.
2. CONTRACTOR TO COORDINATE WITH CYNTHIA RODRIGUES WITH CENTERPOINT ENERGY AT 713-207-6555 FOR SPECIFIC REQUIREMENTS TO RELOCATE DISTRIBUTION LINES REQUIRED FOR EQUIPMENT PLACEMENT AND TUNNEL SHAFT EXCAVATION
3. CONTRACTOR WILL BE REQUIRED TO PROTECT ADJACENT UTILITIES TO ALL TUNNEL SHAFTS AND TUNNEL EXCAVATION, SEE SPECIFICATION SECTIONS 01110 AND 02441LD FOR FURTHER REQUIREMENTS.
4. CONTRACTOR TO REFER TO SHEET 06 FOR TUNNELING WORK NOTES
5. CONTRACTORS TO PROTECT POWERLINE FROM TUNNELING EQUIPMENT AND CRANE
6. RESTORE THE SITE INCLUDING LANDSCAPING TO THE CONDITION EXISTING BEFORE CONSTRUCTION, OR BETTER.
7. REPAIR PAVED AREA AS PER THE REQUIREMENTS OF SECTION 02951 – PAVEMENT REPAIR AND RESTORATION.
8. THE 72" X 72" TEE SHALL HAVE A MINIMUM WALL THICKNESS OF 0.5 INCHES.
9. PROVIDE AN ELLIPTICAL DISHED HEAD PLUG WITH A MINIMUM THICKNESS OF 0.5 INCHES, BUTT WELDED TO THE END OF THE TEE AS DETAILED. THE HEAD MUST BE SHOP-LINED WITH CEMENT MORTAR TO MATCH THE INTERIOR PIPE LINING AND DESIGNED PER ASME BOILER & PRESSURE VESSEL CODE, SECTION VIII, DIVISION 1 (LATEST EDITION). WELD THE DISHED HEAD PLUG TO THE PIPE IN THE FACTORY AND SUBMIT DESIGN CALCULATIONS AND DETAILS TO THE PROJECT MANAGER FOR REVIEW.

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"-20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 74 OF 169	



HORIZ. 0' 10' 20' 40' — 1"=20'

VERT. 0' 1' 2' 4' — 1"=2'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES — *Creating Space Underground*

BRIERLEY ASSOCIATES
1300 WORTHAM CENTER DRIVE, 3RD FLOOR HOUSTON, TX 77065
281-994-7993
WWW.BRIERLEYASSOCIATES.COM
TBPE REGISTRATION NO. F-3691

TUNNELING DESIGN

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF BRENT LINDELOF, TX PE# 117075. NOT FOR BIDDING, PERMIT, OR CONSTRUCTION PURPOSES.

NOTICE:

FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS SIGNATURE DOES NOT FULFILL YOUR OBLIGATION TO CALL 811

VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

ARCADIS

ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

CITY OF HOUSTON

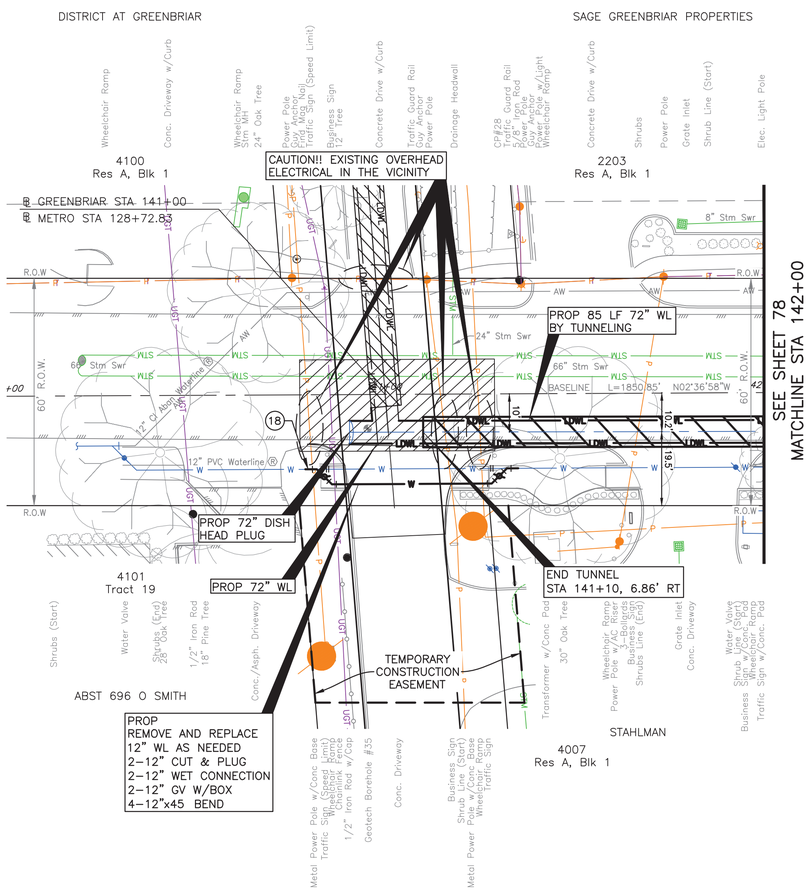
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

PROFILE VIEW
STA 126+00 TO STA 129+03
METRO WESTPARK DR ROW
& GREENBRIAR DR

(SHEET 59 OF 69)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 75 OF 169	



SEE SHEET 77 FOR PROFILE VIEW

GRAPHIC SCALE

0 20' 40'

FULL SIZE□1" = 20'
HALF SIZE□1" = 40'

NO.	DATE	REVISION	APP.

LEGEND

PAVEMENT REPAIR AND RESTORATION ACCORDING TO STREET CUT DETAILS; REFER COH DWGS 02951-01, -02, -03

TBM:

CP-28 AT STA 141+33.34
42.22' LT., EL. 49.66

PROJECT BENCH MARK:
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256-7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

BRIERLEY ASSOCIATES
Creating Space Underground
13100 WORTHAM COURT, 3RD FLOOR
HOUSTON, TX 77065
PH: 281.994.7993
TBPE REGISTRATION NO. F-3691

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VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

AMANI ENGINEERING, INC.
11011 RICHMOND AVE., SUITE 700
HOUSTON, TEXAS 77042
TEL: (713) 270-5700
Texas Registered Engineering Firm No. F-4528
Texas Registered Surveying Firm No. 100282-00

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SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P – 6329

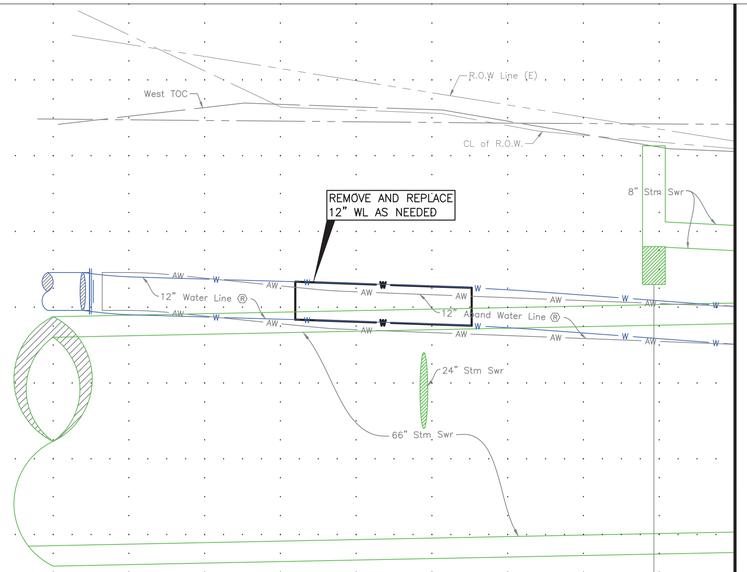
CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
FROM METOR CORRIDOR TO SWPS

WATER LINE
GREENBRIAR DR.
PLAN
STA 140+00 TO STA 142+00

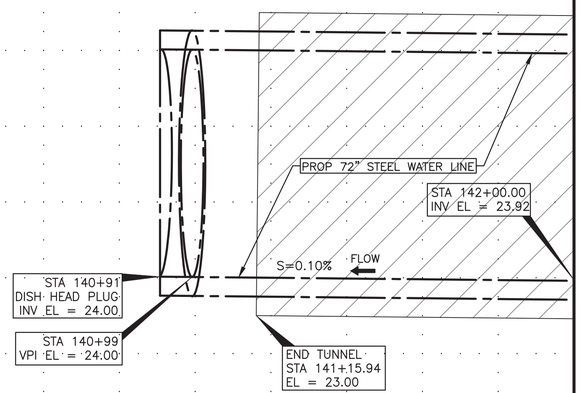
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 76 OF 169	



SEE SHEET 76 FOR PLAN VIEW

G Inlet
Rim El=48.25'
FL 8" (N)=43.59'

MATCHLINE STA 142+00 (SEE SHEET 79)



MATCHLINE STA 142+00

140+00 141+00 142+00

GRAPHIC SCALE
0 20' 40'
FULL SIZE 1" = 20'
HALF SIZE 1" = 40'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES
Creating Space Underground
13100 WORTHAM COURT, 3RD FLOOR
HOUSTON, TX 77065
PH: 281.894.7993
TBPE REGISTRATION NO. F-3691

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VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

AMANI ENGINEERING, INC.
11011 RICHMOND AVE., SUITE 700
HOUSTON, TEXAS 77042
TEL: (713) 270-5700
Texas Registered Engineering Firm No. F-4528
Texas Registered Surveying Firm No. 100282-00

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P – 6329

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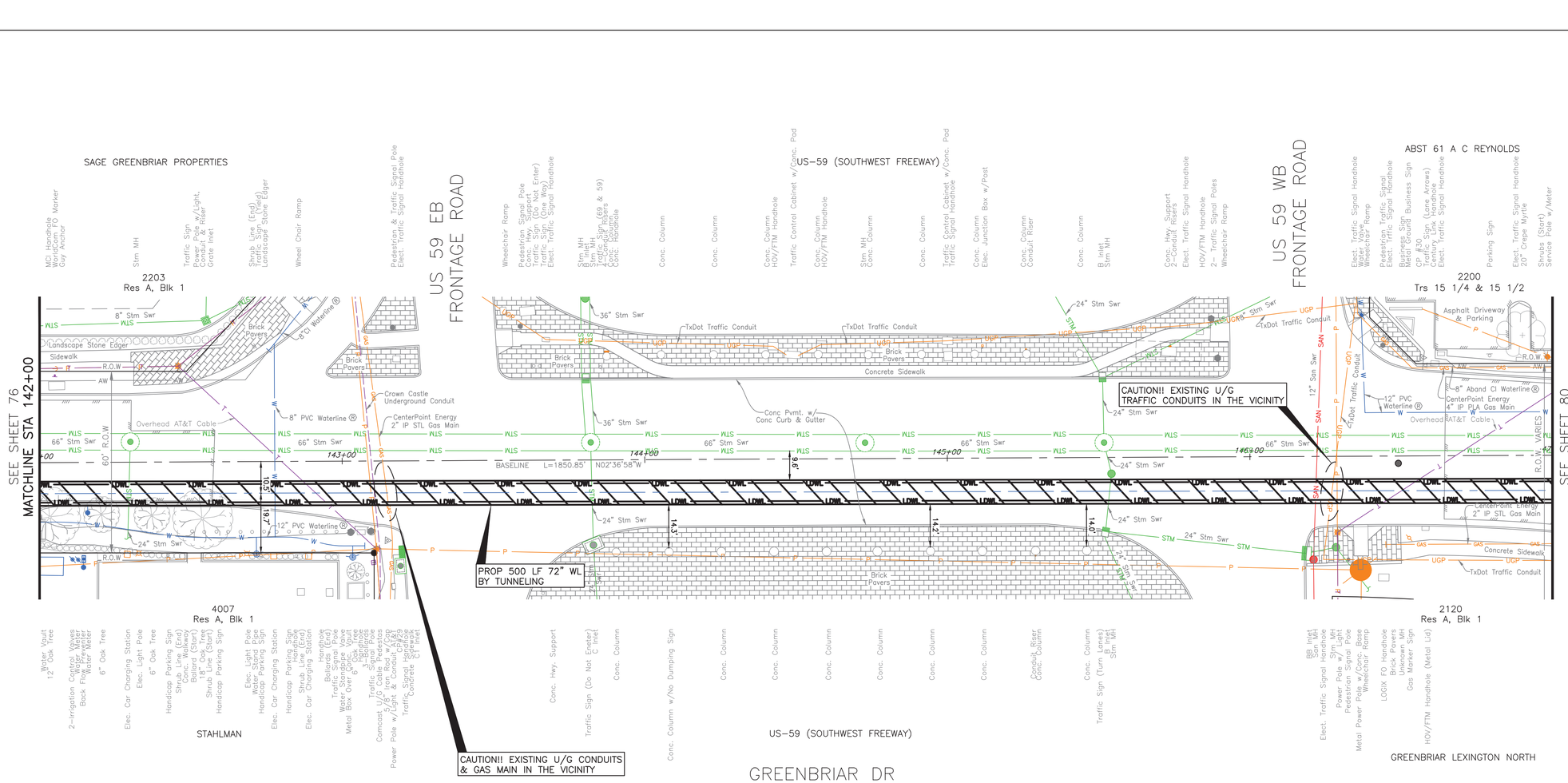
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
FROM METOR CORRIDOR TO SWPS

WATER LINE
GREENBRIAR DR.
PROFILE
STA 140+00 TO STA 142+00

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 77 OF 169	



SEE SHEET 79 FOR PROFILE VIEW

GRAPHIC SCALE
0 20' 40'
FULL SIZE□1" = 20'
HALF SIZE□1" = 40'

N

NO.	DATE	REVISION	APP.

TBM:

CP-29 AT STA 143+14.78
26.25' RT., EL. 47.62

PROJECT BENCH MARK:
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256-7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

BRIERLEY ASSOCIATES
Creating Space Underground
13100 WORTHAM COURT, 3RD FLOOR
HOUSTON, TX 77065
PH: 281.994.7993
TBPE REGISTRATION NO. F-3691

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VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

AMANI ENGINEERING, INC.
11011 RICHMOND AVE., SUITE 700
HOUSTON, TEXAS 77042
TEL: (713) 270-5700
Texas Registered Engineering Firm No. F-4528
Texas Registered Surveying Firm No. 100282-00

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P – 6329

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
FROM METOR CORRIDOR TO SWPS

WATER LINE
GREENBRIAR DR.
PLAN
STA 142+00 TO STA 147+00

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 78 OF 169	

GRAPHIC SCALE

0 20' 40'

FULL SIZE□1" = 20'
HALF SIZE□1" = 40'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES
Creating Space Underground
13100 WORTHAM COURT, 3RD FLOOR
HOUSTON, TX 77065
PH: 281.894.7993
TBPE REGISTRATION NO. F-3691

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Date

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Signature valid for one year.

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11011 RICHMOND AVE., SUITE 700
HOUSTON, TEXAS 77042
TEL: (713) 270-5700
Texas Registered Engineering Firm No. F-4528
Texas Registered Surveying Firm No. 100282-00

SURVEYED BY:
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FB NO. P – 6329

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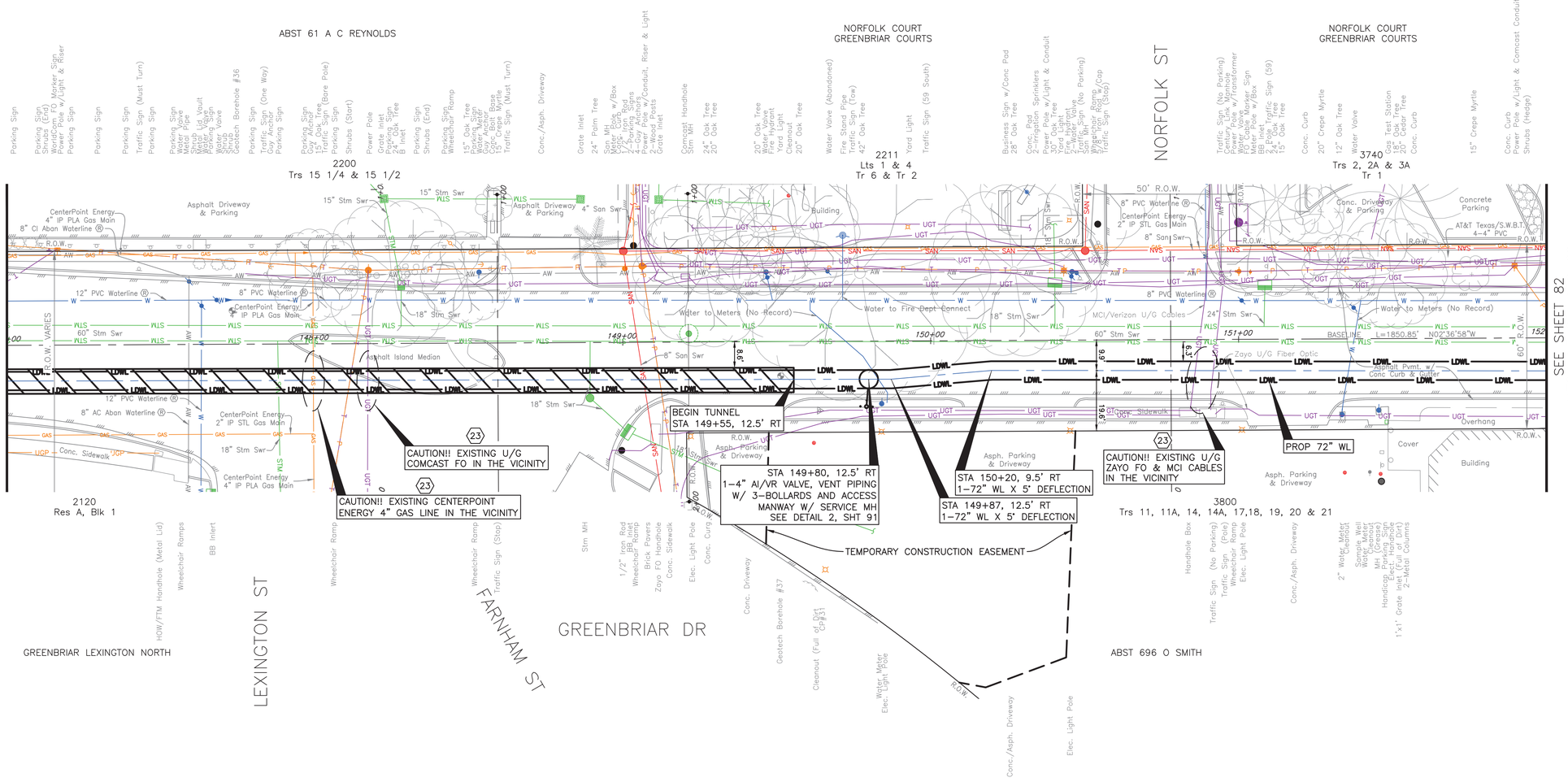
CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
FROM METOR CORRIDOR TO SWPS

WATER LINE
GREENBRIAR DR.
PROFILE
STA 142+00 TO STA 147+00

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 79 OF 169	



NOTE:
REFER TO SHEETS 88 & 89
FOR PAVEMENT REPAIR AND
UTILITY ADJUSTMENTS

SEE SHEET 81 FOR PROFILE VIEW

GRAPHIC SCALE
0 20' 40'
FULL SIZE□1" = 20'
HALF SIZE□1" = 40'

N

NO.	DATE	REVISION	APP.

(23) CRITICAL LOCATION
SEE COH SPEC SEC 02317

TBM:

CP-31 AT STA 149+63.79
22.46' RT., EL. 48.67

PROJECT BENCH MARK:
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256-7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

BRIERLEY ASSOCIATES
Creating Space Underground
13100 WORTHAM COURT, 3RD FLOOR
HOUSTON, TX 77065
PH: 281.994.7993
TBPE REGISTRATION NO. F-3691

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VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

AMANI ENGINEERING, INC.
11011 RICHMOND AVE., SUITE 700
HOUSTON, TEXAS 77042
TEL: (713) 270-5700
Texas Registered Engineering Firm No. F-4528
Texas Registered Surveying Firm No. 100282-00

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P – 6329

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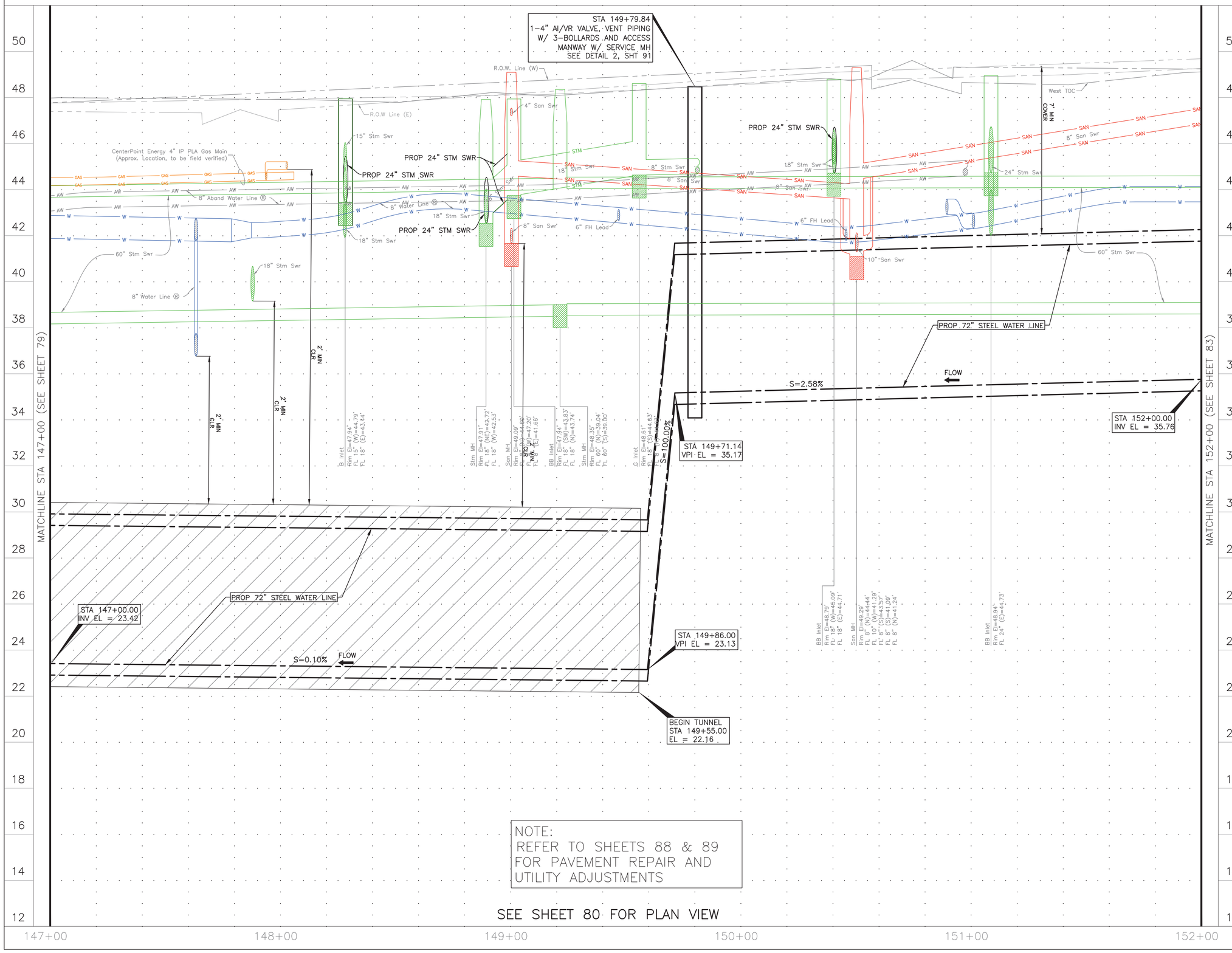
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
FROM METOR CORRIDOR TO SWPS

WATER LINE
GREENBRIAR DR.
PLAN
STA 147+00 TO STA 152+00

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 80 OF 169	



NOTE:
REFER TO SHEETS 88 & 89
FOR PAVEMENT REPAIR AND
UTILITY ADJUSTMENTS

SEE SHEET 80 FOR PLAN VIEW

GRAPHIC SCALE
0 20' 40'
FULL SIZE: 1" = 20'
HALF SIZE: 1" = 40'

NO.	DATE	REVISION	APP.

BRIERLEY ASSOCIATES
Creating Space Underground
13100 WORTHAM COURT, 3RD FLOOR
HOUSTON, TX 77065
PH: 281.894.7993
TBPE REGISTRATION NO. F-3691

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Date

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Signature valid for one year.

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11011 RICHMOND AVE., SUITE 700
HOUSTON, TEXAS 77042
TEL: (713) 270-5700
Texas Registered Engineering Firm No. F-4528
Texas Registered Surveying Firm No. 100282-00

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P - 6329

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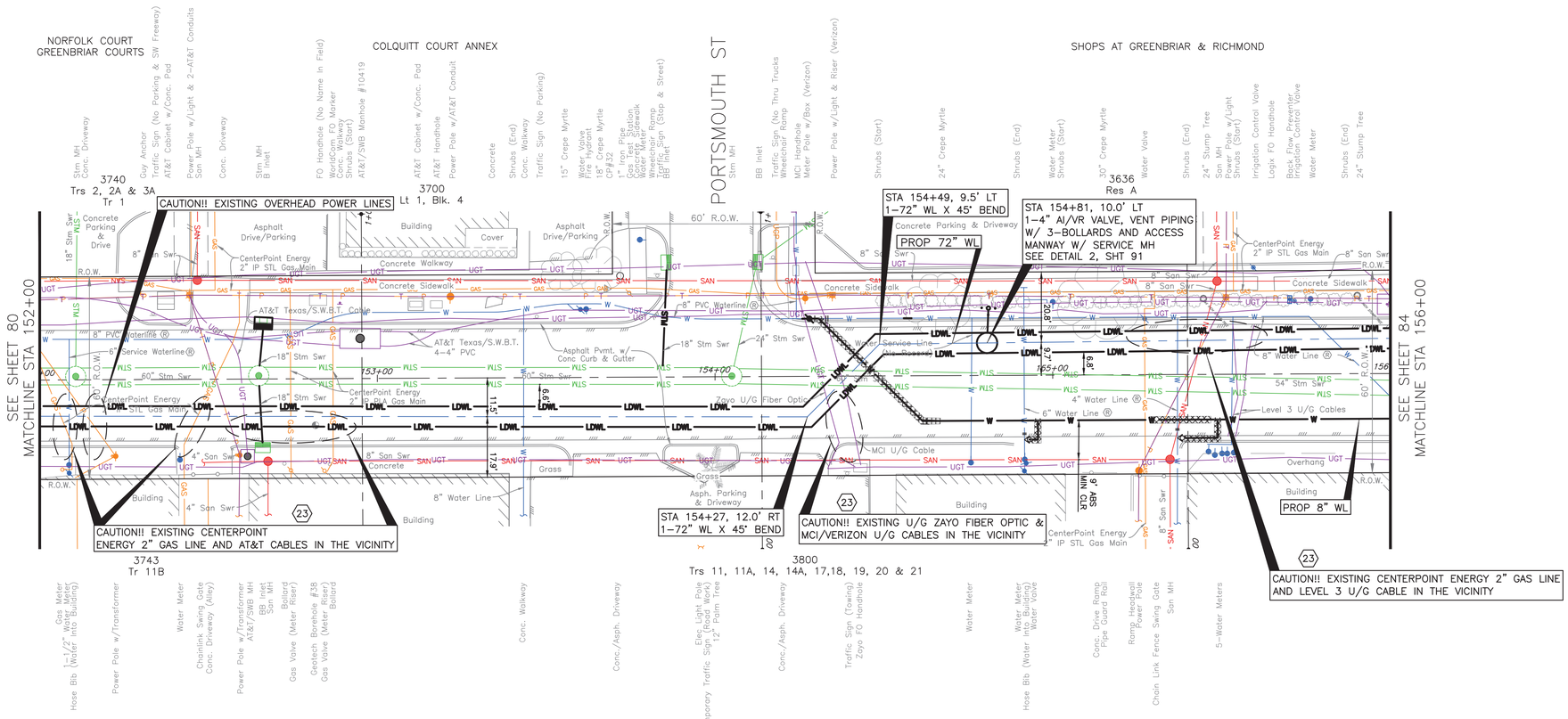
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
FROM METOR CORRIDOR TO SWPS

WATER LINE
GREENBRIAR DR.
PROFILE
STA 147+00 TO STA 152+00

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 81 OF 169	



NOTE:
REFER TO SHEETS 88 & 89
FOR PAVEMENT REPAIR AND
UTILITY ADJUSTMENTS

SEE SHEET 83 FOR PROFILE VIEW

GRAPHIC SCALE
0 20' 40'
FULL SIZE 1" = 20'
HALF SIZE 1" = 40'

NO.	DATE	REVISION	APP.

(23) CRITICAL LOCATION
SEE COH SPEC SEC 02317

TBM:

CP-32 AT STA 153+68,
26.21' LT, EL. 49.47

PROJECT BENCH MARK:
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256-7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

NOTICE:
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Date

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Signature valid for one year.

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HOUSTON, TEXAS 77042
TEL: (713) 270-5700
Texas Registered Engineering Firm No. F-4528
Texas Registered Surveying Firm No. 100282-00

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P – 6329

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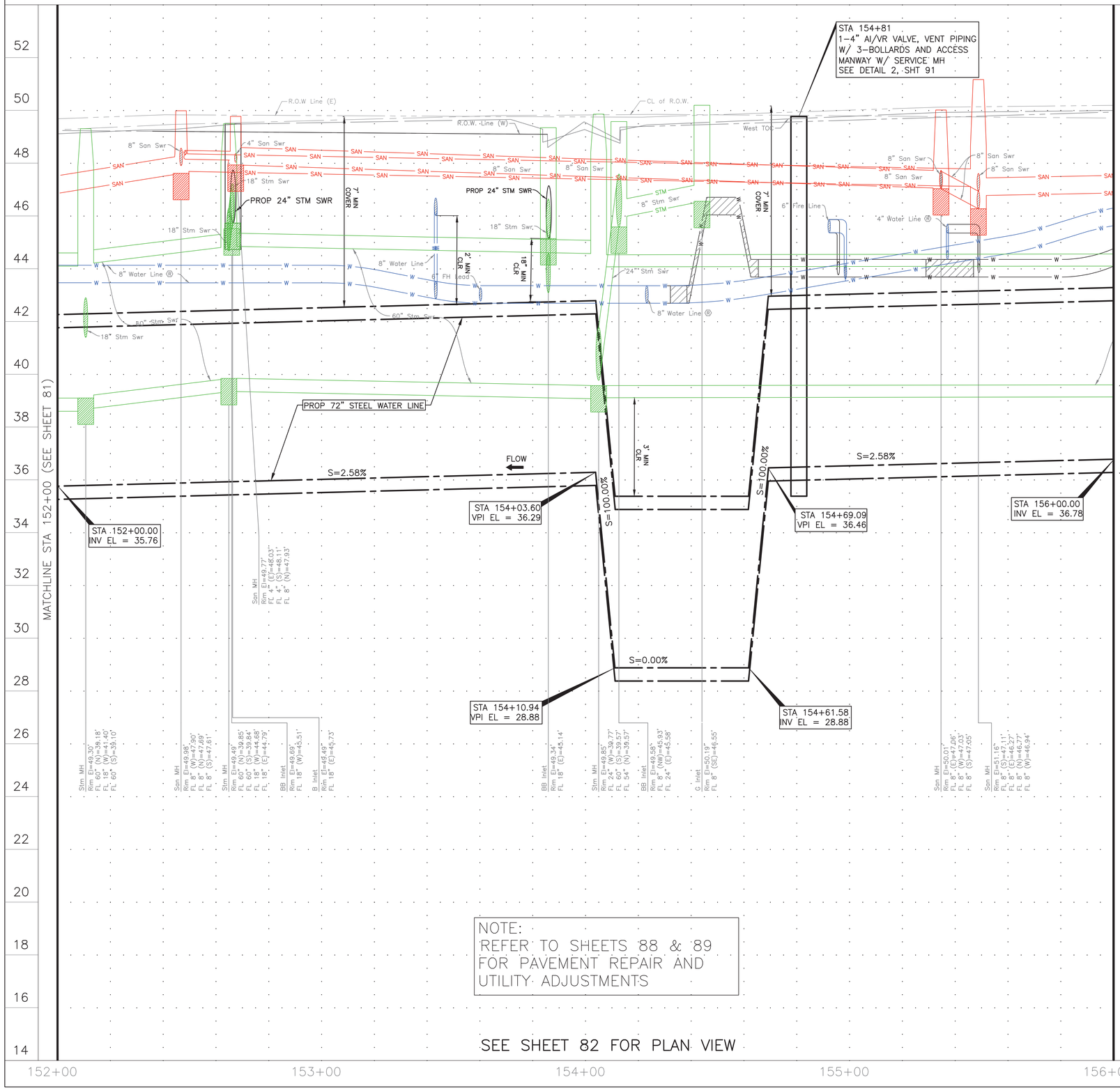
NOT FOR BIDDING, PERMIT, OR CONSTRUCTION PURPOSES.

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
FROM METOR CORRIDOR TO SWPS

WATER LINE
GREENBRIAR DR.
PLAN
STA 152+00 TO STA 156+00

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 82 OF 169	



GRAPHIC SCALE

0 20' 40'

FULL SIZE 1" = 20'
HALF SIZE 1" = 40'

NO.	DATE	REVISION	APP.

NOTICE:
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS SIGNATURE DOES NOT FULFILL YOUR OBLIGATION TO CALL 811

VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities – not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

AMANI ENGINEERING, INC.
11011 RICHMOND AVE., SUITE 700
HOUSTON, TEXAS 77042
TEL: (713) 270-5700
Texas Registered Engineering Firm No. F-4528
Texas Registered Surveying Firm No. 100282-00

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P – 6329

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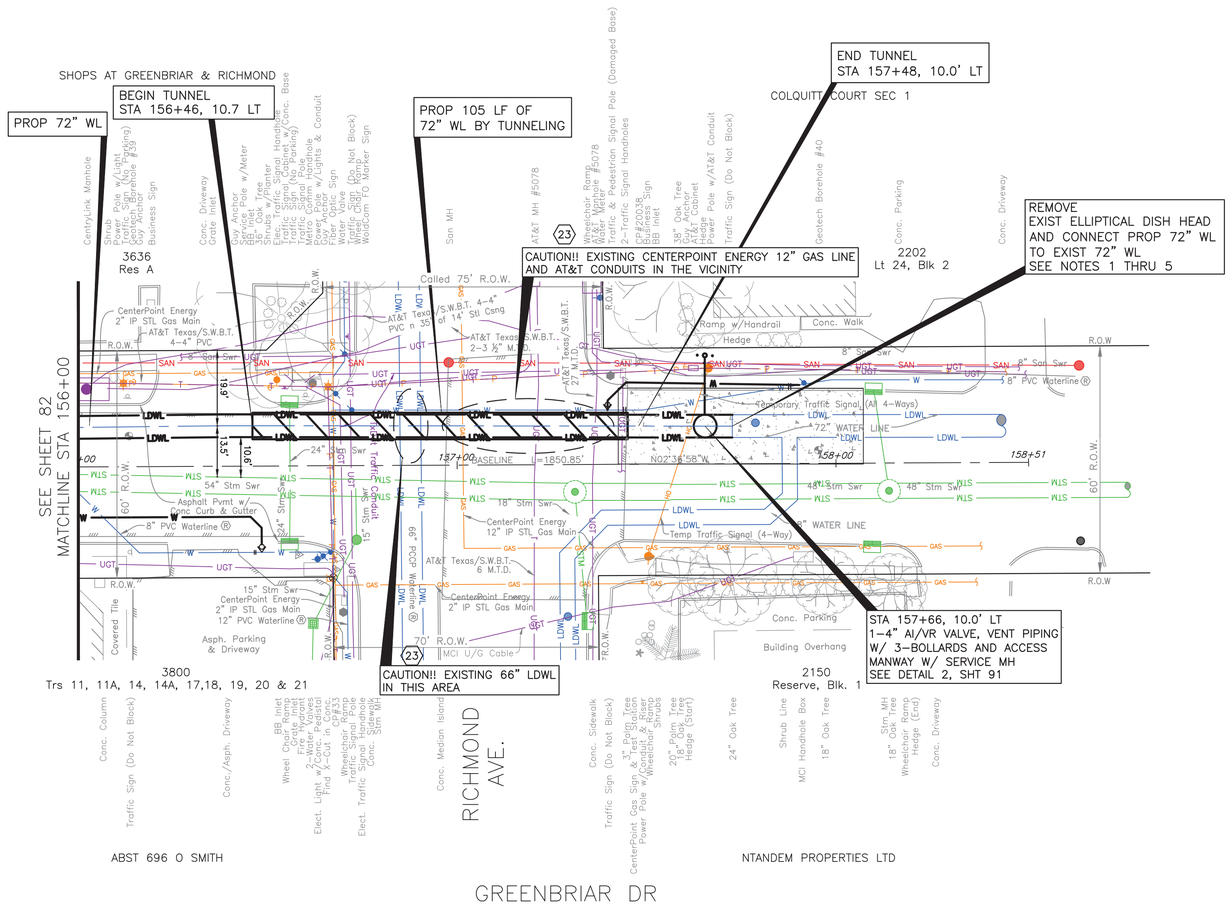
CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. FROM METOR CORRIDOR TO SWPS

WATER LINE
GREENBRIAR DR.
PROFILE
STA 152+00 TO STA 156+00

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 83 OF 169	



NOTE:
REFER TO SHEETS 88 & 89
FOR PAVEMENT REPAIR AND
UTILITY ADJUSTMENTS

SEE SHEET 85 FOR PROFILE VIEW

GRAPHIC SCALE
0 20' 40'
FULL SIZE 1" = 20'
HALF SIZE 1" = 40'

LEGEND

REMOVE AND REPLACE CONCRETE PAVEMENT ACCORDING TO STREET CUT DETAILS; REFER COH DWGS 02951-01, -02, -03

TBM:

CP-33 AT STA 156+68
27.36' RT., EL. 49.93

(23) CRITICAL LOCATION
SEE COH SPEC SEC 02317

PROJECT BENCH MARK:
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256-7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

NOTES

1. REMOVE MAXIMUM OF 9FT OF EXIST. 72" WL WITH EXISTING MANWAY AND MANHOLE TO ACCOMIDATE TUNNEL SHAFT. PROVIDE TEMPORARY PLUG WITH FLANGE ADAPTER TO EXISTING 72" WL DURING SHAFT CONSTRUCTION AND TUNNELING OPERATIONS.

2. PROVIDE INSULATING KIT TO CONNECT TO EXIST. 72" WATER LINE FLANGE ADAPTOR. INSTALL FLUSH-MOUNTED FLANGE ISOLATION TEST STATION. SEE DETAIL X, SHT XXX.

3. INSTALL TEMPORARY INTERNAL ELLIPTICAL DISHED HEAD PLUG ALONG PROP 72" WL, REMOVE INTERNAL ELLIPTICAL DISHED HEAD PLUG AFTER SUCCESSFUL HYDROSTATIC TESTING OF PROPOSED WATER MAIN.

4. FIELD VERIFY LOCATION OF EXIST. 72" WATER LINE AND MAKE NECESSARY ADJUSTMENT TO LINE AND GRADE TO ASSURE PROPER TIE-IN.

5. RELOCATE EXIST. 8" WL TO ACCOMIDATE TUNNEL SHAFT CONSTRUCTION.

NO.	DATE	REVISION	APP.

ARCADIS
ARCADIS U.S., INC.
10205 WESTHEIMER ROAD STE. 800
HOUSTON, TX 77042
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF JAIPAL R MUSKU, TX PE# 108774. NOT FOR BIDDING, PERMIT, OR CONSTRUCTION PURPOSES.

NOTICE:
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VERIFICATION OF PRIVATE UTILITY LINES

Date

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Date

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Date

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Signature valid for one year.

AMANI ENGINEERING, INC.
11011 RICHMOND AVE., SUITE 700
HOUSTON, TEXAS 77042
TEL: (713) 270-5700
Texas Registered Engineering Firm No. F-4528
Texas Registered Surveying Firm No. 100282-00

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P – 6329

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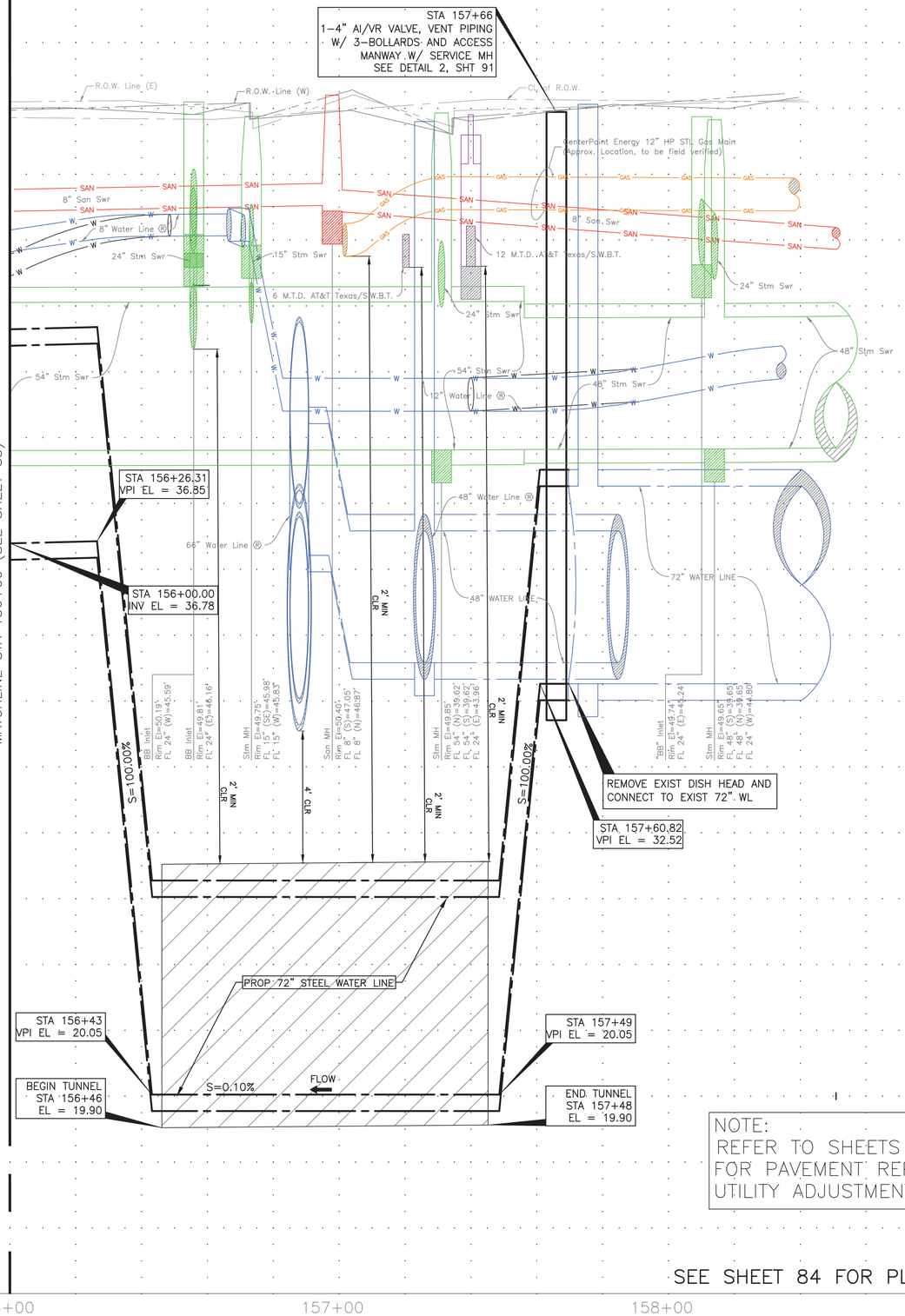
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
FROM METOR CORRIDOR TO SWPS

WATER LINE
GREENBRIAR DR.
PLAN
STA 156+00 TO STA 160+00

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 84 OF 169	



GRAPHIC SCALE

0 20' 40'

FULL SIZE: 1" = 20'
HALF SIZE: 1" = 40'

NO.	DATE	REVISION	APP.

ARCADIS

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10205 WESTHEIMER ROAD STE. 800
HOUSTON, TX 77042
713-953-4800 WWW.ARCADIS.COM
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CITY OF HOUSTON

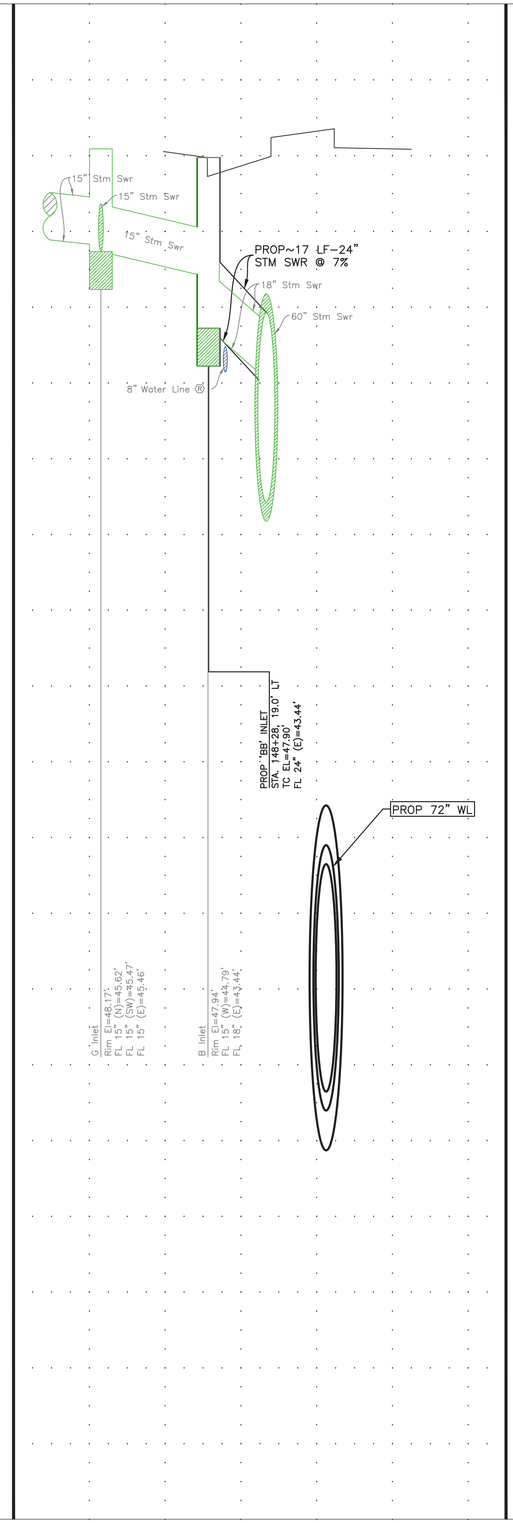
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
FROM METOR CORRIDOR TO SWPS

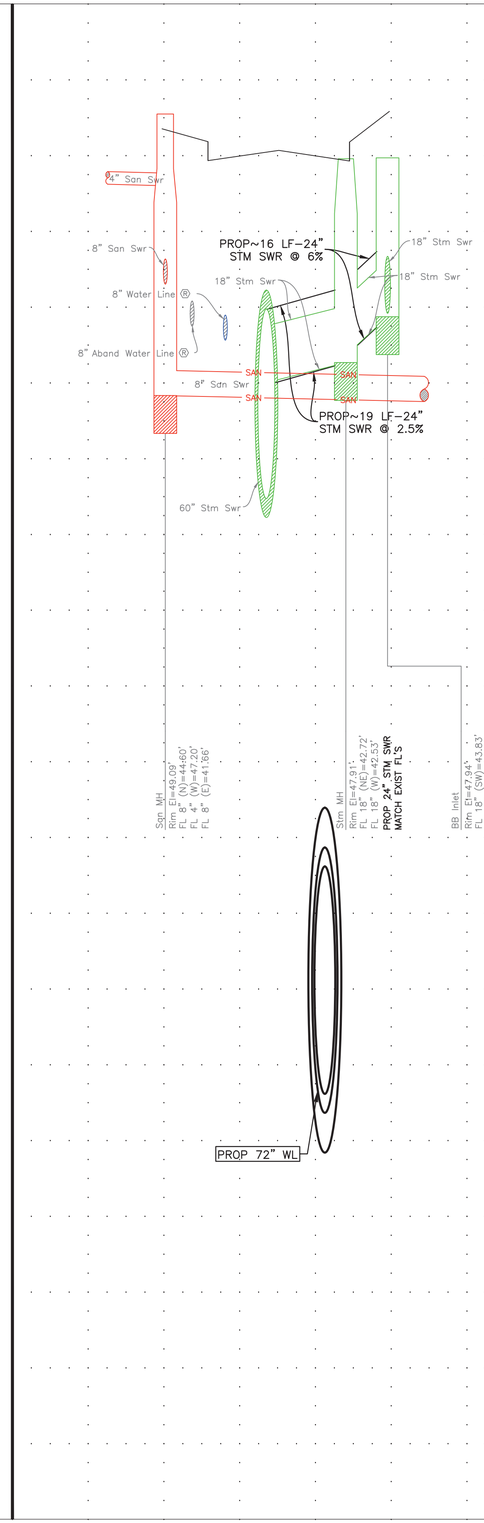
WATER LINE
GREENBRIAR DR.
PROFILE
STA 156+00 TO STA 160+00

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 85 OF 169	

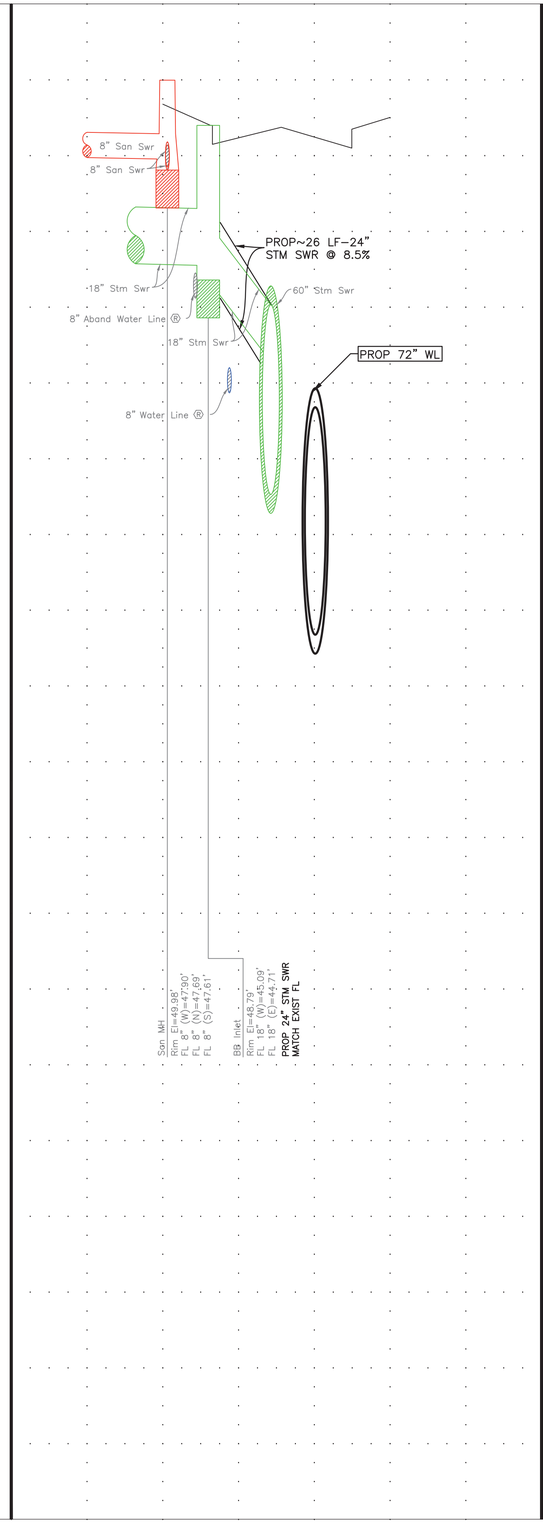
PROFILE AT STA: 148+28



PROFILE AT STA: 148+89



PROFILE AT STA: 150+40



GRAPHIC SCALE
0 20' 40'
FULL SIZE: 1" = 20'
HALF SIZE: 1" = 40'

NO.	DATE	REVISION	APP.

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Date

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Date

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Signature valid for one year.

AMANI ENGINEERING, INC.
11011 RICHMOND AVE., SUITE 700
HOUSTON, TEXAS 77042
TEL: (713) 270-5700
Texas Registered Engineering Firm No. F-4528
Texas Registered Surveying Firm No. 100282-00

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FB NO. P – 6329

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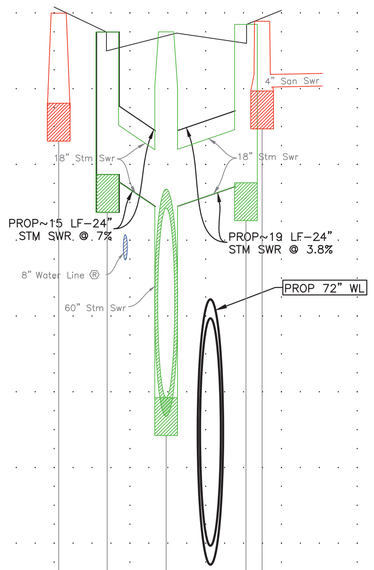
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
FROM METOR CORRIDOR TO SWPS

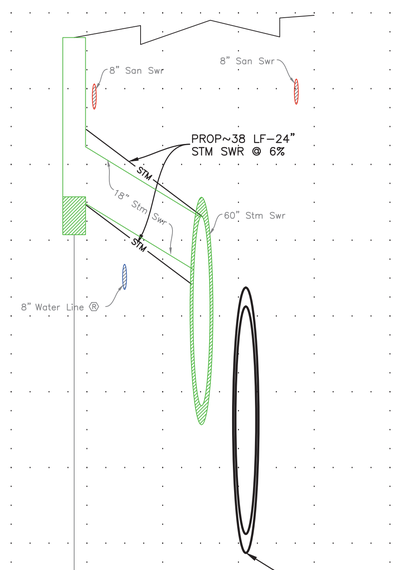
UTILITY ADJUSTMENTS
GREENBRIAR DR.
PROFILE
STA 148+28 TO STA 150+40
(SHEET 1 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 86 OF 169	

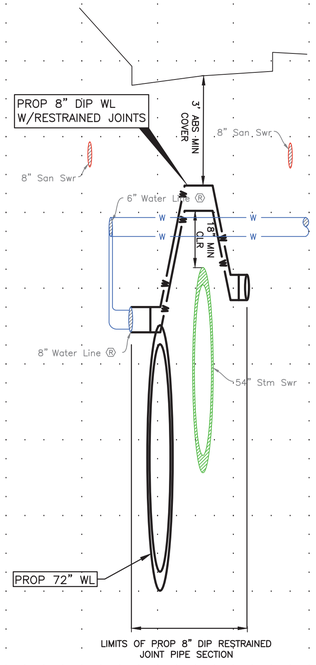
PROFILE AT STA: 152+65



PROFILE AT STA: 153+84



PROFILE AT STA: 155+00



GRAPHIC SCALE

0 20' 40'

FULL SIZE□1" = 20'
HALF SIZE□1" = 40'

NO.	DATE	REVISION	APP.

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Date

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Signature valid for one year.

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11011 RICHMOND AVE., SUITE 700
HOUSTON, TEXAS 77042
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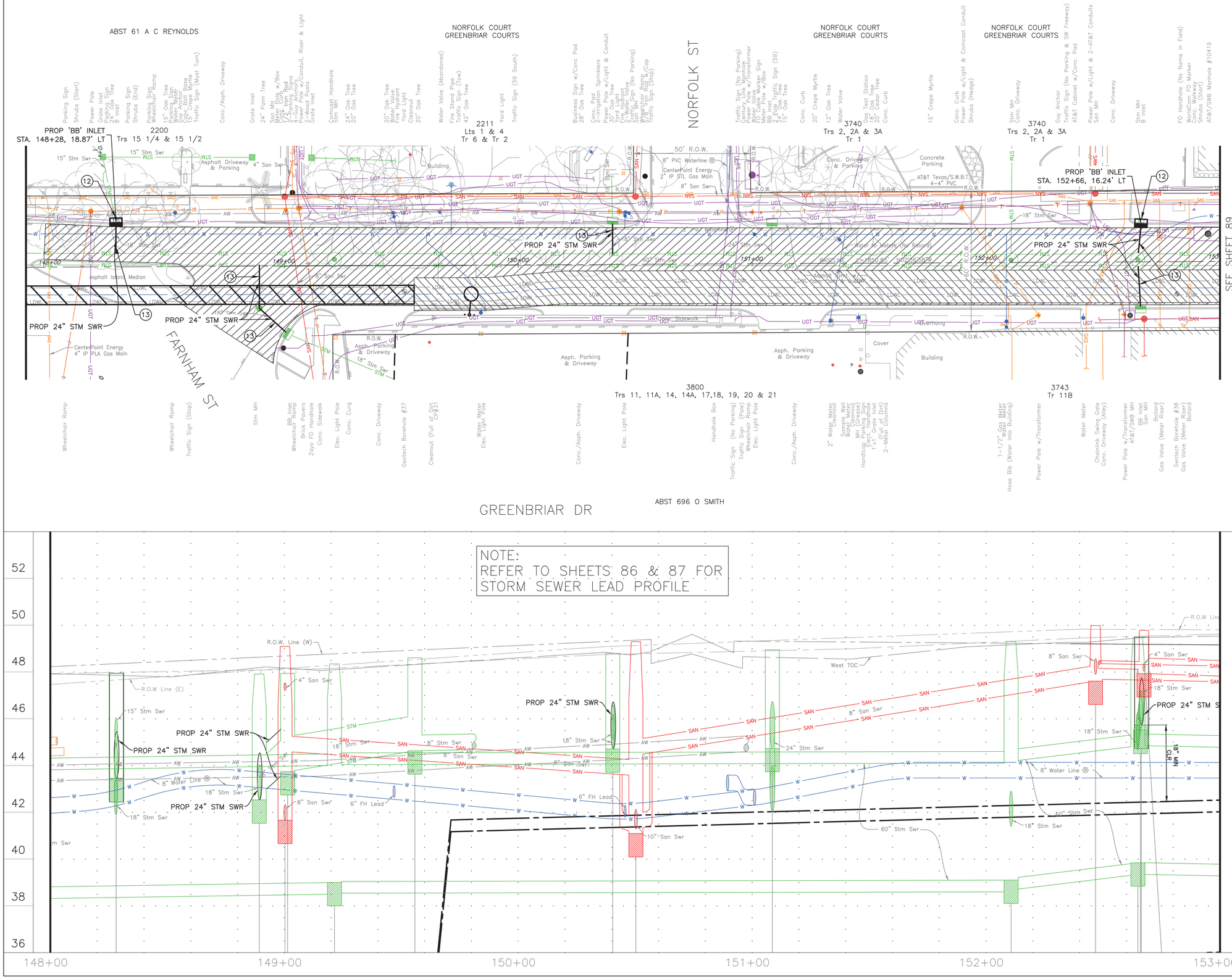
CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
FROM METOR CORRIDOR TO SWPS

UTILITY ADJUSTMENTS
GREENBRIAR DR.
PROFILE
STA 152+65 TO STA 153+84
(SHEET 2 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 87 OF 169	



GRAPHIC SCALE

0 20' 40'

FULL SIZE□1" = 20'
HALF SIZE□1" = 40'

N

LEGEND

- 2" MILL & ASPAHT OVERLAY
- PAVEMENT REPAIR AND RESTORATION ACCORDING TO STREET CUT DETAILS; REFER COH DWGS 02951–01, –02, –03
- TUNNEL SECTION

PROJECT BENCH MARK:
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256–7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

TBM:

CP–31 AT STA 149+63.79
22.46' RT., EL. 48.67

NO.	DATE	REVISION	APP.

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HOUSTON, TEXAS 77042
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Texas Registered Engineering Firm No. F–4528
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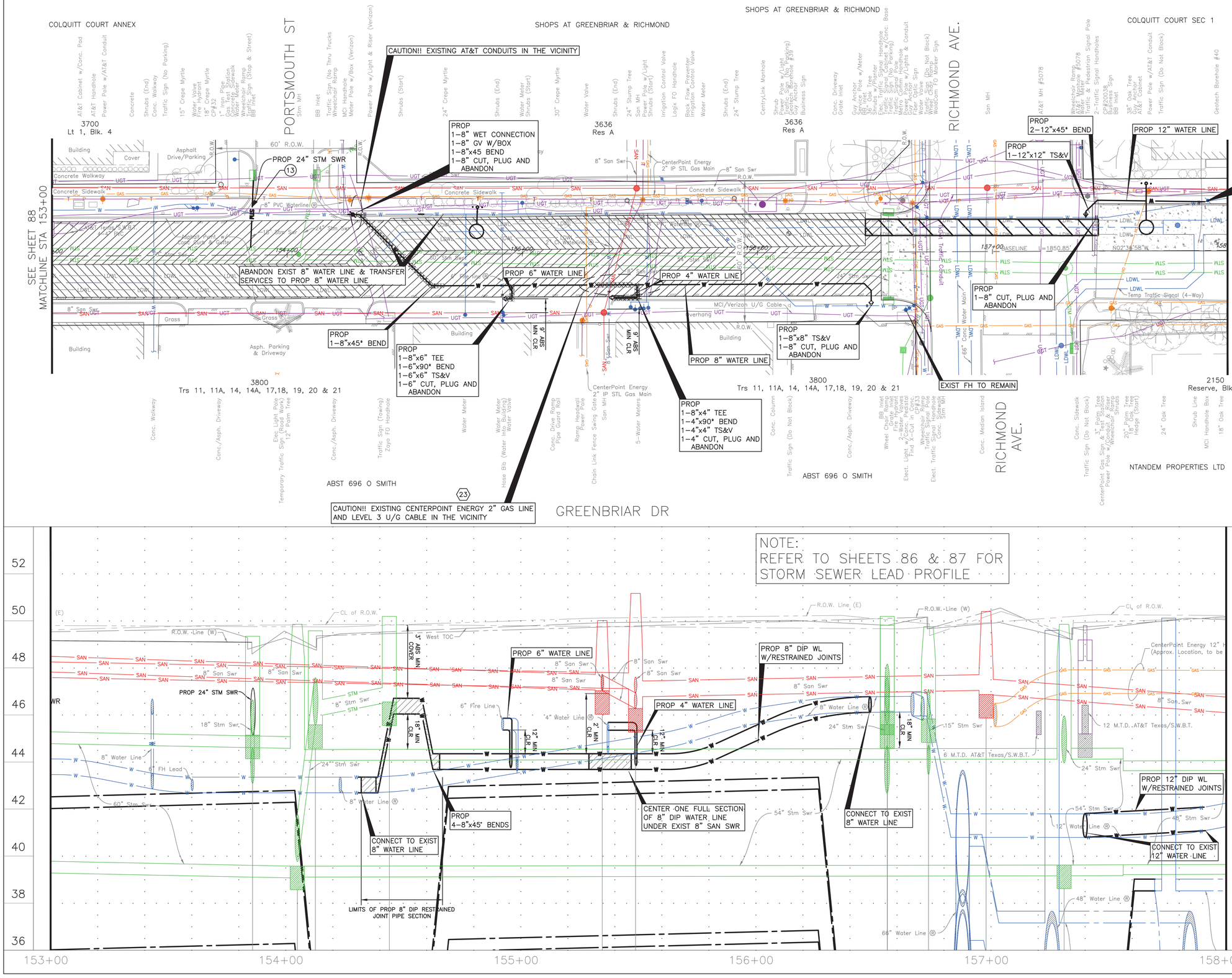
CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
FROM METOR CORRIDOR TO SWPS

PAVEMENT & WATER LINE REPLACEMENT
GREENBRIAR DR.
PLAN & PROFILE
STA 149+00 TO STA 153+00
(SHEET 1 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 88 OF 169	



GRAPHIC SCALE
0 20' 40'
FULL SIZE: 1" = 20'
HALF SIZE: 1" = 40'

LEGEND

2" MILL & ASPAHT OVERLAY

PAVEMENT REPAIR AND RESTORATION ACCORDING TO STREET CUT DETAILS; REFER COH DWGS 02951–01, –02, –03

REMOVE AND REPLACE CONCRETE PAVEMENT ACCORDING TO STREET CUT DETAILS; REFER COH DWGS 02951–01, –02, –03

PROJECT BENCH MARK:
STATIC GPS OBSERVATION MADE ON CITY OF HOUSTON MONUMENT (COH 5256–7403) A BRASS DISK LOCATED SOUTH OF WESTPARK DRIVE APPROXIMATELY 770 FEET WEST OF WESTLAYAN ROAD.

ELEVATION = 56.29' (NAVD 88, GEOID 18)

(23) CRITICAL LOCATION
SEE COH SPEC SEC 02317

TBM:

CP–32 AT STA 153+68,
26.21' LT, EL. 49.47

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HOUSTON, TEXAS 77042
TEL: (713) 270–5700
Texas Registered Engineering Firm No. F–4528
Texas Registered Surveying Firm No. 100282–00

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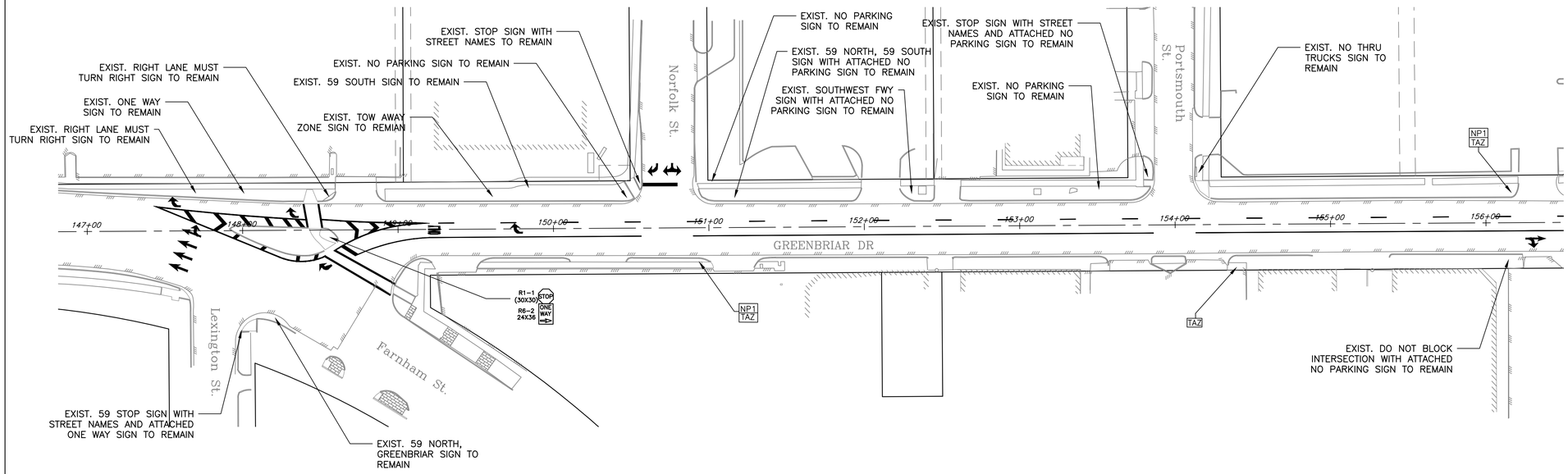
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

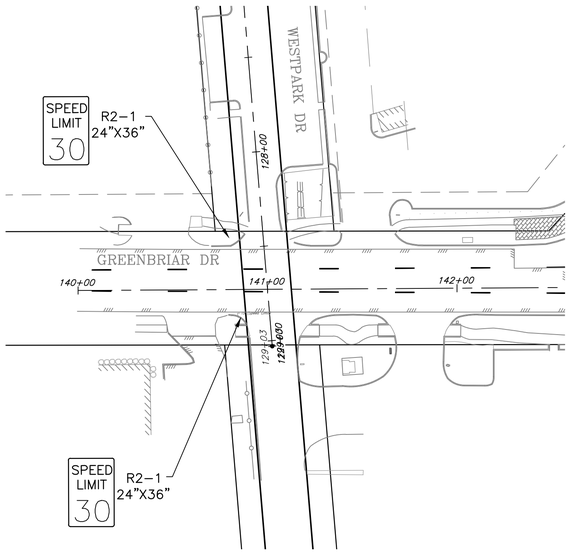
72–INCH WATER LINE ALONG GREENBRIAR DR.
FROM METOR CORRIDOR TO SWPS

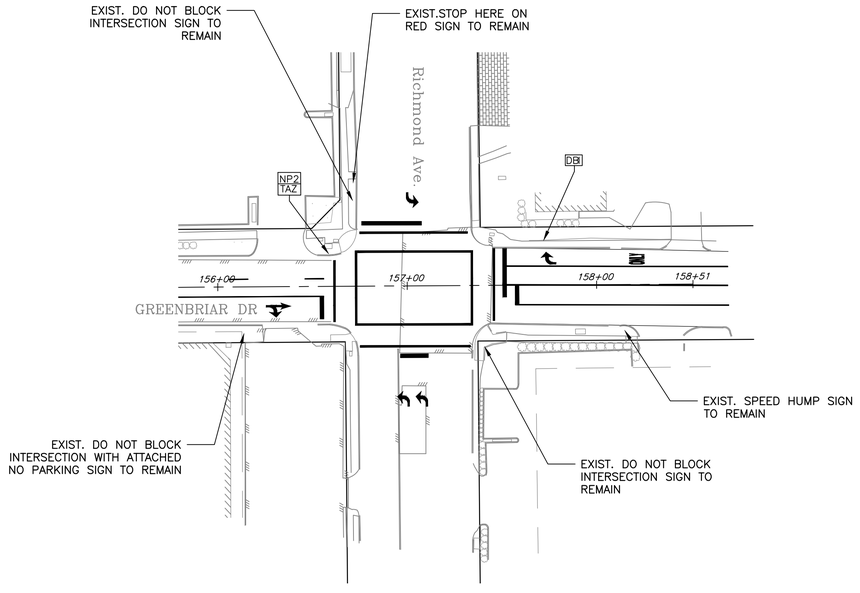
PAVEMENT & WATER LINE REPLACEMENT
GREENBRIAR DR.
PLAN & PROFILE
STA 153+00 TO STA 158+00
(SHEET 2 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
VERT: 1"=2' HORIZ: 1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 89 OF 169	

NO.	DATE	REVISION	APP.







N

0 20' 40' 80'

SCALE: 1" = 40'

NO.	DATE	REVISION	APP.

ARCADIS

ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
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FB NO. P-6329

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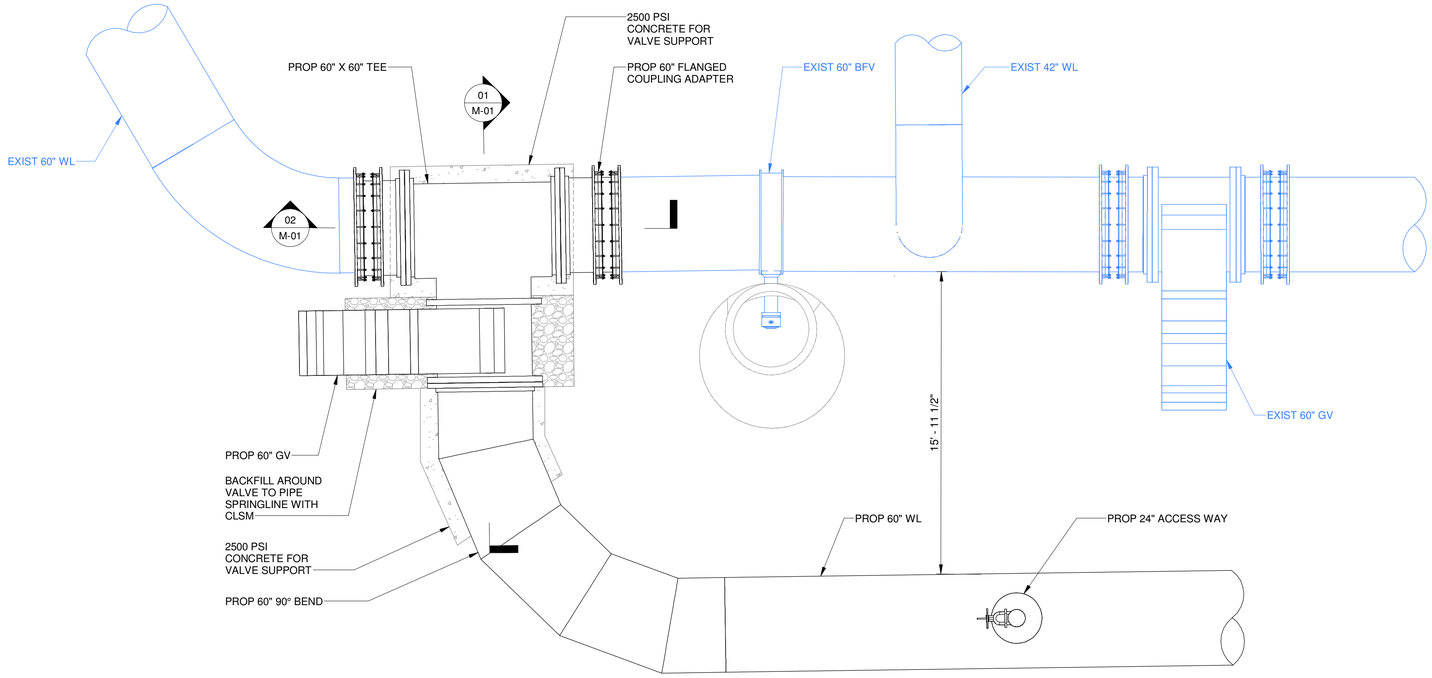
CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

SIGNING AND PAVEMENT MARKING - GREENBRIAR DR. (SHEET 1 OF 1)

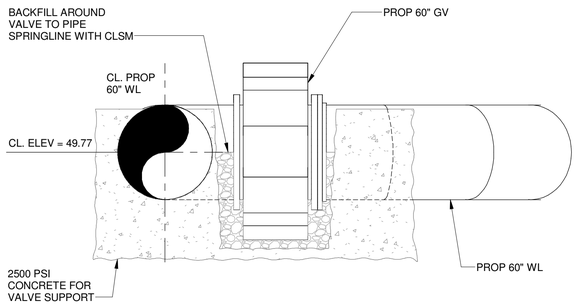
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=40'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 90 OF 169	



PIPE INTERCONNECTION 1 PLAN VIEW

SCALE: 1/4" = 1'-0"

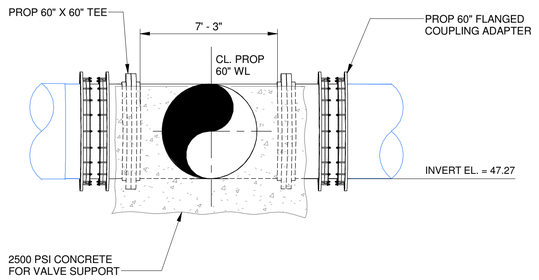
0' 2' 4' 8'



01 M-01 PIPE INTERCONNECTION 1 SECTION VIEW - 1

SCALE: 1/4" = 1'-0"

0' 2' 4' 8'



02 M-01 PIPE INTERCONNECTION 1 SECTION VIEW - 2

SCALE: 1/4" = 1'-0"

0' 2' 4' 8'

NOTES:

1. PRIOR TO ENCASEMENT OF VALVE IN CLSM, WRAP VALVE IN PE SHEET FOR BOND BREAKER. ENSURE ALL VALVE FLANGE, BONNET EXTENSIONS, AND LOWER BEARING HOUSE BOLTS ARE PROTECTED.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING SITE CONDITIONS IN THE FIELD AND HAND LOCATING UTILITIES PRIOR TO PERFORMING THE EXCAVATIONS.
3. CONTRACTOR TO FIELD VERIFY LOCATION OF EXISTING 60" AND 66" WATER LINE AND MAKE NECESSARY ADJUSTMENTS TO LINE AND GRADE TO ASSURE PROPER TIE-IN.

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Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities - not to be used for conflict verification)

Signature valid for six months.

Date

Approved for AT&T underground conduit facilities only.
Signature valid for one year.

ARCADIS

ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6539

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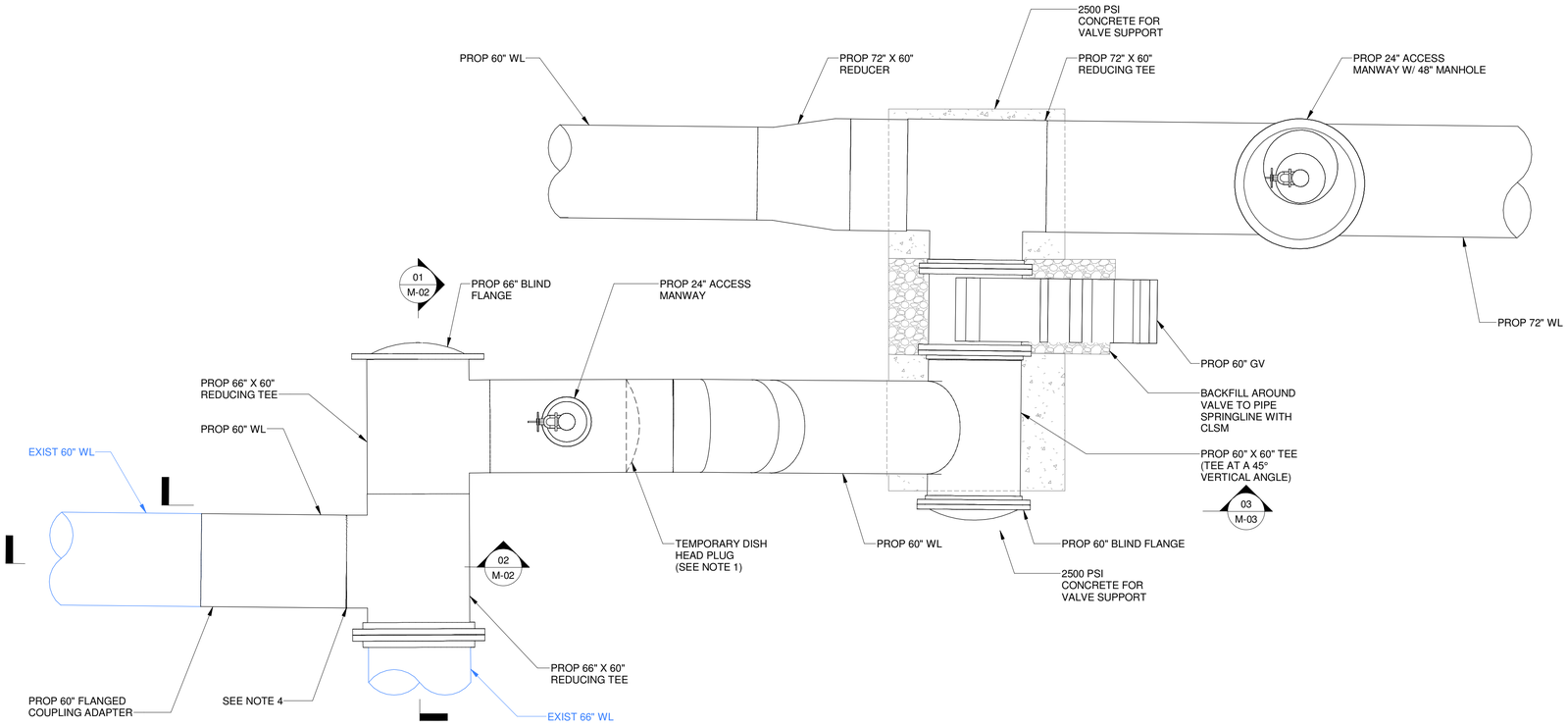
CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR
DR. TO METRO CORRIDOR TO SWPS

SOUTHWEST PUMP STATION WATER LINE INTERCONNECTION NO. 1

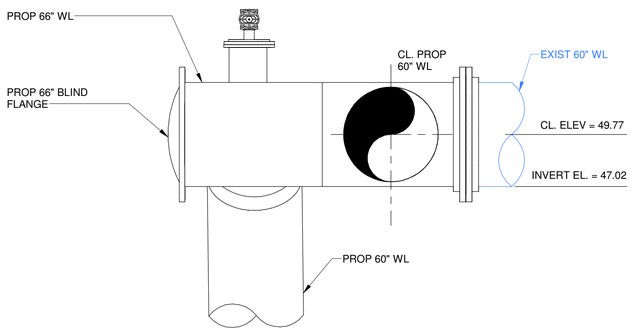
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
AS SHOWN	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO.: ____ OF 100	



PIPE INTERCONNECTION 2 PLAN VIEW

SCALE: 1/4" = 1'-0"

0' 2' 4' 8'

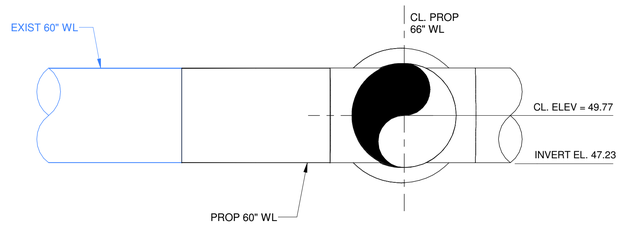


01 M-02

PIPE INTERCONNECTION 2 SECTION VIEW - 1

SCALE: 1/4" = 1'-0"

0' 2' 4' 8'



02 M-02

PIPE INTERCONNECTION 2 SECTION VIEW - 2

SCALE: 1/4" = 1'-0"

0' 2' 4' 8'

NOTES:

1. CONTRACTOR TO REMOVE THE TEMPORARY DISH HEAD PLUG AFTER THE COMPLETION OF THE CONNECTION BETWEEN THE PROPOSED WATER LINE AND THE EXISTING 60-INCH AND 66-INCH WATER LINES.
2. PRIOR TO ENCASEMENT OF VALVE IN CLSM, WRAP VALVE IN PE SHEET FOR BOND BREAKER. ENSURE ALL VALVE FLANGE, BONNET EXTENSIONS, AND LOWER BEARING HOUSE BOLTS ARE PROTECTED.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING SITE CONDITIONS IN THE FIELD AND HAND LOCATING UTILITIES PRIOR TO PERFORMING THE EXCAVATIONS.
4. CONTRACTOR TO FIELD VERIFY LOCATION OF EXISTING 60" AND 66" WATER LINE AND MAKE NECESSARY ADJUSTMENTS TO LINE AND GRADE TO ASSURE PROPER TIE-IN.
5. REMOVE THE EXISTING 90-DEG BEND AND VERIFY THE ELEVATIONS OF THE EXISTING 60" AND 66" PIPE AND MAKE NECESSARY ADJUSTMENTS TO LINE AND GRADE TO ASSURE PROPER TIE-IN.

NOTICE:

FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS SIGNATURE DOES NOT FULFILL YOUR OBLIGATION TO CALL 811

VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy natural gas utilities shown. (Gas service lines are not shown). This signature not be used for conflict verification.

Signature valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This signature verifies existing underground facilities - not to be used for conflict verification)

Signature valid for six months.

Date

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SURVEYED BY:
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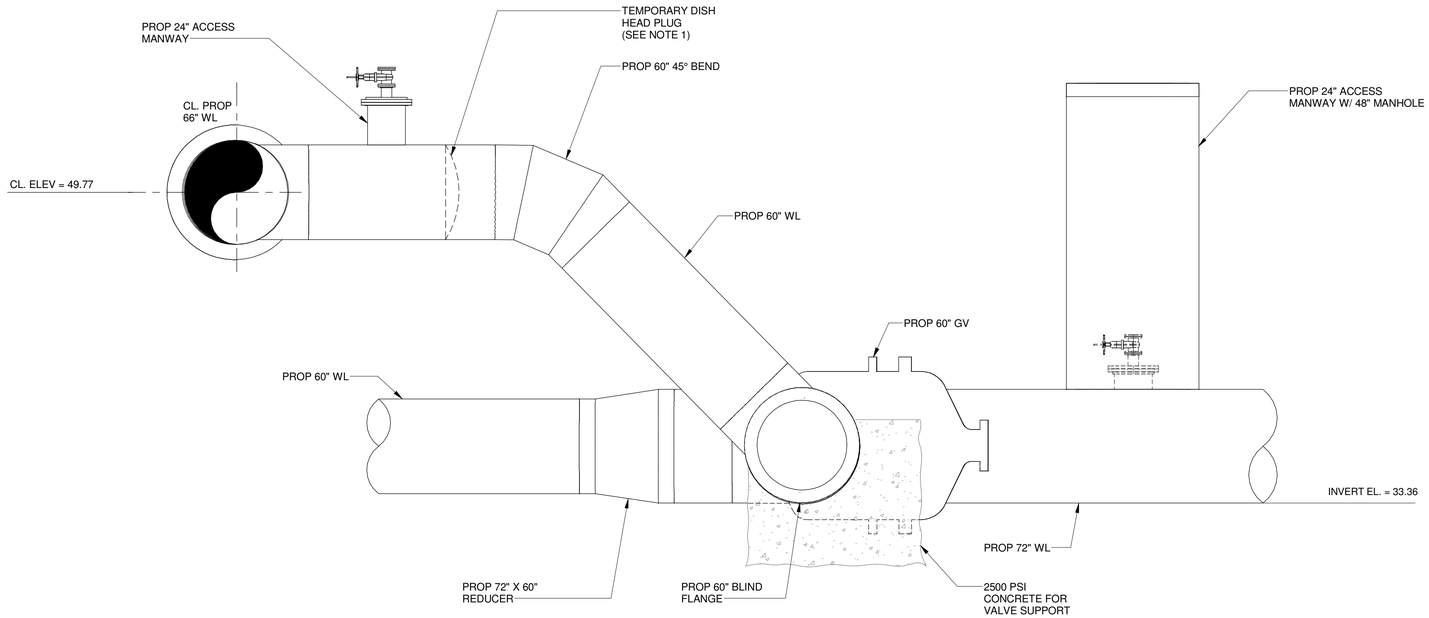
CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

SOUTHWEST PUMP STATION WATER LINE INTERCONNECTION NO. 2

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
AS SHOWN	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO.: ____ OF 100	



03
M-02

PIPE INTERCONNECTION 2 SECTION VIEW - 3

SCALE: 1/4" = 1'-0"

0' 2' 4' 8'

NOTES:

1. CONTRACTOR TO REMOVE THE TEMPORARY DISH HEAD PLUG AFTER THE COMPLETION OF THE CONNECTION BETWEEN THE PROPOSED WATER LINE AND THE EXISTING 60-INCH AND 66-INCH WATER LINES.
2. PRIOR TO ENCASEMENT OF VALVE IN CLSM, WRAP VALVE IN PE SHEET FOR BOND BREAKER. ENSURE ALL VALVE FLANGE, BONNET EXTENSIONS, AND LOWER BEARING HOUSE BOLTS ARE PROTECTED.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING SITE CONDITIONS IN THE FIELD AND HAND LOCATING UTILITIES PRIOR TO PERFORMING THE EXCAVATIONS.
4. CONTRACTOR TO FIELD VERIFY LOCATION OF EXISTING 60" AND 66" WATER LINE AND MAKE NECESSARY ADJUSTMENTS TO LINE AND GRADE TO ASSURE PROPER TIE-IN.

NOTICE:

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FB NO. P-6539

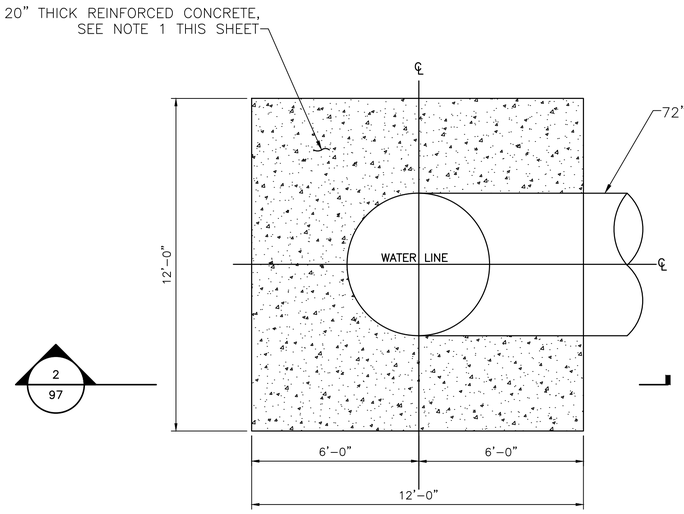
CITY OF HOUSTON

HOUSTON PUBLIC WORKS

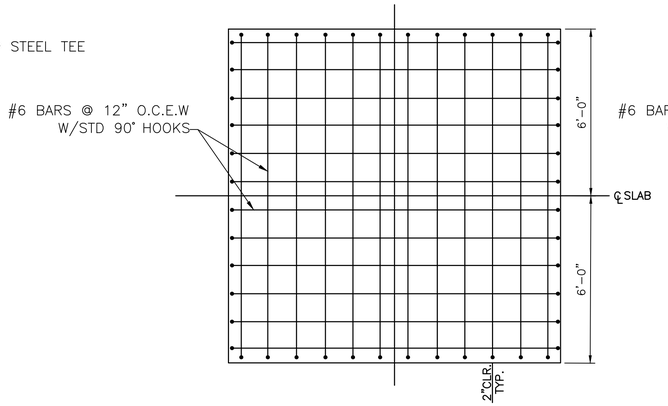
72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

SOUTHWEST PUMP STATION WATER LINE INTERCONNECTION NO. 2 (CONTINUED)

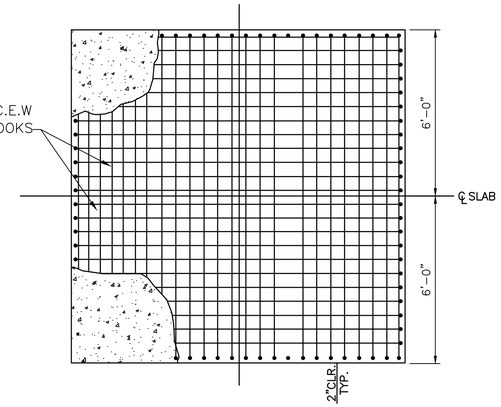
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
AS SHOWN	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO.: ____ OF 100	



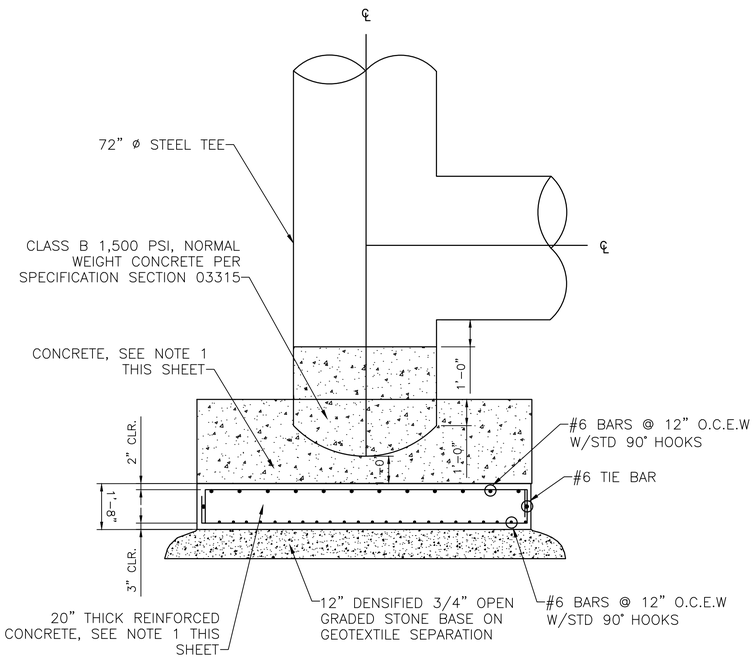
1 / 97 FOUNDATION DETAIL PLAN
SCALE:NTS



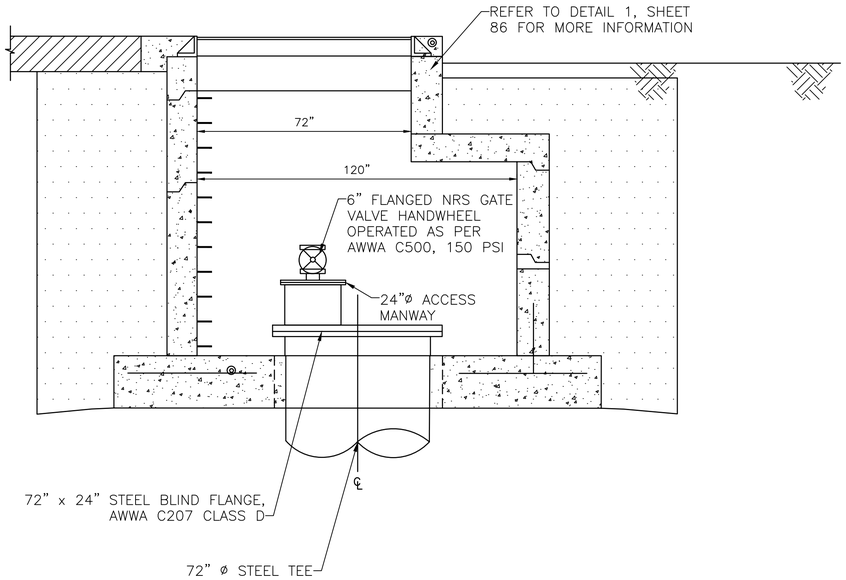
3 / 97 FOUNDATION REINFORCING DETAIL TOP
SCALE:NTS



4 / 97 FOUNDATION REINFORCING DETAIL BOTTOM
SCALE:NTS



2 / 97 FOUNDATION DETAIL PROFILE
SCALE:NTS



5 / 97 MANHOLE SECTION
SCALE:NTS

NO.	DATE	REVISION	APP.

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SURVEYED BY:
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FB NO. P-6329

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

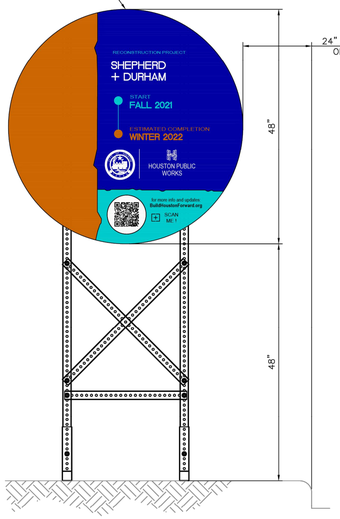
72-INCH TUNNEL FOUNDATION DETAIL

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 94 OF 169	

DocuSign Envelope ID: CB71C116-B716-4899-A5EE-0D2F2CC55AF6

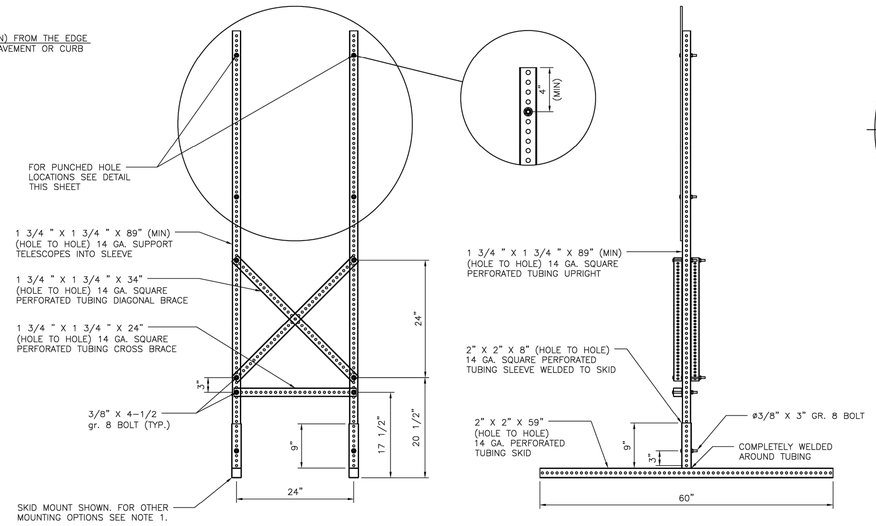
DISCLAIMER:
THE USE OF THIS STANDARD IS GOVERNED BY THE TEXAS ENGINEERING PRACTICE ACT. THE DESIGN REQUIREMENTS ON THIS STANDARD DO NOT PURPORT TO ADDRESS ALL OF THE SAFETY CONCERNS ASSOCIATED WITH THEIR USE. THE ENGINEER OF RECORD (EOR) IS TO REVIEW THESE DESIGN REQUIREMENTS AND BY AUTHORIZING THEIR USE, ACCEPTS RESPONSIBILITY FOR THEIR APPLICABILITY, ADEQUACY AND SAFETY. NO WARRANTY OF ANY KIND IS MADE BY THE CITY OF HOUSTON FOR ANY PURPOSES WHATSOEVER. THE CITY OF HOUSTON ASSUMES NO RESPONSIBILITY FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

NO.	DATE	REVISION	APP.



FRONT VIEW

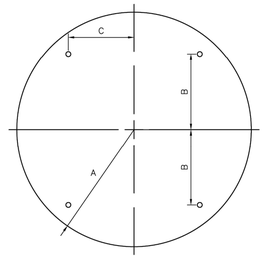
PROJECT SIGN – 48"



FRONT VIEW

SIDE VIEW

SKID MOUNTED SUPPORTS FOR 48" PROJECT SIGN



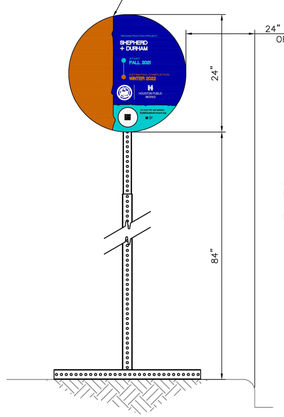
CIRCLE

A	B	C	T
24"	15"	12"	0.080"

48" SIGN PLATE HOLE DETAIL

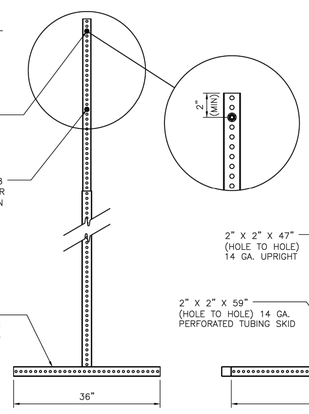
NOTES:

1. ALLOWABLE POST INSTALLATION METHODS ARE: CONCRETE FOOTING, SURFACE MOUNTING, SKID MOUNTING AND PILE DRIVEN POSTS.
2. FOR POST INSTALLATION WITH CONCRETE FOOTING, REFER TO DETAIL 01554–01.
3. FOR SURFACE MOUNTED POST INSTALLATION, REFER TO DETAIL 01554–02.
4. FOR SKID MOUNTING REQUIREMENTS REFER TO SPECIFICATION 01582.
5. PILE DRIVEN POSTS MUST BE DRIVEN TO A MINIMUM DEPTH OF 4–FEET INTO EXISTING GROUND.
6. LAYOUT, TEXT SIZE, AND OVERALL DESIGN OF THE SIGN WILL BE THE RESPONSIBILITY OF THE BUILD HOUSTON COORDINATOR.
7. ALL SIGN POSTS, SIGN TUBING, AND SIGN FASTENERS SHALL BE GALVANIZED STEEL PER SPECIFICATION 01582.

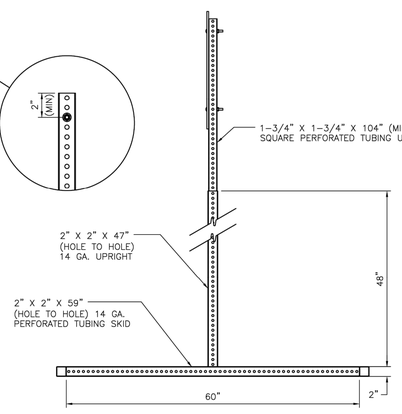


FRONT VIEW

PROJECT SIGN – 24"

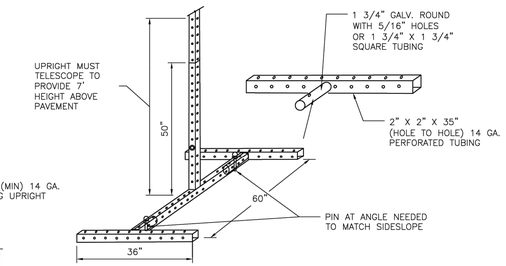


FRONT VIEW

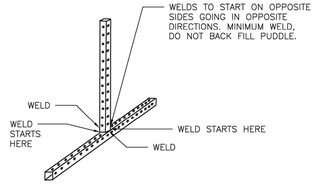


SIDE VIEW

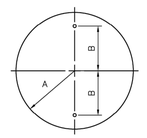
SKID MOUNTED SUPPORTS FOR 24" PROJECT SIGN



ISO VIEW



ISO VIEW



A	B	C
12"	8"	0.080"

24" SIGN PLATE HOLE DETAIL

APPROVED BY:	APPROVED BY:
DocuSigned by: Sukat Kanwar	DocuSigned by: Carl Haddock
CITY ENGINEER	DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: NOV–27–2023	DWG NO: 01582–01

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

CONSTRUCTION SIGN BUILD HOUSTON FORWARD

DRAWING SCALE
NOT TO SCALE

FOR CITY OF HOUSTON USE ONLY

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713–953–4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F–533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P–6329

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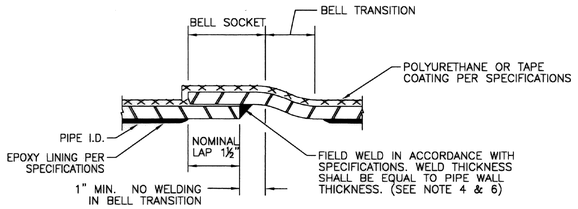
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

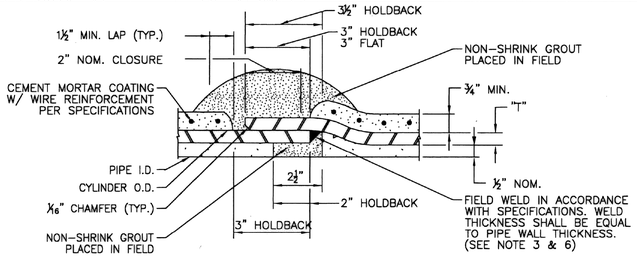
CONSTRUCTION SIGN BUILD HOUSTON FORWARD DETAIL

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 95 OF 169	



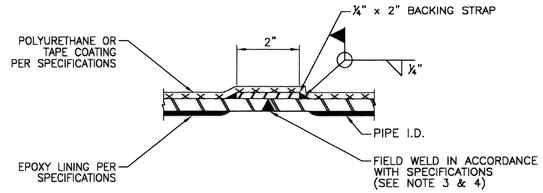
1 LAP–WELD FIELD JOINT – STEEL PIPE JOINT

FLEXIBLE COATING AND LINING



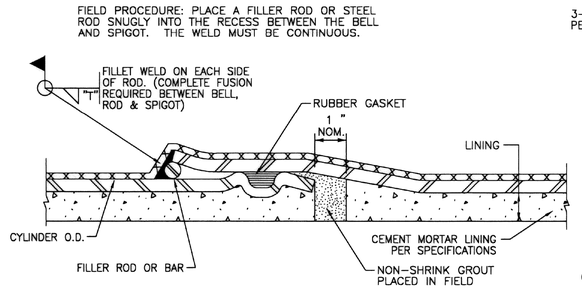
2 LAP–WELD FIELD JOINT – STEEL PIPE JOINT

CEMENT MORTAR LINED & CEMENT MORTAR COATED



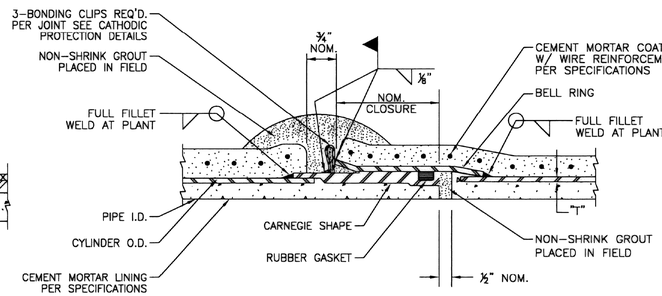
3 BUTT WELD FIELD JOINT – STEEL PIPE JOINT

FLEXIBLE COATING AND LINING



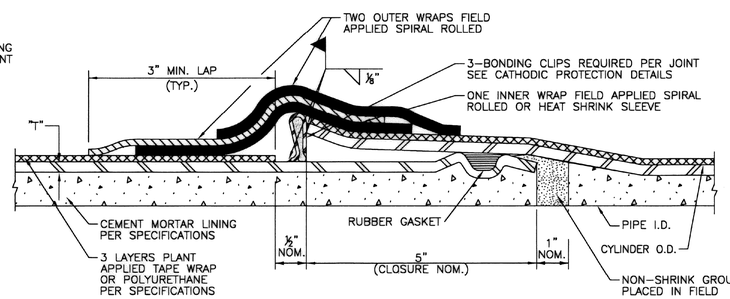
4 FIELD WELDED O–RING – STEEL PIPE JOINT

FLEXIBLE COATING AND CEMENT MORTOR LINING
(FOR ADJUSTMENTS ONLY AS APPROVED BY ENGINEER AND PIPE MANUFACTURER.)



5 CARNEGIE JOINT – STEEL PIPE JOINT

CEMENT MORTAR LINED & CEMENT MORTAR COATED



6 O–RING – STEEL PIPE JOINT

CEMENT MORTAR LINED & FLEXIBLE COATING

NOTES:

1. T = STEEL CYLINDER THICKNESS AND SIZE OF FILLET ATTACHMENT WELD.
2. ALL REFERENCES TO PIPE DIAMETER FOR THIS PROJECT SHALL SIGNIFY SIZE MEASURED TO INSIDE DIAMETER OF THE LINED PIPE.
3. DETAILS 1 AND 3 SHOW EPOXY LINING. CEMENT MORTAR LINING TO BE SIMILAR TO DETAILS ON THIS SHEET SHOWING CEMENT MORTAR LINED PIPE, AS APPROVED BY PROGRAM MANAGER.
4. SEE SPECIFICATIONS FOR REPAIR OF EPOXY LINING.
5. WHEN CEMENT MORTAR COATING IS USED FOR STEEL PIPE, FLEXIBLE MASTIC SEALER SHALL BE APPLIED TO THE EXTERIOR OF THE JOINT PRIOR TO JOINT ENGAGEMENT WHEN PIPE IS INSTALLED IN A TUNNEL OR ENCASEMENT PIPE.
6. OUTSIDE WELD MAY BE SUBSTITUTED FOR INSIDE WELD. INTERIOR WELDING IS NOT RECOMMENDED FOR 30" DIAMETER PIPE AND SMALLER.

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

STANDARD LDWL
STEEL PIPE DETAILS
(SHEET 1 OF 2)

(NOT TO SCALE)

APPROVED BY: ACTING CITY ENGINEER	APPROVED BY: DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: MAR-20-2018	DWG NO: 02518-01

NO.	DATE	REVISION	APP.

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TBPE REGISTRATION NO. F–533

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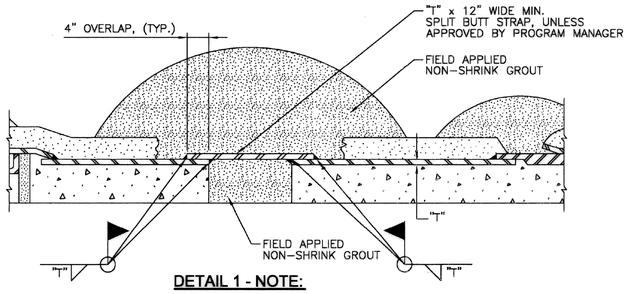
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

STANDARD LDWL STEEL PIPE DETAILS (SHEET 1 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 96 OF 169	

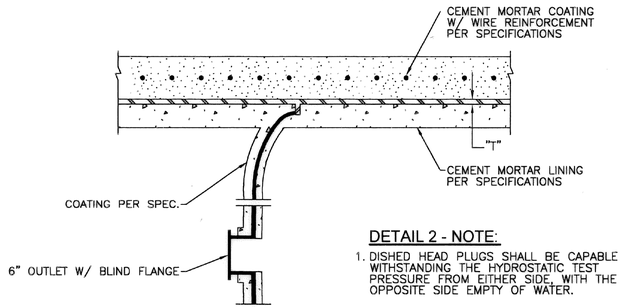


DETAIL 1 - NOTE:

1. WELD SIZE SHALL MATCH THICKNESS OF BUTT STRAP AND CARRIER PIPE, AS RECOMMENDED BY THE PIPE MANUFACTURER.
2. INTERNAL WELD NOT RECOMMENDED FOR 30" DIAMETER PIPE AND SMALLER.
3. NO ANGULAR DEFLECTION ALLOWED.

1 CLOSURE PIECE

FOR STEEL PIPE WITH CEMENT MORTAR LINED AND CEMENT MORTAR COATED (SIMILAR FOR FLEXIBLE COATING AND LINING)

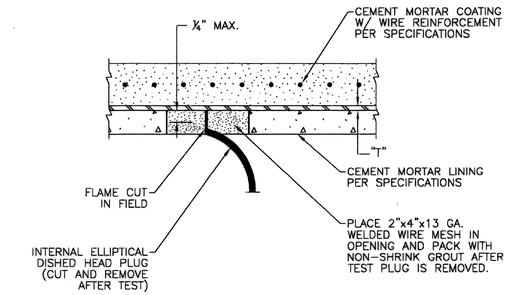


DETAIL 2 - NOTE:

1. DISHED HEAD PLUGS SHALL BE CAPABLE OF WITHSTANDING THE HYDROSTATIC TEST PRESSURE FROM EITHER SIDE, WITH THE OPPOSITE SIDE EMPTY OF WATER.

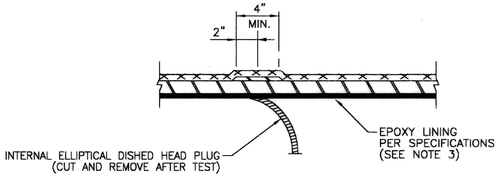
2 INTERNAL ELLIPTICAL DISHED HEAD PLUG

CEMENT MORTAR LINING AND CEMENT MORTAR COATED STEEL PIPE SPECIAL



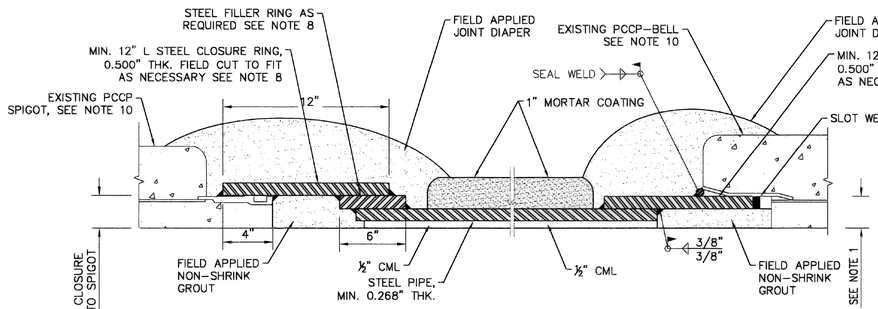
3 INTERNAL ELLIPTICAL DISHED HEAD PLUG REMOVAL

CEMENT MORTAR LINING AND CEMENT MORTAR COATED STEEL PIPE SPECIAL



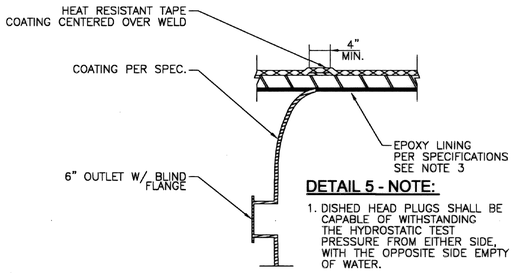
4 INTERNAL ELLIPTICAL DISHED HEAD PLUG REMOVAL

FOR STEEL PIPE WITH FLEXIBLE COATING AND LINING



6 CONNECTION PIECE DETAIL STEEL-TO-PCCP BELL/SPIGOT

(OPTION 1: IF EXISTING PIPE JOINT IS NOT WELDED)

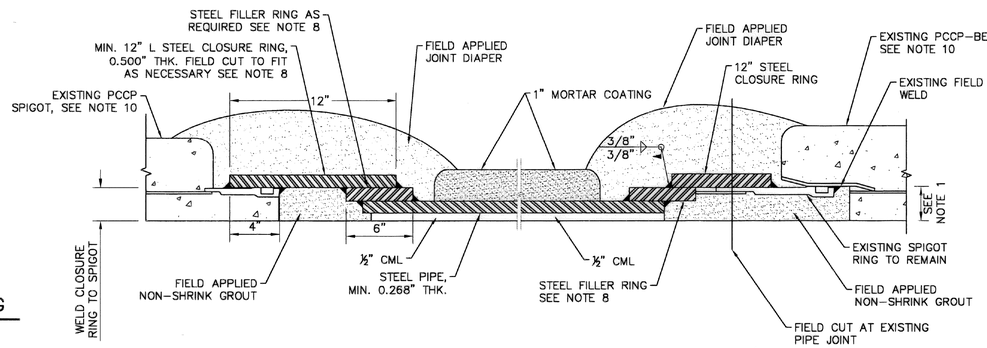


DETAIL 5 - NOTE:

1. DISHED HEAD PLUGS SHALL BE CAPABLE OF WITHSTANDING THE HYDROSTATIC TEST PRESSURE FROM EITHER SIDE, WITH THE OPPOSITE SIDE EMPTY OF WATER.

5 INTERNAL ELLIPTICAL DISHED HEAD PLUG

FOR STEEL PIPE WITH FLEXIBLE COATING AND LINING



7 CONNECTION PIECE DETAIL STEEL-TO-PCCP BELL/SPIGOT

(OPTION 2: IF EXISTING PIPE JOINT IS WELDED)

NOTES:

1. T = STEEL CYLINDER THICKNESS AND SIZE OF FILLET ATTACHMENT WELD.
2. ALL REFERENCES TO PIPE DIAMETER FOR THIS PROJECT SHALL SIGNIFY SIZE MEASURED TO INSIDE DIAMETER OF THE LINED PIPE.
3. DETAILS 4 AND 5 SHOW EPOXY LINING. CEMENT MORTAR LINING TO BE SIMILAR TO DETAILS ON THIS SHEET SHOWING CEMENT MORTAR LINED PIPE, AS APPROVED BY PROGRAM MANAGER.
4. SEE SPECIFICATIONS FOR REPAIR OF EPOXY LINING.
5. WHEN CEMENT MORTAR COATING IS USED FOR STEEL PIPE, FLEXIBLE MASTIC SEALER SHALL BE APPLIED TO THE EXTERIOR OF THE JOINT PRIOR TO JOINT ENGAGEMENT WHEN PIPE IS INSTALLED IN A TUNNEL OR ENCASEMENT PIPE.
6. OUTSIDE WELD MAY BE SUBSTITUTED FOR INSIDE WELD. INTERIOR WELDING IS NOT RECOMMENDED FOR 30" DIAMETER PIPE AND SMALLER.
7. FIELD VERIFY INSIDE DIAMETER OF JOINT RING.
8. RING THICKNESS TO BE DETERMINED BASED ON FIELD VERIFIED JOINT DIMENSIONS.
9. COATINGS ON PROPOSED PIPE TO BE SIMILAR TO EXISTING PIPE.
10. PROTECT EXISTING PIPE SECTIONS TO REMAIN IN PLACE. NOTIFY ENGINEER IF ANY SUSPECTED DAMAGE OCCURS.

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

STANDARD LDWL
STEEL PIPE DETAILS
(SHEET 2 OF 2)

(NOT TO SCALE)

APPROVED BY:	APPROVED BY:
ACTING CITY ENGINEER	DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: MAR-20-2018	DWG NO: 02518-02

NO.	DATE	REVISION	APP.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

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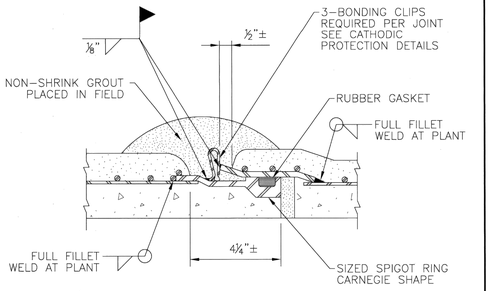
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

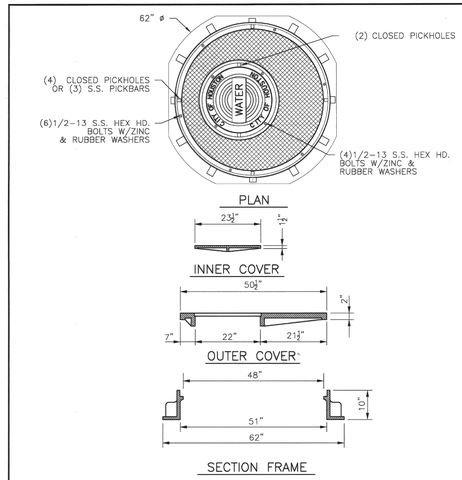
STANDARD LDWL STEEL PIPE DETAILS (SHEET 2 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 97 OF 169	



1 JOINT – BAR WRAPPED CYLINDER PIPE

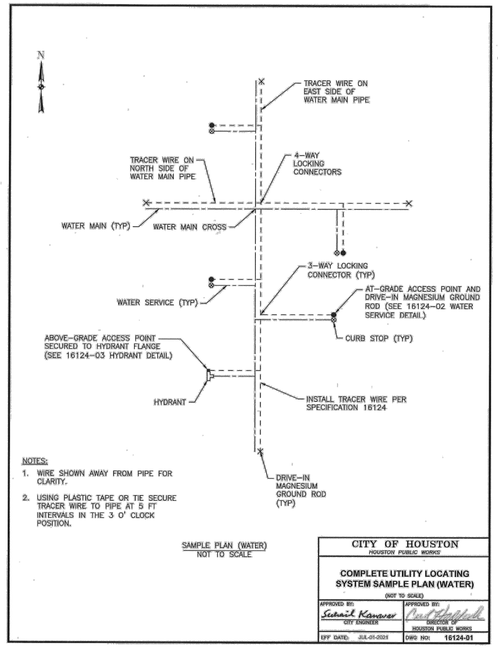
CITY OF HOUSTON HOUSTON PUBLIC WORKS	
STANDARD LDWL BAR WRAPPED CYLINDER PIPE JOINT DETAIL (NOT TO SCALE)	
APPROVED BY: ACTING CITY ENGINEER	APPROVED BY: DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: MAR-20-2018	DWG NO: 02613-01



NOTES:

1. MATERIAL – GRAY IRON ASTM A48 CL35B / DUCTILE IRON ASTM A536 70–50–05
2. CASTING TO MEET M306 PROOF LOAD SPECIFICATION
3. EJIW MODEL V–7048–2 OR APPROVED EQUAL.

CITY OF HOUSTON HOUSTON PUBLIC WORKS	
STANDARD LDWL 48" DIA HEAVY DUTY MANHOLE FRAME AND COVER DETAIL (NOT TO SCALE)	
APPROVED BY: ACTING CITY ENGINEER	APPROVED BY: DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: MAR-20-2018	DWG NO: 02090-12

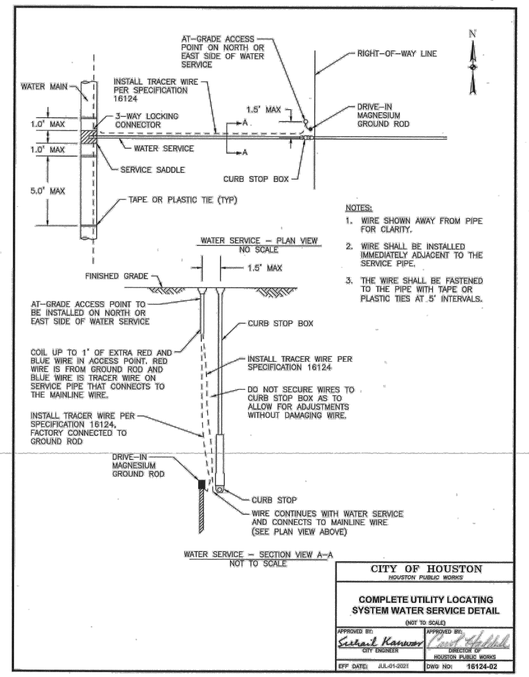


NOTES:

1. WIRE SHOWN AWAY FROM PIPE FOR CLARITY.
2. USING PLASTIC TAPE OR TIE SECURE TRACER WIRE TO PIPE AT 5 FT INTERVALS IN THE 3 O' CLOCK POSITION.

SAMPLE PLAN (WATER)
NOT TO SCALE

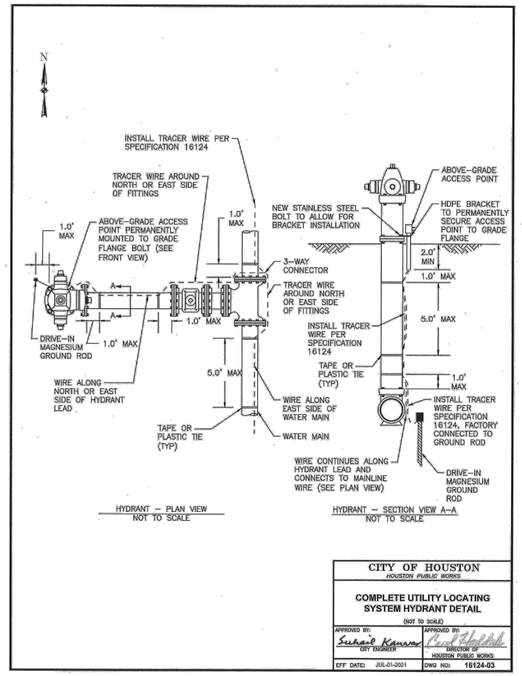
CITY OF HOUSTON HOUSTON PUBLIC WORKS	
COMPLETE UTILITY LOCATING SYSTEM SAMPLE PLAN (WATER) (NOT TO SCALE)	
APPROVED BY: CITY ENGINEER	APPROVED BY: DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: JUL-01-2021	DWG NO: 16124-01



NOTES:

1. WIRE SHOWN AWAY FROM PIPE FOR CLARITY.
2. WIRE SHALL BE INSTALLED IMMEDIATELY ADJACENT TO THE SERVICE PIPE.
3. THE WIRE SHALL BE FASTENED TO THE PIPE WITH TAPE OR PLASTIC TIES AT 5' INTERVALS.

CITY OF HOUSTON HOUSTON PUBLIC WORKS	
COMPLETE UTILITY LOCATING SYSTEM WATER SERVICE DETAIL (NOT TO SCALE)	
APPROVED BY: CITY ENGINEER	APPROVED BY: DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: JUL-01-2021	DWG NO: 16124-02



CITY OF HOUSTON HOUSTON PUBLIC WORKS	
COMPLETE UTILITY LOCATING SYSTEM HYDRANT DETAIL (NOT TO SCALE)	
APPROVED BY: CITY ENGINEER	APPROVED BY: DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: JUL-01-2021	DWG NO: 16124-03

NO.	DATE	REVISION	APP.

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ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
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TBPE REGISTRATION NO. F–533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P–6329

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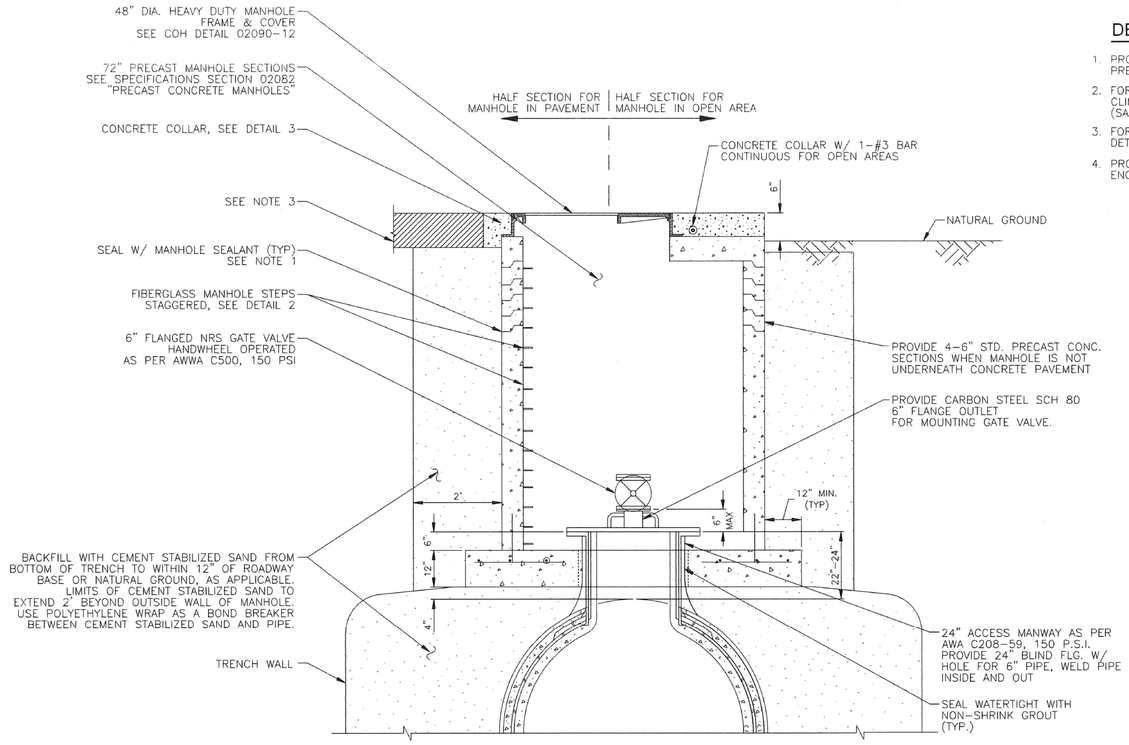
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

STANDARD LDWL DETAILS

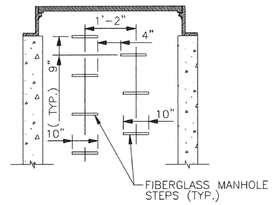
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 98 OF 169	



1 ACCESS MANWAY IN ACCESS MANHOLE
(FOR WATER LINES 36-INCH TO 96-INCH DIAMETER)

DETAIL 1 - NOTES:

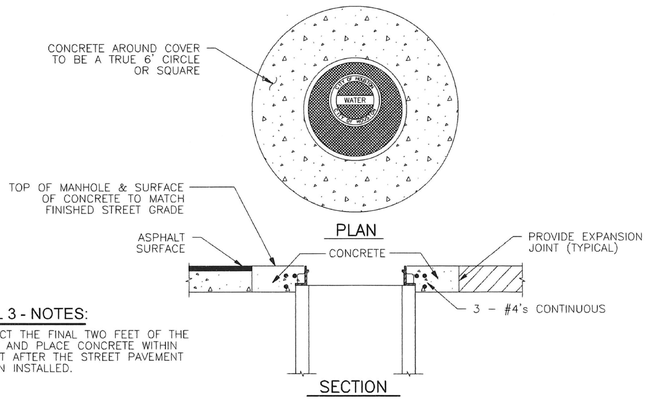
1. PROVIDE RAM-NEK OR APPROVED EQUAL BETWEEN PRECAST SEGMENTS OF THE MANHOLE.
2. FOR MANHOLES DEEPER THAN 20 FEET, SAFETY CLIMBING RAIL MUST BE PROVIDED (SAF-T-CLIMB OR APPROVED EQUAL).
3. FOR PAVEMENT REPAIR, SEE COH STANDARD DETAILS 02902-01 & 02902-02.
4. PROVIDE AN APPROVED PETROLATUM BASED TAPE ENCAPSULATING ALL BOLTS IN ACCESS MANHOLE.



DETAIL 2 - NOTES:

1. PROVIDE MODEL PS1-PF STEPS AS MANUFACTURED BY M.A. INDUSTRIES INC. OR APPROVED EQUAL.
2. BOTTOM MANHOLE STEP SHALL BE NO HIGHER THAN 12" ABOVE MANHOLE INVERT.

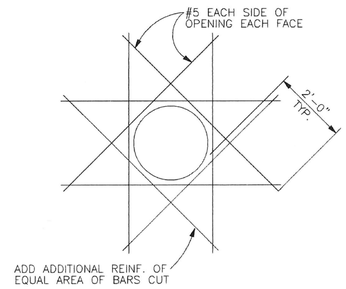
2 MANHOLE STEP DETAIL



DETAIL 3 - NOTES:

1. CONSTRUCT THE FINAL TWO FEET OF THE MANHOLE AND PLACE CONCRETE WITHIN BLOCKOUT AFTER THE STREET PAVEMENT HAS BEEN INSTALLED.

3 MANHOLE CONCRETE COLLAR DETAIL



4 SERVICE MANHOLE REINFORCEMENT DETAIL

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

STANDARD LDWL
ACCESS MANHOLE DETAILS

(NOT TO SCALE)

APPROVED BY:	APPROVED BY:
Suhail Kanwar, CITY ENGINEER	Carol Haddock, DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: JULY - 01 - 2021	DWG NO: 02082-10

NO.	DATE	REVISION	APP.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

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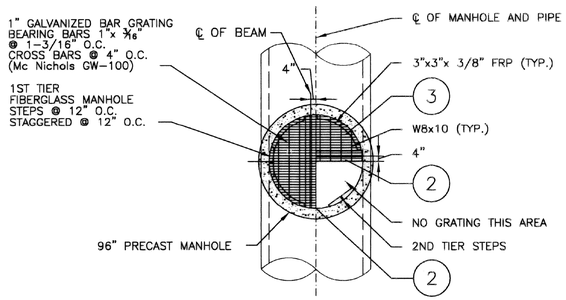
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

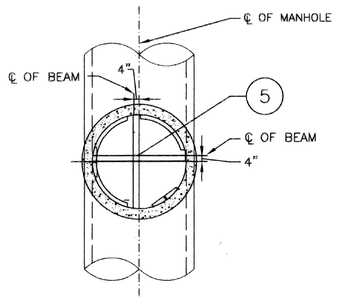
72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

STANDARD LDWL
ACCESS MANHOLE DETAILS

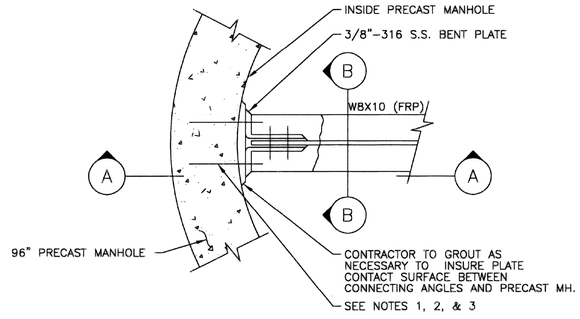
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 99 OF 169	



PLAN VIEW OF LANDING
(W/GRATING SHOWN)



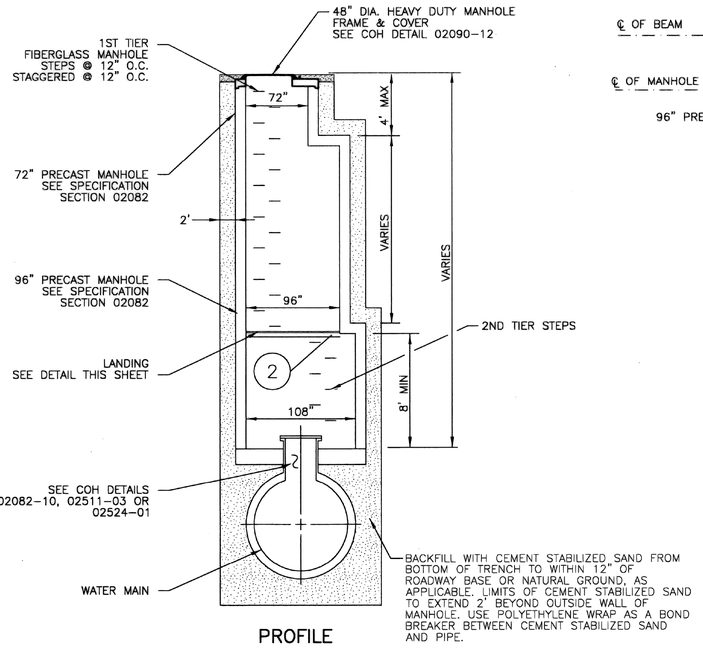
PLAN VIEW OF LANDING
(W/O GRATING SHOWN)



2 BEAM CONNECTION DETAIL
NO SCALE

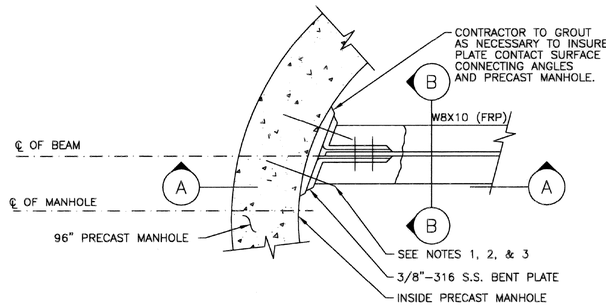
NOTES:

1. CONTRACTOR TO DRILL 1¼" DIAMETER HOLES 4" DEEP, INTO PRECAST MANHOLE FOR ¾" DIAMETER ANCHOR BOLTS.
2. GROUT IN ¾" DIAMETER ANCHOR BOLTS WITH GRUTEM 435 AS MANUFACTURED BY I.W. INDUSTRIES, OR APPROVED EQUAL, MANUFACTURERS INSTRUCTIONS IN THE USE OF ALL MATERIALS SPECIFIED SHALL BE FOLLOWED IN STRICT ACCORDANCE.
3. ANCHOR BOLTS SHALL BE ¾" DIAMETER x 6" LONG 316 S.S. ALL THREAD BOLTS WITH 2" PROJECTION.
4. ALL STEEL TO BE GRADE 40.
5. ALL CONCRETE TO BE CLASS "A".
6. COORDINATE THE LOCATION AND TYPE JOINTS BETWEEN OFFSET BOX AND PRECAST SECTIONS.
7. PROVIDE RAMNEK OR APPROVED EQUAL BETWEEN PRECAST SEGMENTS OF THE MANHOLE.

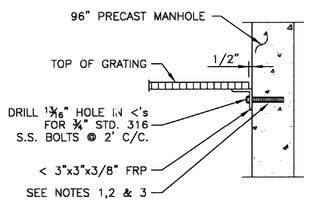


PROFILE

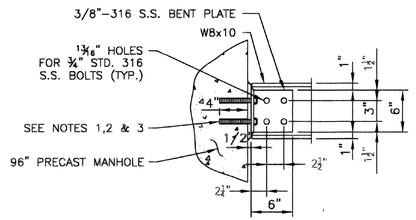
1 EXTRA DEPTH – ACCESS MANHOLE
(SEE PLANS FOR LOCATION)
NO SCALE



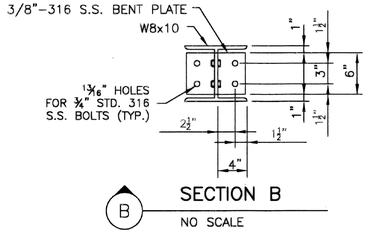
3 BEAM CONNECTION DETAIL
NO SCALE



4 ANGLE CONNECTION DETAIL
NO SCALE



A SECTION
NO SCALE



B SECTION B
NO SCALE

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

STANDARD LDWL
SAF-T-CLIMB DETAILS FOR
EXTRA DEPTH MANHOLE

(NOT TO SCALE)

APPROVED BY:	APPROVED BY:
ACTING CITY ENGINEER	DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: MAR-20-2018	DWG NO: 02082-11

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

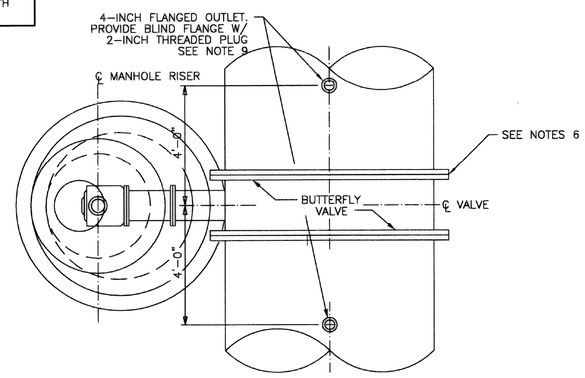
STANDARD LDWL
SAF-T-CLIMB DETAILS
EXTRA DEPTH MANHOLE

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 100 OF 169	

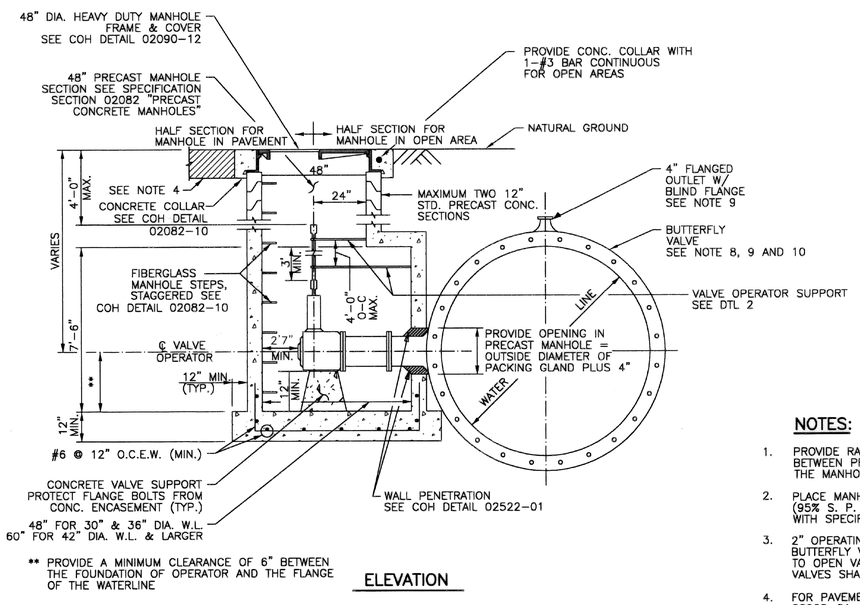
NO.	DATE	REVISION	APP.

NOTE:

SHOULD CONTRACTOR DESIRE TO USE VALVES IN A THROTTLED POSITION FOR FILLING OF LINE SEGMENTS, CONTRACTOR IS CAUTIONED TO OBSERVE RECOMMENDATIONS OF VALVE MANUFACTURER IN ORDER TO PRECLUDE DAMAGE ASSOCIATED WITH THIS MODE OF OPERATION.



PLAN

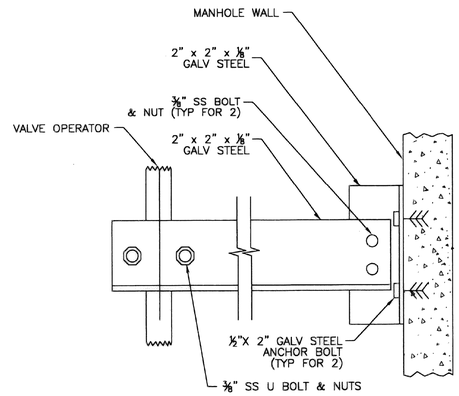


** PROVIDE A MINIMUM CLEARANCE OF 6" BETWEEN THE FOUNDATION OF OPERATOR AND THE FLANGE OF THE WATERLINE

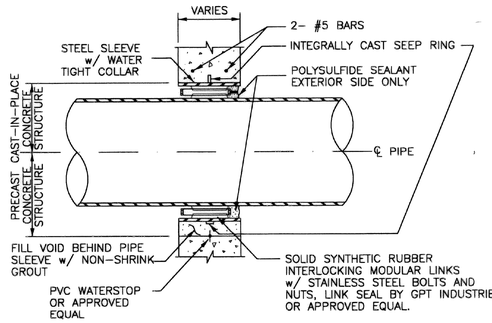
ELEVATION

1 BUTTERFLY VALVE AND OPERATOR MANHOLE DETAIL

(FOR WATER LINES 30–INCHES TO 96–INCH IN DIAMETER)



2 VALVE OPERATOR SUPPORT



3 TYPICAL WALL PENETRATION DETAIL

NOTES:

1. PROVIDE RAMNEK OR APPROVED EQUAL BETWEEN PRECAST SEGMENTS OF THE MANHOLE.
2. PLACE MANHOLE ON NEW COMPACTED (95% S. P. D.) BOTTOM IN ACCORDANCE WITH SPECIFICATION 02316.
3. 2" OPERATING NUT ON LARGE DIAMETER BUTTERFLY VALVES SHALL TURN CLOCKWISE TO OPEN VALVE. ABOVE–GROUND AND PLANT VALVES SHALL OPEN COUNTERCLOCKWISE.
4. FOR PAVEMENT REPAIR, SEE COH DETAILS 02902–01 & 02902–02.
5. FOR MANHOLES DEEPER THAN 20 FEET, PROVIDE SAFETY CLIMBING RAIL (SAF–T–CLIMB OR EQUAL)
6. FOR JOINT BONDING DETAILS AT BUTTERFLY VALVES SEE COH DETAIL 15640–02.
7. ADJUST MANHOLE AND MANHOLE OPENING TO ALIGN WITH VALVE OPERATOR NUT FOR EASE OF OPERATION
8. FOR VALVES GREATER THAN OR EQUAL TO 24–INCH DIAMETER, BACKFILL USING CONTROLLED LOW STRENGTH MATERIAL (CLSM, 100 P.S.I. MIN.) EXTENDING FROM THE VALVE CENTERLINE TO 7–FEET UPSTREAM AND DOWNSTREAM OF THE VALVE CENTERLINE FROM THE BOTTOM OF THE TRENCH TO 12–INCH MIN. ABOVE THE TOP OF PIPE. PROVIDE BUOYANCY CONTROL.
9. ADJUST FLANGED OUTLET LOCATION TO 9–FEET FROM VALVE CENTER LINE FOR VALVES GREATER THAN OR EQUAL TO 54–INCH DIAMETER.
10. USE ENCAPSULATED BOLTS AND POLYETHYLENE WRAP AS A BOND BREAKER BETWEEN PIPE, VALVE AND CLSM. ENSURE CLSM IS PROPERLY FILLED IN PIPE HAUNCHES. FOUR CLSM IN LIFTS.

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

STANDARD LDWL
BUTTERFLY VALVE AND
OPERATOR MANHOLE DETAILS

(NOT TO SCALE)

APPROVED BY:	APPROVED BY:
ACTING CITY ENGINEER	DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: MAR-20-2018	DWG NO: 02522-01

NO.	DATE	REVISION	APP.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
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TBPE REGISTRATION NO. F–533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P–6329

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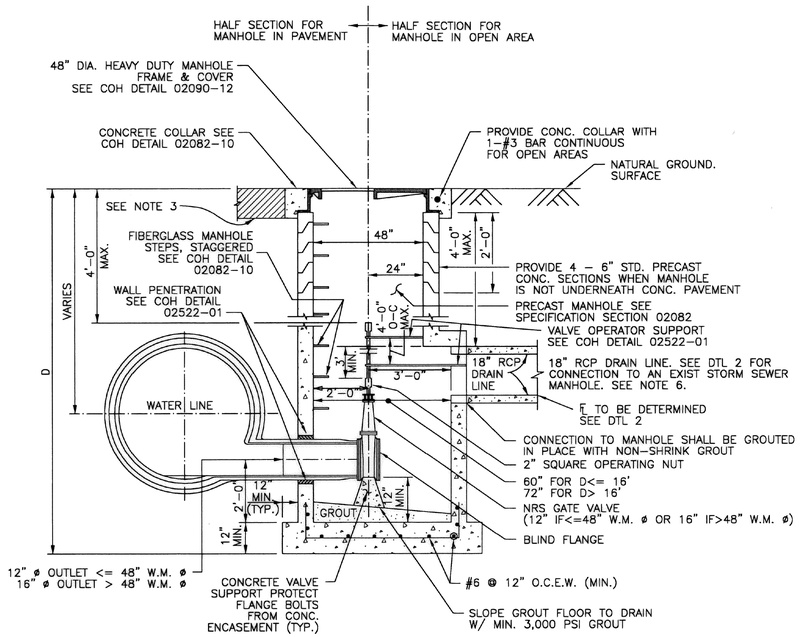
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

STANDARD LDWL
BUTTERFLY VALVE AND
OPERATOR MANHOLE DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 101 OF 169	

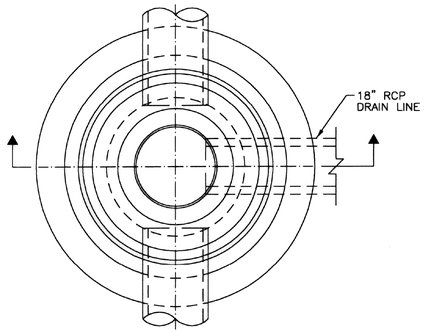


SERVICE MANHOLE FOR DRAINLINE VALVE CONNECTION

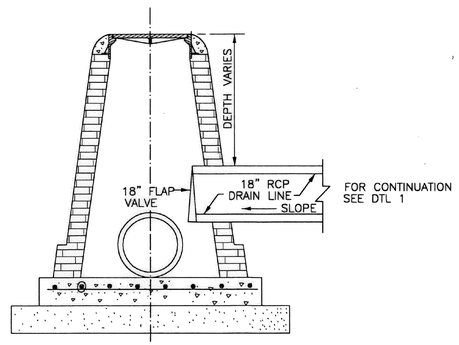
1

NOTES:

1. PROVIDE RAMNEK OR APPROVED EQUAL BETWEEN PRECAST SEGMENTS OF THE MANHOLE.
2. PLACE MANHOLE ON NEW COMPACTED (95% S. P. D.) BOTTOM IN ACCORDANCE WITH SPECIFICATION 02316.
3. FOR PAVEMENT REPAIR, SEE COH DETAILS 02902-01 & 02902-02.
4. FOR MANHOLES DEEPER THAN 20 FEET, PROVIDE SAFETY CLIMBING RAIL (SAF-T-CLIMB OR EQUAL). SEE COH DETAIL 02082-11.
5. ADJUST MANHOLE AND MANHOLE OPENING TO ALIGN WITH VALVE OPERATOR NUT FOR EASE OF OPERATION.
6. IF PROPOSED STORM SEWER MANHOLE IS CALLED OUT IN PLANS, SEE COH DETAILS 02081-01 OR 02081-02.



PLAN
(COVER NOT SHOWN)



SECTION

DRAIN LINE CONNECTION TO EXISTING STORM SEWER MANHOLE

2

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

STANDARD LDWL
DRAIN LINE VALVE DETAILS

(NOT TO SCALE)

APPROVED BY:	APPROVED BY:
ACTING CITY ENGINEER	DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: MAR-20-2018	DWG NO: 02511-03

NO.	DATE	REVISION	APP.

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

STANDARD LDWL
DRAIN LINE VALVE DETAILS

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CITY OF HOUSTON PM	
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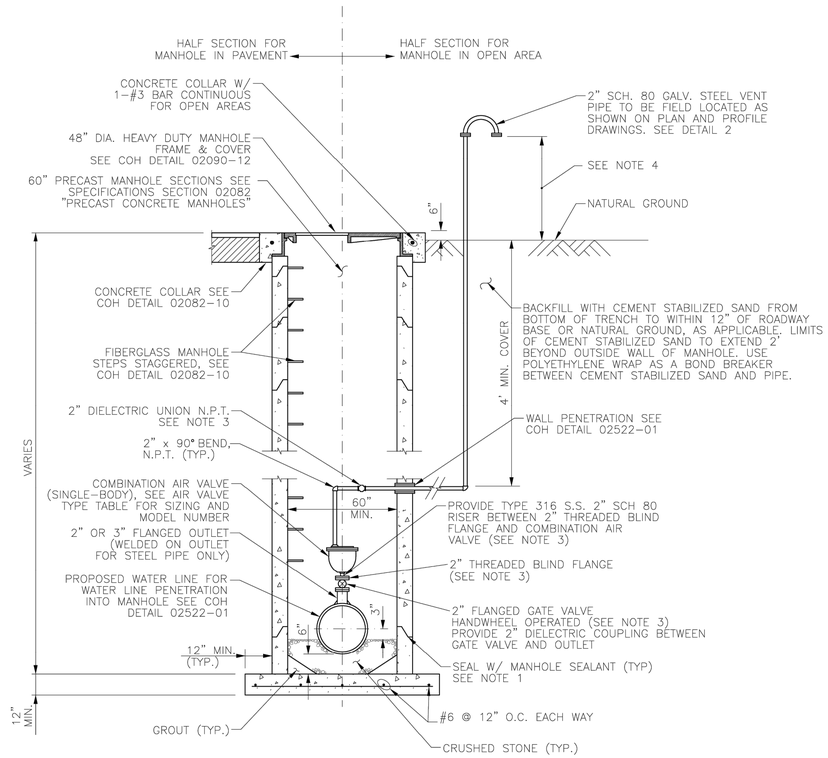
SHEET NO. 102 OF 169	



1 COMBINATION AIR VALVE ASSEMBLY IN SERVICE MANHOLE

(FOR WATER LINES SMALLER THAN 36–INCHES DIAMETER)

		VACUUM (AI/VR)	
WATER MAIN DIAMETER	MANUFACTURER (1)	SERIES	ORIFICE SIZE
<=36"	APCO	140C	
	CLAVAL	36	
	PRATT	WCV 01	

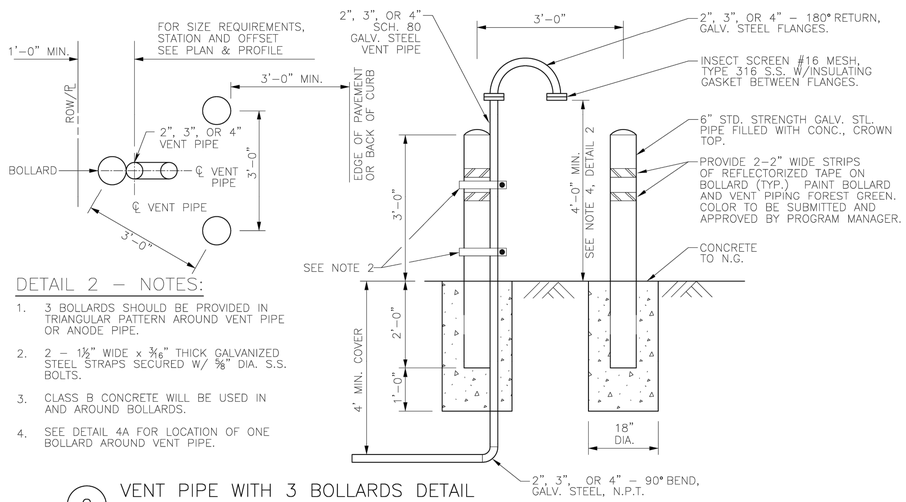
COMBINATION AIR VALVE & TYPE TABLE

(FOR WATER LINES SMALLER THAN 36" DIAMETER)

(1) OR APPROVED EQUAL.

DETAIL 1 – NOTES:

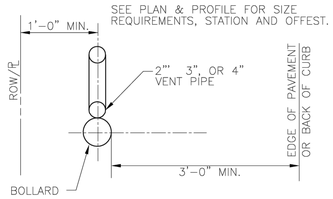
1. PROVIDE RAM–NEK OR APPROVED EQUAL BETWEEN PRECAST SEGMENTS OF THE MANHOLE.
2. FOR MANHOLES DEEPER THAN 20 FEET, SAFETY CLIMBING RAIL MUST BE PROVIDED (SAF–T–CLIMB OR APPROVED EQUAL). SEE COH DETAIL 02082–11.
3. PIPING AND APPURTENANCES OF THE SAME DIAMETER AND CONSTRUCTED OF THE SAME MATERIAL AND CLASS.
4. VERIFY THAT LOCATION OF VENT PIPE SCREEN IS 1 FOOT ABOVE 100–YEAR FLOOD PLAIN ELEVATION OR 4 FEET ABOVE NATURAL GROUND WHICHEVER IS HIGHER.
5. REFER TO PLAN AND PROFILE SHEETS FOR LOCATIONS OF AIR VALVES.
6. FOR PAVEMENT REPAIR, SEE COH DETAILS 02902–01 & 02902–02.
7. PROVIDE AN APPROVED PETROLATUM BASED TAPE ENCAPSULATING ALL BOLTS IN ACCESS MANHOLE.



DETAIL 2 – NOTES:

1. 3 BOLLARDS SHOULD BE PROVIDED IN TRIANGULAR PATTERN AROUND VENT PIPE OR ANODE PIPE.
2. 2 – 1½" WIDE x 3⁄16" THICK GALVANIZED STEEL STRAPS SECURED W/ ⅝" DIA. S.S. BOLTS.
3. CLASS B CONCRETE WILL BE USED IN AND AROUND BOLLARDS.
4. SEE DETAIL 4A FOR LOCATION OF ONE BOLLARD AROUND VENT PIPE.

2 VENT PIPE WITH 3 BOLLARDS DETAIL



2A VENT PIPE WITH 1 BOLLARD DETAIL

NO.	DATE	REVISION	APP.

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

LDWL
COMBINATION AIR VALVE ASSEMBLY IN SERVICE MANHOLE DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 103 OF 169	

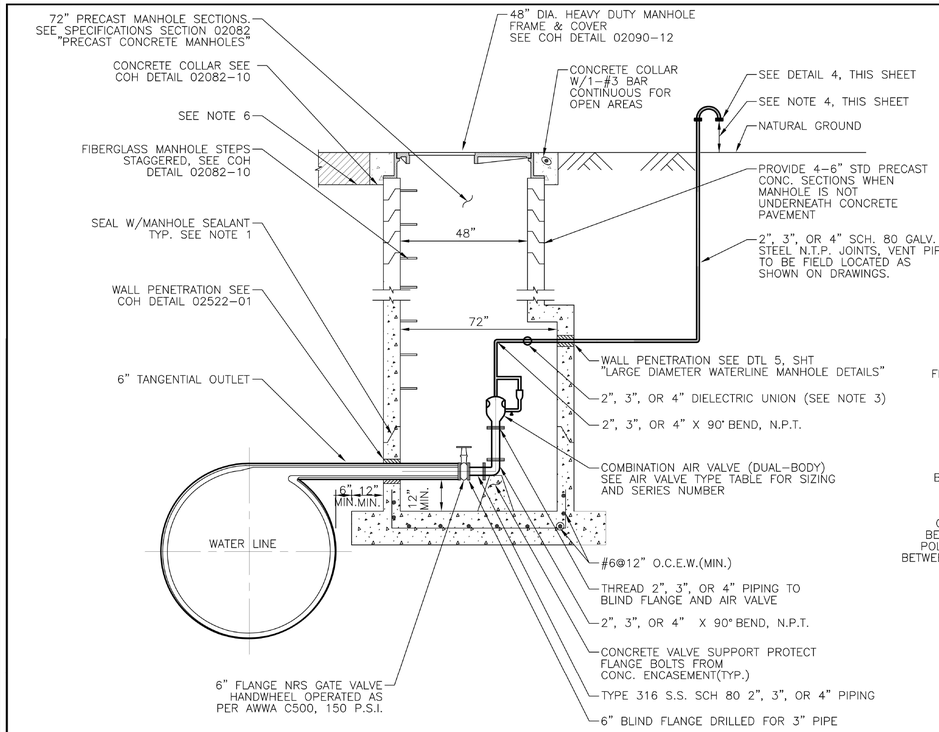
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LDWL
COMBINATION AIR VALVE ASSEMBLY IN SERVICE MANHOLE DETAILS
(NOT TO SCALE)

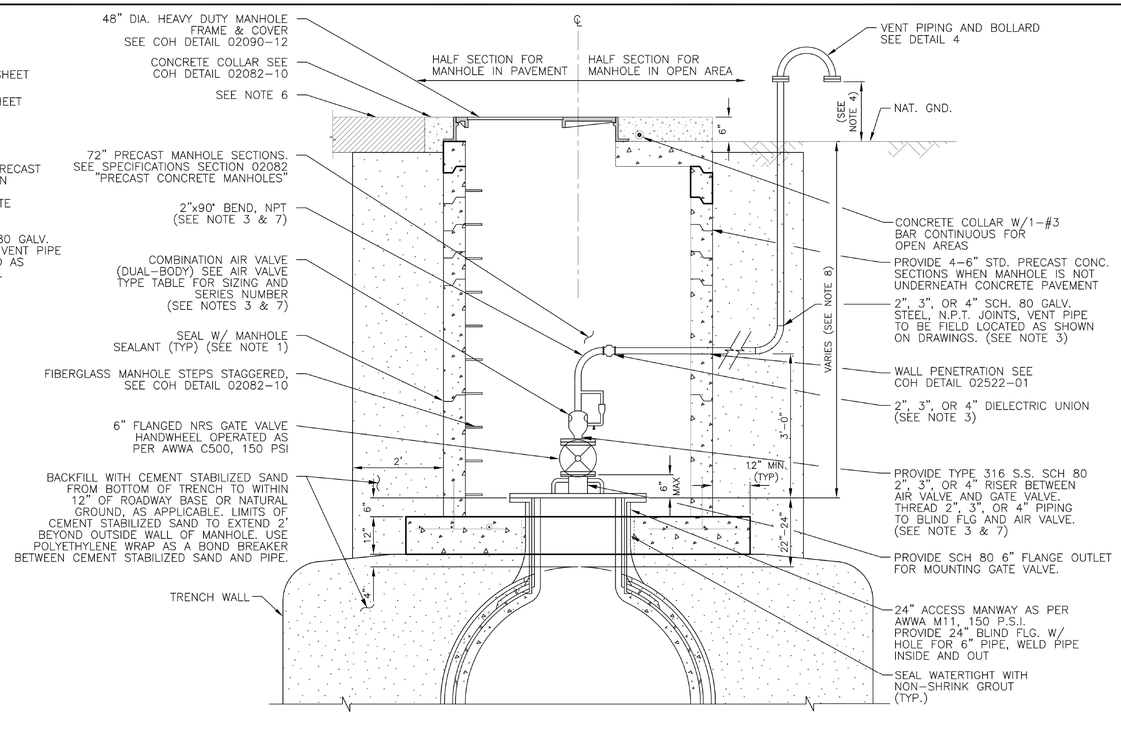
REVISED ON: _____

REVISED BY: _____

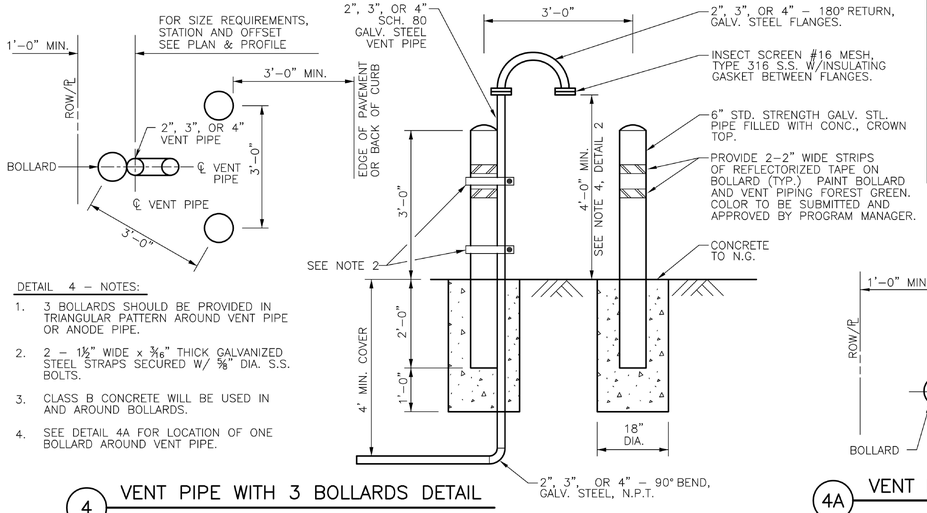
EFF DATE: MAR-20-2018 | DWG NO: **02524-02**



1 LOW PROFILE AIR VALVE ASSEMBLY
(FOR WATER LINES 36-INCH TO 96-INCH DIAMETER)



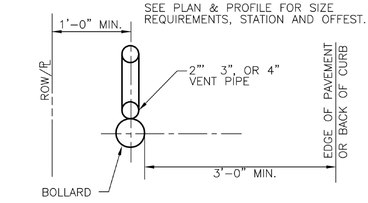
2 AIR VALVE ASSEMBLY WITH ACCESS MANWAY IN SERVICE MANHOLE
(FOR WATER LINES 36-INCH TO 96-INCH DIAMETER)



DETAIL 4 - NOTES:

1. 3 BOLLARDS SHOULD BE PROVIDED IN TRIANGULAR PATTERN AROUND VENT PIPE OR ANODE PIPE.
2. 2 - 1½" WIDE x 3/16" THICK GALVANIZED STEEL STRAPS SECURED W/ 5/8" DIA. S.S. BOLTS.
3. CLASS B CONCRETE WILL BE USED IN AND AROUND BOLLARDS.
4. SEE DETAIL 4A FOR LOCATION OF ONE BOLLARD AROUND VENT PIPE.

4 VENT PIPE WITH 3 BOLLARDS DETAIL



4A VENT PIPE WITH 1 BOLLARD DETAIL

		VACUUM (AI/VR)		AIR RELEASE		
WATER MAIN DIAMETER	MANUFACTURER (1)	SERIES	ORIFICE SIZE	SERIES	INLET SIZE (NPT)	ORIFICE SIZE (2)
>=36" <=96"	APCO	1500C		200A	1"	
	CLAVAL	38VB		34AR-C	1"	
	PRATT	WAVVB		WAR 02	1"	

3 AIR VALVE & TYPE TABLE
(FOR WATER LINES 36" TO 96" DIAMETER)

DETAILS 3 - NOTES:

(1) OR APPROVED EQUAL.

(2) MINIMUM ORIFICE SIZE REQUIRED. TO BE UPDATED FOR EACH PROJECT BASED ON TRANSIENT ANALYSIS.

DETAILS 1 & 2 - NOTES:

1. PROVIDE RAM-NEK OR APPROVED EQUAL BETWEEN PRECAST SEGMENTS OF THE MANHOLE.
2. FOR MANHOLES DEEPER THAN 20 FEET, SAFETY CLIMBING RAIL MUST BE PROVIDED (SAF-T-CLIMB OR APPROVED EQUAL). SEE COH DETAIL 02082-11.
3. PIPING AND APPURTENANCES OF THE SAME DIAMETER AND CONSTRUCTED OF THE SAME MATERIAL AND CLASS.
4. VERIFY THAT LOCATION OF VENT PIPE SCREEN IS 1 FOOT ABOVE 100-YEAR FLOOD PLAIN ELEVATION OR 4 FEET ABOVE NATURAL GROUND WHICHEVER IS HIGHER.
5. REFER TO PLAN AND PROFILE SHEETS FOR LOCATIONS OF AIR VALVES.
6. FOR PAVEMENT REPAIR, SEE COH DETAILS 02902-01 & 02902-02.
7. PROVIDE AN APPROVED PETROLATUM BASED TAPE ENCAPSULATING ALL BOLTS IN ACCESS MANHOLE.
8. IF DEPTH OF COVER IS LESS THAN 5', OR CALLED OUT IN PLAN USE "LOW PROFILE AIR VALVE ASSEMBLY DETAIL".

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LDWL
AIR VALVE ASSEMBLY IN SERVICE MANHOLE DETAIL
(NOT TO SCALE)

REVISED ON: _____
REVISED BY: _____

EFF DATE: MAR-20-2018 | DWG NO: **02524-03**

NO.	DATE	REVISION	APP.

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

LDWL AIR VALVE ASSEMBLY IN SERVICE MANHOLE DETAILS

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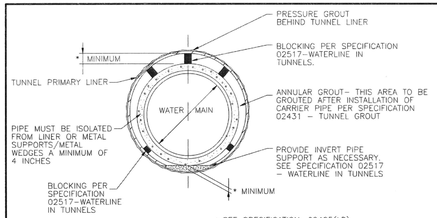
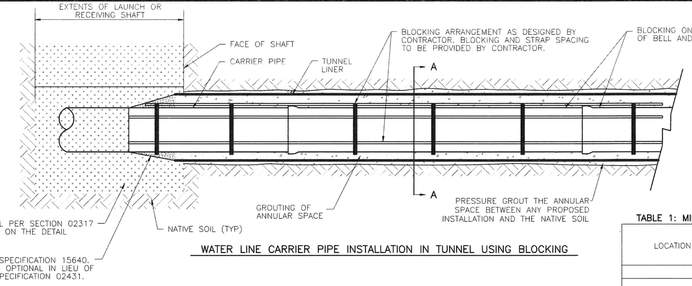
RAM CHAKRADHAR, P.E.	
SHEET NO. 104 OF 169	



SECTION A–A

1 WATER LINE CARRIER PIPE INSTALLATION IN TUNNEL USING BLOCKING



WATER LINE CARRIER PIPE INSTALLATION IN TUNNEL USING BLOCKING

GENERAL NOTES:

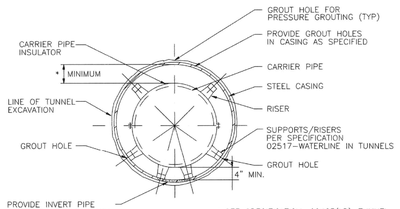
1. DETAIL IS FOR PRESTRESSED CONCRETE CYLINDER PIPE (BAR WRAPPED STEEL CYLINDER PIPE, STEEL PIPE AND D.I.P. ALTERNATE SIMILAR).
2. MINIMUM CLEARANCES SHOWN ON THE PLAN & PROFILE DRAWINGS ARE TO THE O.D. OF TUNNEL LINER. ADJUST PROFILE AS REQUIRED TO MAINTAIN CLEARANCES IDENTIFIED. NO SEPARATE PAY.
3. DIAMETERS INDICATED ON PLANS ARE NOMINAL DIAMETERS.

TABLE 1: MINIMUM TUNNEL LINER / CASING SIZES AND THICKNESS

LOCATION	WATER MAIN DIA.	PIPE MATERIAL	NOMINAL DIA[1] (IN)(CASING O.D.)/ WALL THICKNESS (IN.)		
			2–FLANGE[2] LINER PLATE	4–FLANGE LINER PLATE	STEEL CASING

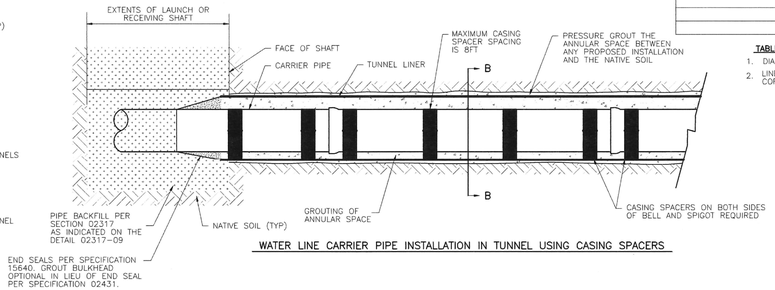
TABLE 1 – NOTES:

1. DIAMETER OF LINER PLATE IS AT NEUTRAL AXIS.
2. LINER PLATE IS TWO FLANGE AND NOMINALLY 2–INCH CORRUGATION BY 6–INCH PROFILE.

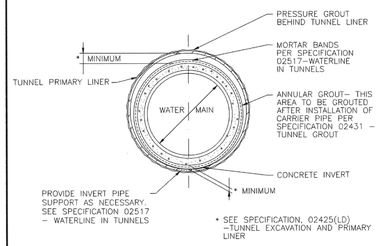


SECTION B–B

2 WATER LINE CARRIER PIPE INSTALLATION IN TUNNEL USING CASING SPACERS

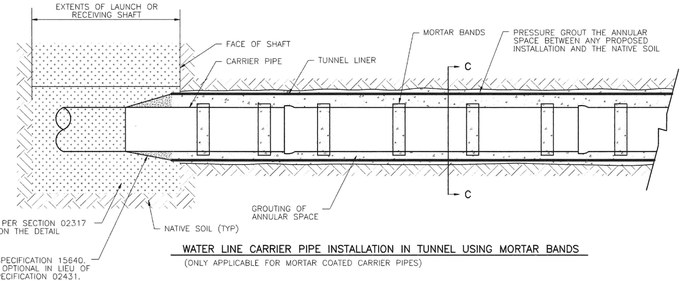


WATER LINE CARRIER PIPE INSTALLATION IN TUNNEL USING CASING SPACERS



SECTION C–C

3 WATER LINE CARRIER PIPE INSTALLATION IN TUNNEL USING MORTAR BANDS



WATER LINE CARRIER PIPE INSTALLATION IN TUNNEL USING MORTAR BANDS
(ONLY APPLICABLE FOR MORTAR COATED CARRIER PIPES)

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LDWL
TUNNEL AND CASING DETAILS FOR WATER LINES 24-INCH AND LARGER
(NOT TO SCALE)

APPROVED BY:	APPROVED BY:
Suhail Kanwar, CITY ENGINEER	Carol Haddock, DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: JUL - 01 - 2021	DWG NO: 02517-01

NO.	DATE	REVISION	APP.

TABLE 1:MINIMUM TUNNEL LINER/CASING SIZES AND THICKNESS

LOCATION (STREET NAME AND STA)	WATER MAIN DIA.	PIPE MATERIAL	NOMINAL DIA[1] (IN.) (CASING O.D.) / WALL THICKNESS (IN.)		
			2–FLANGE[2] LINER PLATE	4–FLANGE LINER PLATE	STEEL CASING
SWPS, STA 171+29.50 – STA 171+12.95	60"	STEEL	---	---	84"/1"
WESTPARK BRIDGE, STA 2+59.00 – STA 4+43.00	72"	STEEL	---	---	84"/1"
UP RAILROAD TRACK, STA 12+12.00 – STA 21+62.00	72"	STEEL	---	---	96"/1.375"
METRO ROW, STA 37+00.00 – STA 38+36.00	72"	STEEL	---	---	84"/1"
METRO ROW, STA 52+64.00 – STA 54+07.00	72"	STEEL	---	---	84"/1"
METRO ROW, STA 60+17.00 – STA 64+79.00	72"	STEEL	---	---	96"/1"
METRO ROW, STA 66+45.00 – STA 66+95.00	72"	STEEL	---	---	84"/1"
METRO ROW, STA 71+40.00 – STA 72+37.00	72"	STEEL	---	---	84"/1"
METRO ROW, STA 79+71.00 – STA 84+35.00	72"	STEEL	---	---	96"/1"
METRO ROW, STA 93+38.00 – STA 103+00.00	72"	STEEL	---	---	96"/1"
METRO ROW, STA 105+40.00 – STA 105+81.00	72"	STEEL	---	---	84"/1"
METRO ROW, STA 109+10.00 – STA 111+25.00	72"	STEEL	---	---	84"/1"
METRO ROW, STA 114+18.00 – STA 114+58.00	72"	STEEL	---	---	84"/1"
METRO ROW, STA 117+30.00 – STA 117+92.00	72"	STEEL	---	---	84"/1"
METRO ROW, STA 119+17.00 – STA 119+60.00	72"	STEEL	---	---	84"/1"
METRO ROW, STA 122+45.00 – STA 128+74.00	72"	STEEL	---	---	96"/1"
US–59 BRIDGE, STA 141+12.50 – STA 149+55.00	72"	STEEL	---	---	96"/1"
GREENBRIAR, STA 156+46.00 – STA 157+56.00	72"	STEEL	---	---	84"/1"

TABLE 1–NOTES:

1. DIAMETER OF LINER PLATE IS AT NEUTRAL AXIS.
2. LINER PLATE IS TWO FLANGE AND NOMINALLY 2–INCH CORRUGATION BY 6–INCH PROFILE.

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HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

LDWL TUNNEL AND CASING DETAILS FOR WATER LINES 24" & LARGER

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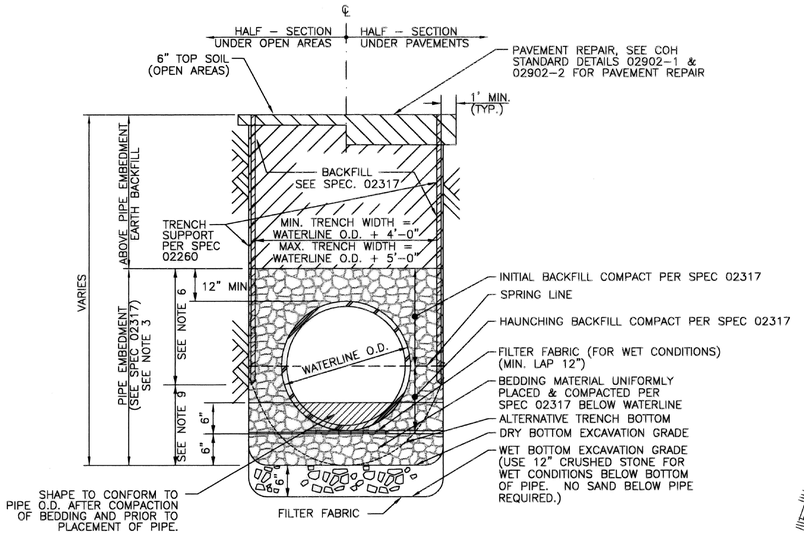


1 EXCAVATION & BACKFILL DETAIL

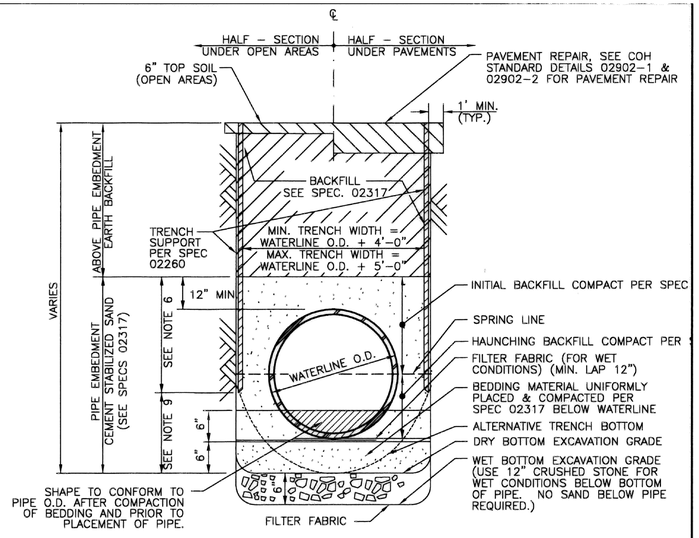
NO SCALE

DETAIL APPLICABLE IN FOLLOWING LIMITS:

– WATER MAIN WITH DEPTH OF COVER LESS THAN 16 FT

DETAILS 1 & 2 – NOTES:

1. SEE TRENCH SAFETY SYSTEM SPECIFICATIONS.
2. FOR WET BOTTOM EXCAVATION LIMITS OF CRUSHED STONE, EXTEND AS SHOWN.
3. PLACEMENT OF TRENCH DAM WITH A MINIMUM OF 12 INCHES INTO TRENCH BOTTOM AND WALLS.
4. TRENCH DAM MAY BE FORMED OR UNFORMED. ACTUAL SHAPE OF TRENCH DAM CROSS SECTION MAY BE DETERMINED BY CONTRACTOR IN FIELD, MEETING 12–INCH MINIMUM THICKNESS AND 12–INCH KEY DEPTH REQUIREMENTS.
5. TRENCH DAM SHALL BE PLACED AT LEAST 5 FT. AWAY FROM ANY PIPELINE STRUCTURE (EACH SIDE). SEE SECTION 02317 FOR OTHER REQUIREMENTS.
6. THIS PORTION OF PIPE EMBEDMENT ZONE MUST BE RECOMPACTED TO PROPER DENSITIES AFTER MOVING SUPPORT SYSTEM FORWARD.
7. USE FILTER FABRIC AS A BOND BREAKER IN PPCA LIMITS AND USE POLYETHYLENE WRAP AS A BOND BREAKER AT OTHER LOCATIONS BETWEEN CEMENT STABILIZED SAND AND PIPE.
8. REFER TO SPEC 02317 FOR GEOTEXTILE REQUIREMENTS AROUND EMBEDMENT.
9. ADJUST HEIGHT OF UNSUPPORTED TRENCH AS NEEDED FOR SAFE CONDITIONS.



2 EXCAVATION & BACKFILL DETAIL

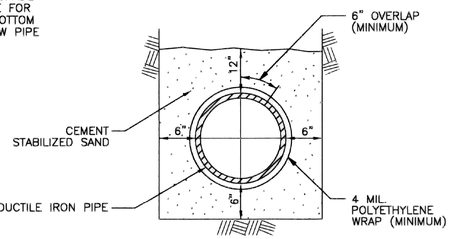
NO SCALE

DETAIL APPLICABLE IN FOLLOWING LIMITS:

– WATER MAIN WITH DEPTH OF COVER GREATER THAN 16 FT

– TUNNEL SHAFT LIMITS

– PPCA LIMITS



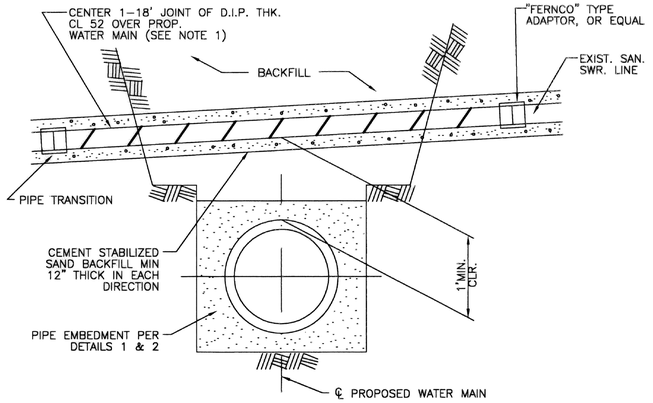
EMBEDMENT AND CORROSION PROTECTION FOR SANITARY SEWER DUCTILE IRON PIPE

4

NO SCALE

DETAIL 4 – NOTES:

1. FOLLOWING EXCAVATION OF TRENCH, PLACE A 6" LAYER OF CEMENT STAB. SAND AT BOTTOM OF TRENCH. LAY POLYETHYLENE WRAP IN TRENCH, AND LAY PIPE ON TOP OF WRAP. FOLD WRAP AROUND PIPE WITH A 6" OVERLAP (MIN.) AND TIE AROUND PIPE WITH HEAVY BINDER TWINE, OR EQUAL, ON 6" CENTERS. PROVIDE A 12" OVERLAP (MIN.) AND TIE WITH HEAVY BINDER TWINE END LAPS. PLACE ADDITIONAL CEMENT SAND UP TO 12" ABOVE.
2. ALL DUCTILE IRON PIPE SHALL HAVE A POLYETHYLENE "WRAP" OF 4 MIL. THICKNESS (MINIMUM) EXCEPT AS NOTED BELOW.
3. WHERE PIPE IS PLACED IN AN AUGER OR TUNNEL OR IN A CASING, PIPE IS TO HAVE A DOUBLE WRAP OF 4 MIL POLYETHYLENE AND SHALL BE BONDED ON 12" CENTERS WITH ½" STAINLESS STEEL BANDS. END LAPS TO BE AS SPECIFIED FOR TRENCH SECTIONS.
4. REFER TO SPECIFICATION SECTION 02528 – POLYETHYLENE ENCASEMENT/WRAP.

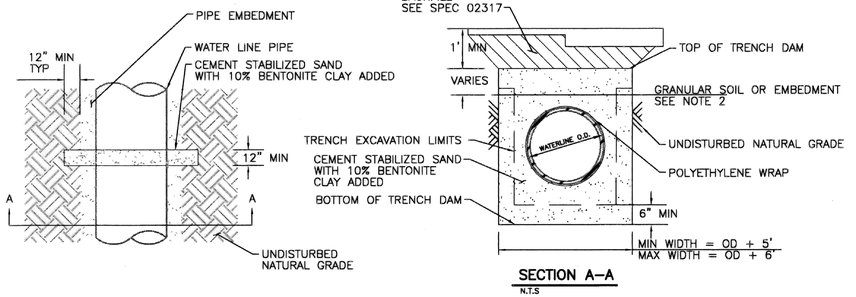


3 D.I.P. OVER PROPOSED WATER LINE

NO SCALE

DETAIL 3 – NOTES:

1. IF PERMITTED BY PROGRAM MANAGER, P.V.C. PIPE DR18 MAY BE USED.
2. DETAIL ALSO APPLIES IN CASES WHERE EXISTING SAN. SWR. IS LOCATED BELOW PROPOSED WATER MAIN.



5 TRENCH DAM DETAIL

NO SCALE

DETAIL 5 – NOTES:

1. REFER TO SPEC 02317 FOR INSTALLATION REQUIREMENTS.
2. EXTEND TRENCH DAM 5 FEET MIN ABOVE TOP OF SURROUNDING GRANULAR SOIL LAYERS OR TOP OF GRANULAR EMBEDMENT MATERIAL, WHICHEVER IS HIGHEST.

SECTION A–A

N.T.S

NO.	DATE	REVISION	APP.

ARCADIS

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HOUSTON, TX 77056
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TBPE REGISTRATION NO. F–533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P–6329

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

STANDARD LDWL EXCAVATION AND BACKFILL DETAIL
(NOT TO SCALE)

APPROVED BY:	APPROVED BY:
ACTING CITY ENGINEER	DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: MAR-20-2018	DWG NO: 02317-09

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

STANDARD LDWL EXCAVATION AND BACKFILL DETAIL

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 106 OF 169	

GALVANIC ANODE BED SCHEDULE

PIPE DIA. (IN.)	PIPE MATERIAL	BASELINE	STATION NO.	ANODES		SPACING (FT)	DETAIL REFERENCE
				NO.	TYPE		
36	AWWA C105 POLYETHYLENE ENCASED DUCTILE IRON PIPE	SWPS	170+67	2	60-LB ZINC	10	1/CP4, 15/CP10, 1/CP11, 2/CP11, 3/CP11
60	AWWA C200 STEEL WITH DIELECTRIC COATING	SWPS	171+43	6	60-LB ZINC	10	1/CP4, 15/CP10, 1/CP11, 2/CP11, 3/CP11

IMPRESSED CURRENT ANODE & RECTIFIER SCHEDULE

PIPE DIA. (IN.)	PIPE MATERIAL	RECTIFIER NO.	BASELINE	STATION NO.	SIZE		ANODES		ANODE WELL DIA. (IN.)	ANODE WELL DEPTH (FT.)	STRUCTURE	DETAIL REFERENCE
					AMPS	VOLTS	NO.	TYPE				
72	AWWA C200 STEEL WITH DIELECTRIC COATING	1	METRO	72+97	10	15	6	HIGH-SILICON CAST IRON (2284)	10	137	KIRBY EXTENSION PROJECT 72" WATER LINE	1/CP2, 2/CP2, 3/CP2, 4/CP3, 1/CP3, 2/CP3, 3/CP3, 1/CP8

CATHODIC PROTECTION TEST STATION SCHEDULE

TEST STATION NO.	STATION NO.	BASELINE	PIPE DIAMETER (IN)	TEST STATION TYPE	STRUCTURES	DETAIL REFERENCE
1	170+24	SWPS	36	INSULATING JOINT TEST STATION	PROPSED 36" DIP AND ISOLATE FROM EXISTING 36" CAST IRON PIPE	4/CP3, 1/CP4, 2/CP4, 1/CP8, 9/CP10, 12/CP10, 15/CP10
2	170+82	SWPS	36	INSULATING JOINT TEST STATION	PROPSED 36" DIP AND ISOLATE FROM EXISTING 36" CAST IRON PIPE	4/CP3, 1/CP4, 2/CP4, 1/CP8, 9/CP10, 12/CP10, 15/CP10
3	170+52	SWPS	60	INSULATING JOINT TEST STATION	KIRBY EXTENSION WATER LINE AND ISOLATE FROM 60" YARD PIPING	4/CP3, 1/CP4, 2/CP4, 1/CP8, 9/CP10, 12/CP10, 15/CP10
4	171+32	SWPS	60	INSULATING JOINT TEST STATION	KIRBY EXTENSION WATER LINE AND ISOLATE FROM 60" YARD PIPING	4/CP3, 1/CP4, 2/CP4, 1/CP8, 9/CP10, 12/CP10, 15/CP10
5	171+10	SWPS	60	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING SOUTH END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
6	171+24	SWPS	60	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING NORTH END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
7	171+28	SWPS	60	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING NORTH END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
8	171+70	SWPS	60	MONOLITHIC INSULATING JOINT TEST STATION	KIRBY EXTENSION WATER LINE AND ISOLATE FROM 66" YARD PIPING	4/CP3, 1/CP4, 2/CP4, 4/CP4, 1/CP8, 15/CP10
9	4+43	SWPS-A	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING NORTH END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
10	3+18	SWPS-A	72	#1 - SSD MITIGATOR WIRE (NO TEST STATION)	MITIGATOR WIRE SOUTH END	--
11	2+55	SWPS-A	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING SOUTH END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
12	2+47	SWPS-A	72	#1 - SOLID STATE DECOUPLER	KIRBY EXTENSION WATER LINE	3/CP3, 2/CP8, 3/CP8, 4/CP8, 5/CP8, 1/CP9, 2/CP9, 3/CP9, 4CP9, 15/CP10
13	12+12	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING WEST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
14	16+54	METRO	72	#1 - SSD MITIGATOR WIRE (NO TEST STATION)	MITIGATOR WIRE NORTH END	--
15	17+54	METRO	72	#2 - SSD MITIGATOR WIRE (NO TEST STATION)	MITIGATOR WIRE SOUTH END	--
16	21+62	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING EAST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
17	22+05	METRO	72	ACCESSIBLE INSULATING JOINT (NO TEST STATION)	INSTALL 4" INSULATING FLANGE KIT TO ISOLATE FROM 4" AI/VR INLET/ VACUUM RELIEF VALVE	3/CP4, 9/CP10, 12/CP10
18	22+10	METRO	72	#2 - SOLID STATE DECOUPLER	KIRBY EXTENSION WATER LINE	3/CP3, 2/CP8, 3/CP8, 4/CP8, 5/CP8, 1/CP9, 2/CP9, 3/CP9, 4CP9, 15/CP10
19	27+30	METRO	72	#2 - SSD MITIGATOR WIRE (NO TEST STATION)	MITIGATOR WIRE NORTH END	--
20	29+00	METRO	72	MONITORING TEST STATION	KIRBY EXTENSION WATER LINE	4/CP3, 15/CP10, 1/CP7, 2/CP7, 1/CP8
21	37+00	METRO	72	FOREIGN PIPELINE/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING WEST END, AND CENTERPOINT ENERGY 4" IP STEEL GAS LINE CROSSING AT STA 37+25	5/CP3, 1/CP6, 2/CP6, 3/CP6, 1/CP8, 15/CP10
22	38+36	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING EAST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
23	38+75	METRO	72	ACCESSIBLE INSULATING JOINT (NO TEST STATION)	INSTALL 4" INSULATING FLANGE KIT TO ISOLATE FROM 4" AI/VR INLET/ VACUUM RELIEF VALVE	3/CP4, 9/CP10, 12/CP10
24	45+50	METRO	72	MONITORING TEST STATION	KIRBY EXTENSION WATER LINE	4/CP3, 15/CP10, 1/CP7, 2/CP7, 1/CP8
25	52+63	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING WEST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
26	54+08	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING EAST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
27	54+75	METRO	72	ACCESSIBLE INSULATING JOINT (NO TEST STATION)	INSTALL 4" INSULATING FLANGE KIT TO ISOLATE FROM 4" AI/VR INLET/ VACUUM RELIEF VALVE	3/CP4, 9/CP10, 12/CP10
28	60+08	METRO	72	ACCESSIBLE INSULATING JOINT (NO TEST STATION)	INSTALL 4" INSULATING FLANGE KIT TO ISOLATE FROM 4" AI/VR INLET/ VACUUM RELIEF VALVE	3/CP4, 9/CP10, 12/CP10
29	60+16	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING WEST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
30	64+80	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING EAST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
31	65+21	METRO	72	ACCESSIBLE INSULATING JOINT (NO TEST STATION)	INSTALL 4" INSULATING FLANGE KIT TO ISOLATE FROM 4" AI/VR INLET/ VACUUM RELIEF VALVE	3/CP4, 9/CP10, 12/CP10
32	66+45	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING WEST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
33	66+95	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING EAST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
34	67+37	METRO	72	ACCESSIBLE INSULATING JOINT (NO TEST STATION)	INSTALL 4" INSULATING FLANGE KIT TO ISOLATE FROM 4" AI/VR INLET/ VACUUM RELIEF VALVE	3/CP4, 9/CP10, 12/CP10
35	71+40	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING WEST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
36	72+37	METRO	72	FOREIGN PIPELINE/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING EAST END AND 8" WATER LINE CROSSING AT STA 72+30 (INSTALL ONLY CTS IF EXISTING WATER LINE IS NONMETALLIC)	5/CP3, 1/CP6, 2/CP6, 3/CP6, 1/CP8, 15/CP10
37	72+79	METRO	72	ACCESSIBLE INSULATING JOINT (NO TEST STATION)	INSTALL 4" INSULATING FLANGE KIT TO ISOLATE FROM 4" AI/VR INLET/ VACUUM RELIEF VALVE	3/CP4, 9/CP10, 12/CP10
38	79+63	METRO	72	ACCESSIBLE INSULATING JOINT (NO TEST STATION)	INSTALL 4" INSULATING FLANGE KIT TO ISOLATE FROM 4" AI/VR INLET/ VACUUM RELIEF VALVE	3/CP4, 9/CP10, 12/CP10
39	79+71	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING WEST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
40	84+35	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING EAST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
41	84+70	METRO	72	ACCESSIBLE INSULATING JOINT (NO TEST STATION)	INSTALL 4" INSULATING FLANGE KIT TO ISOLATE FROM 4" AI/VR INLET/ VACUUM RELIEF VALVE	3/CP4, 9/CP10, 12/CP10
42	91+22	METRO	72	#3 - SSD MITIGATOR WIRE (NO TEST STATION)	MITIGATOR WIRE WEST END	--
43	93+26	METRO	72	#3 - SOLID STATE DECOUPLER	KIRBY EXTENSION WATER LINE	3/CP3, 2/CP8, 3/CP8, 4/CP8, 5/CP8, 1/CP9, 2/CP9, 3/CP9, 4CP9, 15/CP10
44	93+38	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING WEST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
45	101+86	METRO	72	#3 - SSD MITIGATOR WIRE (NO TEST STATION)	MITIGATOR WIRE EAST END	--
46	103+00	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING EAST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
47	103+35	METRO	72	ACCESSIBLE INSULATING JOINT (NO TEST STATION)	INSTALL 4" INSULATING FLANGE KIT TO ISOLATE FROM 4" AI/VR INLET/ VACUUM RELIEF VALVE	3/CP4, 9/CP10, 12/CP10
48	105+40	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING WEST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
49	105+81	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING EAST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
50	109+10	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING WEST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
51	111+25	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING EAST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
52	112+00	METRO	72	ACCESSIBLE INSULATING JOINT (NO TEST STATION)	INSTALL 4" INSULATING FLANGE KIT TO ISOLATE FROM 4" AI/VR INLET/ VACUUM RELIEF VALVE	3/CP4, 9/CP10, 12/CP10
53	114+18	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING WEST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10

NOTES:

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3. VERIFY PIPE MATERIAL FOR ALL FOREIGN PIPELINES. FOREIGN PIPELINE TEST STATIONS ARE NOT REQUIRED FOR PROJECT PIPELINE CROSSINGS WITH NON-METALLIC PIPELINES.

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Fax
V&A Project No.: 24-0284

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CHRISTOPHER L. SHELDON
Engineer
112184
Registration Number
11/21/2025
Date

V&A CONSULTING ENGINEERS, INC.
Texas Registered Engineering Firm
F-9154

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6539

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

WATER LINE

CATHODIC PROTECTION SCHEDULES

(SHEET 1 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: HORIZ:	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 107 OF 169	

CATHODIC PROTECTION TEST STATION SCHEDULE						
TEST STATION NO.	STATION NO.	BASELINE	PIPE DIAMETER (IN)	TEST STATION TYPE	STRUCTURES	DETAIL REFERENCE
54	114+58	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING EAST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
55	117+29	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING WEST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
56	117+92	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING EAST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
57	118+13	METRO	72	ACCESSIBLE INSULATING JOINT (NO TEST STATION)	INSTALL 4" INSULATING FLANGE KIT TO ISOLATE FROM 4" AI/VR INLET/ VACUUM RELIEF VALVE	3/CP4, 9/CP10, 12/CP10
58	119+17	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING WEST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
59	119+60	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING EAST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
60	122+45	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING WEST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
61	123+40	METRO	72	#4 - SSD MITIGATOR WIRE (NO TEST STATION)	MITIGATOR WIRE WEST END	--
62	128+76	METRO	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING EAST END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
63	128+83	METRO	72	#4 - SOLID STATE DECOUPLER	KIRBY EXTENSION WATER LINE	3/CP3, 2/CP8, 3/CP8, 4/CP8, 5/CP8, 1/CP9, 2/CP9, 3/CP9, 4CP9, 15/CP10
64	141+16	GREENBRIAR	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING SOUTH END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
65	142+59	GREENBRIAR	72	#4 - SSD MITIGATOR WIRE (NO TEST STATION)	MITIGATOR WIRE NORTH END	--
66	149+55	GREENBRIAR	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING NORTH END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
67	156+40	GREENBRIAR	72	FOREIGN PIPELINE/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING SOUTH END AND CENTERPOINT ENERGY 2" IP STEEL GAS LINE CROSSING AT 156+67	5/CP3, 1/CP6, 2/CP6, 3/CP6, 1/CP8, 15/CP10
68	157+45	GREENBRIAR	72	COUPON MONITORING/CASING TEST STATION	KIRBY EXTENSION WATER LINE, CASING NORTH END AND COUPON	5/CP3, 3/CP7, 4/CP7, 1/CP8, 15/CP10
69	157+33	GREENBRIAR	72	MONOLITHIC INSULATING JOINT TEST STATION	KIRBY EXTENSION WATER LINE AND ISOLATE FROM 72" WATER LINE	4/CP3, 1/CP4, 2/CP4, 4/CP4, 1/CP8, 15/CP10

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F-9154
V&A Project No.: 24-0284

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Engineer
112184
Registration Number
11/21/2025
Date

V&A CONSULTING ENGINEERS, INC.
Texas Registered Engineering Firm
F-9154

SURVEYED BY:
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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

WATER LINE

CATHODIC PROTECTION SCHEDULES

(SHEET 2 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
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CITY OF HOUSTON PM	
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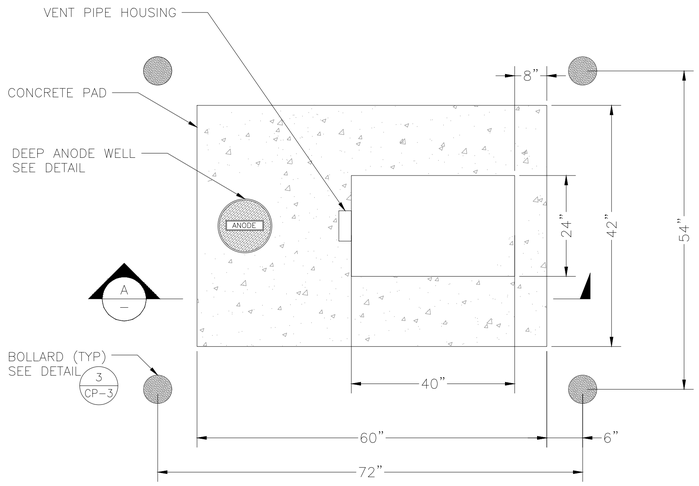
SHEET NO. 108 OF 169	

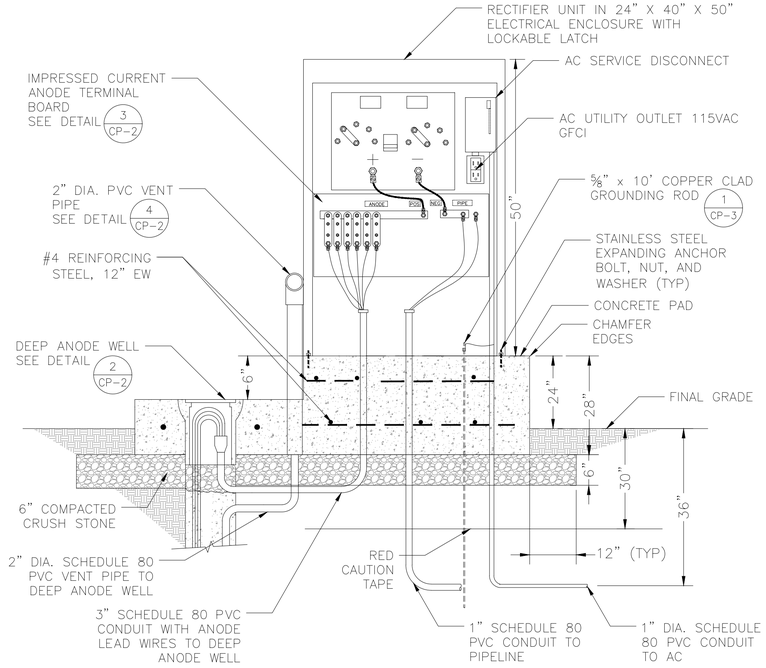


NOTE:

RECTIFIER DOOR SHALL FACE AWAY FROM THE STREET

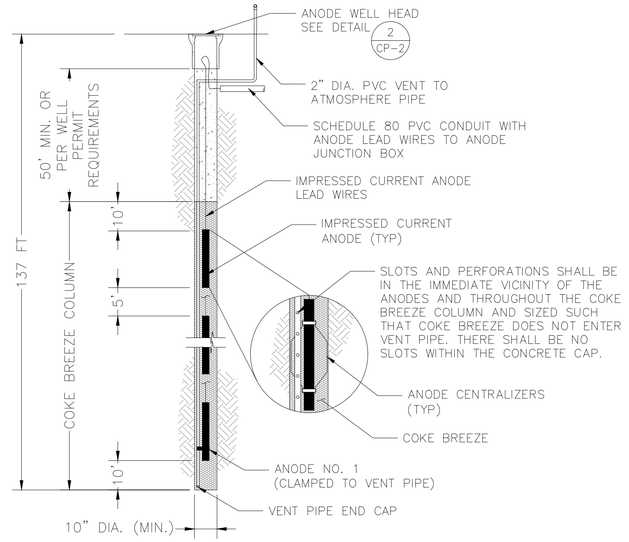
RECTIFIER AND DEEP ANODE WELL INSTALLATION PLAN VIEW — 1

SCALE: NTS



RECTIFIER INSTALLATION WITH ELECTRICAL ENCLOSURE SECTION — A

SCALE: NTS

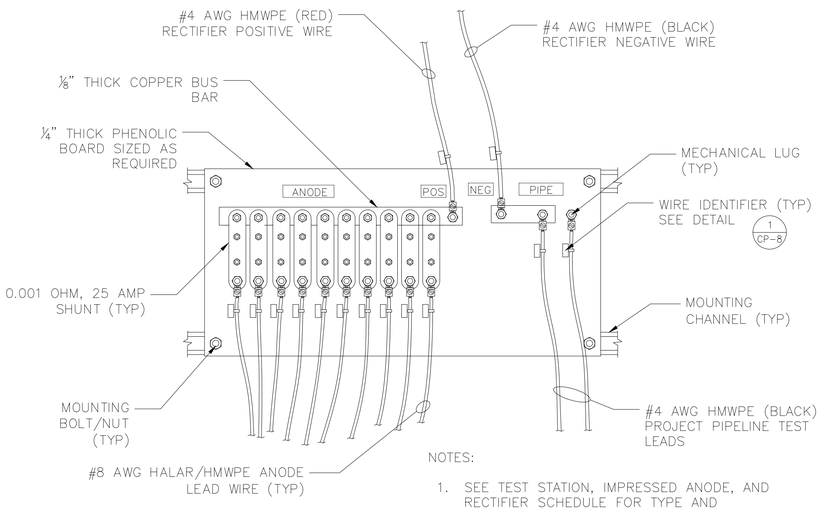


NOTES:

1. CONCRETE CAP SHALL HAVE A MINIMUM DEPTH OF 50'.
2. STEEL CASING OPTIONAL.

DEEP ANODE WELL DETAIL — 2

SCALE: NTS

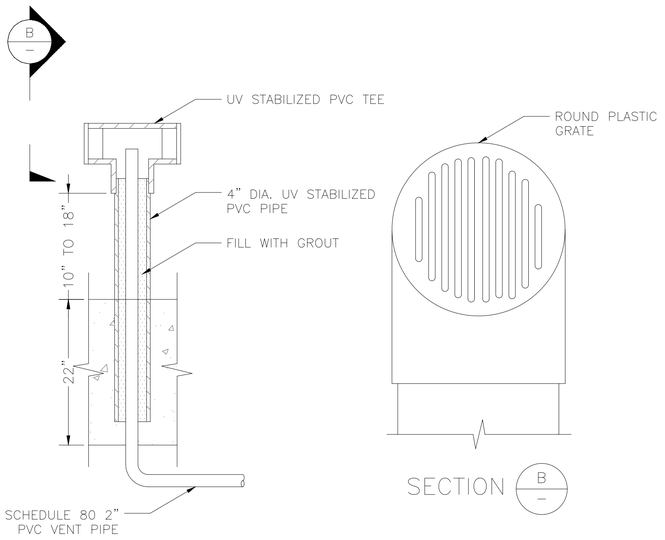


NOTES:

1. SEE TEST STATION, IMPRESSED ANODE, AND RECTIFIER SCHEDULE FOR TYPE AND QUANTITY.
2. RECTIFIER POSITIVE AND NEGATIVE WIRE TO BE TAGGED AS WELL AS COLOR CODED.

IMPRESSED CURRENT ANODE TERMINAL BOARD DETAIL — 3

SCALE: NTS



VENT PIPE HOUSING — 4

SCALE: NTS

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V&A Project No.: 24-0284

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CHRISTOPHER L. SHELDON
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112184
Registration Number
11/21/2025
Date

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FB NO. P-6539

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CITY OF HOUSTON

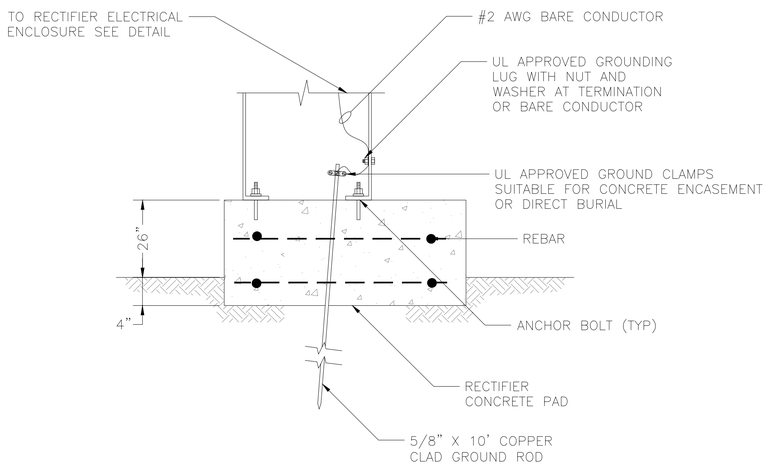
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

WATER LINE
CATHODIC PROTECTION DETAILS

(SHEET 1 OF 10)

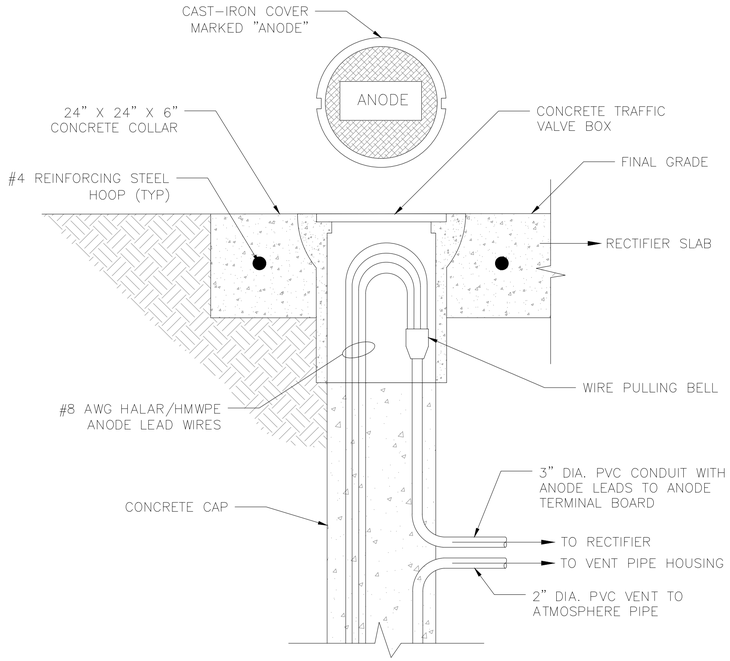
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: HORIZ:	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 109 OF 169	



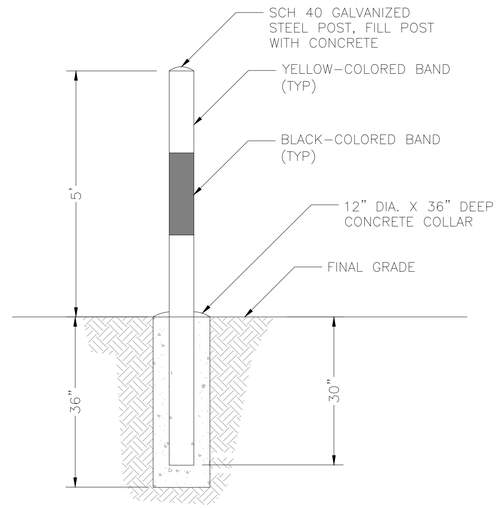
NOTE:

THE GROUND ROD SHALL BE INSTALLED OBLIQUELY THROUGH THE FOUNDATION IN UNDISTURBED SOIL AT AN ANGLE NOT TO EXCEED 45° FROM VERTICAL.

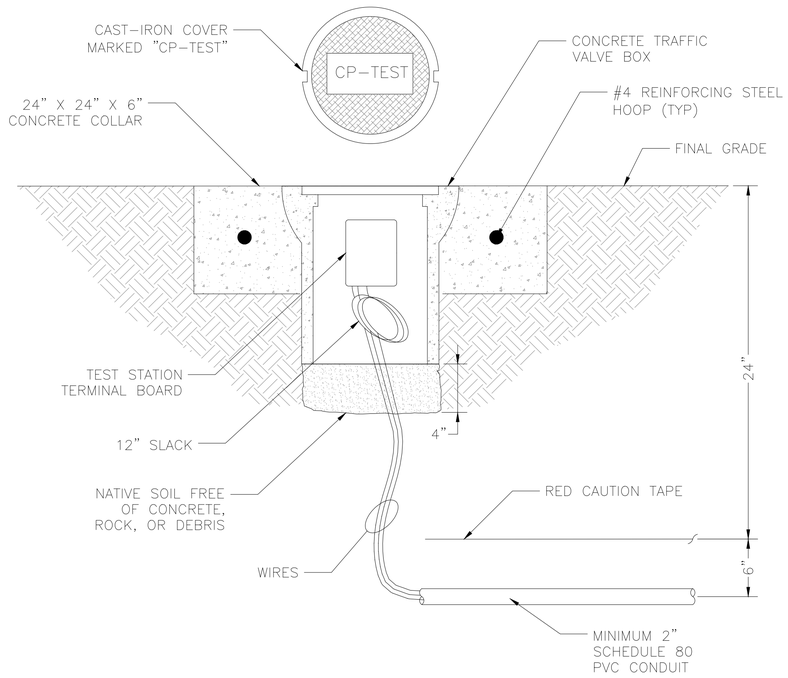
GROUNDING ROD 1
SCALE: NTS



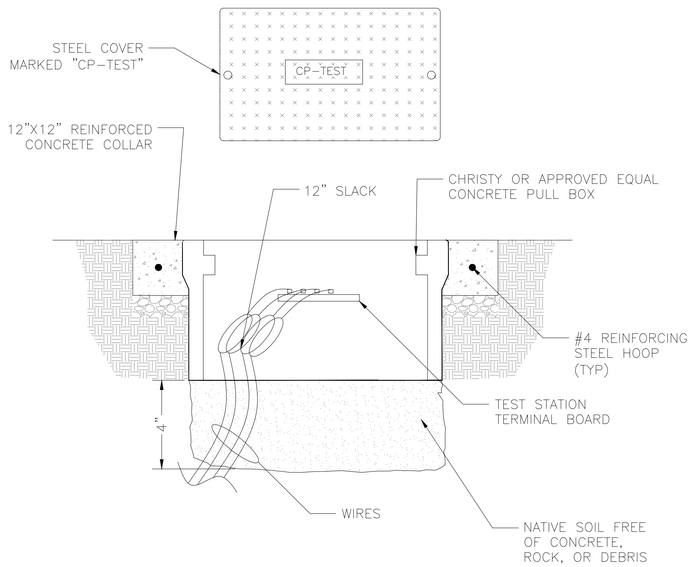
ANODE WELL HEAD DETAIL 2
SCALE: NTS



BOLLARD DETAIL 3
SCALE: NTS



FLUSH-MOUNTED TEST STATION DETAIL 4
SCALE: NTS



FLUSH-MOUNTED PULL BOX TEST STATION DETAIL 5
SCALE: NTS

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

WATER LINE CATHODIC PROTECTION DETAILS

(SHEET 2 OF 10)

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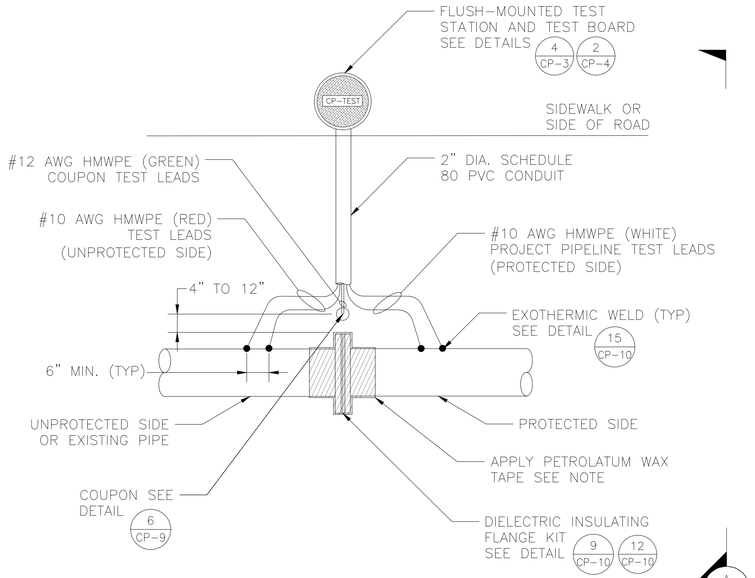
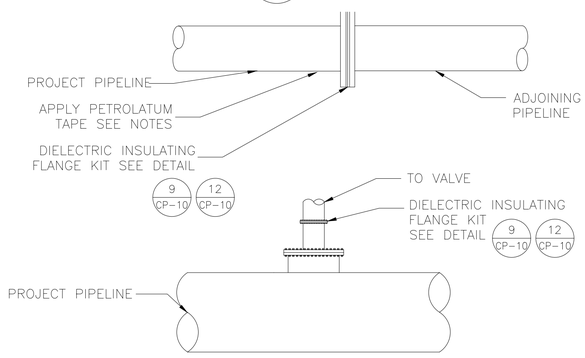


NOTE:

COAT THE EXTERIOR OF THE INSULATING FLANGE WITH PETROLATUM WAX TAPE FOR A MINIMUM OF 6 FEET BEYOND THE GASKET WITH A MINIMUM OF 6 INCHES OF OVERLAP WITH THE FACTORY-APPLIED COATING ON THE PIPELINE.

INSULATING JOINT TEST STATION (IJTS) PLAN VIEW — 1

SCALE: NTS

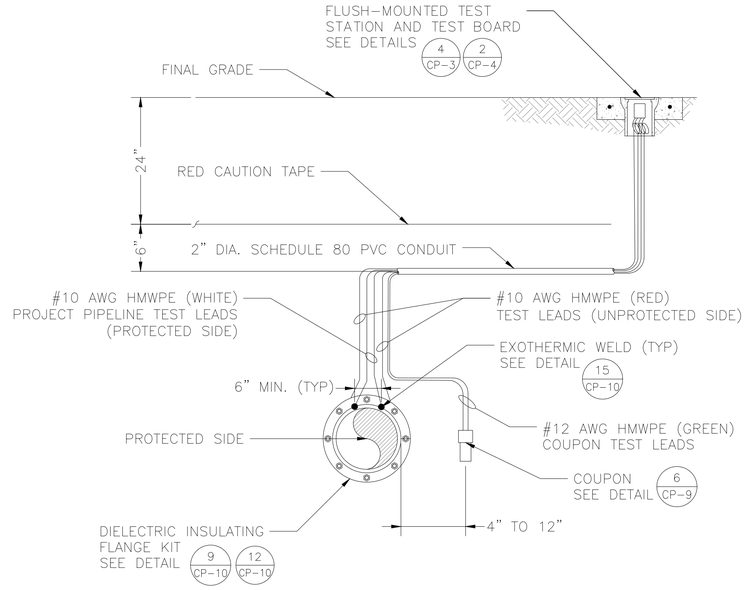


NOTE:

1. TWO GENERAL INSULATING LOCATIONS ARE SHOWN ABOVE:
   1.1 IN-LINE ISOLATION (TOP)
   1.2 STUB-OUT ISOLATION (BOTTOM)
2. AVOID ANY CONTACT BETWEEN THE PROJECT PIPELINE AND THE REINFORCING STEEL THROUGH SLAB WHEN APPLICABLE (NOT SHOWN).
3. DO NOT BOND ACROSS INSULATING FLANGE.
4. PETROLATUM WAX TAPE NOT SHOWN FOR CLARITY. COAT THE EXTERIOR OF THE JOINT WITH PETROLATUM WAX TAPE FOR A MINIMUM OF 3 FEET BEYOND THE JOINT WITH A MINIMUM OF 6 INCHES OF OVERLAP WITH THE FACTORY-APPLIED COATING ON THE PIPELINE.

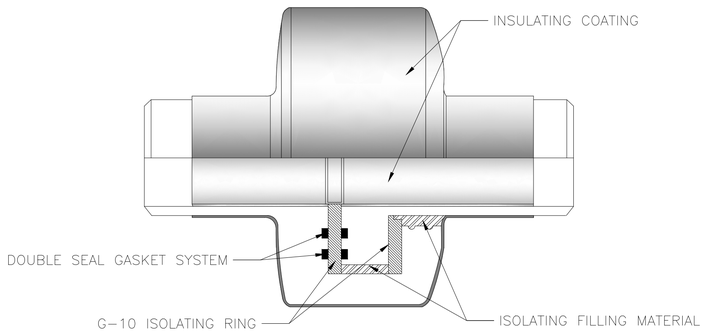
ACCESSIBLE INSULATING JOINT (NO TEST STATION) — 3

SCALE: NTS



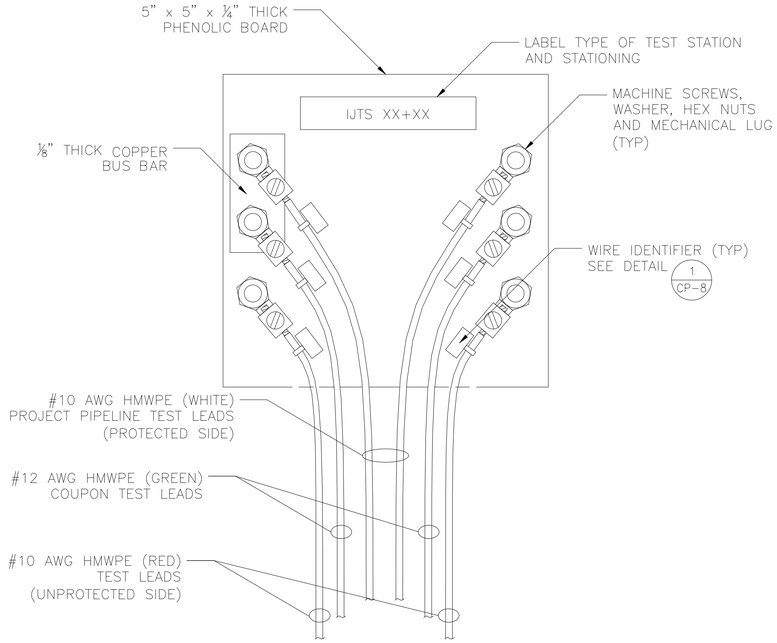
INSULATING JOINT TEST STATION (IJTS) SECTION VIEW — A

SCALE: NTS



MONOLITHIC INSULATING JOINT DETAIL — 4

SCALE: NTS



INSULATING JOINT TEST STATION (IJTS) TERMINAL BOARD DETAIL — 2

SCALE: NTS

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

WATER LINE CATHODIC PROTECTION DETAILS

(SHEET 3 OF 10)

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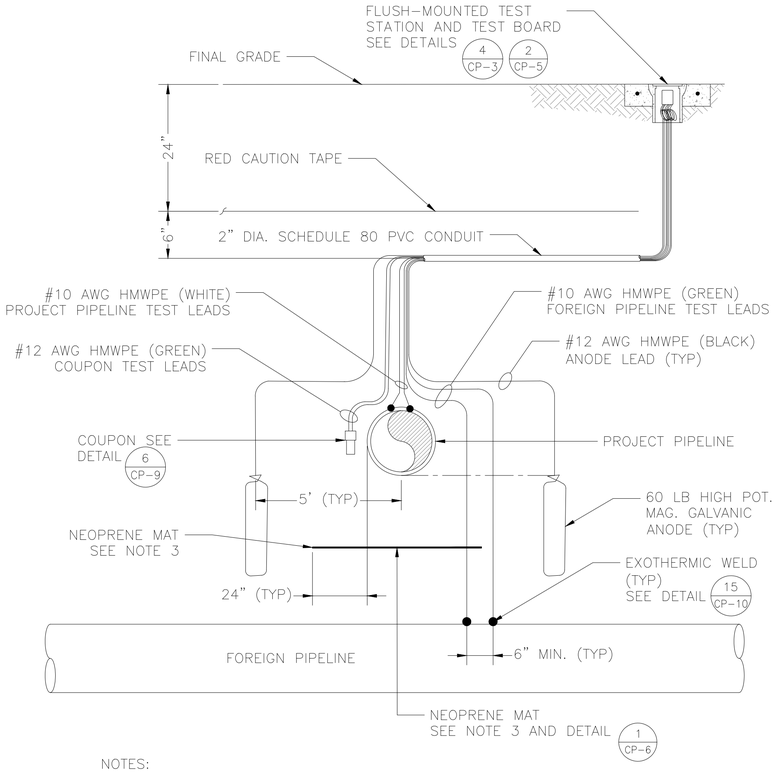
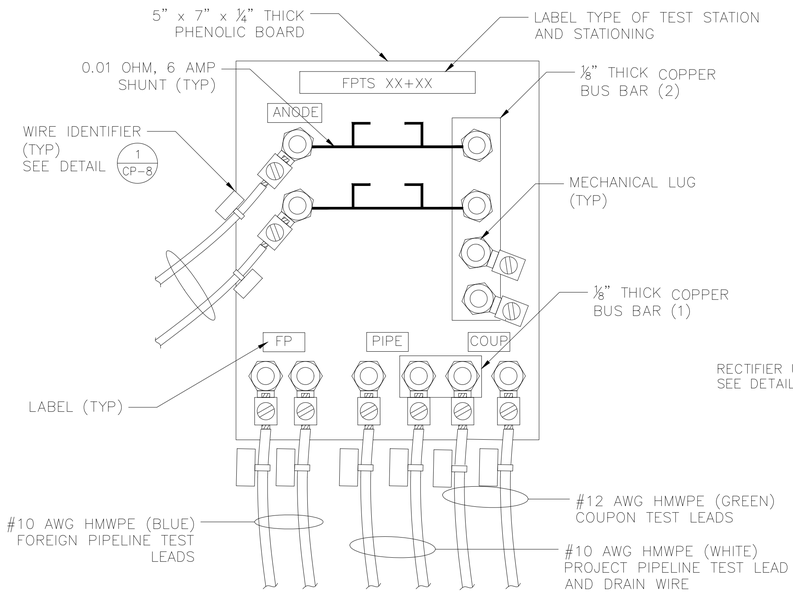
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 111 OF 169	



NOTES:

1. CONNECTIONS TO FOREIGN PIPELINES SHALL BE MADE BY THE OWNER'S REPRESENTATIVE. IF FOREIGN PIPELINE OWNER DOES NOT AGREE TO THE ATTACHMENT OF FOREIGN PIPELINE TEST LEADS, INSTALL ALL OTHER COMPONENTS OF THE FOREIGN PIPELINE TEST STATION WITHOUT CONNECTIONS TO FOREIGN PIPE.
2. INSTALL COPPER-COPPER SULFATE REFERENCE CELL MIDWAY BETWEEN PROJECT PIPELINE AND NEOPRENE MAT.
3. TOP OF ANODE SHALL BE ALIGNED WITH THE BOTTOM OF THE PROJECT PIPELINE WITH 5' BETWEEN THE ANODE AND PIPE.
4. NEOPRENE MAT SHALL EXTEND 24" (MIN.) BEYOND PROJECT PIPE EDGE ON EACH SIDE. INSTALL NEOPRENE MAT MIDWAY BETWEEN CASING AND FOREIGN PIPELINE.
5. COUPON SHALL BE INSTALLED 4" TO 12" FROM PROJECT PIPELINE.

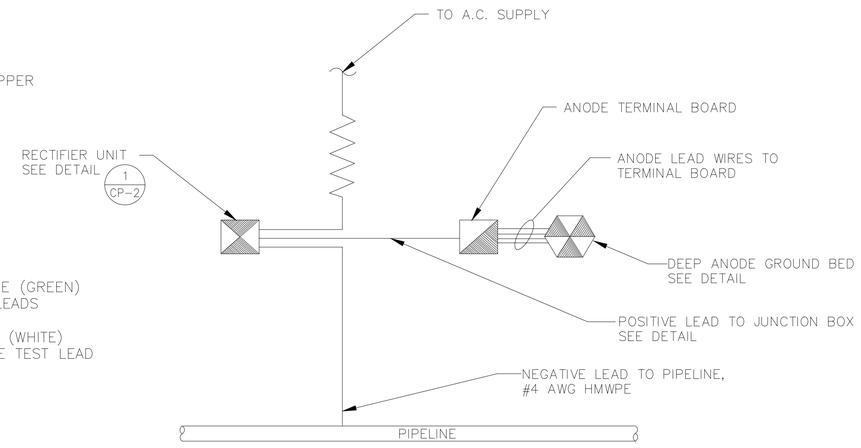
FOREIGN PIPELINE TEST STATION (FPTS) — 1 / —
SCALE: NTS



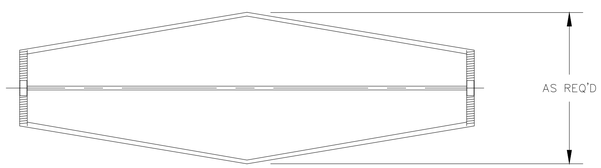
NOTE:

IF STRAY CURRENT IS A CONCERN, TERMINATE THE PIPELINE TEST LEAD AND COUPON TEST LEAD THAT ARE CONNECT TO COPPER BUS BAR (1) TO COPPER BUS BAR (2).

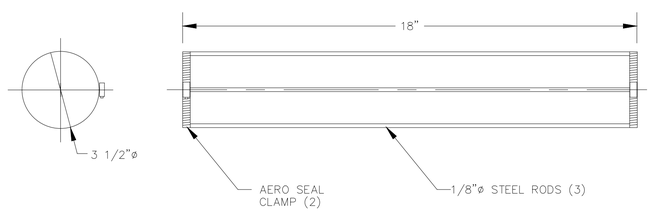
FOREIGN PIPELINE TEST STATION (FPTS) TERMINAL BOARD DETAIL — 2 / —
SCALE: NTS



COH ELECTRICAL SCHEMATIC DIAGRAM FOR IMPRESSED CURRENT CATHODIC PROTECTION SYSTEM — 3 / —
SCALE: NTS



CENTRALIZERS ARE SHIPPED STRAIGHT AS SHOWN BELOW. 1/8" RODS ARE BENT AS SHOWN ABOVE TO FIT THE HOLE FOR PROPER CENTERING OF ANODE.



COH ANODE CENTRALIZER — 4 / —
SCALE: NTS

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

WATER LINE
CATHODIC PROTECTION DETAILS

(SHEET 4 OF 10)

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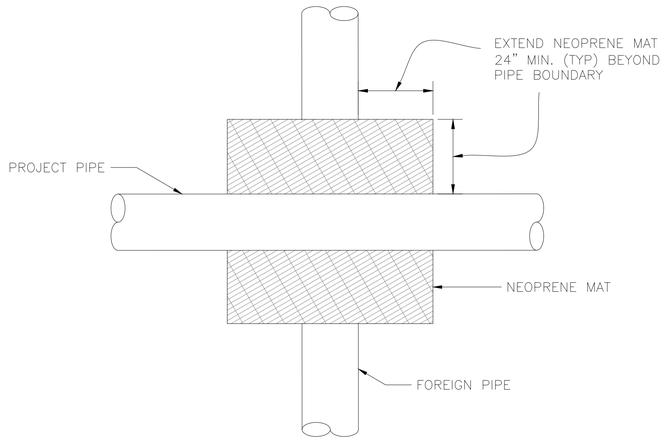
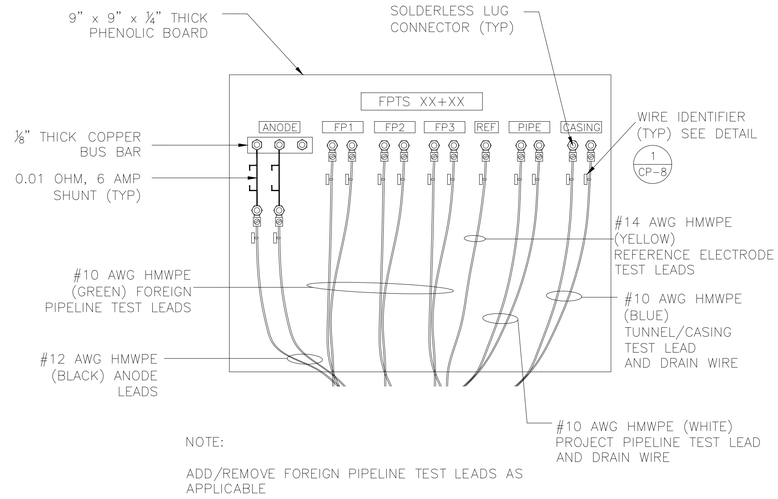


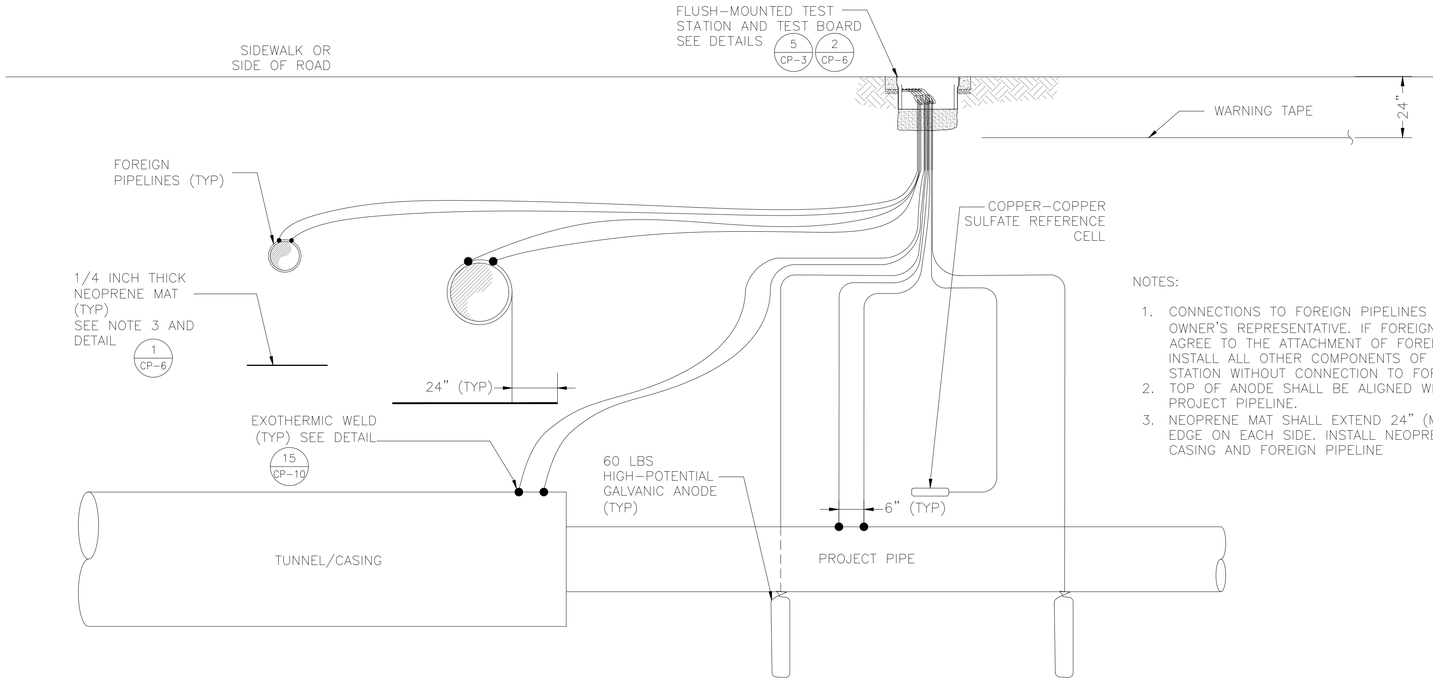
NEOPRENE MAT INSTALLATION DETAIL
PLAN VIEW — 1 / —
SCALE: NTS



NOTE:

ADD/REMOVE FOREIGN PIPELINE TEST LEADS AS APPLICABLE

FOREIGN PIPELINE AND CASING TEST STATION
TERMINAL BOARD DETAIL — 2 / —
SCALE: NTS



NOTES:

1. CONNECTIONS TO FOREIGN PIPELINES SHALL BE MADE BY THE OWNER'S REPRESENTATIVE. IF FOREIGN PIPELINE OWNER DOES NOT AGREE TO THE ATTACHMENT OF FOREIGN PIPELINE TEST LEADS, INSTALL ALL OTHER COMPONENTS OF THE FOREIGN PIPELINE TEST STATION WITHOUT CONNECTION TO FOREIGN PIPE.
2. TOP OF ANODE SHALL BE ALIGNED WITH THE BOTTOM OF THE PROJECT PIPELINE.
3. NEOPRENE MAT SHALL EXTEND 24" (MIN.) BEYOND PROJECT PIPE EDGE ON EACH SIDE. INSTALL NEOPRENE MAT MIDWAY BETWEEN CASING AND FOREIGN PIPELINE

FOREIGN PIPELINE AND CASING
TEST STATION DETAIL — 3 / —
SCALE: NTS

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(SHEET 5 OF 10)

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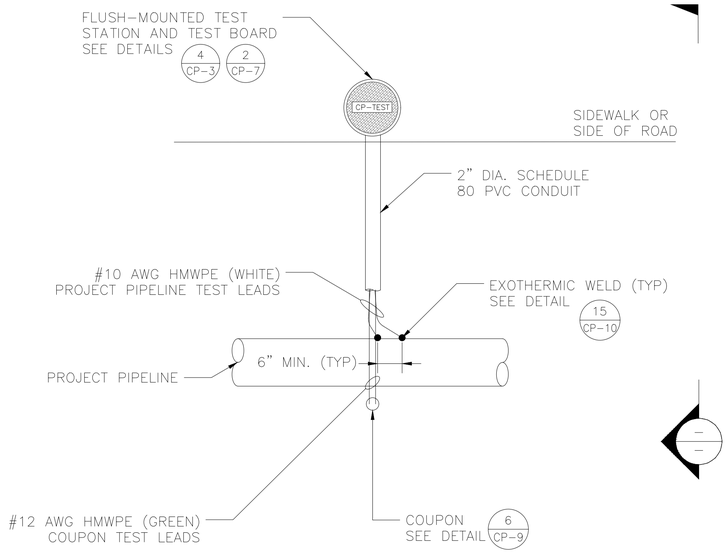
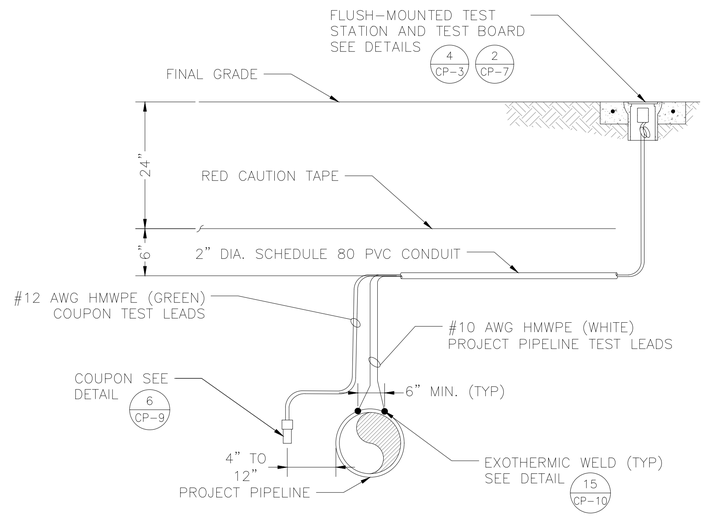


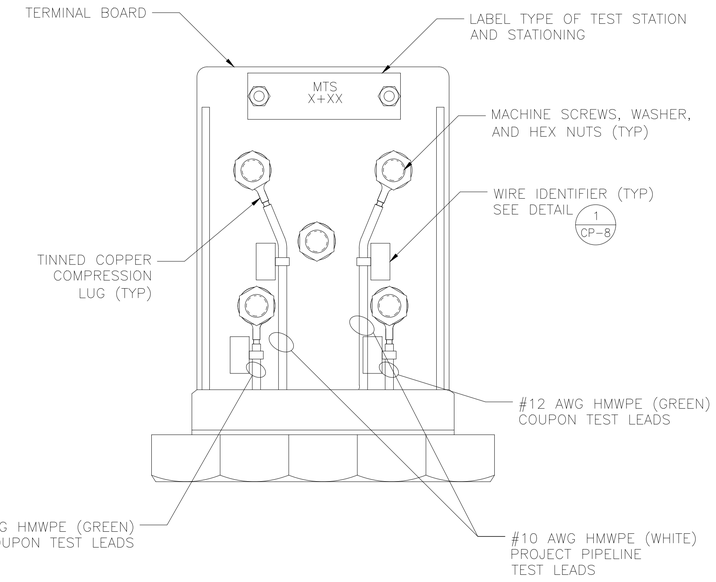
MONITORING TEST STATION (MTS)
PLAN VIEW
SCALE: NTS

1



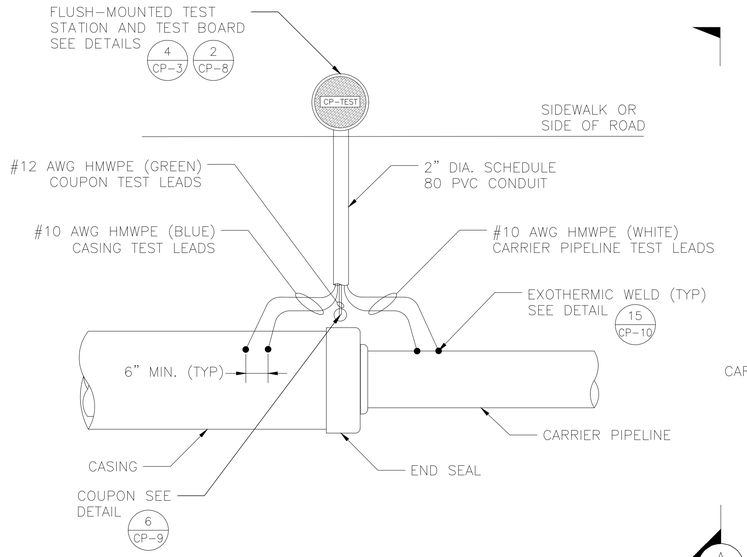
MONITORING TEST STATION (MTS)
SECTION VIEW
SCALE: NTS

A



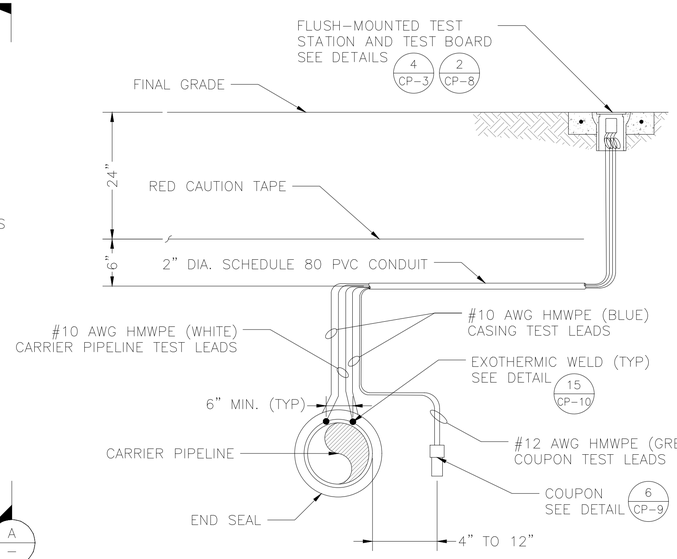
MONITORING TEST STATION (MTS)
TERMINAL BOARD DETAIL
SCALE: NTS

2



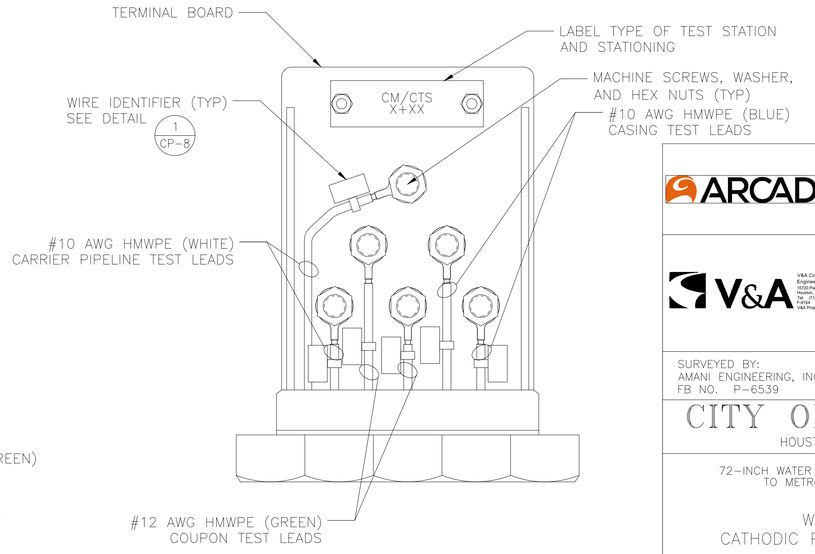
COUPON MONITORING AND CASING
TEST STATION (CM/CTS) PLAN VIEW
SCALE: NTS

3



COUPON MONITORING AND CASING
TEST STATION (CM/CTS) SECTION VIEW
SCALE: NTS

A



COUPON MONITORING AND CASING
TEST STATION TERMINAL BOARD DETAIL
SCALE: NTS

4

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(SHEET 6 OF 10)

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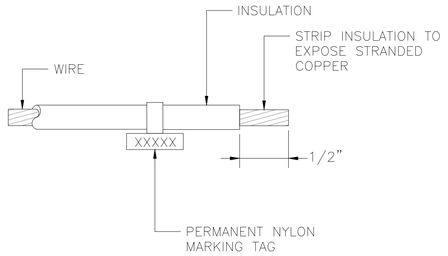
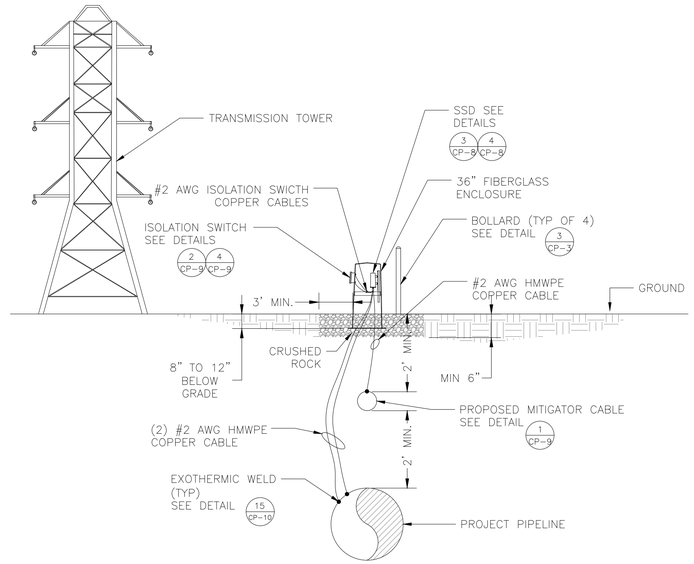


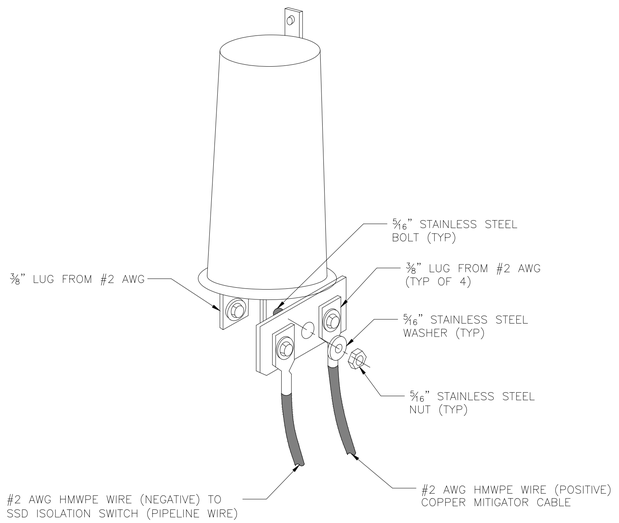
WIRE IDENTIFIER SCHEDULE	
STRUCTURE	LABEL
72" WATER	72" W
60" WATER	60" W
36" WATER	36" w
X" GAS LINE	X" G
REFERENCE ELECTRODE	RE
CASING	CAS
COUPON	COU

WIRE IDENTIFIER DETAIL (1)
SCALE: NTS

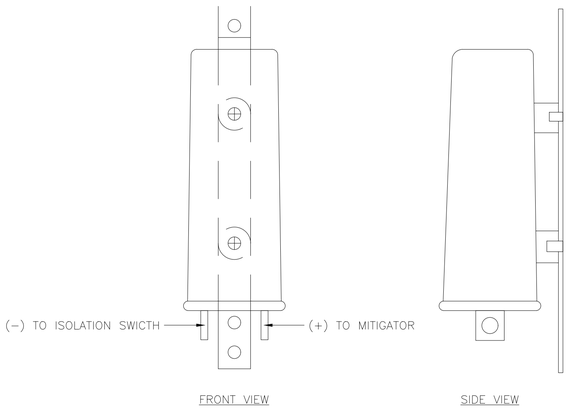


NOTES: SPACE SSD ENCLOSURE WITHIN THE BOUNDARIES OF THE PERMANENT PROJECT EASEMENT.

AC MITIGATION ELEVATION DETAIL (2)
SCALE: NTS



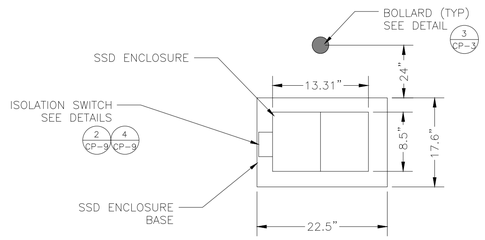
SOLID STATE DECOUPLER (SSD) CONNECTION DETAIL (3)
SCALE: NTS



NOTES:

1. SSD IS TO BE MOUNTED INSIDE THE FIBERGLASS ENCLOSURE. ALL COPPER CABLES ARE TO PASS THROUGH BOTTOM OF ENCLOSURE.

SOLID STATE DECOUPLER (SSD) DETAIL (4)
SCALE: NTS



NOTE:

2. INSTALL ENCLOSURE AS CLOSE AS POSSIBLE TO PIPING CONNECTIONS TO REDUCE LEAD LENGTHS.
3. INSTALL BOLLARD BETWEEN THE SSD ENCLOSURE AND THE ACCESS ROAD.

SOLID STATE DECOUPLER ENCLOSURE PLAN VIEW (5)
SCALE: NTS

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Engineer
112184
Registration Number
11/21/2025
Date

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Texas Registered Engineering Firm F-9154

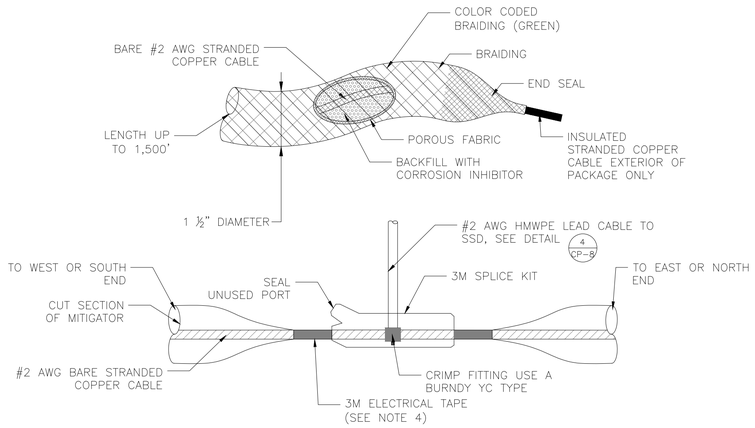
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

WATER LINE CATHODIC PROTECTION DETAILS

(SHEET 7 OF 10)

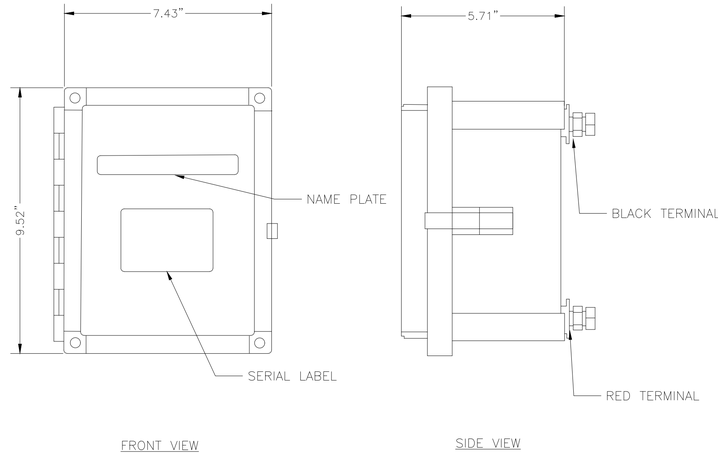
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
VERT: HORIZ:	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 115A OF 169	



NOTES:

1. CUT BACK INSULATION FROM END OF LEAD CABLE APPROXIMATELY 1". BE SURE CABLE END AND CONNECTIONS ARE CLEAN OF DIRT AND FOREIGN MATTER, AND THAT ALL CONNECTIONS ARE BARE METAL.
2. INSTALL CRIMP FITTING. PUT CABLES IN CRIMP FITTING AND CRIMP THE FITTING.
3. INSTALL SPLICE KITS AS PER SPECS PROVIDED WITH SPLICE KITS.
4. WITH 3M ELECTRICAL TAPE (#33 OR EQUAL) OR HEAT SHRINK SLEEVE, COVER ANY EXPOSED COPPER CABLE BETWEEN MITIGATOR AND SPLICE CONNECTION. WHERE THE MITIGATOR MAY BE SUBJECT TO A RELATIVELY WET ENVIRONMENT ONLY HEAT SHRINK IS RECOMMENDED.
5. DO NOT SPLICE TOGETHER MITIGATOR ENDS WITH DIFFERENT NUMBERS. SEE SCHEDULE.

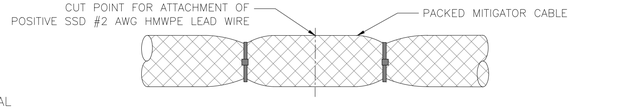
MITIGATOR SPLICE DETAIL — 1
SCALE: NTS



FRONT VIEW

SIDE VIEW

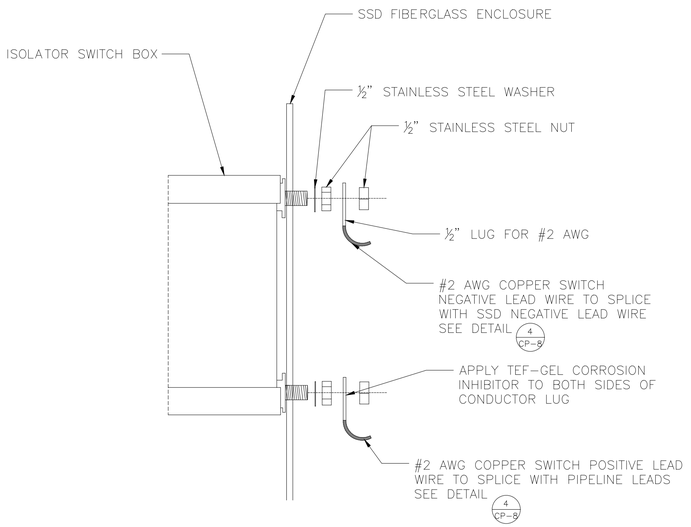
SSD ISOLATION SWITCH DETAIL — 2
SCALE: NTS



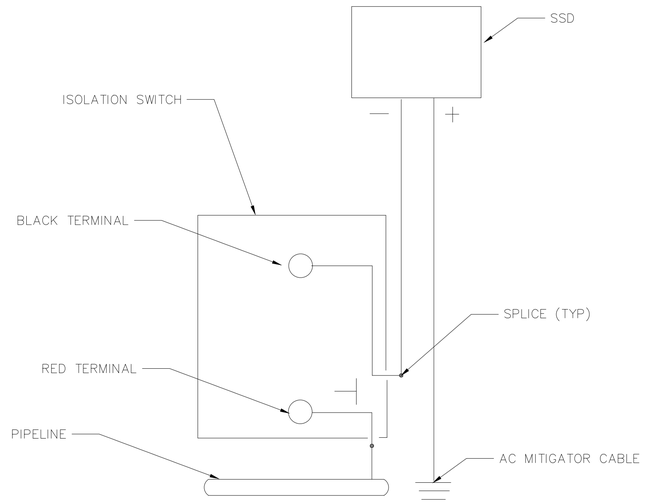
NOTES:

1. PLACE AND TIGHTEN TIE-WRAPS ON EITHER SIDE OF AREA TO BE CUT.
2. CUT CLOTH TO EXPOSE COPPER CABLE.
3. CUT CABLE ONLY IF END OF SEGMENT NEEDED.
4. SECURE TIE WRAPS TO RETAIN BACKFILL INSIDE PACKAGED MITIGATOR.
5. SPLICE WIRE END OF CABLE, IF NEEDED.

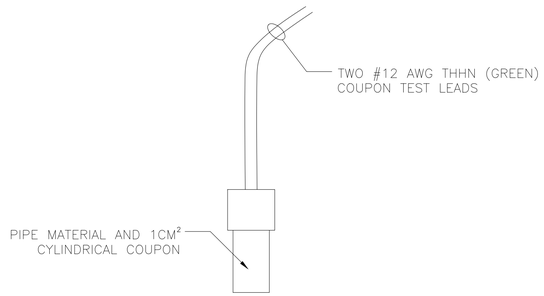
MITIGATION CUT DETAIL — 3
SCALE: NTS



CABLE TO ISOLATION SWITCH TERMINAL DETAIL — 4
SCALE: NTS



CONNECTION SCHEMATIC DETAIL — 5
SCALE: NTS



COUPON DETAIL — 6
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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

WATER LINE CATHODIC PROTECTION DETAILS

(SHEET 8 OF 10)

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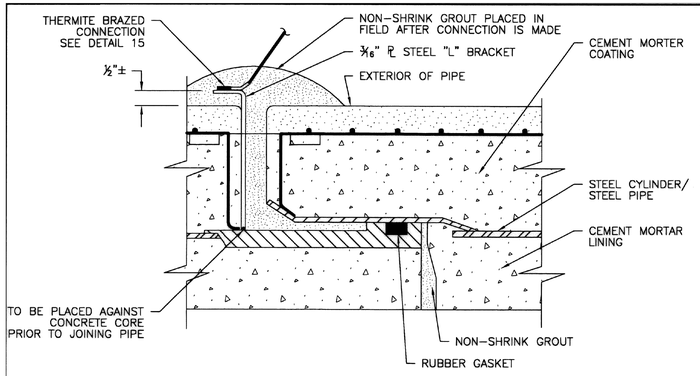
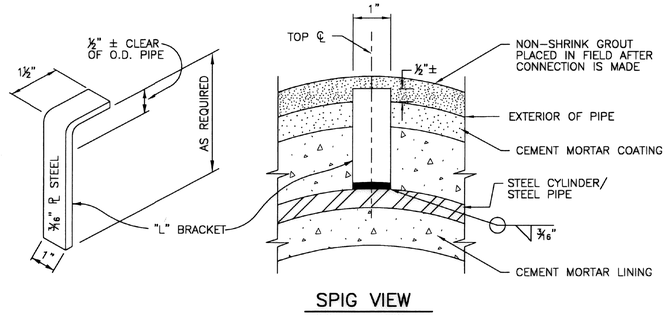
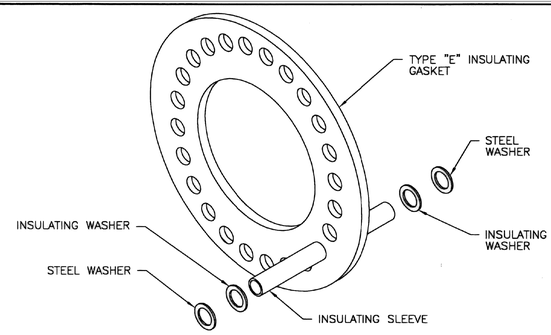


7 TEST LEAD CONNECTION DETAIL



SPIG VIEW

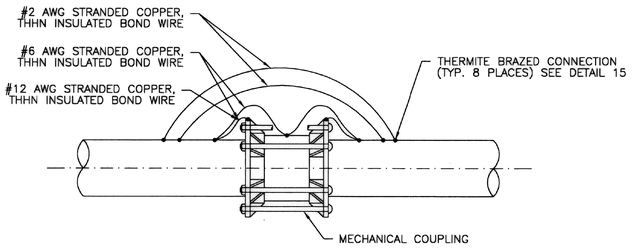
8 "L" BRACKET DETAIL



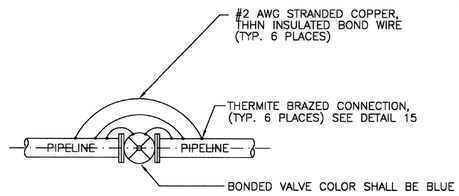
INSULATING SLEEVE AND ACCESSORIES

9 ISOLATION FLANGE ASSEMBLY

SEE AWWA M11 FOR FLANGE BOLT TIGHTENING SEQUENCE

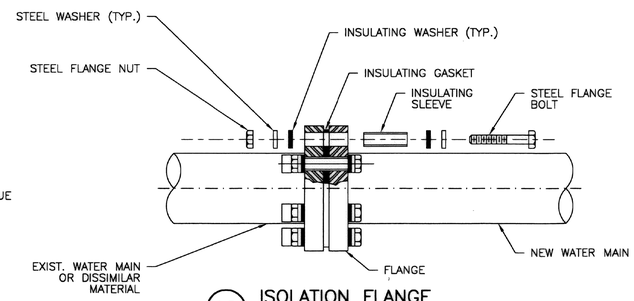


10 MECHANICAL COUPLING BOND DETAIL



11 VALVE BONDING ARRANGEMENT

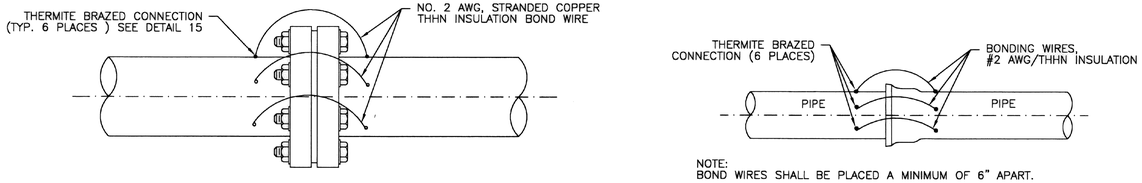
MAINLINE WITH CATHODIC PROTECTION



12 ISOLATION FLANGE

DETAIL 12 – NOTES:

1. DETAILS SHOW BONDING ARRANGEMENTS ONLY. SEE JOINT DETAIL FOR PIPE JOINT REQUIREMENTS.



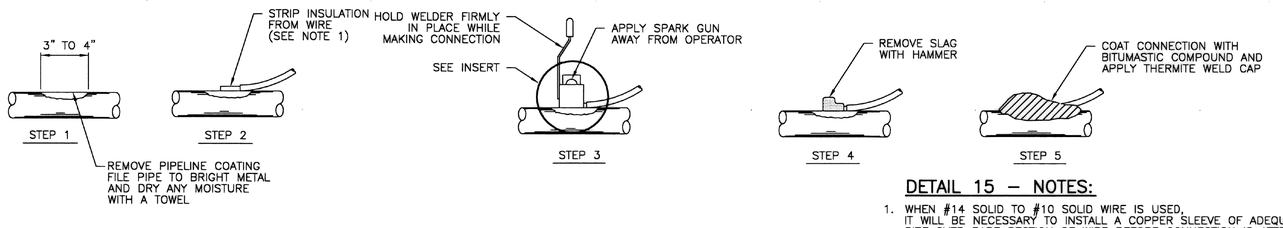
13 ELECTRICAL BONDING ACROSS FLANGE

NOTE: BOND WIRES SHALL BE PLACED A MINIMUM OF 6" APART.

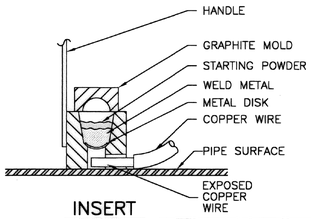
NOTE:
BOND WIRES SHALL BE PLACED A MINIMUM OF 6" APART.

14 BELL & SPIGOT BONDING ARRANGEMENT

DUCTILE IRON PIPE



15 THERMITE BRAZED CONNECTION DETAIL



INSERT

DETAIL 15 – NOTES:

1. WHEN #14 SOLID TO #10 SOLID WIRE IS USED, IT WILL BE NECESSARY TO INSTALL A COPPER SLEEVE OF ADEQUATE SIZE OVER BARE SECTION OF WIRE BEFORE CONNECTION IS ATTEMPTED.
2. THERMITE WELD PROCEDURES SIMILAR FOR "L" BRACKETS.
3. REPAIR ALL DAMAGE TO COATING AND LINING IN ACCORDANCE WITH MFG. RECOMMENDATIONS.

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

STANDARD LDWL
CATHODIC PROTECTION
DETAILS FOR JOINT BONDING
(SHEET 2 OF 2)

(NOT TO SCALE)

APPROVED BY: ACTING CITY ENGINEER	APPROVED BY: DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: MAR-20-2018	DWG NO: 15640-02

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

WATER LINE
CATHODIC PROTECTION DETAILS

(SHEET 9 OF 10)

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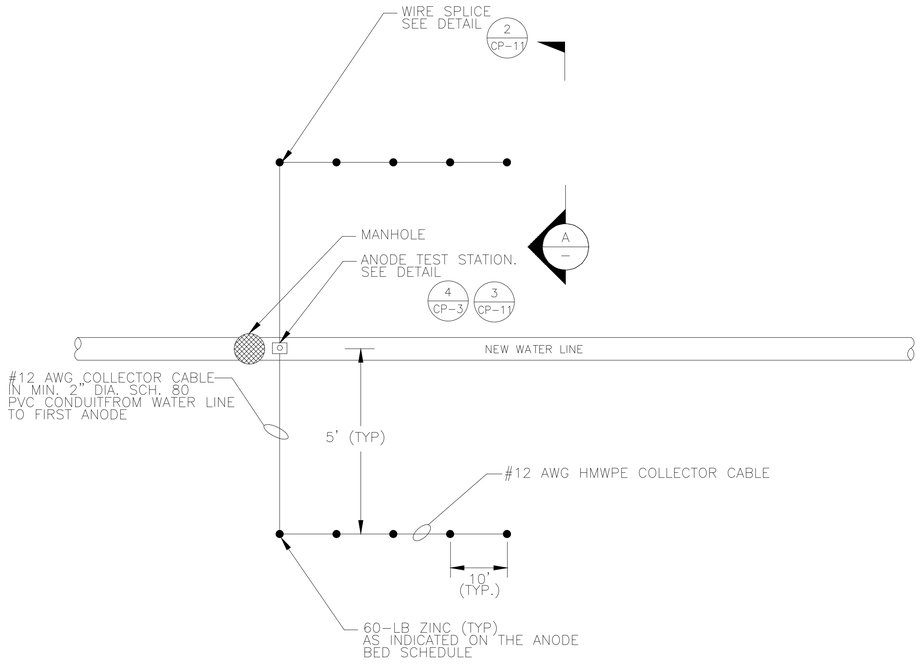


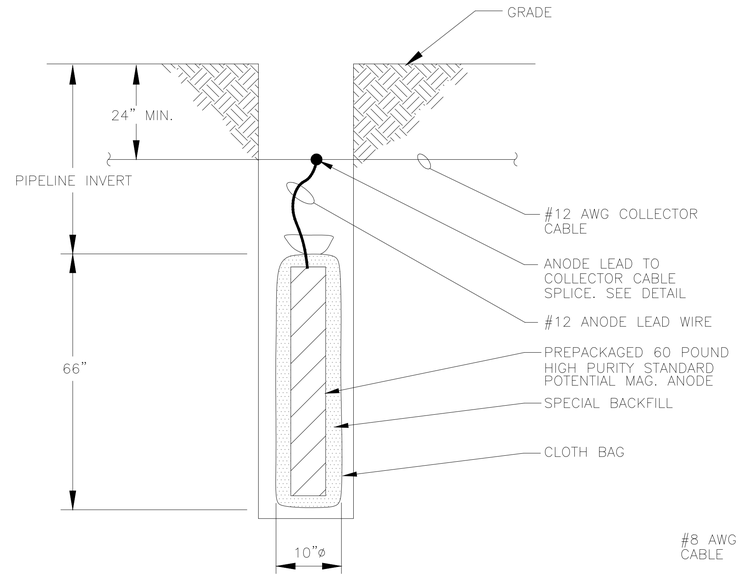
NOTE:

THE SIZE, TYPE, AND NUMBER OF ANODES PER ANODE BED SHALL BE AS SHOWN ON THE TEST STATION SCHEDULE.

COH ANODE TEST STATION (ATS) PLAN VIEW

SCALE: NTS

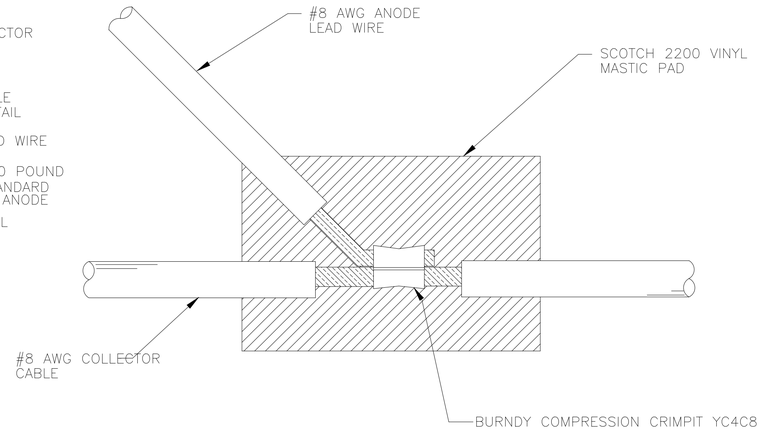
1 — CP-11



COH GALVANIC ANODE SECTION VIEW

SCALE: NTS

A — CP-11

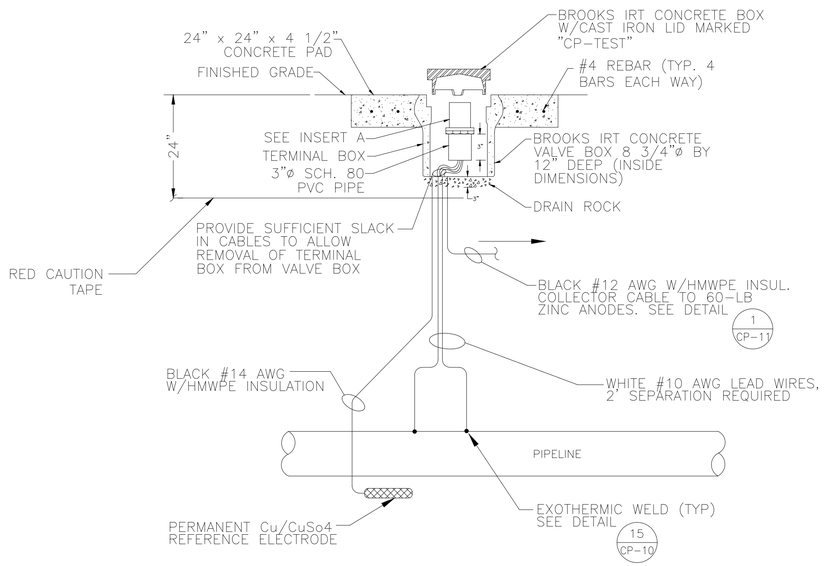


NOTE: FOLD PAD OVER SPLICE. FIRMLY PRESS MASTIC TOGETHER TO REMOVE ALL AIR POCKETS.

COH WIRE SPLICE DETAIL

SCALE: NTS

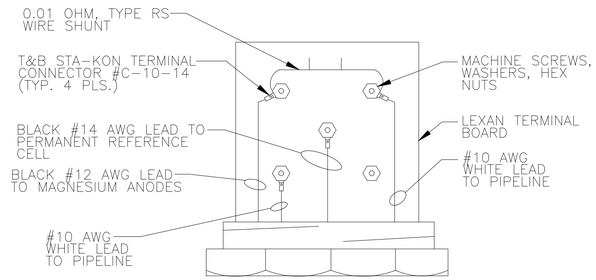
2 — CP-11



COH ANODE TEST STATION (ATS) AND TERMINAL BOARD DETAIL

SCALE: NTS

3 — CP-11



INSERT A

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

WATER LINE CATHODIC PROTECTION DETAILS

(SHEET 10 OF 10)

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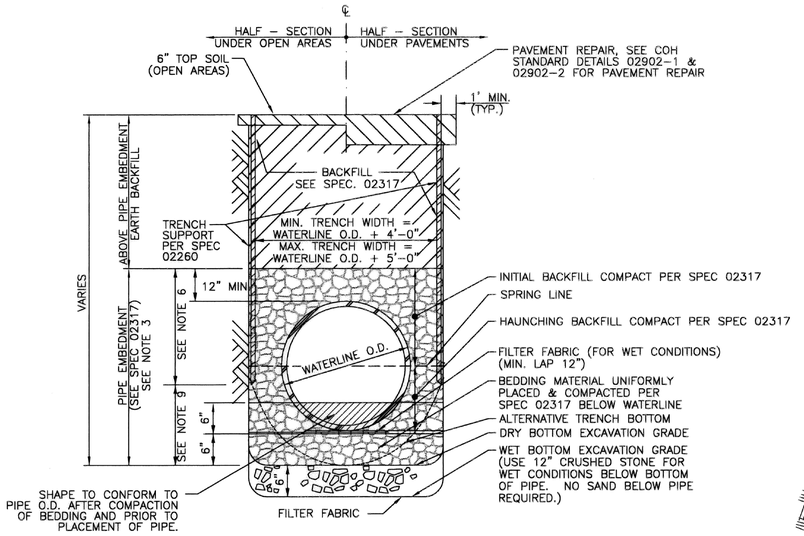


1 EXCAVATION & BACKFILL DETAIL

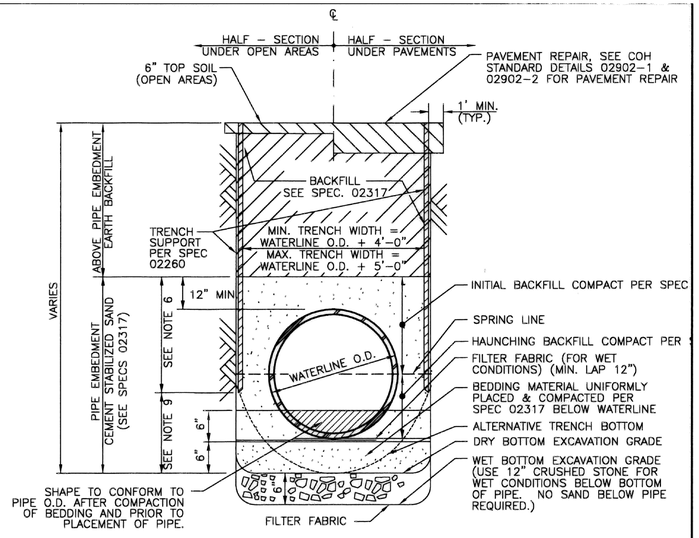
NO SCALE

DETAIL APPLICABLE IN FOLLOWING LIMITS:

– WATER MAIN WITH DEPTH OF COVER LESS THAN 16 FT

DETAILS 1 & 2 – NOTES:

1. SEE TRENCH SAFETY SYSTEM SPECIFICATIONS.
2. FOR WET BOTTOM EXCAVATION LIMITS OF CRUSHED STONE, EXTEND AS SHOWN.
3. PLACEMENT OF TRENCH DAM WITH A MINIMUM OF 12 INCHES INTO TRENCH BOTTOM AND WALLS.
4. TRENCH DAM MAY BE FORMED OR UNFORMED. ACTUAL SHAPE OF TRENCH DAM CROSS SECTION MAY BE DETERMINED BY CONTRACTOR IN FIELD, MEETING 12–INCH MINIMUM THICKNESS AND 12–INCH KEY DEPTH REQUIREMENTS.
5. TRENCH DAM SHALL BE PLACED AT LEAST 5 FT. AWAY FROM ANY PIPELINE STRUCTURE (EACH SIDE). SEE SECTION 02317 FOR OTHER REQUIREMENTS.
6. THIS PORTION OF PIPE EMBEDMENT ZONE MUST BE RECOMPACTED TO PROPER DENSITIES AFTER MOVING SUPPORT SYSTEM FORWARD.
7. USE FILTER FABRIC AS A BOND BREAKER IN PPCA LIMITS AND USE POLYETHYLENE WRAP AS A BOND BREAKER AT OTHER LOCATIONS BETWEEN CEMENT STABILIZED SAND AND PIPE.
8. REFER TO SPEC 02317 FOR GEOTEXTILE REQUIREMENTS AROUND EMBEDMENT.
9. ADJUST HEIGHT OF UNSUPPORTED TRENCH AS NEEDED FOR SAFE CONDITIONS.



2 EXCAVATION & BACKFILL DETAIL

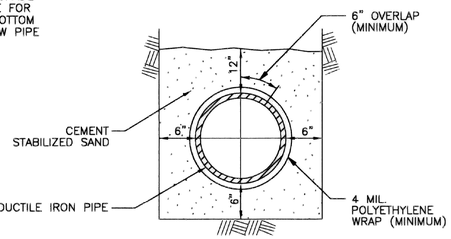
NO SCALE

DETAIL APPLICABLE IN FOLLOWING LIMITS:

– WATER MAIN WITH DEPTH OF COVER GREATER THAN 16 FT

– TUNNEL SHAFT LIMITS

– PPCA LIMITS



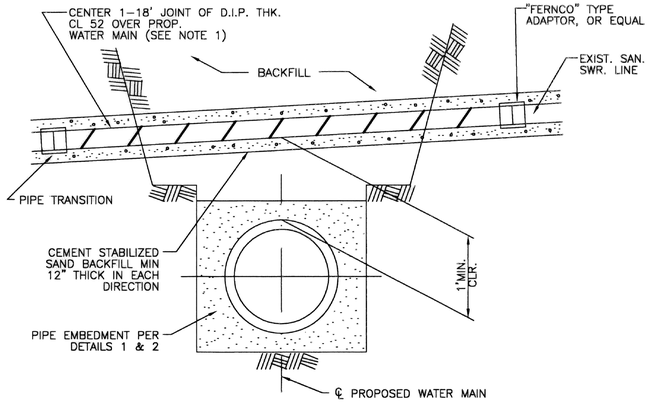
EMBEDMENT AND CORROSION PROTECTION FOR SANITARY SEWER DUCTILE IRON PIPE

4

NO SCALE

DETAIL 4 – NOTES:

1. FOLLOWING EXCAVATION OF TRENCH, PLACE A 6" LAYER OF CEMENT STAB. SAND AT BOTTOM OF TRENCH. LAY POLYETHYLENE WRAP IN TRENCH, AND LAY PIPE ON TOP OF WRAP. FOLD WRAP AROUND PIPE WITH A 6" OVERLAP (MIN.) AND TIE AROUND PIPE WITH HEAVY BINDER TWINE, OR EQUAL, ON 6" CENTERS. PROVIDE A 12" OVERLAP (MIN.) AND TIE WITH HEAVY BINDER TWINE END LAPS. PLACE ADDITIONAL CEMENT SAND UP TO 12" ABOVE.
2. ALL DUCTILE IRON PIPE SHALL HAVE A POLYETHYLENE "WRAP" OF 4 MIL. THICKNESS (MINIMUM) EXCEPT AS NOTED BELOW.
3. WHERE PIPE IS PLACED IN AN AUGER OR TUNNEL OR IN A CASING, PIPE IS TO HAVE A DOUBLE WRAP OF 4 MIL POLYETHYLENE AND SHALL BE BONDED ON 12" CENTERS WITH ½" STAINLESS STEEL BANDS. END LAPS TO BE AS SPECIFIED FOR TRENCH SECTIONS.
4. REFER TO SPECIFICATION SECTION 02528 – POLYETHYLENE ENCASEMENT/WRAP.

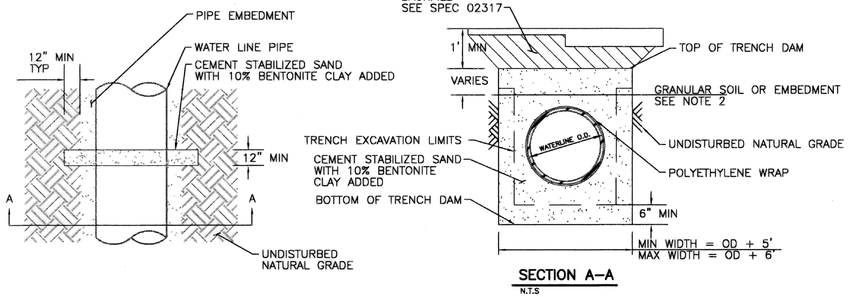


3 D.I.P. OVER PROPOSED WATER LINE

NO SCALE

DETAIL 3 – NOTES:

1. IF PERMITTED BY PROGRAM MANAGER, P.V.C. PIPE DR18 MAY BE USED.
2. DETAIL ALSO APPLIES IN CASES WHERE EXISTING SAN. SWR. IS LOCATED BELOW PROPOSED WATER MAIN.



5 TRENCH DAM DETAIL

NO SCALE

DETAIL 5 – NOTES:

1. REFER TO SPEC 02317 FOR INSTALLATION REQUIREMENTS.
2. EXTEND TRENCH DAM 5 FEET MIN ABOVE TOP OF SURROUNDING GRANULAR SOIL LAYERS OR TOP OF GRANULAR EMBEDMENT MATERIAL, WHICHEVER IS HIGHEST.

SECTION A–A

N.T.S

NO.	DATE	REVISION	APP.

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FB NO. P–6329

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

STANDARD LDWL EXCAVATION AND BACKFILL DETAIL
(NOT TO SCALE)

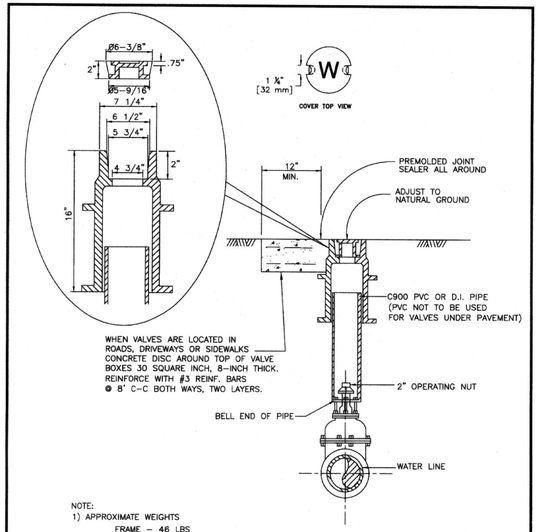
APPROVED BY:	APPROVED BY:
ACTING CITY ENGINEER	DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: MAR-20-2018	DWG NO: 02317-09

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

STANDARD LDWL EXCAVATION AND BACKFILL DETAIL

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 106 OF 169	



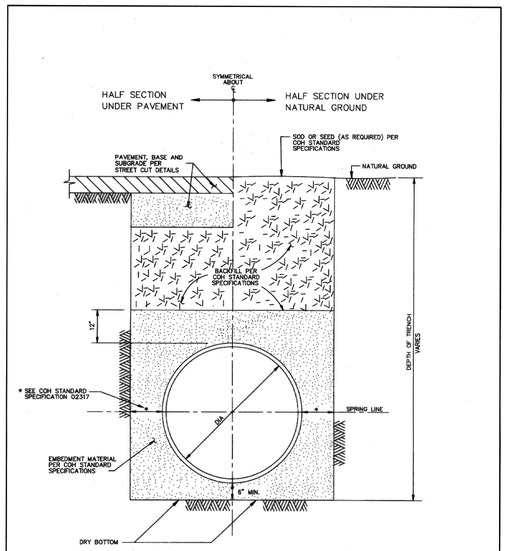
NOTE:
1) APPROXIMATE WEIGHTS
FRAME – 46 LBS
COVER – 10 LBS
2) MATERIAL – GRAY IRON ASTM A48 CL35B

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

VALVE BOX DETAIL

(NOT TO SCALE)

APPROVED BY: CITY ENGINEER | DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF. DATE: JULY 01, 2010 | DWG. NO: 02085-03

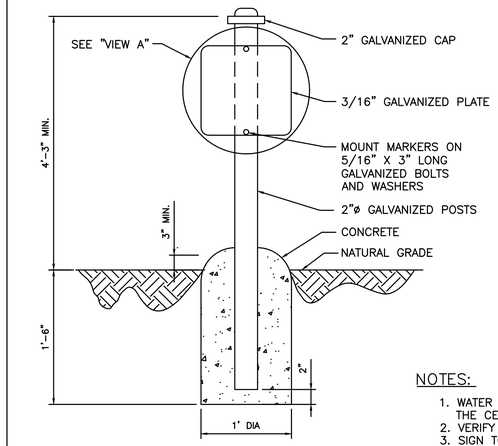


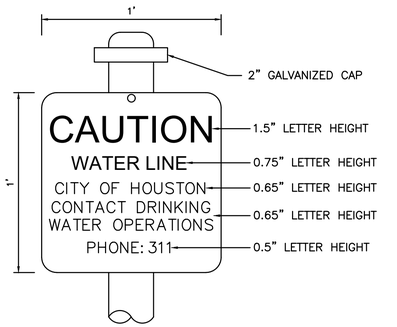
CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

WATER DISTRIBUTION MAIN BEDDING AND BACKFILL FOR OPEN CUT TRENCHES

(NOT TO SCALE)

APPROVED BY: CITY ENGINEER | DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: JUL-01-2010 | DWG NO: 02317-04





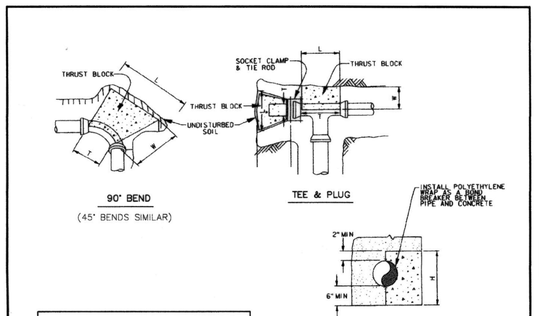
VIEW A

NOTES:

1. WATER LINE MARKER TO BE INSTALLED 1' INSIDE ROW OR EASEMENT OVER THE CENTER OF THE WATER LINE AS IDENTIFIED ON THE PLAN DRAWINGS.
2. VERIFY LABELING ON THE SIGN PRIOR TO MANUFACTURING.
3. SIGN TO BE BLUE BACKGROUND WITH BLACK LETTERING. USE BAKED ENAMEL PAINT.

1 WATER LINE MARKER INSTALLATION
NOT TO SCALE

NO.	DATE	REVISION	APP.



MINIMUM BLOCKING DIMENSION IN INCHES												
PIPE SIZE	90° BEND			45° BEND			TEE/PLUG		
	W	H	L	T	W	H	L	T	W	H	L	T
4"	6	12	14	10	6	8	11	8	6	10	12	12
6"	8	14	26	12	8	14	14	12	8	14	19	19
8"	10	16	40	16	10	18	20	16	10	18	26	26
10"	12	24	42	18	12	22	25	18	12	24	30	30
12"	14	36	40	30	14	26	30	22	14	26	40	40

CORRECTION FACTORS		
SOIL TYPE	SOIL BEARING STRENGTH S_B (lb/ft²)	MULTIPLY "L" AND "H" BY
SOFT CLAY	1000	1.73
SILT	1500	1.41
SANDY SILT	3000	1.00
SAND	4000	0.87
SANDY CLAY	6000	0.71
HARD CLAY	9000	0.58

NOTES:

1. DEPTH "W" MAY BE GREATER THAN SPECIFIED TO ALLOW WORKING SPACE.
2. BLOCKING MUST BE PLACED AGAINST UNDISTURBED EARTH, WHERE THIS IS NOT POSSIBLE, THE FILL BETWEEN THE BEARING SURFACE AND UNDISTURBED SOIL MUST BE COMPACTED TO AT LEAST 90% STANDARD PROCTOR DENSITY.
3. PROVIDE CONCRETE IN ACCORDANCE WITH STANDARD SPECIFICATION SECTION 03315 – CONCRETE FOR UTILITY CONSTRUCTION.
4. BLOCKING DIMENSIONS SHOWN ARE BASED ON 3000 PSI SOIL BEARING STRENGTH AND 125 PSI INTERNAL WATER PRESSURE, FOR OTHER SOIL CONDITIONS, MULTIPLY DIMENSIONS "L" AND "H" BY THE APPROPRIATE CORRECTION FACTOR.

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

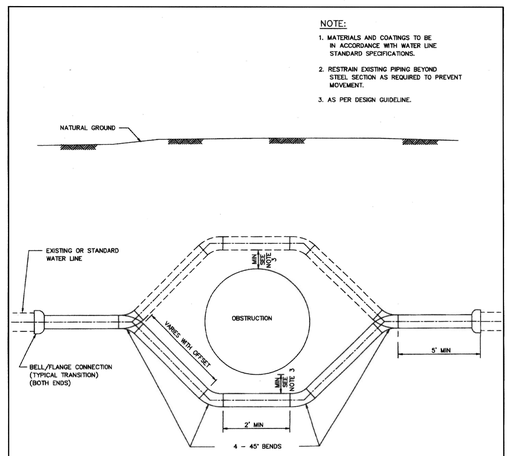
THRUST BLOCK DETAIL FOR WATER LINES (4-INCH TO 12 INCH)

(NOT TO SCALE)

APPROVED BY: CITY ENGINEER | DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF. DATE: JULY-01-2010 | DWG NO: 02511-02

NOTE:

1. MATERIALS AND COATINGS TO BE IN ACCORDANCE WITH WATER LINE STANDARD SPECIFICATIONS.
2. RESTRAIN EXISTING PIPING BEYOND STEEL SECTION AS REQUIRED TO PREVENT MOVEMENT.
3. AS PER DESIGN GUIDELINE.



PIPE OFFSET ALTERNATES

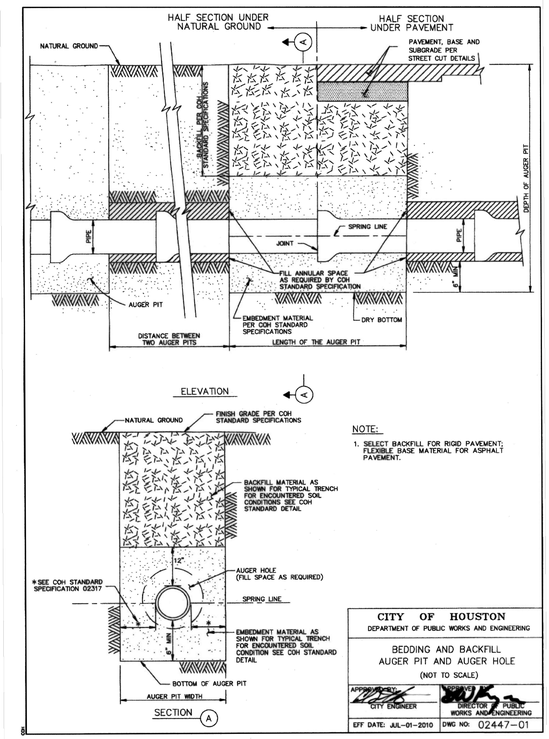
1. DUCTILE IRON PIPE PRESSURE 250 PSI WITH APPROVED RESTRAINED JOINTS.
2. PVC PIPE WITH INTEGRAL RESTRAINED JOINT SYSTEM, OR DUCTILE – IRON RESTRINED JOINT FITTINGS, EPOXY LINED AND COATED. USE 250 PSI AWWA C900 OR 14 FOR PVC RESTRAINED JOINTS.
3. PVC NOT ALLOWED FOR GREATER THAN 20 FT OF COVER OR FOR DIAMETER LARGER THAN 20 IN.
4. USE ONLY DUCTILE IRON AND PVC PRODUCTS LISTED ON OCE DIVISION APPROVED PRODUCTS LIST AND IN ACCORDANCE WITH CITY STANDARD SPECIFICATIONS.

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

TYPICAL STEEL PIPE OFFSET SECTION FOR WATER LINES

(NOT TO SCALE)

APPROVED BY: CITY ENGINEER | DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: JULY-01-2010 | DWG NO: 02511-01



ELEVATION

SECTION (A)

NOTE:

1. SELECT BACKFILL FOR RIGID PAVEMENT; FLEXIBLE BASE MATERIAL FOR ASPHALT PAVEMENT.

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

BEDDING AND BACKFILL AUGER PIT AND AUGER HOLE

(NOT TO SCALE)

APPROVED BY: CITY ENGINEER | DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: JUL-01-2010 | DWG NO: 02447-01

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ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

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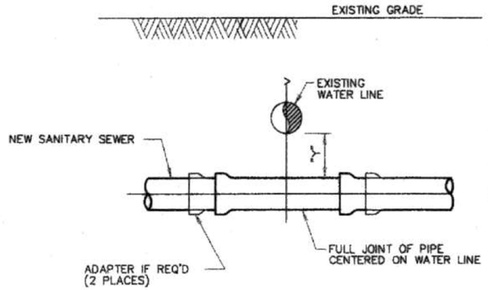
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

SMALL DIAMETER WATER LINE DETAILS

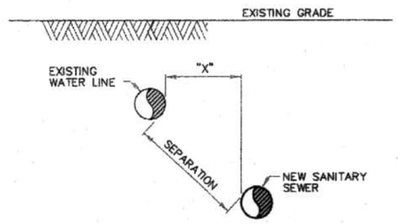
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 116 OF 169	



INSTALLATION REQUIREMENTS

1. IF "Y" IS GREATER THAN 1' AND "Y" IS LESS THAN 2', USE MINIMUM 18 FT JOINT OF PRESSURE-RATED PIPE PER COH STANDARD DRAWING.
2. IF "Y" IS GREATER THAN 2' AND "Y" IS LESS THAN 9', USE GRAVITY SEWER PIPE IN CEMENT-STABILIZED SAND EMBEDMENT.
3. IF "Y" IS GREATER THAN 9', USE STANDARD EMBEDMENT AND NORMAL JOINT SPACING.

NEW SANITARY SEWER CROSSING EXISTING WATER LINE



INSTALLATION REQUIREMENTS

1. IF SEPARATION IS LESS THAN 9', USE PRESSURE-RATED PIPE MH TO MH. "X" MUST BE AT LEAST 4 FT. VERTICAL SEPARATION MUST BE AT LEAST 2 FT.
2. IF SEPARATION IS 9' OR GREATER, USE STANDARD PIPE AND EMBEDMENT.

NEW SANITARY SEWER PARALLEL TO EXISTING WATER LINE

INSTALLING SANITARY SEWERS CROSSING OR PARALLEL TO WATER LINES

NOTES:

1. SANITARY SEWER MUST BE BELOW WATER LINE WHEREVER POSSIBLE. WHEN WATERLINE IS BELOW THE SANITARY SEWER PROVIDE MINIMUM 2 FT SEPARATION AND INSTALL PIPE IN ACCORDANCE TO CHAPTER 7 TABLE 7.3 OF COH DESIGN MANUAL.
2. WHEN PRESSURE-RATED PIPE IS REQUIRED, PROVIDE PIPE WITH MINIMUM 150 psi PRESSURE RATING.
3. ADAPTERS MUST BE FACTORY MOLDED OR FABRICATED, WITH RING STIFFNES AT LEAST EQUAL TO THE ADJOINING SANITARY SEWER PIPE, AND USING RESILIENT GASKET OR SEAL MATERIAL. FLEXIBLE RUBBER "BOOT" TYPE ADAPTERS WILL NOT BE ACCEPTED.
4. INSTALL FORCE MAINS SAME AS FOR GRAVITY SEWER, USING SPECIFIED PRESSURE PIPE.
5. "Y" MUST ALWAYS BE GREATER THAN OR EQUAL TO 1 FT FOR PRESSURE RATED SS AND 2 FT FOR NON-PRESSURE RATED SS.
6. "X" MUST BE GREATER THAN OR EQUAL TO 4 FT.
7. ALTERNATIVES MAY BE SHOWN ON THE DRAWINGS OR DESCRIBED IN THE SPECIFICATIONS.
8. SEPARATION REQUIREMENTS SHOWN HERE DO NOT APPLY TO SERVICE CONNECTIONS - REFER TO PLUMBING CODE FOR APPLICABLE REQUIREMENTS.

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

SANITARY SEWER
INSTALLING SANITARY SEWERS CROSSING OR PARALLEL TO WATER LINES
(NOT TO SCALE)

APPROVED	APPROVED
CITY ENGINEER	DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: JUL-01-2010	DWG NO: 02531-05

NO.	DATE	REVISION	APP.

ARCADIS
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HOUSTON, TX 77056
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TBPE REGISTRATION NO. F-533

SURVEYED BY:
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FB NO. P-6329

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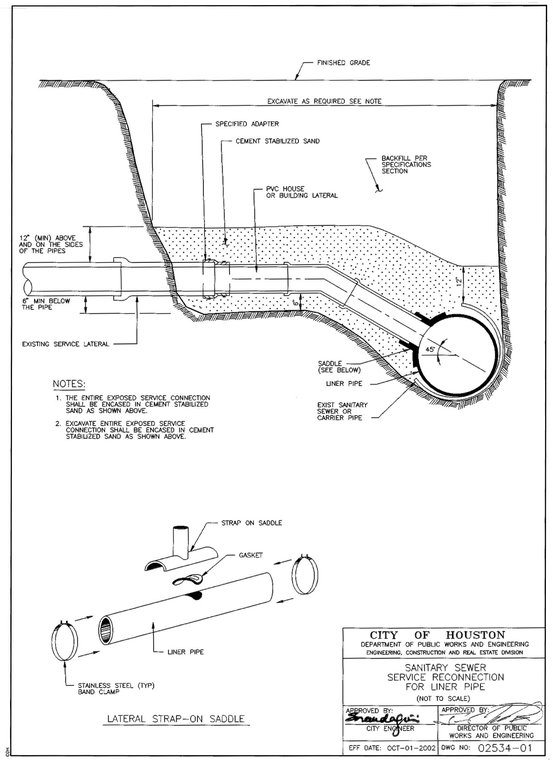
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

STANDARD SANITARY SEWER DETAILS (SHEET 1 OF 2)

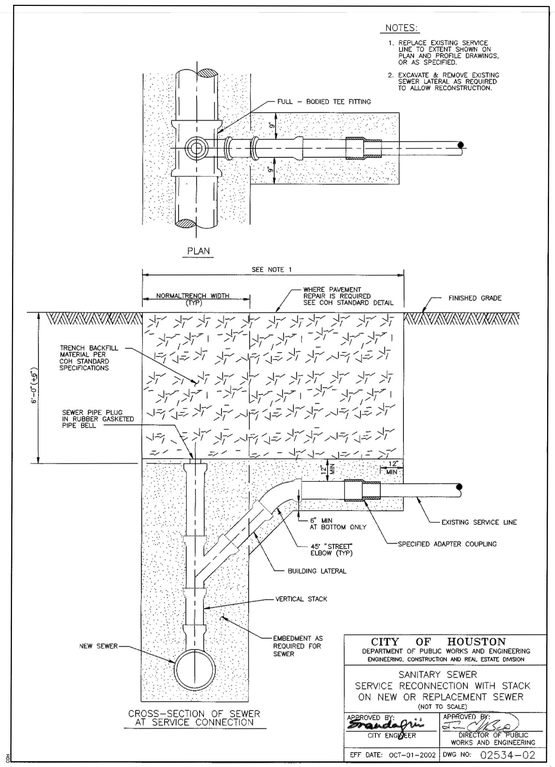
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 117 OF 169	



CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
ENGINEERING, CONSTRUCTION AND REAL ESTATE DIVISION

SANITARY SEWER
SERVICE RECONNECTION
FOR LINER PIPE
(NOT TO SCALE)

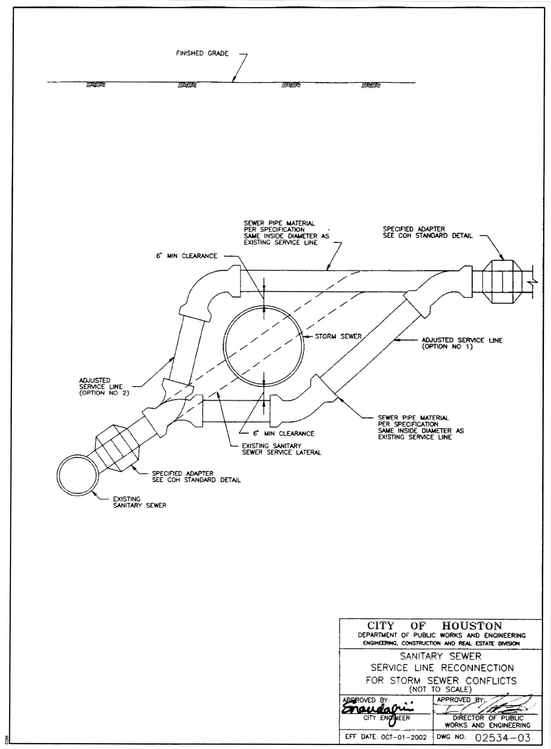
APPROVED BY: CITY ENGINEER	APPROVED BY: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: OCT-01-2002	DWG NO: 02534-01



CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
ENGINEERING, CONSTRUCTION AND REAL ESTATE DIVISION

SANITARY SEWER
SERVICE RECONNECTION WITH STACK
ON NEW OR REPLACEMENT SEWER
(NOT TO SCALE)

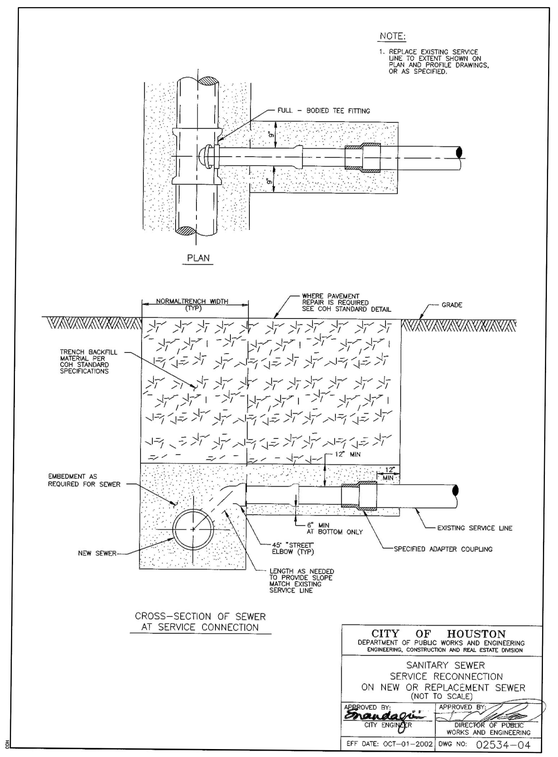
APPROVED BY: CITY ENGINEER	APPROVED BY: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: OCT-01-2002	DWG NO: 02534-02



CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
ENGINEERING, CONSTRUCTION AND REAL ESTATE DIVISION

SANITARY SEWER
SERVICE LINE RECONNECTION
FOR STORM SEWER CONFLICTS
(NOT TO SCALE)

APPROVED BY: CITY ENGINEER	APPROVED BY: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: OCT-01-2002	DWG NO: 02534-03



CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
ENGINEERING, CONSTRUCTION AND REAL ESTATE DIVISION

SANITARY SEWER
SERVICE RECONNECTION
ON NEW OR REPLACEMENT SEWER
(NOT TO SCALE)

APPROVED BY: CITY ENGINEER	APPROVED BY: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: OCT-01-2002	DWG NO: 02534-04

NO.	DATE	REVISION	APP.

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

STANDARD SANITARY SEWER DETAILS (SHEET 2 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 118 OF 169	

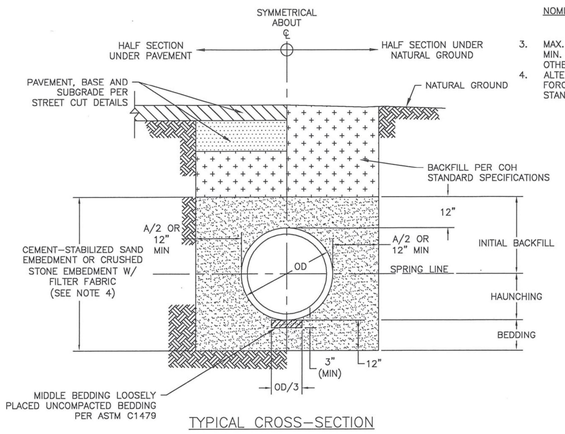
02317–03

NOTES:

1. THIS DETAIL MAY BE USED ONLY FOR DRY STABLE TRENCH CONDITIONS PER COH STANDARD. SEE COH STANDARD SPECIFICATION FOR REQUIREMENTS IN OTHER CONDITIONS.
2. MIN. TRENCH WIDTH SHALL BE PIPE OD PLUS AN ALLOWANCE "A" FOR THE NOMINAL PIPE SIZE:

NOMINAL PIPE SIZE	"A"
18" TO 30"	24"
OVER 30"	36"

3. MAX. TRENCH WIDTH SHALL BE NOT GREATER THAN MIN. TRENCH WIDTH PLUS 24 INCHES, UNLESS OTHERWISE NOTED.
4. ALTERNATIVE EMBEDMENT BACKFILL MATERIALS FOR FORCE MAINS MAY BE ALLOWED. SEE COH STANDARD SPECIFICATIONS.



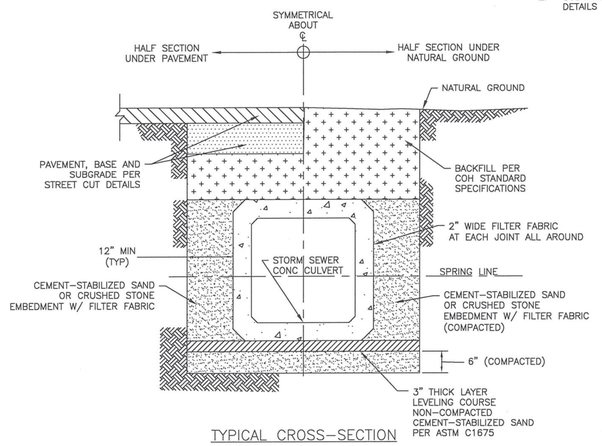
TYPICAL CROSS–SECTION

SANITARY OR STORM SEWER BEDDING AND BACKFILL FOR DRY STABLE TRENCH
NTS

02317–05

NOTES:

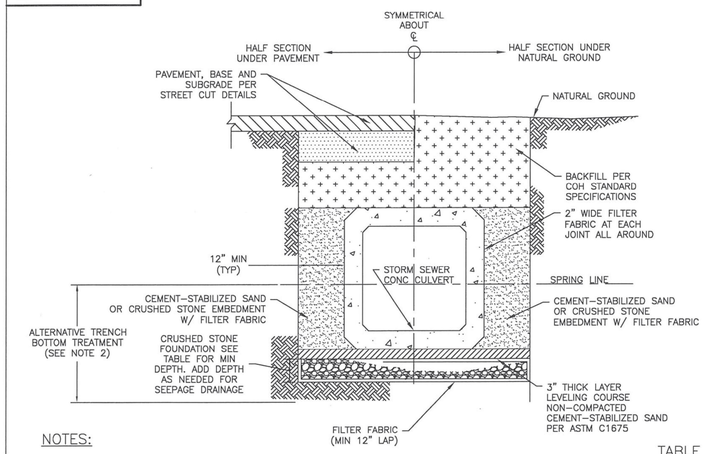
1. WHERE MULTIPLE BOX SEWER ARE USED IN THE SAME TRENCH, MIN. OUTSIDE TO OUTSIDE BOX SEWER SEPERATION SHALL BE 6".
2. SUBGRADE AND PAVEMENT FOR STREET CUT DETAILS – 02951.



TYPICAL CROSS–SECTION

PRECAST CONCRETE BOX STORM SEWER BEDDING AND BACKFILL FOR DRY STABLE TRENCH
NTS

02317–06



NOTES:

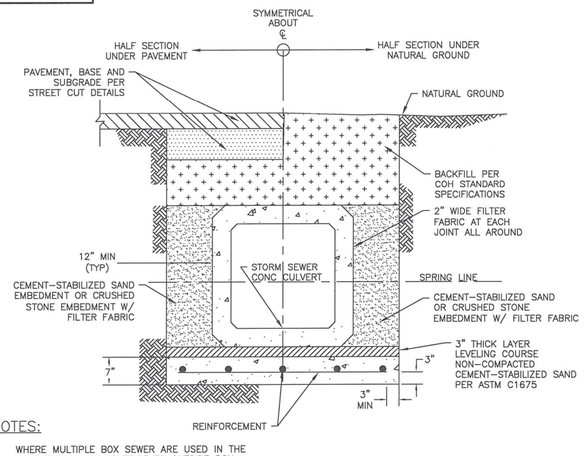
1. WHERE MULTIPLE BOX SEWER ARE USED IN THE SAME TRENCH, MIN. OUTSIDE TO OUTSIDE BOX SEWER SEPERATION SHALL BE 6".
2. ALTERNATIVE TRENCH BOTTOM TREATMENT MAY BE USED AS APPROVED BY THE CITY OF ENGINEERS AND AS PAID FOR IN THE PROPOSAL.

TABLE

CULVERT SIZE (FT)	FOUNDATION DEPTH(INCHES)
3' X 2' TO 6' X 6'	12
6' X 6' AND LARGER	18

PRECAST CONCRETE BOX STORM SEWER BEDDING AND BACKFILL FOR WET STABLE TRENCH
NTS

02317–07



NOTES:

1. WHERE MULTIPLE BOX SEWER ARE USED IN THE SAME TRENCH, MIN OUTSIDE TO OUTSIDE BOX SEWER SEPERATION SHALL BE 6".
2. REINFORCED CONCRETE SLAB PIPE BEDDING TO BE PLACED IN DRY TRENCH ONLY.
3. CONCRETE IN SLAB TO REACH MIN COMPRESSIVE STRENGTH OF 1000 PSI BASED ON MAX DESIGN BEFORE PIPE IS LAID.
4. PRECAST SEAL SLAB MAYBE USED AS APPROVED BY CITY ENGINEER.

PRECAST CONCRETE BOX STORM SEWER BEDDING AND BACKFILL WITH SEAL SLAB
NTS

NO.	DATE	REVISION	APP.

FIRM INFORMATION | ENGINEER'S SEAL

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

STORM SEWER
02317–03 THROUGH 07

APPROVED BY:	APPROVED BY:
CITY ENGINEER	DEPUTY DIRECTOR
APPROVED BY:	
DIRECTOR	

EFFECTIVE DATE: JUL–01–2019

FOR CITY OF HOUSTON USE ONLY

SHEET NO.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713–953–4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F–533

SURVEYED BY:
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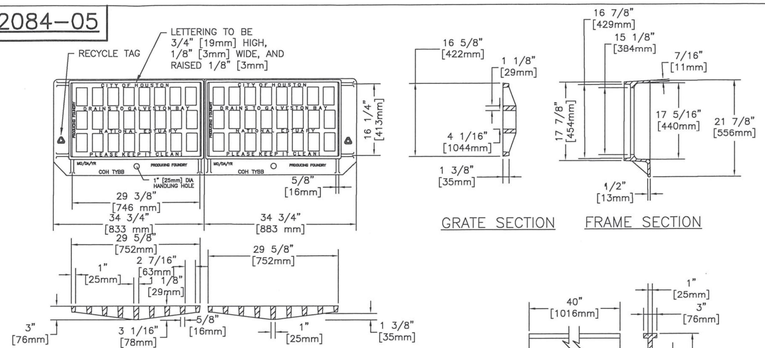
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

STANDARD STORM SEWER DETAILS (SHEET 1 OF 3)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 119 OF 169	

02084–05

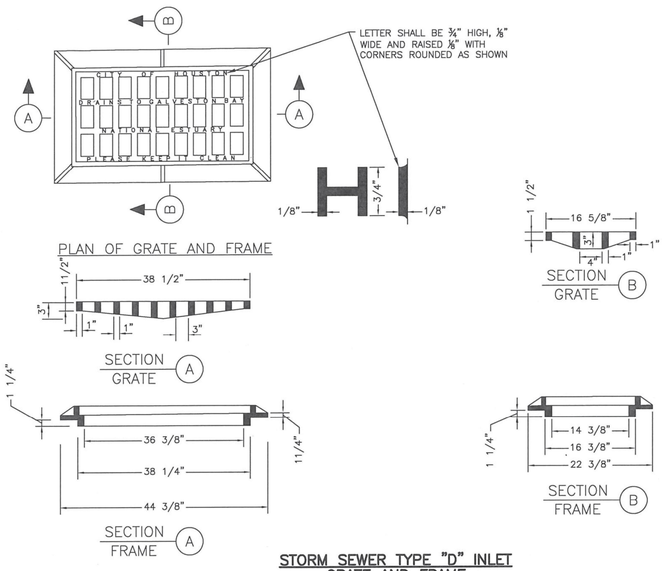


1) NOTE: APPROXIMATE WEIGHTS.
   GRATE – 115 LBS 52kg
   FRAME – 120 LBS 55kg
   I BEAM – 107 LBS 49kg
   UNIT – 577 LBS 262kg
2) MATERIAL– GRAY IRON ASTM A48 CL35B
3) CASTING TO MEET M306 PROOF LOAD SPECIFICATION
4) EJIW V–4243 ASY OR APPROVED EQUAL

OPEN AREA OF GRATE
240 SQ. IN.
[1548 SQ. cm.]

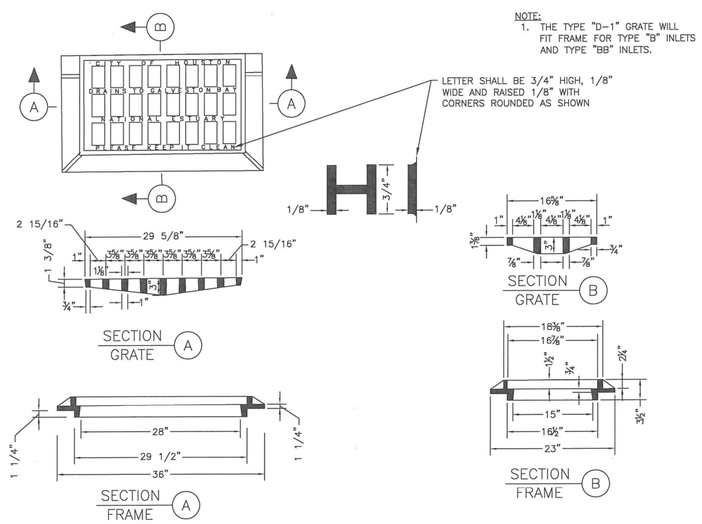
STORM SEWER FRAME AND GRATE FOR TYPE B–B INLET DOUBLE ASSEMBLY
NTS

02084–06



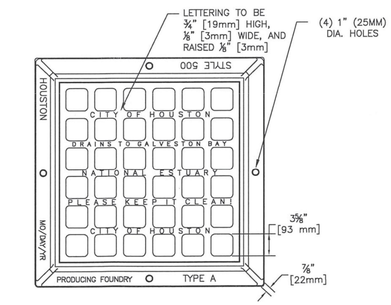
STORM SEWER TYPE "D" INLET GRATE AND FRAME
NTS

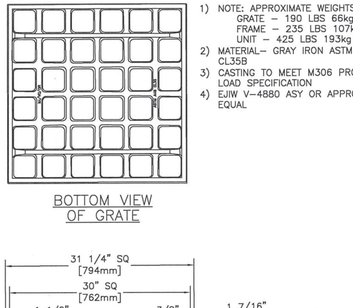
02084–07



STORM SEWER TYPE "D–1" INLET GRATE AND FRAME
NTS

02084–08





1) NOTE: APPROXIMATE WEIGHTS.
   GRATE – 190 LBS 66kg
   FRAME – 235 LBS 107kg
   UNIT – 425 LBS 193kg
2) MATERIAL– GRAY IRON ASTM A48 CL35B
3) CASTING TO MEET M306 PROOF LOAD SPECIFICATION
4) EJIW V–4880 ASY OR APPROVED EQUAL

OPEN AREA OF GRATE
473 SQ. IN.
[3051 SQ. cm.]

STORM SEWER TYPE "A" INLET GRATE AND FRAME
NTS

NO.	DATE	REVISION	APP.

FIRM INFORMATION | ENGINEER'S SEAL

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

STORM SEWER
02084–05 THROUGH 08

APPROVED BY: CITY ENGINEER
APPROVED BY: DEPUTY DIRECTOR
APPROVED BY: DIRECTOR
EFFECTIVE DATE: JUL–01–2019
FOR CITY OF HOUSTON USE ONLY

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

STANDARD STORM SEWER DETAILS (SHEET 2 OF 3)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
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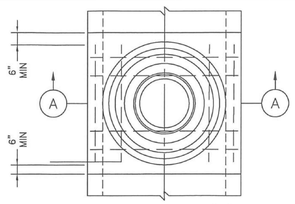
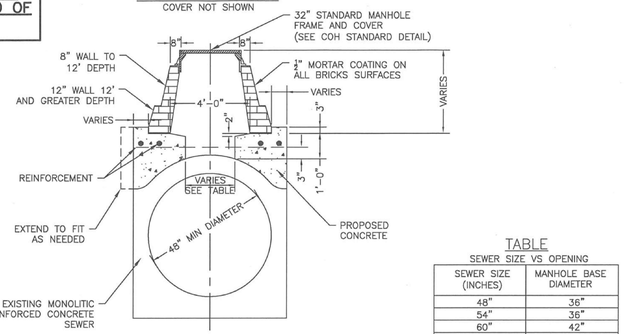
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 120 OF 169	

02081–05

COH IS PHASING OUT BRICK. NEW DETAILS TO BE POSTED END OF 2019



PLAN OF TYPE "E"
COVER NOT SHOWN



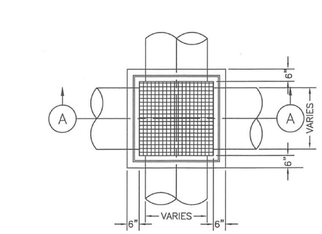
SECTION A

TABLE
SEWER SIZE VS OPENING

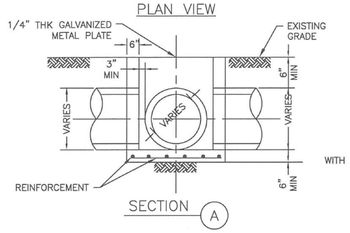
SEWER SIZE (INCHES)	MANHOLE BASE DIAMETER
48"	36"
54"	36"
60"	42"
66" OR GREATER	48"

STORM SEWER MANHOLE TYPE 'E' FOR EXISTING MONOLITIC REINFORCED CONCRETE 48" DIAMETER AND GREATER
NTS

02081–06

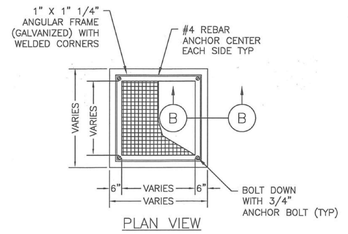


PLAN VIEW

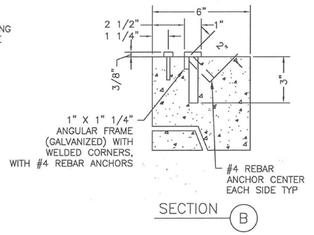


SECTION A

JUNCTION BOX DETAIL



PLAN VIEW



SECTION B

LID FRAME DETAIL

NOTES:

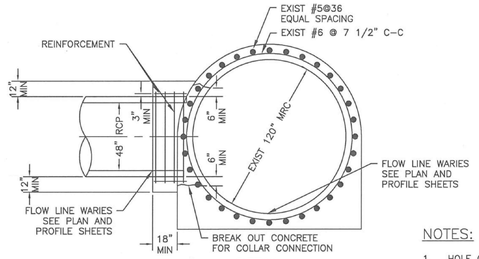
1. DETAIL TO BE USED WHERE STORM SEWER SIZE IS 24" DIA OR LESS.
2 FOR SEWER GREATER 24" DIA USE TYPE 'C' MANHOLE.

NOTES TO SPECIFIER:

1. WALL TO BE 6" CONCRETE.
2. NOT TO BE USED IN STREET. FOR AREA BETWEEN CURB AND PROPERTY LINE ONLY.

STORM SEWER
JUNCTION BOX WITH LID OR GRATE TOP
FOR MAXIMUM OF 24" DIAMETER STORM SEWE4R5
NTS

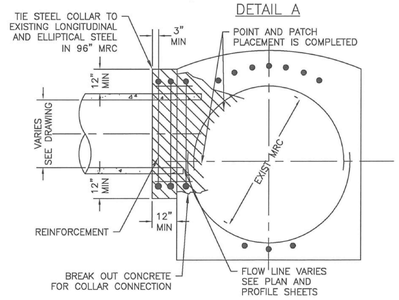
02081–07



DETAIL A

NOTES:

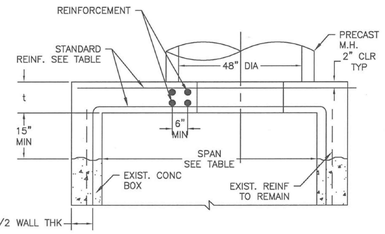
1. HOLE CUT IN WALL OF 120" MRC TO BE NEAT AND DONE IN WORKMAN LIKE MANNER.
2. THE STEEL COLLAR TO EXIST LONGITUDINAL AND ELLIPTICAL STEEL WHERE APPLICABLE.
3. CONCRETE COLLAR SHALL BE CONSTRUCTED AT EACH CONNECTION OF A PROPOSED RCP TO AN EXISTING MRC. HOLE CUT IN WALL OF EXISTING 96" MRC TO BE NEAT AND DONE IN WORKMAN LIKE MANNER.

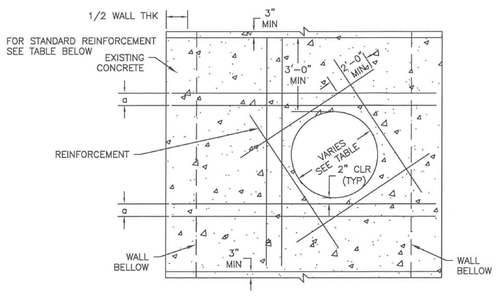


CONCRETE COLLAR DETAIL

LATERAL CONNECTION TO EXISTING
MONOLITHIC REINFORCED CONCRETE STORM SEWER
NTS

02081–08





PROPOSED MANHOLE ON
EXISTING BOX STORM SEWER
NTS

FIRM INFORMATION | ENGINEER'S SEAL

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

STORM SEWER
02081–05 THROUGH 08

APPROVED BY: CITY ENGINEER | APPROVED BY: DEPUTY DIRECTOR

APPROVED BY: DIRECTOR

EFFECTIVE DATE: JUL–01–2019

FOR CITY OF HOUSTON USE ONLY

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

STANDARD STORM SEWER DETAILS (SHEET 3 OF 3)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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RAM CHAKRADHAR, P.E.	
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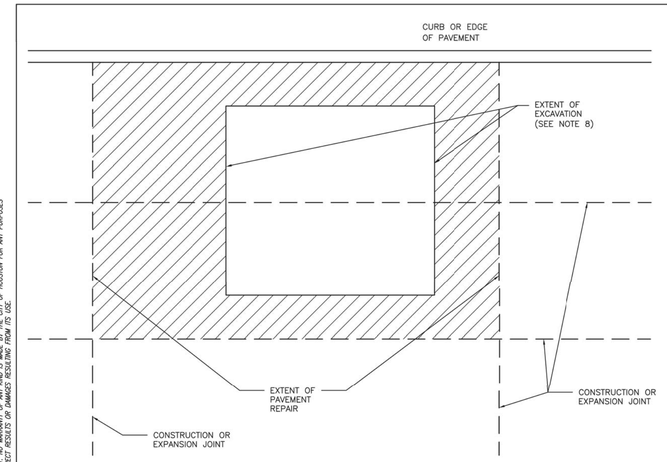

NOTES:

1. EXTENT OF PAVEMENT REPAIR SHALL BE PERPENDICULAR AND PARALLEL TO TRAVEL WAY.
2. REPLACE ENTIRE PANEL WIDTH AND LENGTH TO NEAREST CONSTRUCTION OR EXPANSION JOINT BEYOND EDGE OF EXCAVATION.
3. SAW CUT AND EXPOSE 15" OF REINFORCING STEEL WITHIN EXISTING PAVEMENT. PROVIDE HORIZONTAL DOWELS (PER SPECIFICATION SECTION 02951–PAVEMENT REPAIR AND RESTORATION) IF EXISTING REINFORCING IS BROKEN OFF.
4. REPLACE CURB WHEN ADJACENT LANE IS REPLACED.
5. MAINTAIN EXPANSION JOINTS AT EXISTING LOCATIONS UNLESS OTHERWISE DIRECTED BY CITY ENGINEER.
6. SPECIALTY PAVEMENTS (IE: BRICK PAVERS) TO BE REPLACED WITH MATCHING PAVEMENT IN ALL CASES.
7. REPLACE PAVEMENT MARKINGS IN ACCORDANCE WITH CITY OF HOUSTON STANDARD SPECIFICATIONS 02764–RAISED PAVEMENT MARKERS AND 02767–THERMOPLASTIC PAVEMENT MARKINGS.
8. EXTENT OF EXCAVATION INCLUDES 18" OVERCUT AS SHOWN ON STANDARD DETAIL 02951–04 PAVEMENT REPAIR DETAIL FOR STREET CUTS (FLEX–BASE PAVEMENT & CONCRETE PAVEMENT).

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

STREET CUT FOR CONCRETE PAVEMENT REPLACEMENT/RESTORATION AGE OF PAVEMENT ≤ 5YRS
(SCALE: NOT TO SCALE)

APPROVED BY:

DocuSigned by: Suhail Faruqui — CITY ENGINEER
DocuSigned by: Carol Haddock — DIRECTOR OF HPW
DocuSigned by: HUNG NGUYEN — CITY TRAFFIC ENGINEER

EFF DATE: NOV–27–2023 | DWG NO: 02951–01

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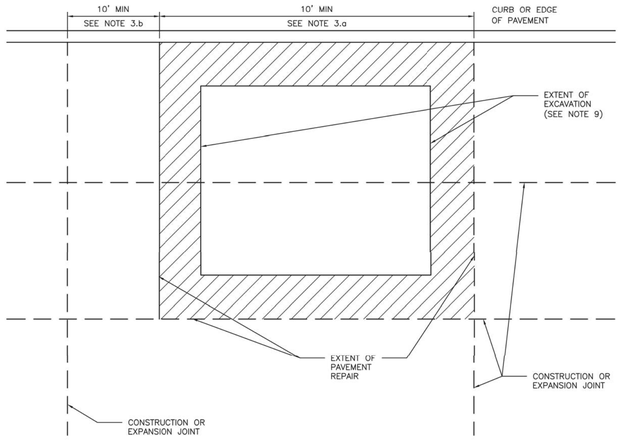

NOTES:

1. *EXTENT OF PAVEMENT REPAIR SHALL BE PERPENDICULAR AND PARALLEL TO TRAVEL WAY.*
2. WIDTH:
   REPLACE PANEL WIDTH TO NEAREST CONSTRUCTION OR EXPANSION JOINT BEYOND EDGE OF EXCAVATION.
3. LENGTH:
   a. MINIMUM LENGTH OF PAVEMENT REPAIR ALONG TRAVEL WAY IS 10' FROM THE NEAREST JOINT.
   b. IF EXTENT OF PAVEMENT REPAIR IS LESS THAN 10' FROM EXISTING CONSTRUCTION OR EXPANSION JOINT, EXTEND PAVEMENT REPAIR TO EXISTING JOINT.
4. SAW CUT AND EXPOSE 15" OF REINFORCING STEEL AROUND EDGE OF PANEL REPLACEMENT. PROVIDE HORIZONTAL DOWELS (PER SPECIFICATION SECTION 02951–PAVEMENT REPAIR AND RESTORATION) IF REINFORCING IS BROKEN OFF OR DOES NOT EXIST.
5. REPLACE CURB WHEN ADJACENT LANE IS REPLACED.
6. MAINTAIN EXPANSION JOINTS AT EXISTING LOCATIONS UNLESS OTHERWISE DIRECTED BY CITY ENGINEER.
7. SPECIALTY PAVEMENTS (IE: BRICK PAVERS) TO BE REPLACED WITH MATCHING PAVEMENT IN ALL CASES.
8. REPLACE PAVEMENT MARKINGS IN ACCORDANCE WITH CITY OF HOUSTON STANDARD SPECIFICATIONS 02764–RAISED PAVEMENT MARKERS AND 02767–THERMOPLASTIC PAVEMENT MARKINGS.
9. EXTENT OF EXCAVATION INCLUDES 18" OVERCUT AS SHOWN ON STANDARD DETAIL 02951–04 PAVEMENT REPAIR DETAIL FOR STREET CUTS (FLEX–BASE PAVEMENT & CONCRETE PAVEMENT).

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

STREET CUT FOR CONCRETE PAVEMENT REPLACEMENT/RESTORATION AGE OF PAVEMENT > 5YRS
(SCALE: NOT TO SCALE)

APPROVED BY:

DocuSigned by: Suhail Faruqui — CITY ENGINEER
DocuSigned by: Carol Haddock — DIRECTOR OF HPW
DocuSigned by: HUNG NGUYEN — CITY TRAFFIC ENGINEER

EFF DATE: NOV–27–2023 | DWG NO: 02951–02

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DATE 08/28/2025
TBPELS FIRM #F-4528

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. FROM METRO CORRIDOR TO SWPS

STREET CUT AND PAVEMENT REPAIRS DETAILS

(SHEET 1 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
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CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 122 OF 169	

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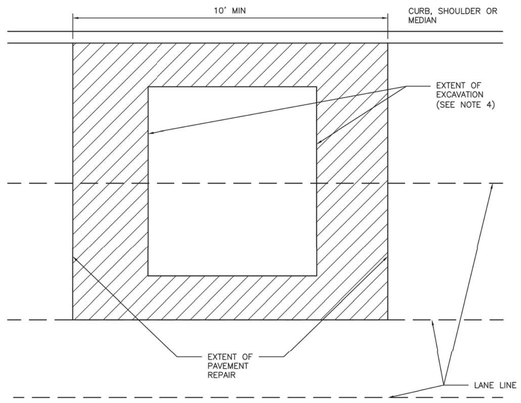

NOTES:

1. EXTENT OF PAVEMENT REPAIR SHALL BE PERPENDICULAR AND PARALLEL TO TRAVEL WAY.
2. FLEXIBLE BASE: REPLACE BASE TO SAME THICKNESS PLUS TWO INCHES (2") FOR EXTENT OF EXCAVATION. USE APPROVED BASE MATERIAL TYPE.*
3. SURFACE COURSE:
   - 3.1. WIDTH: SURFACE MILL AND OVERLAY FULL WIDTH OF LANE(S) TO NEAREST LANE DIVIDER BEYOND EDGE OF EXCAVATION.
   - 3.2. LENGTH: MINIMUM LENGTH OF SURFACE MILL ALONG TRAVEL WAY IS 10'.
   - 3.3. REPLACE PAVEMENT MARKINGS IN ACCORDANCE WITH CITY OF HOUSTON STANDARD SPECIFICATIONS 02764–RAISED PAVEMENT MARKERS AND 02767–THERMOPLASTIC PAVEMENT MARKINGS.
4. EXTENT OF EXCAVATION INCLUDES 18" OVER CUT AS SHOWN ON STANDARD DETAIL 02951–04 PAVEMENT REPAIR DETAIL FOR STREET CUTS (FLEX–BASE PAVEMENT AND CONCRETE PAVEMENT).
5. ADDITIONAL REQUIREMENTS FOR ASPHALT OVERLAY ON CONCRETE PAVEMENT:
   - 5.1. REPLACE CONCRETE FOR EXTENT OF EXCAVATION. REPLACE TO SAME THICKNESS PLUS TWO INCHES (2").
   - 5.2. WIDTH:
     - 5.2.1. IF EXCAVATION EXTENDS MORE THAN HALF OF A LANE, REPLACE ENTIRE LANE OF CONCRETE. OTHERWISE USE STANDARD DETAIL 02951–04 THROUGH 05.
   - 5.3. SAW CUT AND EXPOSE 15" OF REINFORCING STEEL AROUND EDGE OF CONCRETE REPLACEMENT. IF NO REINFORCING STEEL EXISTS, USE HORIZONTAL DOWELS PER CITY OF HOUSTON STANDARD SPECIFICATION SECTION 02951–PAVEMENT REPAIR AND RESTORATION.
   - 5.4. REPLACE CURB WHEN ADJACENT LANE IS REPLACED.
   - 5.5. MAINTAIN CONCRETE EXPANSION JOINTS AT EXISTING LOCATIONS UNLESS OTHERWISE APPROVED BY CITY ENGINEER.

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

STREET CUT FOR ASPHALT PAVEMENT REPLACEMENT/RESTORATION FOR PAVEMENT OF ALL AGES
(SCALE: NOT TO SCALE)

APPROVED BY:

CITY ENGINEER	DIRECTOR OF HPW
CITY TRAFFIC ENGINEER	

EFF DATE: NOV–27–2023 | DWG NO: 02951–03

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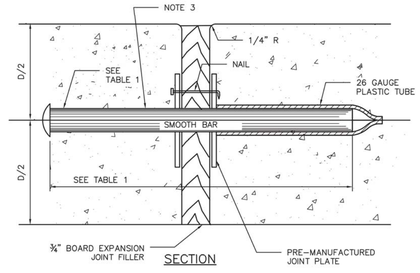
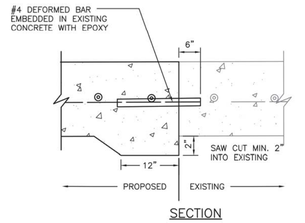
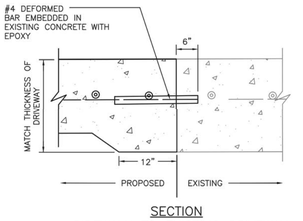


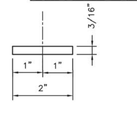
SECTION
DOWEL TYPE EXPANSION JOINT



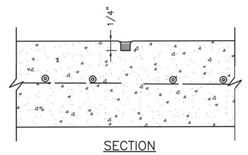
SECTION
SIDEWALK TO EXISTING SIDEWALK



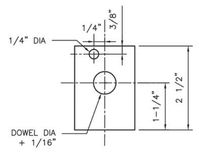
SECTION
SIDEWALK TO EXISTING DRIVEWAY



PLAN VIEW
JOINT PLATE



SECTION
CONTROL JOINT



ELEVATION VIEW
JOINT PLATE

TABLE 1

PAVEMENT THICKNESS (IN)	DOWEL SIZES AND SPACINGS		
	DIAMETER (IN)	LENGTH (IN)	SPACING (IN)
4 1/2	1/2	18	12
5	1/2	18	12
6	3/4	18	12
7	1	18	12

NOTES:

1. STEEL TO MEET ASTM STANDARD SPECIFICATIONS FOR CONCRETE REINFORCING BARS.
2. EXPANSION JOINT TO BE PLACED AT THE END OF EACH CURB RADIUS AND SPACED AT A MAXIMUM DISTANCE OF 3 FEET MAXIMUM SPACING FOR CONTROL JOINTS SHALL BE 5 FEET.
3. CENTER DOWEL HORIZONTALLY ON JOINT.
4. CENTER DOWEL VERTICALLY IN CONCRETE AS NEEDED TO MAINTAIN A 2 INCH MINIMUM COVER.

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

SIDEWALK EXPANSION AND CONSTRUCTION JOINT DETAILS
(SCALE: NOT TO SCALE)

APPROVED BY:

CITY ENGINEER	DIRECTOR OF HPW
CITY TRAFFIC ENGINEER	

EFF DATE: NOV–27–2023 | DWG NO: 02752–02

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TBPE REGISTRATION NO. F–533

AMANI ENGINEERING, INC.
11011 RICHMOND AVE., SUITE 700
HOUSTON, TEXAS 77042
TEL: (713) 270–5700
Texas Registered Engineering Firm No. F–4528
Texas Registered Surveying Firm No. 100282–00

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P – 6329

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MAHESH DUTTA 114252
NAME P.E. NO.
DATE 08/28/2025
TBPELS FIRM #F-4528

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

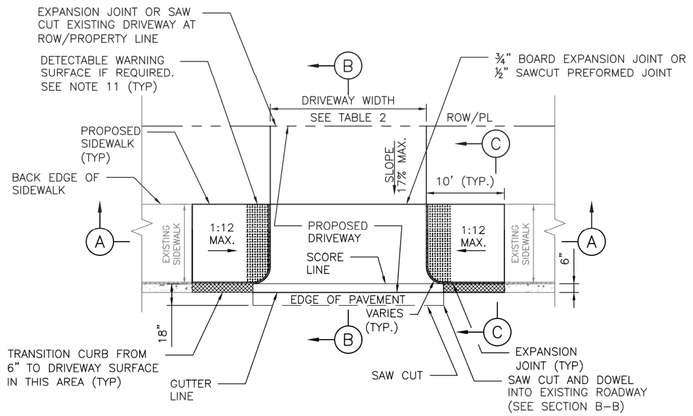
72–INCH WATER LINE ALONG GREENBRIAR DR. FROM METRO CORRIDOR TO SWPS

STREET CUT AND PAVEMENT REPAIRS DETAILS

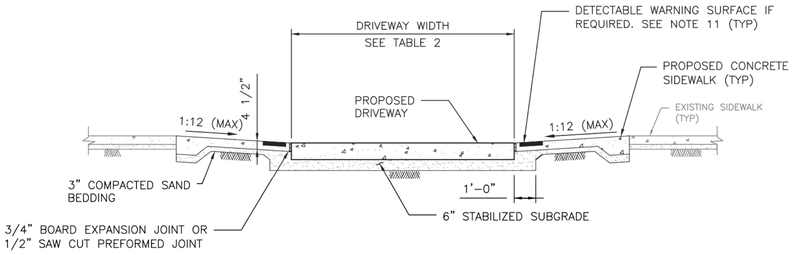
(SHEET 2 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 123 OF 169	

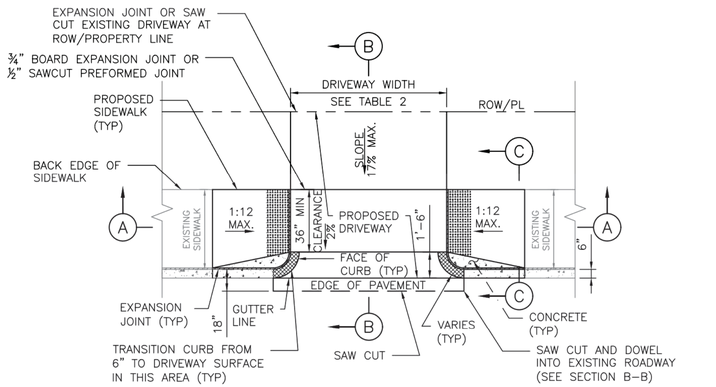
P:\Cadd\2023\23024–Arcadis Greenbriar\CAD_DWG\Standard DWG\PAVING DETAILS.dwg Nov 21, 2025 4:00pm



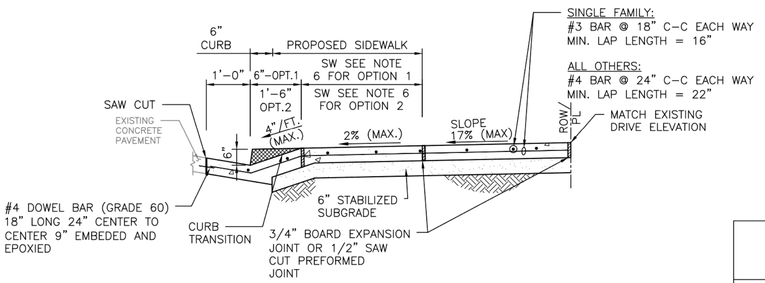
OPTION 1 – CURB LEVEL SIDEWALK
PLAN VIEW – DRIVEWAY WITHOUT CURB AT CURB RETURN



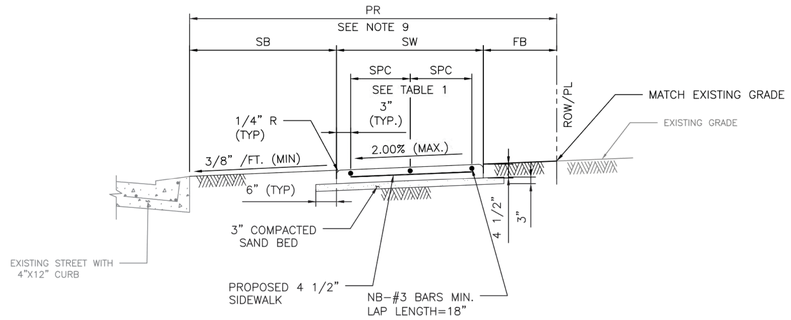
SECTION A–A
PROPOSED SIDEWALK THROUGH DRIVEWAY



OPTION 2 – CURB LEVEL SIDEWALK
PLAN VIEW – DRIVEWAY WITH CURB AT CURB RETURN



SECTION B–B
TYPICAL DRIVEWAY SECTION THROUGH DRIVEWAY



SECTION C–C
TYPICAL SIDEWALK SECTION

TABLE 1

REINFORCING STEEL INFORMATION
FOR 4 ½ " THICK SIDEWALKS
EXPANSION JOINT SPACING = 40 FT
fc' = 3,500 PSI AND fy = 60,000 PSI
REFER TO CONTRACT DRAWINGS FOR SIDEWALKS WIDER THAN 6 FEET.

SIDEWALK THICKNESS (IN)	SIDEWALK WIDTH (FT)	LONGITUDINAL STEEL			TRANSVERSE STEEL #3 BARS SPACING (IN)
		#3 BARS			
		NO. OF BARS "NB"	SPACING "SPC" (IN)	END BAR SPACING (IN)	
4.5	5	3	27	3	48
4.5	6	4	22	3	48

TABLE 2

DRIVEWAY DESIGN CRITERIA (1)(2)

TRAFFIC TYPE	TYPE A DRIVEWAY (FOR SINGLE FAMILY RESIDENTIAL HOUSES OR DUPLEXES)				TYPE B DRIVEWAY (SHARED ACCESS/SHARED DRIVEWAY)				TYPE C DRIVEWAY (COMMERCIAL DRIVEWAY)			
	WIDTH (FT)		RADIUS (FT)		WIDTH (FT)		RADIUS (FT)		WIDTH (FT)		RADIUS (FT)	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
ONE–WAY	10	12	4	10	12(5)	16(5)	4(5)	10(5)	15	20	10	20
TWO–WAY	10(3)	24(4)	4	10	16(6)	24	4	10	24	35	10	20

(1) REFER TO INFRASTRUCTURE DESIGN MANUAL ARTICLE 15.2.07.C.1.F FOR DRIVEWAYS THAT REQUIRE A VEHICLE SWEPT PATH ANALYSIS.
(2) REFER TO INFRASTRUCTURE DESIGN MANUAL ARTCILES 15.2.07.C.1.G.(1) AND 15.2.07.C.1.G.(2) FOR TYPE 1 PAE AND TYPE 2 PAE REQUIREMENTS.
(3) THE MINIMUM WIDTH FOR JOINT ACCESS DRIVEWAY IS 12 FT.
(4) REFER TO CHAPTER 42 OF THE CODE OF ORDINANCES FOR DRIVEWAY WIDTHS FOR NARROW LOTS.
(5) ONLY MURS AND COURTYARD STYLE DEVELOPMENTS ON CORNER LOTS CAN HAVE ONE–WAY DRIVEWAYS.
(6) REFER TO CHAPTER 42, SECTION 42–146 OF THE CODE OF ORDINANCES FOR EXCEPTIONS TO THE MINIMUM DRIVEWAY WIDTH FOR SHARED DRIVEWAYS.

NOTES:

1. REPAIR, RECONSTRUCTION OR REPLACEMENT OF SIDEWALKS SHALL MEET PERMITTING REQUIREMENTS OF CODE OF ORDINANCES SECTION 40–552.
2. FOR REPAIR, RECONSTRUCTION, OR REPLACEMENT OF EXISTING SIDEWALKS:
   - 2.1. EXISTING SIDEWALKS LESS THAN OR EQUAL TO 20 FEET IN TOTAL LENGTH:
     - 2.1.1. THE PROPOSED SIDEWALK WIDTH WILL BE ALLOWED TO MATCH THE EXISTING SIDEWALK.
   - 2.2. EXISTING SIDEWALKS GREATER THAN 20 FEET IN TOTAL LENGTH:
     - 2.2.1. THE SIDEWALK WIDTH FOR THE ENTIRE PROPERTY WIDTH SHALL BE IMPROVED TO MEET WIDTH REQUIREMENTS ACCORDING TO THE LATEST INFRASTRUCTURE DESIGN MANUAL.
   - 2.3. 20 FOOT TOTAL LENGTH IS DEFINED AS:
     - 2.3.1. UP TO 10 FEET ON BOTH SIDES OF THE DRIVEWAY; OR
     - 2.3.2. UP TO 20 FEET WHEN SIDEWALK AFFECTED IS LOCATED ONLY ON ONE SIDE OF THE DRIVEWAY.
3. PROPOSED SIDEWALKS THAT DO NOT FALL WITHIN THE SCOPE DEFINED IN NOTE 2 SHALL BE DESIGNED ACCORDING TO IDM REQUIREMENTS AND CONSTRUCTED ACCORDING TO THE CONTRACT DRAWINGS.
4. DRIVEWAY WIDTH VARIES TO MATCH EXISTING DRIVE.
5. DRIVEWAY DETAIL TO PROVIDE FOR SIDEWALK TRANSITION FROM EXISTING BACK OF CURB TO PROPOSED DRIVEWAY EDGE.
6. DRIVEWAY WITH WIDTH >5' @ 2% CROSS SLOPE QUALIFIES AS PASSING SPACE. (SEE OPTION 1 AND OPTION 2 PLANS)
7. ALL RAMPS AND SIDEWALKS/WALKWAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH HOUSTON PUBLIC WORKS STANDARDS, TEXAS ACCESSIBILITY STANDARDS (TAS) AND AMERICANS WITH DISABILITIES ACT (ADA) REQUIREMENTS. IF THERE IS A CONFLICT IN THE REQUIREMENTS, THE STRICTEST REQUIREMENTS SHALL GOVERN.
8. CURB RAMPS THAT ARE STEEPER THAN A 1:12 MAX SLOPE WILL NOT BE ACCEPTED BY THE CITY OF HOUSTON.
9. REFER TO CONTRACT DRAWINGS FOR PEDESTRIAN REALM (PR), SIDEWALK (SW), FRONTAGE BUFFER (FB), AND SAFETY BUFFER (SB) WIDTHS.
10. DRIVEWAYS SHALL BE MINIMUM 6" THICK FOR SINGLE FAMILY AND DUPLEXES. DRIVEWAYS SHALL BE MINIMUM 7" THICK FOR ALL OTHERS (I.E. COMMERCIAL, INDUSTRIAL, ETC.)
11. DETECTABLE WARNING SURFACES:
    - 11.1. SIDEWALK SHALL HAVE A DETECTABLE WARNING SURFACE WHERE:
      - 11.1.1. SIDEWALK INTERSECTS TYPE C DRIVEWAYS (COMMERCIAL DRIVEWAYS) THAT ARE STOP, YIELD OR TRAFFIC SIGNAL CONTROLLED; OR
      - 11.1.2. SIDEWALK SLOPE IS GREATER THAN 1:20 AND INTERSECTS A TYPE C DRIVEWAY (COMMERCIAL DRIVEWAY)
    - 11.2. DETECTABLE WARNING SURFACES ARE OPTIONAL WHERE SIDEWALKS INTERSECT TYPE A DRIVEWAYS (SINGLE FAMILY RESIDENTIAL HOUSES OR DUPLEXES) OR TYPE B DRIVEWAYS (SHARED ACCESS/SHARED DRIVEWAYS).
    - 11.3. REFER TO STANDARD DETAILS 02775–06 TO 02775–07 FOR DETECTABLE WARNING SURFACE STANDARDS.

APPROVED BY:	APPROVED BY:
DocuSigned by: Suhail Tanwar 9EF8B0C941F5478...	DocuSigned by: KHANG NGUYEN 95A28EFDA7584CD...
CITY ENGINEER	CITY TRAFFIC ENGINEER

APPROVED BY:
DocuSigned by: Carl Haddock A83C410B72B3453...
DIRECTOR OF HOUSTON PUBLIC WORKS

EFF DATE: NOV–27–2023 | DWG NO: 02754–03

AMANI ENGINEERING, INC.
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MAHESH DUTTA (NAME) 114252 (P.E. NO.)
DATE 08/28/2025
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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. FROM METRO CORRIDOR TO SWPS

PROPOSED SIDEWALK THROUGH DRIVEWAY WITH EXCESSIVE ELEVATION DIFFERENCE

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DRAWING SCALE	
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CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 124 OF 169	

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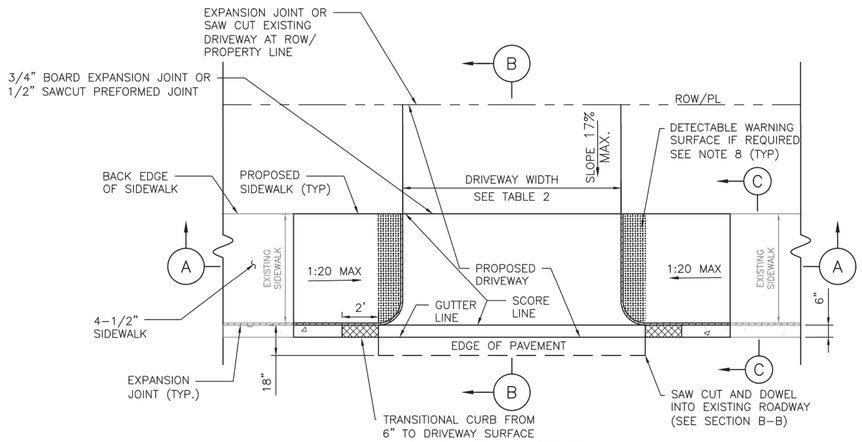
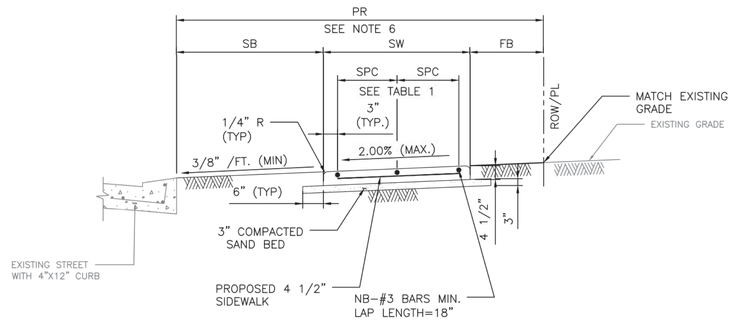
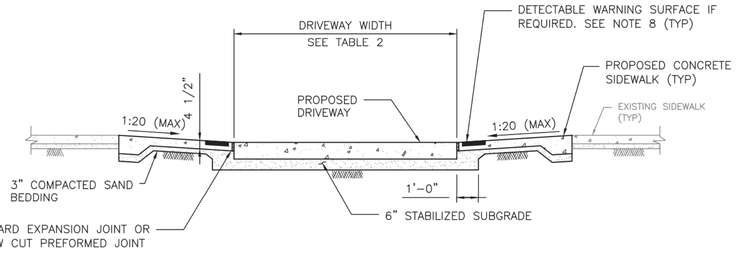


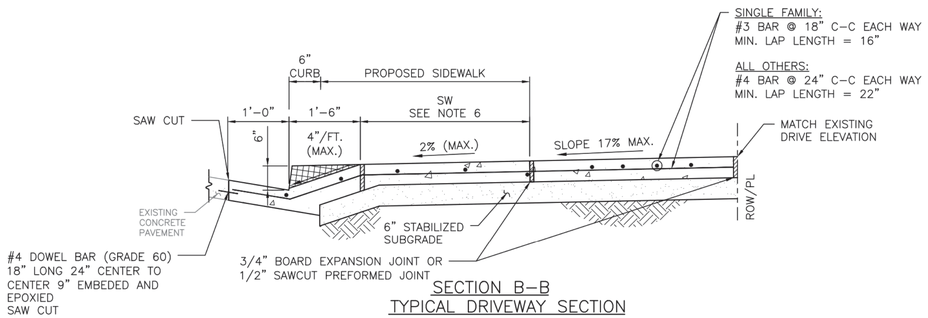
PLAN VIEW – DRIVEWAY



SECTION C–C
TYPICAL SIDEWALK SECTION



SECTION A–A
PROPOSED SIDEWALK THROUGH DRIVEWAY



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		NO. OF BARS "NB"	SPACING "SPC" (IN)	END BAR SPACING (IN)	
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DRIVEWAY DESIGN CRITERIA (1)(2)

TRAFFIC TYPE	TYPE A DRIVEWAY (FOR SINGLE FAMILY RESIDENTIAL HOUSES OR DUPLEXES)				TYPE B DRIVEWAY (SHARED ACCESS/SHARED DRIVEWAY)				TYPE C DRIVEWAY (COMMERCIAL DRIVEWAY)			
	WIDTH (FT)		RADIUS (FT)		WIDTH (FT)		RADIUS (FT)		WIDTH (FT)		RADIUS (FT)	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
ONE–WAY	10	12	4	10	12(5)	16(5)	4(5)	10(5)	15	20	10	20
TWO–WAY	10(3)	24(4)	4	10	16(6)	24	4	10	24	35	10	20

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DocuSigned by: Suhail Kanwar 9EFB80C641F5478...	DocuSigned by: KHANG NGUYEN 95A29EFDA7584CD...
CITY ENGINEER	CITY TRAFFIC ENGINEER

APPROVED BY:
DocuSigned by: Carol Haddock A63C410B72B3453...
DIRECTOR OF HOUSTON PUBLIC WORKS

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AMANI ENGINEERING, INC.
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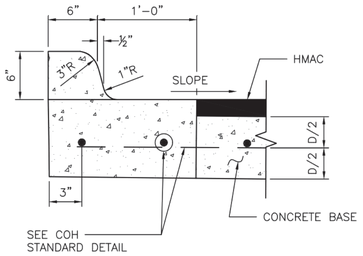
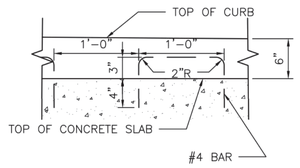
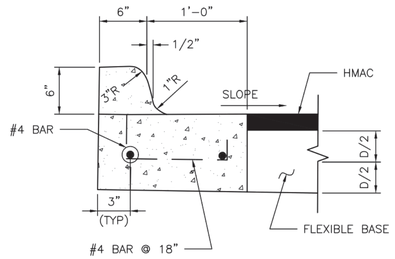


ESPLANADE CURB CONNECTED TO CONCRETE BASE



ALTERNATE CONCRETE CURB REINFORCEMENT



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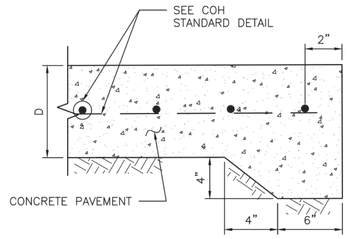
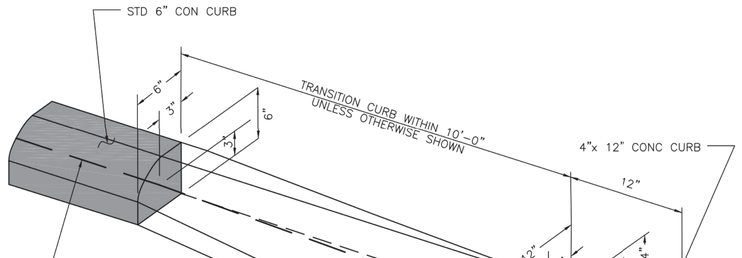
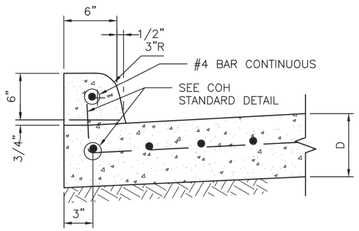


STANDARD CONCRETE PAVING HEADER

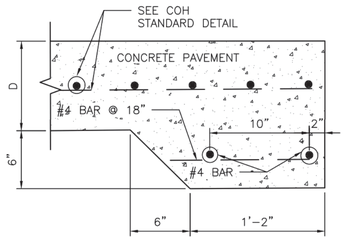


CURB TRANSITION

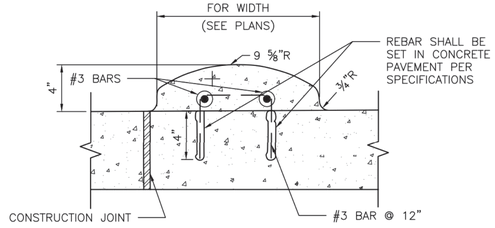
(SEE NOTES)



CONCRETE CURB

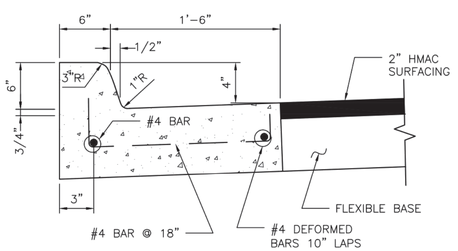


STANDARD RAILROAD HEADER

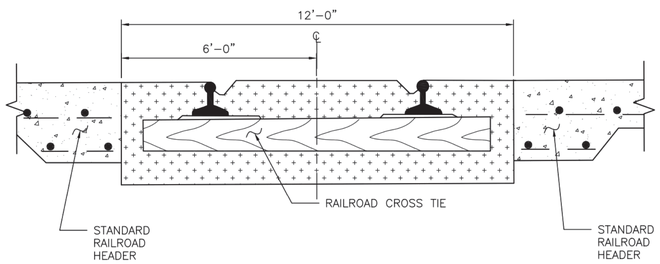


MOUNTABLE CURB

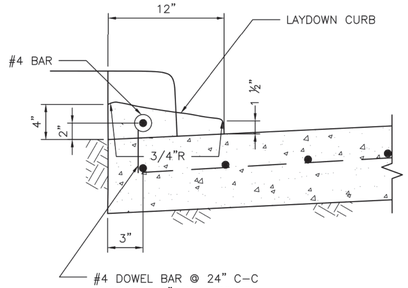
WHEN CONCRETE CURB IS TO BE PLACED EXISTING CONCRETE USE BASE
#4 BAR @ 18x10" LONG, DOWELED AND SET IN EPOXY GROUT.
SET #4 DOWEL BARS, 25" LONG AT 12" C–C WHEN PAVEMENT SECTION POURED.



MONOLITHIC CURB AND GUTTER

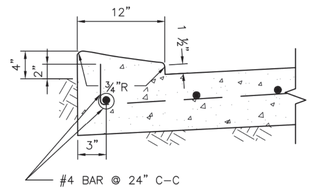


STANDARD RAILROAD CROSSING – SINGLE TRACK



4–INCH x 12–INCH TRANSITION CURB

(SEE NOTES)



4–INCH x 12–INCH MONOLITHIC CURB

(SEE NOTES)

4"x12" MONOLITHIC AND TRANSITION CURB NOTES:

1. 6–INCH CONCRETE CURB TO BE CONSTRUCTED ON ALL ESPLANADES, ISLANDS, NON–RESIDENTIAL STREETS, AND RESIDENTIAL STREETS.
2. TRANSITIONS FROM 6– INCH CONCRETE CURB TO 4–INCH x 12–INCH CONCRETE CURB TO BE ACCOMPLISHED WITHIN 10 FEET, UNLESS OTHERWISE SHOWN. IF THIS 10–FEET TRANSITION CURB IS NOT POURED MONOLITHICALLY WITH THE PAVEMENT, THEN REINFORCING STEEL AS SHOWN IN "4–INCH x 12–INCH TRANSITION CURB" IS TO BE INSTALLED.

APPROVED BY:	APPROVED BY:
DocuSigned by: Suhail Kanwar 9EFB80C641F5478...	DocuSigned by: KHANG NGUYEN 90A28EFDA75B4CD...
CITY ENGINEER	CITY TRAFFIC ENGINEER

APPROVED BY:
DocuSigned by: Carl Haddock A3DC4105728345...
DIRECTOR OF HOUSTON PUBLIC WORKS

EFF DATE: NOV–27–2023 | DWG NO: 02771–01

AMANI ENGINEERING, INC.
11011 RICHMOND AVE., SUITE 700
HOUSTON, TEXAS 77042
TEL: (713) 270–5700
Texas Registered Engineering Firm No. F–4528
Texas Registered Surveying Firm No. 100282–00

SURVEYED BY:
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FB NO. P – 6329

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MAHESH DUTTA (NAME) 114252 (P.E. NO.)
DATE 08/28/2025
TBPELS FIRM #F–4528

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
FROM METRO CORRIDOR TO SWPS

CURB, CURB AND GUTTER
AND HEADER DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 126 OF 169	

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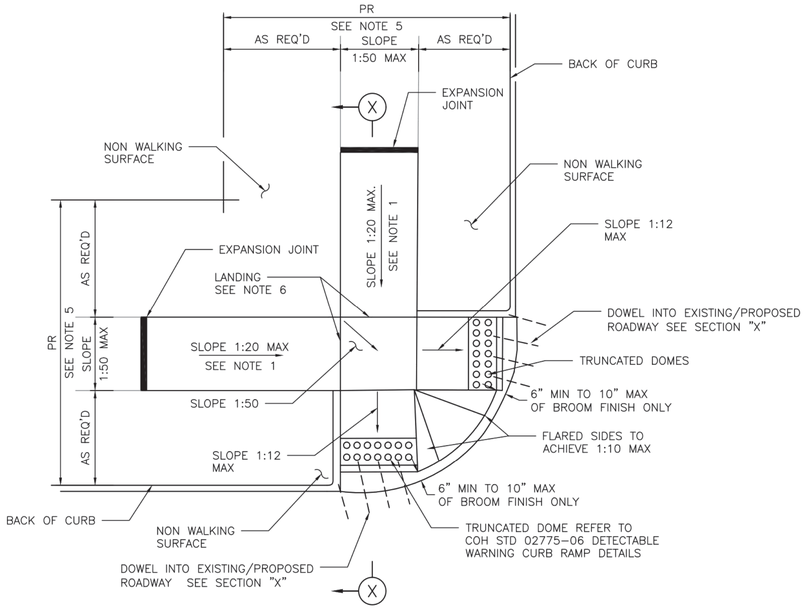
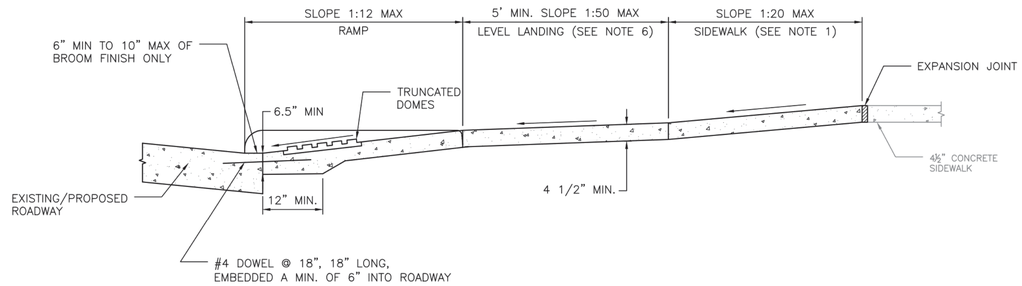


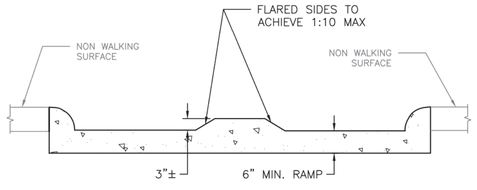
STREETS WITH NON– WALKING SURFACE BEHIND CURB
SEE NOTE–7



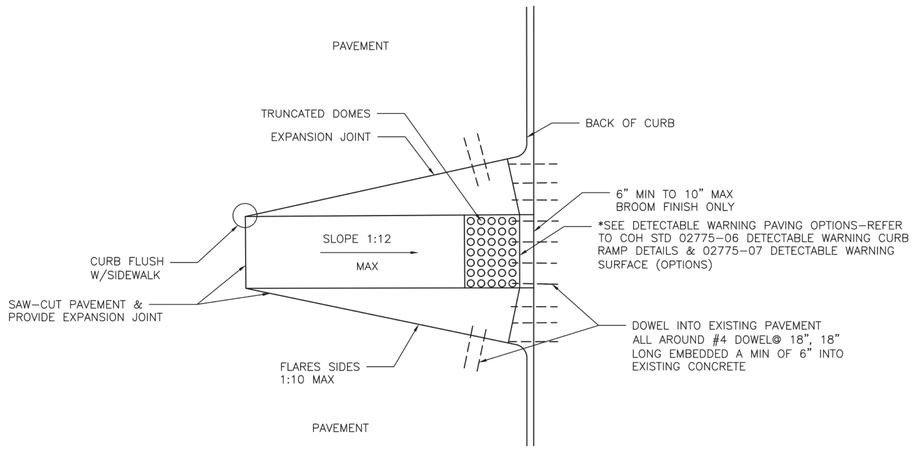
SECTION X–X

NOTES:

1. REPLACE EXISTING SIDEWALK FROM LEVEL LANDING AS NECESSARY TO ACHIEVE 1:20 SLOPE
2. BROOM FINISH IS MEASURED FROM FACE OF CURB.
3. ALL RAMPS AND SIDEWALKS/WALKWAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH HOUSTON PUBLIC WORKS STANDARDS, TEXAS ACCESSIBILITY STANDARDS (TAS) AND AMERICANS WITH DISABILITIES ACT (ADA) REQUIREMENTS. IF THERE IS A CONFLICT IN THE REQUIREMENTS, THE STRICTEST REQUIREMENTS SHALL GOVERN.
4. CURB RAMPS THAT ARE STEEPER THAN A 1:12 MAX SLOPE WILL NOT BE ACCEPTED BY THE CITY OF HOUSTON UNLESS NOTED OTHERWISE.
5. REFER TO CONTRACT DRAWINGS FOR PEDESTRIAN REALM (PR) WIDTH.
6. MINIMUM 5'x5' LANDING PAD ACCORDING TO ADA REQUIREMENTS. WHEN THE APPROACHING SIDEWALK IS WIDER THAN 5', THE LANDING PAD AND RAMP WIDTH MUST MATCH THE SIDEWALK WIDTH.
7. FOR STREETS WITH WALKABLE SURFACES IMMEDIATELY BEHIND THE CURB A FLARE IS REQUIRED ON BOTH SIDES OF THE RAMP.



ELEVATION
LOOKING UP RAMP



CURB RAMP CONSTRUCTION FOR EXISTING PAVEMENT

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DocuSigned by: Suhail Kanwar 9EF8B0C641F5478...	DocuSigned by: KHANG NGUYEN 95A29EFDA75B4CD...
CITY ENGINEER	CITY TRAFFIC ENGINEER
APPROVED BY: DocuSigned by: Curt Haddock A93C410B72B3453...	
DIRECTOR OF HOUSTON PUBLIC WORKS	
EFF DATE: NOV–27–2023	DWG NO: 02775–02

AMANI ENGINEERING, INC.
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MAHESH DUTTA 114252
NAME P.E. NO.
DATE 08/28/2025
TBPELS FIRM #F-4528

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
FROM METRO CORRIDOR TO SWPS

TYPICAL CURB RAMP DETAILS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 127 OF 169	

DISCLAIMER:
THE USE OF THIS STANDARD IS GOVERNED BY THE TEXAS ENGINEERING PRACTICE ACT. THE DESIGN REQUIREMENTS ON THIS STANDARD DO NOT PURPORT TO ADDRESS ALL OF THE SAFETY CONCERNS ASSOCIATED WITH THEIR USE. THE ENGINEER OF RECORD (EOR) IS TO REVIEW THESE DESIGN REQUIREMENTS AND BY AUTHORIZING THEIR USE, ACCEPTS RESPONSIBILITY FOR THEIR APPLICABILITY, ADEQUACY AND SAFETY. NO WARRANTY OF ANY KIND IS MADE BY THE CITY OF HOUSTON FOR ANY PURPOSES WHATSOEVER. THE CITY OF HOUSTON ASSUMES NO RESPONSIBILITY FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

GENERAL PAVEMENT MARKING NOTES:

1. PRIOR TO START OF CONSTRUCTION, ALL EXISTING PAVEMENT MARKINGS WITHIN THE AREA OF CONSTRUCTION SHALL BE INVENTORIED AND DOCUMENTED JOINTLY BY THE CITY INSPECTOR AND THE CONTRACTOR. THIS DOCUMENT WILL BE JOINTLY SIGNED BY BOTH PARTIES REFLECTING ALL EXISTING PAVEMENT MARKINGS AND LANE CONFIGURATIONS WILL BE DUPLICATED AGAIN. THIS REVIEW CAN BE DONE IN CONJUNCTION WITH SIGN INVENTORY. THE CONTRACTOR IS HELD ACCOUNTABLE FOR EXISTING AND TEMPORARY CONSTRUCTION PAVEMENT MARKINGS THROUGHOUT THE PROJECT AND AT THE PROJECT'S COMPLETION.
2. ALL PAVEMENT MARKINGS SHALL CONFORM TO CITY OF HOUSTON STANDARDS AND SPECIFICATIONS AND GENERAL GUIDELINES OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).
3. THE PERMANENT PAVEMENT MARKINGS MAY BE MODIFIED AS DIRECTED BY THE CITY TRAFFIC ENGINEER.
4. THE DESIGN SPEED FOR THE ROAD IS: ____. THE POSTED SPEED LIMIT IS: ____.
5. ALL LANE DIMENSIONS ARE FROM CENTER OF LANE LINE, CENTER OF DOUBLE LANE LINE, FACE OF CURB, OR EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
6. THE PAVEMENT MARKING DRAWINGS ARE SCHEMATIC ONLY. THE CONTRACTOR SHALL FOLLOW ALL DIMENSIONS, DETAILS, AND STANDARDS WHEN INSTALLING PAVEMENT MARKINGS AND SYMBOLS.
7. THE FINAL LONGITUDINAL STRIPINGS SHALL BE 60 MIL (0.060") THICK HOT-SPRAYED THERMOPLASTIC PLACED OVER THE TEMPORARY STRIPING WITHIN 14 TO 30 CALENDAR DAYS AFTER COMPLETION OF THE FINAL PAVEMENT SURFACE, OR AS DIRECTED BY THE CITY TRAFFIC ENGINEER. ALL OTHER PAVEMENT MARKINGS SHALL BE APPLIED AT THE SAME TIME. TEMPORARY STRIPING SHALL BE WATER BASED PAINT.
8. ALL FINAL TRANSVERSE MARKINGS SHALL BE 90 MIL (0.090") HOT-SPRAYED THERMOPLASTIC. ALL PAVEMENT ARROWS AND LEGENDS SHALL ALSO BE 90 MIL (0.090") HOT-SPRAYED THERMOPLASTIC. PREFORMED THERMOPLASTIC APPLICATIONS MAY BE USED IF ONLY APPROVED BY THE CITY TRAFFIC ENGINEER.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LAYOUT AND INSTALLATION OF PAVEMENT MARKINGS OF FINAL SURFACE COURSE FOLLOWING CONTROL POINTS THAT HAVE BEEN SET NO MORE THAN 50 FEET APART ALONG THE LINES TO BE IMPLEMENTED. IN TANGENT SECTIONS OF A ROAD WHERE THE PAVEMENT MARKING PATTERN DOES NOT CHANGE, CONTROL POINTS CAN BE SET AT 200 FEET SPACING. THE LAYOUT AND INSPECTION OF ALL PAVEMENT MARKINGS SHALL BE APPROVED BY CITY OF HOUSTON REPRESENTATIVE PRIOR TO THE APPLICATION OF MATERIALS.
10. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE FINAL SURFACE COURSE IS PLACED SO THAT THE STRIPING IS OFFSET NO MORE THAN ONE FOOT CLEAR OF THE CONSTRUCTION JOINT, UNLESS OTHERWISE DIRECTED BY THE CITY TRAFFIC ENGINEER.
11. ALL RAISED PAVEMENT MARKERS (RPMS) SHALL BE INSTALLED SO THAT THE REFLECTIVE FACE OF EACH MARKER IS FACING THE DIRECTION OF TRAFFIC AND IS PERPENDICULAR TO THE DIRECTION OF TRAFFIC FLOW. TYPE C PAVEMENT MARKERS SHALL BE INSTALLED SO THAT THE CLEAR FACE OF EACH MARKER IS FACING THE APPROACHING TRAFFIC FLOW AND PERPENDICULAR TO THE DIRECTION OF TRAFFIC FLOW.
12. ALL REMOVAL OF EXISTING PAVEMENT MARKINGS SHALL BE ACCOMPLISHED IN ACCORDANCE TO CITY OF HOUSTON STANDARD SPECIFICATION 02762. APPLYING OVER EXISTING PAVEMENT MARKINGS DOES NOT CONSTITUTE AS APPROVED OBLITERATION METHOD.
13. THE ENGINEER OF RECORD SHALL BE REQUIRED TO PRODUCE AS-BUILT OF PAVEMENT MARKING PLANS WITHIN 30 DAYS AFTER COMPLETION OF PAVEMENT MARKING IMPLEMENTATION.
14. BLUE RPMS MAY BE PLACED ADJACENT TO FIRE HYDRANTS WITH THE APPROVAL OF THE CITY TRAFFIC ENGINEER.
15. FOR ALL CONSTRUCTION, ALL PAVEMENT MARKINGS AND SIGNING SHALL BE INSTALLED AND SHALL BE PAID BY THE PROJECT OWNER/DEVELOPER.
16. FINAL INSPECTION AND ACCEPTANCE OF PAVEMENT MARKINGS SHALL BE PERFORMED BY TRANSPORTATION & DRAINAGE OPERATION REPRESENTATIVE (713-803-3054).

Description and Application of Pavement Marking Lines

Line Series	Color	Description	Width Inches	Typical Applications
WB	White	Broken (10' stripe w/ 30' gap)	4"	- Lane lines between travel lanes in the same direction where changing of lanes is permitted.
WS	White	Solid	4"	- Edge lines to delineate the right edge of the roadway
			6"	- Left edge of bicycle lane and lane lines between travel lanes in the same direction where changing of lanes is discouraged.
			12"	- Perpendicular crosswalk lines.
			24"	- Stop bars at intersections (signalized and unsignalized). - Hatching at high visibility crosswalks.
			12", 24"	- Diagonal hatching used in gores between same direction of travel lanes.
WG	White	Guide (2' stripe w/6' gap)	6"	- Guide lines through intersections. - Taper lines for turn lanes. - Guide lines for bicycle lanes.
YS	Yellow	Solid	4"	- Edge lines to delineate the left edge of a divided roadway, a one-way road, or ramp.
			12", 24"	- Diagonal hatching used in gores between opposing direction of travel lanes.
YDS	Yellow	Double Solid	4" - (4") - 4" (gap)	- Centerline that separates opposing travel lanes and delineation of median islands.
YDB	Yellow	Double Broken	4" - (4") - 4" (gap)	- Defines the edges of center reversible lanes that are used as TWLTLs during intermittent periods.
YB	Yellow	Broken (10' stripe w/ 30' gap)	4"	- Separates travel lanes in opposite directions where passing is permitted in both directions of travel.
YB (BIKE)	Yellow	Broken (3' stripe w/ 9' gap)	4"	- Separates bicycle travel lanes in opposite directions where passing is permitted in both directions of travel.
YSB	Yellow	Solid & Broken Broken (10' stripe w/ 30' gap)	4" - (4") - 4" (gap)	- Separates travel lanes in opposite directions where passing is permitted in one direction and prohibited in the opposite direction. - Used for edge of two-way left-turn lanes (TWLTL).
BICYCLE GREEN	Green	Solid Colored Pavement	Varies	- Ped/Bike crossing - Vehicle / Bike/ Conflict Area
YIELD LINE	White	Triangle	16" x 24"	- Mid-Block crossing.

Description and Application of Reflective Raised Pavement Markers (RPM)

RRPM Types	Color	COH Spec. Sec. 02764 Equivalent	Description
C	Clear	Type I-C	- Approach face that reflects white light, and the other side does not reflect.
R	Clear & Red	Type II-C-R	- Approach face that reflects white light, and the other side reflects red light.
A	Amber & Amber	Type II-A-A	- Approach face and the other side both reflect amber light.

Line Style Designation : YSB4 - A40/A40

- Color
- Pattern
- Width of stripe
- RPM spacing
- RPM type
- RPM spacing
- RPM Type

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

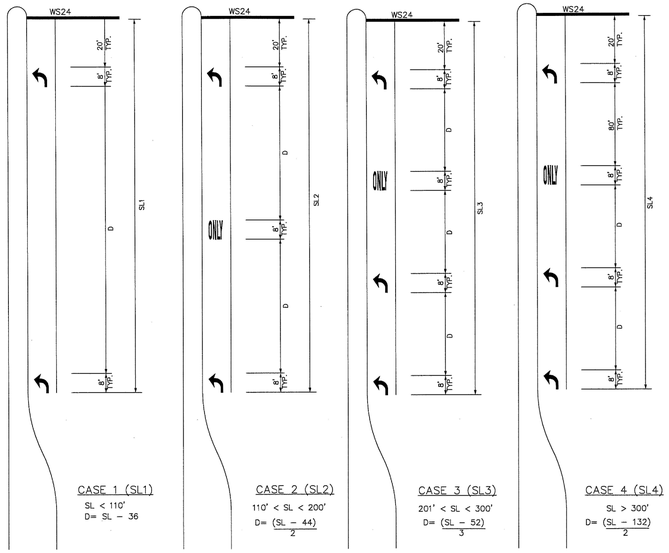
GENERAL NOTES AND LEGENDS

(NOT TO SCALE)

CITY TRAFFIC ENGINEER
CITY ENGINEER

DIRECTOR OF HOUSTON PUBLIC WORKS

EFF DATE: JUL-01-2018 | DWG NO: 01510-01



CASE 1 (SL1)
SL < 110'
D= SL - 36

CASE 2 (SL2)
110' < SL < 200'
D= (SL - 44)/2

CASE 3 (SL3)
201' < SL < 300'
D= (SL - 52)/3

CASE 4 (SL4)
SL > 300'
D= (SL - 132)/2

KEY (FOR TURN LANES ONLY):

SL - STORAGE LENGTH (FEET)

D - DISTANCE BETWEEN ARROWS AND/OR WORDS (FEET)

GENERAL NOTES:

1. ALL CASES AND DETAILS ALSO APPLY TO RIGHT-TURN LANES.
2. FOR DUAL-TURN LANES, DIMENSIONS SHALL BE THE SAME FOR EACH LANE.
3. SL DIMENSION IS FROM BACK OF STOP LINE TO END OF TURN LANE. NOTE: DO NOT INCLUDE TAPER LENGTH.
4. PAVEMENT ARROWS AND "ONLY" LEGEND MARKINGS ARE TYPICALLY USED AT ALL SIGNALIZED INTERSECTIONS AND AT ALL UNSIGNALIZED INTERSECTIONS THAT HAVE TURN LANES.
5. MINIMUM SL= 100', SL MAY BE LESS THAN 100 FEET ONLY BY APPROVAL OF THE CITY TRAFFIC ENGINEER.

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

LEFT/RIGHT-TURN "ONLY" AND ARROW SPACING

(NOT TO SCALE)

CITY TRAFFIC ENGINEER
CITY ENGINEER

DIRECTOR OF HOUSTON PUBLIC WORKS

EFF DATE: JUL-01-2018 | DWG NO: 01510-02

NO.	DATE	REVISION	APP.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

STANDARD PAVEMENT MARKING DETAILS (SHEET 1 OF 6)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 128 OF 169	

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

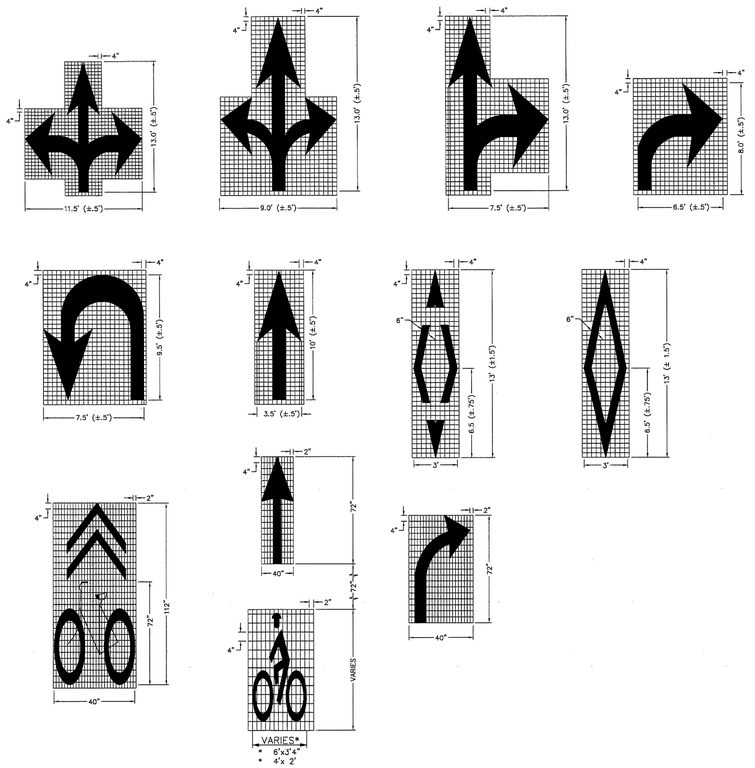
STANDARD PAVEMENT MARKING – (WORDS)

(NOT TO SCALE)

CITY TRAFFIC ENGINEER
CITY ENGINEER

DIRECTOR OF HOUSTON PUBLIC WORKS

EFF DATE: JUL-01-2018 | DWG NO: 01510-03



NOTES FOR PAVEMENT MARKINGS "SYMBOLS" AND "ARROWS":

1. MINIMUM 8 FOOT WHITE MARKINGS SHALL BE USED, UNLESS OTHERWISE NOTED. IF MESSAGE CONSISTS OF MORE THAN ONE WORD, IT SHOULD BE PLACED WITH FIRST WORD NEAREST THE DRIVER.

2. THESE DETAILS ARE STANDARD SIZE FOR NORMAL INSTALLATION; SIZES MAY BE REDUCED APPROXIMATELY ONE-THIRD DEPENDING ON CONDITIONS. SPECIAL PERMISSION NEEDED BY CITY TRAFFIC ENGINEER FOR REDUCTION BELOW ONE-THIRD OF STANDARD SIZES.

3. THE LONGITUDINAL SPACE BETWEEN MARKINGS SHOULD BE 30 FEET, OR AS INDICATED ON THE PLANS.

4. MARKINGS CONSIDERED APPROPRIATE FOR USE WHEN WARRANTED INCLUDE THE FOLLOWING:

   A. REGULATORY
      STOP
      RIGHT (LEFT) TURN ONLY, SYMBOL ARROWS.

   B. WARNING
      STOP AHEAD
      SIGNAL AHEAD
      SCHOOL
      SCHOOL X-ING
      PED X-ING
      R X R (SEE SHEET 01510-08 DETAILS)
      OTHER WORDS OR SYMBOLS MAY BE NECESSARY UNDER CERTAIN CONDITIONS. SPECIAL PERMISSION NEEDED BY CITY TRAFFIC ENGINEER FOR SPECIAL CONDITIONS.

5. UNCONTROLLED USE OF PAVEMENT MARKINGS CAN RESULT IN DRIVER CONFUSION. WORD AND SYMBOL MARKINGS SHOULD BE NO MORE THAN THREE LINES.

6. THE WORD "STOP" SHALL NOT BE USED ON THE PAVEMENT UNLESS ACCOMPANIED BY A STOP LINE AND STOP SIGN. THE WORD "STOP" SHALL NOT BE PLACED ON THE PAVEMENT IN ADVANCE TO A STOP LINE, UNLESS EVERY VEHICLE IS REQUIRED TO STOP AT ALL TIMES (ALL-WAY STOP).

7. PAVEMENT MARKINGS SHOULD GENERALLY BE NO MORE THAN ONE LANE IN WIDTH, WITH SCHOOL MESSAGES BEING THE EXCEPTION. FOR DETAILS OF SCHOOL AND SCHOOL CROSSING PAVEMENT MARKINGS, REFER TO PART VII OF THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

8. SPACING BETWEEN STANDARD SIZE LETTERS SHOULD BE 4 INCHES (MIN). THE WIDTH OF NON-STANDARD SIZE LETTERS MAY VARY DEPENDING ON THE WIDTH OF THE TRAVEL LANES. APPROVAL BY CITY TRAFFIC ENGINEER. SPECIAL PERMISSION NEEDED FOR NON-STANDARD SIZE "LETTER" AND/OR "ARROWS".

9. LANE-USE ARROW MARKINGS MAY BE USED TO CONVEY EITHER GUIDANCE OR MANDATORY MESSAGES. SINGLE TURN ARROWS USED TO CONVEY A MANDATORY MOVEMENT MUST BE ACCOMPANIED STANDARD SIGNS AND THE PAVEMENT MARKING WORD "ONLY".

10. PAVEMENT MARKINGS ARE TO BE LOCATED AS SPECIFIED IN THE DESIGN PLANS.

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

STANDARD PAVEMENT MARKING – SYMBOLS

(NOT TO SCALE)

CITY TRAFFIC ENGINEER
CITY ENGINEER

DIRECTOR OF HOUSTON PUBLIC WORKS

EFF DATE: JUL-01-2018 | DWG NO: 01510-04

NO.	DATE	REVISION	APP.

ARCADIS
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SURVEYED BY:
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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

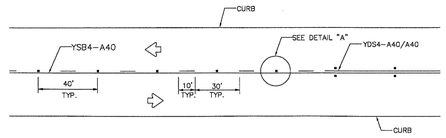
72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

STANDARD PAVEMENT MARKING DETAILS (SHEET 2 OF 6)

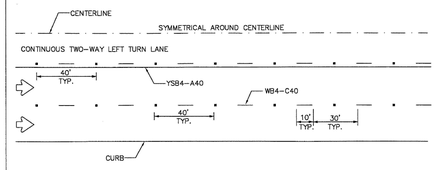
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 129 OF 169	

NO.	DATE	REVISION	APP.

CENTERLINE & FOR ALL TWO LANE STREETS WITH PASSING ZONE

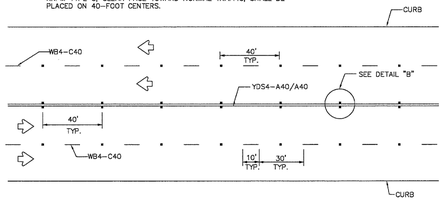


CENTERLINE & LANE LINES FOR TWO-WAY LEFT TURN LANE



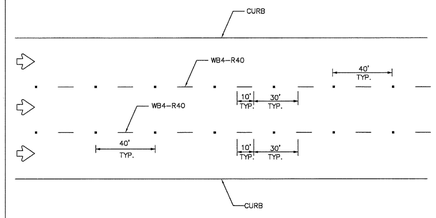
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY STREETS

RRPM TYPE C, CLEAR FACE TOWARD NORMAL TRAFFIC, SHALL BE PLACED ON 40-FOOT CENTERS.



LANE LINES FOR ONE-WAY MULTILANE STREET

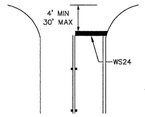
RRPM TYPE R SHALL HAVE CLEAR FACE TOWARD NORMAL TRAFFIC AND RED FACE TOWARD WRONG-WAY TRAFFIC.



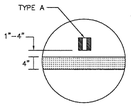
GENERAL NOTES:

1. EDGELINE ADJACENT TO CURB AND GUTTER IS NOT REQUIRED IN ALL CASES, HOWEVER SHALL BE PLACED AS DIRECTED BY CITY TRAFFIC ENGINEER.
2. THE TRAVELED WAY INCLUDES ONLY THAT PORTION OF THE ROADWAY USED FOR VEHICULAR TRAVEL AND NOT THE PARKING LANES, SIDEWALKS, BERMS AND SHOULDERS. THE TRAVELED WAYS SHALL BE MEASURED FROM THE INSIDE OF EDGELINE TO INSIDE OF EDGELINE OF A TWO LANE ROADWAY.
3. ALL RAISED PAVEMENT MARKERS PLACED IN BROKEN LINES SHALL BE PLACED IN LINE WITH AND MIDWAY BETWEEN THE STRIPES.
4. ON CONCRETE PAVEMENTS THE RAISED PAVEMENT MARKERS SHOULD BE PLACED TO ONE SIDE OF THE LONGITUDINAL JOINTS.
5. ALL PAVEMENT MARKING MATERIAL SHALL MEET THE REQUIRED MATERIAL SPECIFICATIONS AS SPECIFIED BY CITY OF HOUSTON STANDARD SPECIFICATIONS.

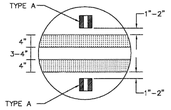
GUIDE FOR PLACEMENT OF STOP LINES & CENTERLINE



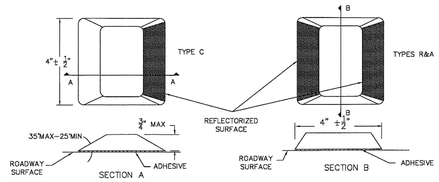
DETAIL "A"



DETAIL "B"

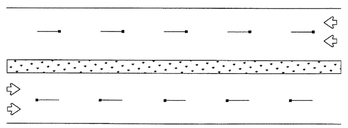


REFLECTIVE RAISED PAVEMENT MARKERS

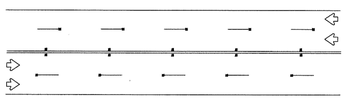


CITY OF HOUSTON HOUSTON PUBLIC WORKS	
STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS FOR POSITION GUIDANCE (NOT TO SCALE)	
CITY TRAFFIC ENGINEER CITY ENGINEER	DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: JUL-01-2018	DWG NO: 01510-05

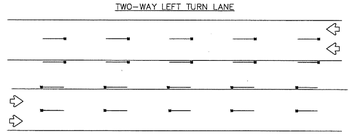
LANE LINES FOR DIVIDED STREET



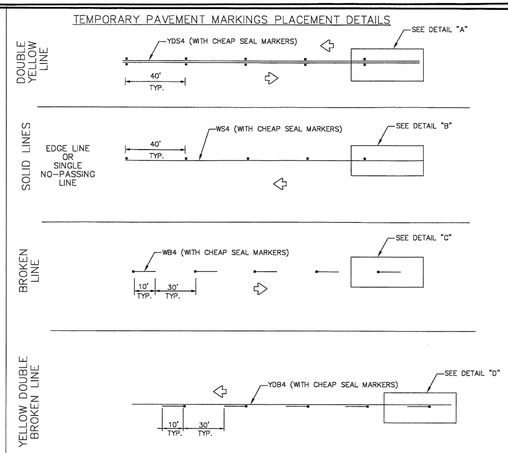
LANE & CENTER LINES FOR MULTILANE UNDIVIDED STREETS



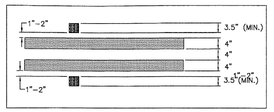
TWO-WAY LEFT TURN LANE



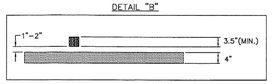
TEMPORARY PAVEMENT MARKINGS PLACEMENT DETAILS



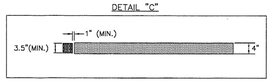
DETAIL "A"



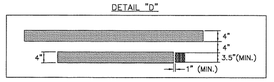
DETAIL "B"



DETAIL "C"



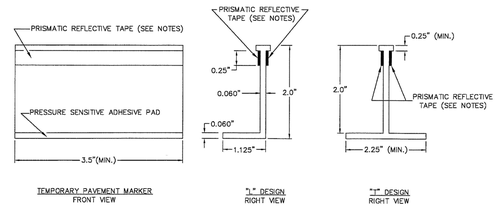
DETAIL "D"



NOTES:

1. YELLOW MARKERS SHALL HAVE YELLOW BODIES AND YELLOW REFLECTIVE TAPE.
2. WHITE MARKERS SHALL HAVE WHITE BODIES AND WHITE REFLECTIVE TAPE.
3. ONE-WAY OR TWO-WAY REFLECTIVE SHALL BE USED AS NECESSARY FOR APPLICATION.
4. THE CLEAR PLASTIC COVER MAY VARY FROM ONE MANUFACTURER TO ANOTHER IF DEEMED NECESSARY BY SPECIFIC PROJECT.
5. ALL TEMPORARY PAVEMENT MARKERS SHALL BE PLACED WITH REFLECTIVE SIDE FACING ON COMING TRAFFIC.
6. ALL TEMPORARY STRIPING SHALL BE WATER BASED PAINT.

TEMPORARY CHIP SEAL MARKER DETAIL



CITY OF HOUSTON HOUSTON PUBLIC WORKS	
REFLECTIVE CHIP SEAL MARKER USE FOR TEMPORARY MARKINGS (NOT TO SCALE)	
CITY TRAFFIC ENGINEER CITY ENGINEER	DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: JUL-01-2018	DWG NO: 01510-06

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FB NO. P-6329

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

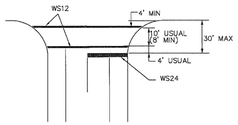
72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

STANDARD PAVEMENT MARKING DETAILS (SHEET 3 OF 6)

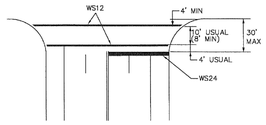
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 130 OF 169	

NO.	DATE	REVISION	APP.

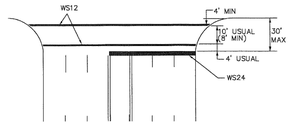
TWO LANES WITH SHOULDERS



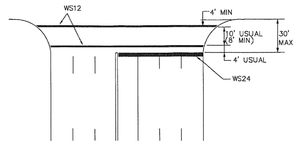
FOUR LANES WITH SHOULDERS



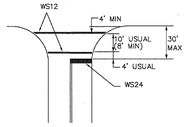
MULTI – LANES



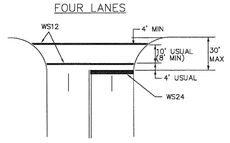
MULTI – LANE WITH MEDIAN



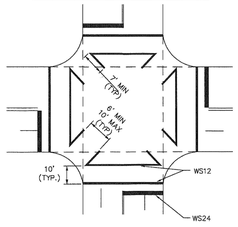
TWO LANES



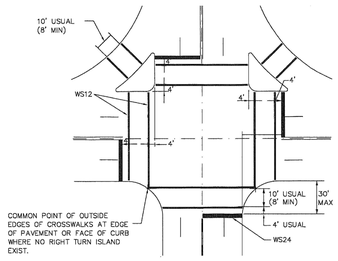
FOUR LANES



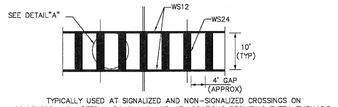
EXCLUSIVE PEDESTRIAN PHASE



INTERSECTION WITH RIGHT – TURN ISLANDS

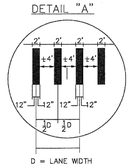


HIGH VISIBILITY CROSSWALK DETAIL



TYPICALLY USED AT SIGNALIZED AND NON-SIGNALIZED CROSSINGS ON COLLECTOR AND ARTERIAL ROADWAYS AND AT LOCATIONS REQUIRING EXTRA EMPHASIS.

DETAIL "A"



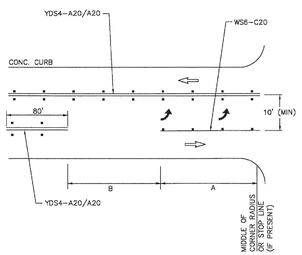
D = LANE WIDTH

NOTES:

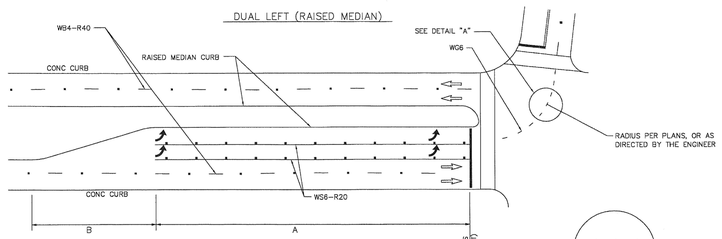
1. CROSSWALKS AND STOP LINES SHALL BE WHITE.
2. "D" IS EQUAL TO ONE HALF THE WIDTH OF TRAVEL LANE.

CITY OF HOUSTON HOUSTON PUBLIC WORKS	
TYPICAL CROSSWALK DETAILS (NOT TO SCALE)	
CITY TRAFFIC ENGINEER CITY ENGINEER	DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: JUL-01-2018	DWG NO: 01510-10

LEFT-TURN LANE

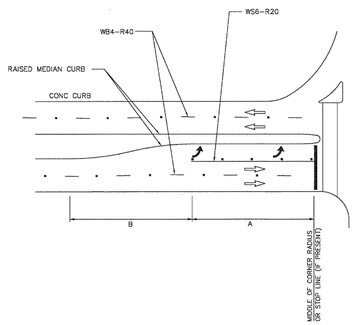


DUAL LEFT (RAISED MEDIAN)



DETAIL "A"

LEFT-TURN LANE (RAISED MEDIAN)



LEFT TURN BAY DIMENSIONS

A = 150' MINIMUM AT INTERSECTION OF TWO (2) MAJOR STREETS WHEN PRACTICAL.
= 100' MINIMUM AT ALL OTHER INTERSECTIONS.

B = 100' MINIMUM ON STRAIGHT ROADWAYS.
*TAPER LENGTH MAY BE SHORTER IF IT IS ON A HORIZONTAL CURVE TO THE LEFT.
*TAPER LENGTH MAY BE LONGER IF CURVE IS TO THE RIGHT.

NOTE:
1. DIMENSIONS SHALL BE ADJUSTED AS DETERMINED BY CITY OF HOUSTON TRAFFIC ENGINEER.
2. REFER TO CITY OF HOUSTON DESIGN MANUAL (DWG No. 10.06-07) FOR DETAILS.

NOTES:

1. THE DIMENSIONS GIVEN FOR DUAL LEFT (RAISED MEDIAN) ON THIS SHEET ARE ALSO APPLICABLE FOR DUAL RIGHT-TURN LANES.
2. STORAGE LENGTHS LONGER THAN THE MINIMUMS LISTED ON THIS DRAWING MAY BE DETERMINED USING TRAFFIC ENGINEERING ANALYSIS.
3. FOR THE PLACEMENT OF PAVEMENT ARROWS AND WORDS SEE LEFT-TURN "ONLY" AND ARROW SPACING WORKSHEET.
4. REFER TO APPLICABLE STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS FOR POSITION GUIDANCE AND LEFT-TURN & RIGHT-TURN LANE STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKINGS.
5. REFER TO BICYCLE LANE PAVEMENT MARKINGS STANDARD FOR TYPE AND PLACEMENT.

CITY OF HOUSTON HOUSTON PUBLIC WORKS	
LEFT-TURN LANE & RIGHT-TURN LANE DESIGN WORKSHEET 1 (NOT TO SCALE)	
CITY TRAFFIC ENGINEER CITY ENGINEER	DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: JUL-01-2018	DWG NO: 01510-11

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CITY OF HOUSTON

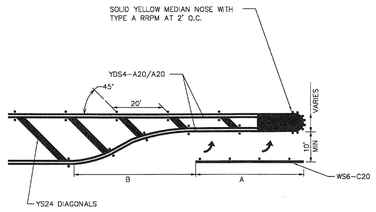
HOUSTON PUBLIC WORKS

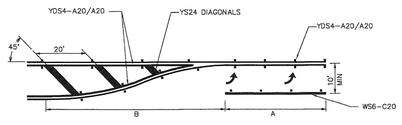
72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

STANDARD PAVEMENT MARKING DETAILS (SHEET 4 OF 6)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 131 OF 169	

PAINTED MEDIAN LEFT TURN BAY DETAILS





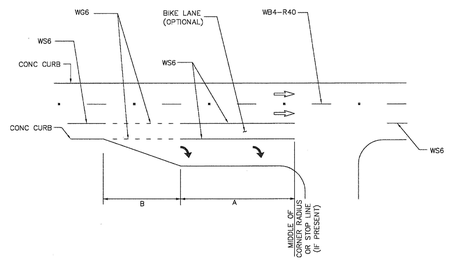
LEFT TURN BAY DIMENSIONS

A = 150' MINIMUM AT INTERSECTION OF TWO (2) MAJOR STREETS WHEN PRACTICAL.
= 100' MINIMUM AT ALL OTHER INTERSECTIONS.

B = 100' MINIMUM ON STRAIGHT ROADWAYS.
*TAPER LENGTH MAY BE SHORTER IF IT IS ON A HORIZONTAL CURVE TO THE LEFT.
*TAPER LENGTH MAY BE LONGER IF CURVE IS TO THE RIGHT.

NOTE:
1. DIMENSIONS SHALL BE ADJUSTED AS DETERMINED BY CITY OF HOUSTON TRAFFIC ENGINEER.
2. REFER TO CITY OF HOUSTON DESIGN MANUAL (DWG No. 10.06-07) FOR DETAILS.

UNSIGNALIZED RIGHT-TURN LANE

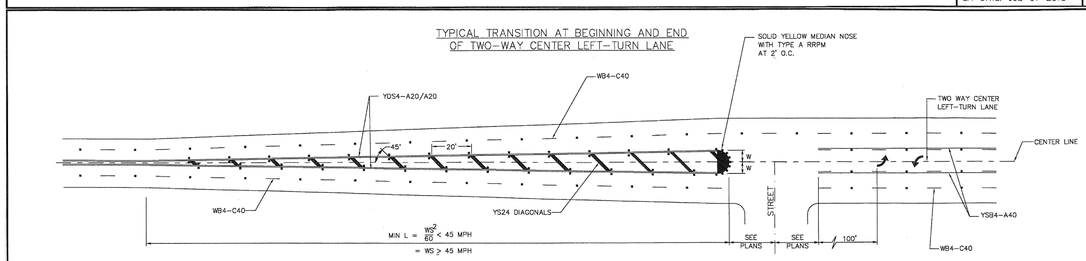


NOTES:

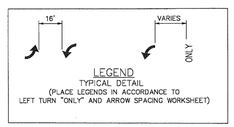
1. STORAGE LENGTHS LONGER THAN THE MINIMUMS LISTED ON THIS DRAWING MAY BE DETERMINED USING TRAFFIC ENGINEERING ANALYSIS OR APPROXIMATE CALCULATIONS.
2. FOR THE PLACEMENT OF PAVEMENT ARROWS AND WORDS SEE LEFT-TURN "ONLY" AND ARROW SPACING WORKSHEET.
3. REFER TO APPLICABLE STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS FOR POSITION GUIDANCE AND LEFT-TURN & RIGHT-TURN LANE STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKINGS.
4. REFER TO BICYCLE LANE PAVEMENT MARKINGS STANDARD FOR TYPE AND PLACEMENT.

CITY OF HOUSTON HOUSTON PUBLIC WORKS	
LEFT-TURN LANE & RIGHT-TURN LANE DESIGN WORKSHEET 2 (NOT TO SCALE)	
CITY TRAFFIC ENGINEER CITY ENGINEER	DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: JUL-01-2018	DWG NO: 01510-12

TYPICAL TRANSITION AT BEGINNING AND END OF TWO-WAY CENTER LEFT-TURN LANE



W = WIDTH OF OFFSET (FT)
S = POSTED SPEED (MPH)
L = LENGTH OF CROSSHATCHING (FT)

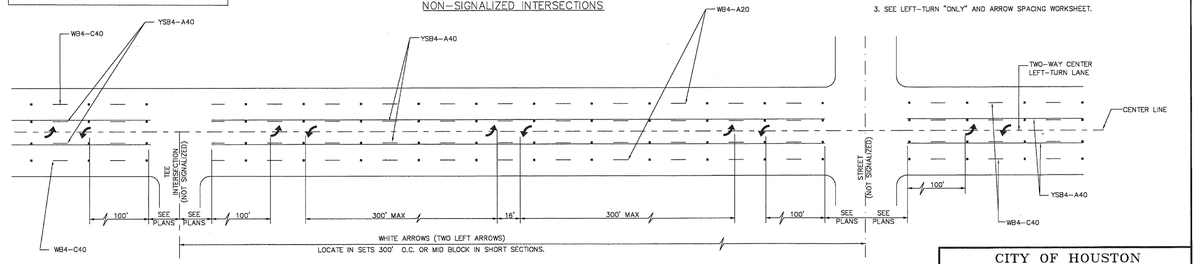


LEGEND
TYPICAL DETAIL
(PLACE LEGENDS IN ACCORDANCE TO LEFT TURN "ONLY" AND ARROW SPACING WORKSHEET)

NOTE:

1. REFLECTIVE RAISED PAVEMENT MARKERS SHOULD BE IN ACCORDANCE WITH STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS FOR POSITION GUIDANCE AND LEFT-TURN & RIGHT-TURN LANE STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS.
2. SEE LEFT-TURN & RIGHT-TURN LANE DESIGN WORKSHEET FOR APPLICABLE INFORMATION.
3. SEE LEFT-TURN "ONLY" AND ARROW SPACING WORKSHEET.

TWO-WAY LEFT-TURN LANE DETAILS NON-SIGNALIZED INTERSECTIONS



CITY OF HOUSTON HOUSTON PUBLIC WORKS	
TWO-WAY LEFT-TURN LANE DETAIL 1 (NOT TO SCALE)	
CITY TRAFFIC ENGINEER CITY ENGINEER	DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: JUL-01-2018	DWG NO: 01510-13

NO.	DATE	REVISION	APP.

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

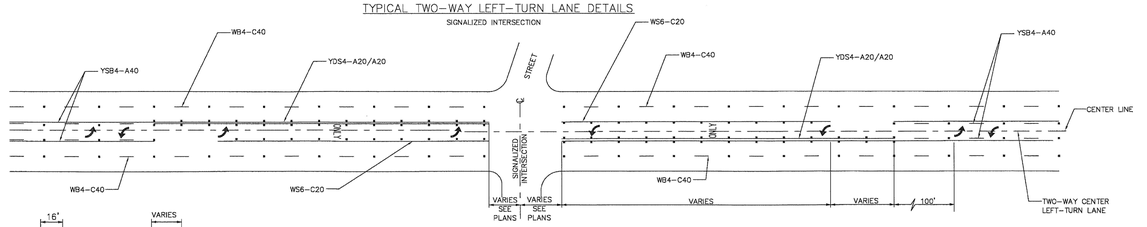
STANDARD PAVEMENT MARKING DETAILS (SHEET 5 OF 6)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 132 OF 169	

NO.	DATE	REVISION	APP.

TYPICAL TWO-WAY LEFT-TURN LANE DETAILS

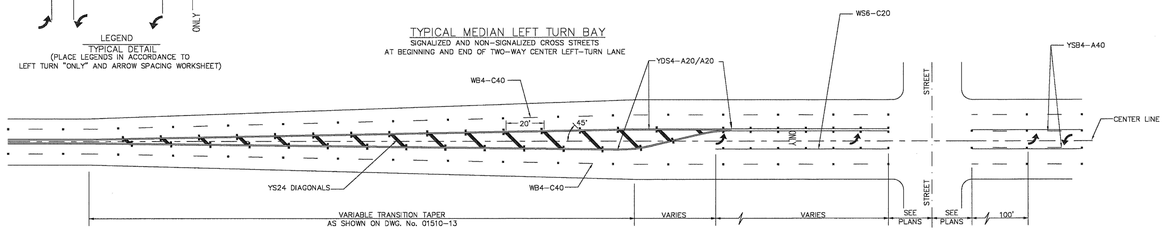
SIGNALIZED INTERSECTION



LEGEND
TYPICAL DETAIL
(PLACE LEGENDS IN ACCORDANCE TO LEFT TURN "ONLY" AND ARROW SPACING WORKSHEET)

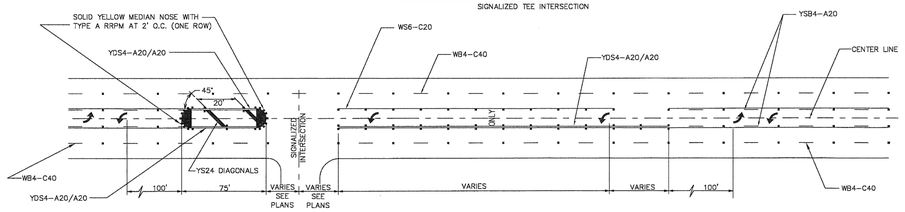
TYPICAL MEDIAN LEFT TURN BAY

SIGNALIZED AND NON-SIGNALIZED CROSS STREETS
AT BEGINNING AND END OF TWO-WAY CENTER LEFT-TURN LANE



TYPICAL TWO-WAY LEFT-TURN LANE DETAILS

SIGNALIZED TEE INTERSECTION



NOTE:

1. REFLECTIVE RAISED PAVEMENT MARKERS SHOULD BE IN ACCORDANCE WITH STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS FOR POSITION GUIDANCE AND LEFT-TURN & RIGHT-TURN LANE STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS.
2. SEE LEFT-TURN & RIGHT-TURN LANE DESIGN WORKSHEET FOR APPLICABLE INFORMATION.
3. SEE LEFT-TURN "ONLY" AND ARROW SPACING WORKSHEET.

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

TWO-WAY LEFT-TURN LANE
DETAIL 2

(NOT TO SCALE)

CITY TRAFFIC ENGINEER / CITY ENGINEER	DIRECTOR OF HOUSTON PUBLIC WORKS
EFF DATE: JUL-01-2018	DWG NO: 01510-14

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

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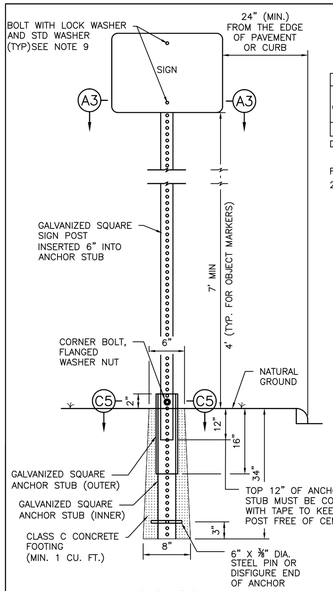
CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

STANDARD PAVEMENT MARKING DETAILS (SHEET 6 OF 6)

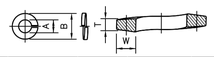
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 133 OF 169	



ELEVATION

TYPICAL GROUND SIGN INSTALLATION
PERFORATED SQUARE METAL TUBING

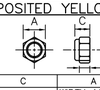
TABLE A	
GALVANIZED SQUARE SIGN POST (PERFORATED)	1–3/4"x–1–3/4" (14 GAUGE)
GALVANIZED SQUARE ANCHOR STUB (PREFORATAED) (INNER)	2"x2"x36" (14 GAUGE)
GALVANIZED SQUARE ANCHOR STUB (PERFORATED) (OUTER)	2 1/4" x 2 1/4" x 18" (14 GAUGE)



NOMINAL WASHER SIZE	A INSIDE DIAMETER MAX	A INSIDE DIAMETER MIN	B OUTSIDE DIAMETER MAX	T MEAN SECTION (THICKNESS)	W SECTION WIDTH
5/16"	0.332"	0.314"	0.583"	0.078"	0.125"

DIMENSIONS: ASME B18.21.1
MATERIAL: ALLOY STEEL PER ASME B18.21.1
FINISH: MECHANICAL ZINC PER ASTM B695, CLASS 5, TYPE 2 (YELLOW)

5/16" SPLIT LOCK WASHER, HIGH ALLOY MECHANICAL DEPOSITED YELLOW SINK



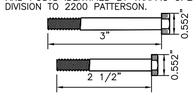
SIZE	C THICKNESS MAX	C THICKNESS MIN	A WIDTH ACROSS FLATS MAX	A WIDTH ACROSS FLATS MIN	D HEX HEIGHT MIN
0.313"	0.359"	0.329"	0.502"	0.489"	0.250"

DIMENSIONS: ASME B18.16.6
MATERIAL: CARBON STEEL, GRADE 8 PER ASME B18.16.6, NYLON ⅝
THREAD REQUIREMENTS: ASME B1.1 UNC & UNF CLASS 2B

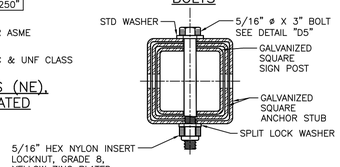
HEX NYLON INSERT LOCKNUTS (NE), GRADE 8, YELLOW ZINC PLATED

NOTES:

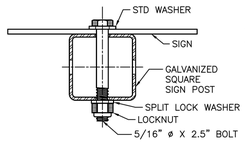
1. THE EXISTING SIGNS LOCATED ON PUBLIC CONSTRUCTION SITE ARE THE PROPERTY OF THE CITY OF HOUSTON. THROUGHOUT THE PERIOD OF THE CONTRACT, THE CONTRACTOR SHALL PROTECT THESE SIGNS SUCH THAT THEY ARE NOT DAMAGED IN THE COURSE OF CONSTRUCTION ACTIVITY. SUCH PROTECTION SHALL INCLUDE THE PERIOD AFTER SIGNS ARE REMOVED FROM INSTALLATION AND STORED BY THE CONTRACTOR OR DELIVERED TO THE TRAFFIC OPERATIONS CENTER (2200 PATTERSON). THE GENERAL TRAFFIC SUPERINTENDENT (832–395–6771) MUST BE NOTIFIED 48 HOURS IN ADVANCE PRIOR TO DELIVERY.
2. AFTER SIGNS ARE REMOVED FROM INSTALLATION AND ARE BEING STORED BY THE CONTRACTOR, THE CONTRACTOR SHALL CONTACT THE TRAFFIC OPERATIONS DIVISION OF HOUSTON PUBLIC WORKS (832–395–6771) AND ARRANGE FOR A CONVENIENT TIME TO DELIVER ONLY CITY SIGNS AND POSTS IDENTIFIED BY TRAFFIC OPERATIONS DIVISION TO 2200 PATTERSON.
3. PRIOR TO THE START OF CONSTRUCTION, ALL EXISTING SIGNS WITHIN THE AREA OF CONSTRUCTION WILL BE INVENTORIED AND DOCUMENTED JOINTLY BY THE CITY INSPECTOR AND THE CONTRACTOR. THIS DOCUMENT WILL BE JOINTLY SIGNED BY BOTH PARTIES REFLECTING THE SIGN TYPE, SIGN SIZE, SIGN CONDITION, SIGN LOCATION, REFLECTIVITY ADEQUACY, ETC. THE CONTRACTOR IS HELD ACCOUNTABLE FOR THESE SIGNS THROUGHOUT THE PROJECT AND AT THE PROJECTS COMPLETION.
4. ALL GROUND MOUNTED STOP SIGNS, WARNING SIGNS, AND OTHER REGULATORY SIGNS SHALL USE AT A MINIMUM HIGH INTENSITY PRISMATIC REFLECTIVE SHEETING.
5. ALL OVERHEAD SIGNS SHALL USE DIAMOND GRADE REFLECTIVE SHEETING.
6. ALL OTHER SIGNS SHALL USE SUPER ENGINEER GRADE SHEETING.
7. ALL BLANKS TO BE INSTALLED SHALL BE ALUMINUM ALLOY 6061–T–6 OR 5052–H38 IN ACCORDANCE WITH ASTM B209.
8. ALL HOLES SHALL BE ⅜" DIAMETER DRILLED OR PUNCHED AS SHOWN ON EACH BLANK DETAIL AND SHALL BE FREE OF BURRS AND / OR ROUGH EDGES. WHERE NON–STANDARD ORIENTATION OF SIGN IS USED, ENLARGE HOLE IN SIGN POST AT SIGN CONNECTION NOT GREATER THAN 11/16" IN DIAMETER.
9. BOLT SIZE REQUIREMENTS FOR SIGN CONNECTION:
   9.1. STANDARD ORIENTATION = 5/16" DIA X 2 1/2" BOLT
   9.2. NON STANDARD ORIENTATION = 5/16" DIA X 3" BOLT
10. SIGN BLANK CORNERS TO BE ROUNDED AS SHOWN ON EACH DETAIL ON SHEET 01554–06.
11. ALL SIGN BLANKS ARE TO BE ETCHED, DEGREASED, AND HAVE A COATING MEETING THE REQUIREMENTS OF ASTM B449, CLASS 2, OR ASTM B921, CLASS 2. PRIOR TO APPLICATION OF LEGENDS.
12. ALL SIGNS SHALL BE MANUFACTURED AND INSTALLED IN CONFORMANCE TO THE LATEST TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD) AND STANDARD HIGHWAY SIGNS LATEST EDITION.



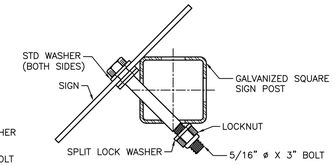
SECTION D5
BOLTS



SECTION C5
CORNER BOLT



STANDARD ORIENTATION



NON–STANDARD ORIENTATION

SECTION A3: SIGN CONNECTION DETAILS

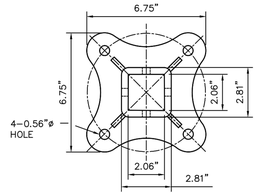
CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

GENERAL NOTES AND GROUND MOUNTING SIGN
(SCALE: NOT TO SCALE)

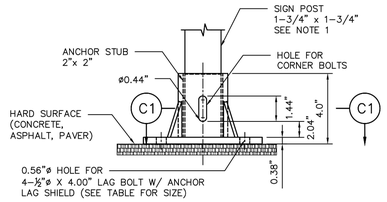
APPROVED BY:

DocuSigned by: Suhail Kanwar — CITY ENGINEER
DocuSigned by: HANG NGUYEN — CITY TRAFFIC ENGINEER
DocuSigned by: Carol Haddock — DIRECTOR OF HPW

EFF DATE: NOV–27–2023 | DWG NO: 01554–01



TOP VIEW



SIDE VIEW

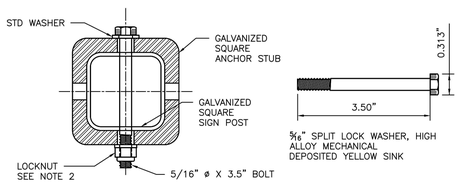
TYPICAL HARD SURFACE INSTALLATION GALVANIZED SIGN BASE

NOTES:

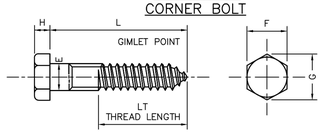
1. REFER TO COH STD DWG 01554–01 FOR SIGN AND POST REQUIREMENTS.
2. REFER TO DETAIL "C5" ON COH STD DWG 01554–01 FOR NUT AND BOLT REQUIREMENTS.

BASE PLATE NOTES:

1. MATERIAL: ASTM A–536 GRADE 65–45–12 DUCTILE IRON
2. HOT DIP GALVANIZE PER ASTM A–153
3. ALL DIMENSIONS ARE IN INCHES



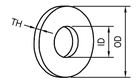
SECTION C1
CORNER BOLT



DIAMETER	E BODY DIAMETER MAX	E BODY DIAMETER MIN	F WIDTH ACROSS FLATS MAX	F WIDTH ACROSS FLATS MIN	G WIDTH ACRSS CORNERS MAX	G WIDTH ACRSS CORNERS MIN	H HEIGHT MAX	H HEIGHT MIN	L LENGTH	LT THREAD LENGTH
1/2"	0.515"	0.482"	0.750"	0.725"	0.866"	0.826"	0.364"	0.302"	4.00"	3.84"

MATERIAL:PER A307 GRADE A
COATING: HOT DIP ZINC PER ASTM F2329 OR IN ACCORDANCE WITH CLASS C OF ASTM A153 AND CLASS D FOR ⅜" DIAMETER AND LESS

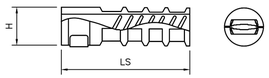
4" HEX LAG SCREWS, HOT DIPPED GALVANIZED



SAE FLAT WASHERS									
	ID			OD			THICKNESS – TH		
SIZE	BASIC	TOLERANCE PLUS	TOLERANCE MINUS	BASIC	TOLERANCE PLUS	TOLERANCE MINUS	BASIC	MAX	MIN
1/2"	0.531	0.015"	0.005"	1.062"	0.030"	0.007"	0.95"	0.121"	0.74"

DIMENSIONS: ASME B18.21.1, TYPE A PLAIN WASHERS
MATERIAL: CARBON STEEL
FINISH: Fe/Zn 3AT PER ASTM F1941

1/2" FLAT WASHERS, LOW CARBON, SAE, ZINC PLATED



TH	LS LENGTH OF SHIELD NOMINAL	H DRILLED HOLE SIZE	L BOLT LENGTH REQ
LAG THREAD SIZE			
1/2"	3.00"	0.75"	4.00"

ANCHOR LAG SHIELD – ZINC ALLOY

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

SIGN BASE
HARD SURFACE
MOUNTING DETAILS
(SCALE: NOT TO SCALE)

APPROVED BY:

DocuSigned by: Suhail Kanwar — CITY ENGINEER
DocuSigned by: HANG NGUYEN — CITY TRAFFIC ENGINEER
DocuSigned by: Carol Haddock — DIRECTOR OF HPW

EFF DATE: NOV–27–2023 | DWG NO: 01554–02

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713–953–4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F–533

SURVEYED BY:
AMANI ENGINEERING, INC.
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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

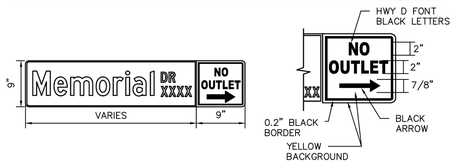
72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

STANDARD SIGNAGE DETAILS (SHEET 1 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 134 OF 169	

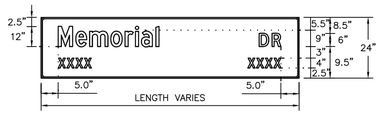
NO.	DATE	REVISION	APP.

POST MOUNTED STREET NAME SIGN W/ NO OUTLET SIGN



D3 – POST MOUNTED STREET NAME SIGN

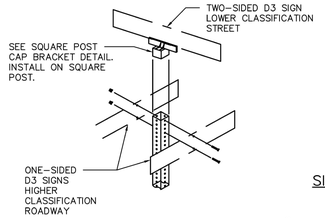
OVERHEAD STREET NAME SIGN DETAIL



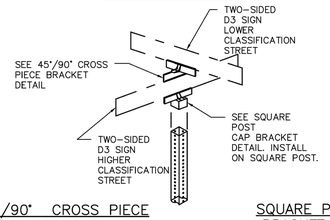
D3 – STREET NAME SIGN

	POST–MOUNTED SIGN	OVERHEAD SIGN
HEIGHT	9"	24"
LENGTH	30" MIN 48" MAX 6" INCREMENTS OF LENGTH	10" MAX 2' INCREMENT OF LENGTH
THICKNESS	0.125"	0.080"
SUBSTREATE	ALLUMINUM ALLOY, 5052–H38 (ASTM B–209)	
SIGN FACE MATERIALS	GREEN FILM OVER DIAMOND GRADE VIP SHEETING	
LEGENDS AND SYMBOLS	HIGHWAY GOTHIC SERIES D (USUAL) HIGHWAY GOTHIC SERIES C OR B FOR MAXIMUM LENGTH SIGN BLACK	
COLOR	LETTERS–WHITE REFLECTIVE BORDER–WHITE REFLECTIVE BACKGROUND–GREEN REFLECTIVE	

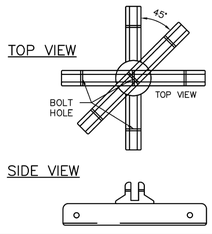
D3 SIGNS GREATER THAN 42" PLATES IN LENGTH



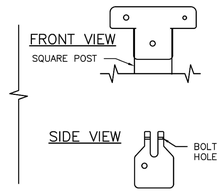
D3 SIGNS LESS THAN OR EQUAL TO 42" PLATES IN LENGTH



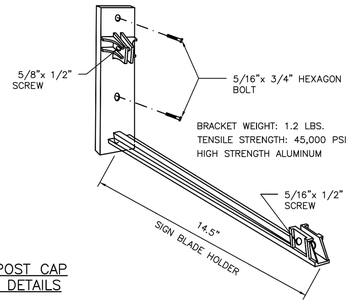
45°/90° CROSS PIECE SIGN BRACKET



SQUARE POST CAP BRACKET DETAILS



SIGNAL POLE MOUNTING DETAIL



NOTES:

1. TYPICAL SIGN PLATE SHOULD BE 30" MAX.
2. LONGER SIGN PLATE MUST BE APPROVED BY THE CITY TRAFFIC ENGINEER.

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

STREET NAME SIGN AND SIGN MOUNTING

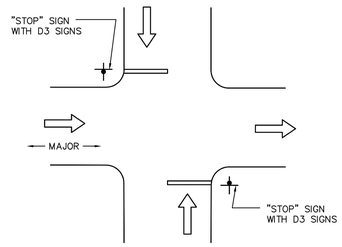
(SCALE: NOT TO SCALE)

APPROVED BY:

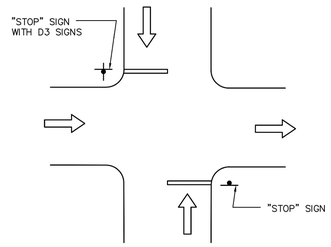
DocuSigned by: Sukat kanwar — CITY ENGINEER
DocuSigned by: KHANG NGUYEN — CITY TRAFFIC ENGINEER
DocuSigned by: Carl Haddock — DIRECTOR OF HPW

EFF DATE: NOV–27–2023 | DWG NO: 01554–03

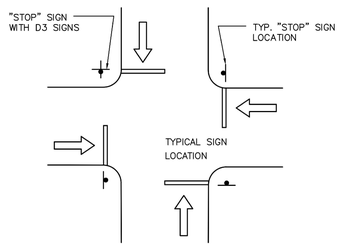
TYPICAL SIGN PLACEMENT



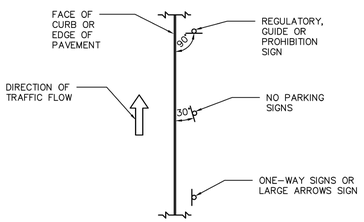
TWO–WAY STOP
AND ONE–WAY OPERATION
ON MAJOR/LOCAL INTERSECTION



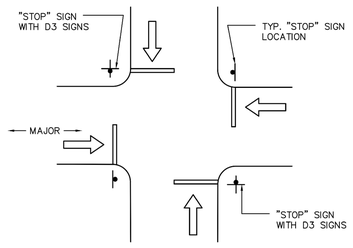
TWO–WAY STOP
AND ONE–WAY OPERATION
ON LOCAL/LOCAL INTERSECTION



FOUR–WAY STOP CONTROL
ON LOCAL/LOCAL INTERSECTION



MAST ARM INSTALLATION
REFER TO TRAFFIC SIGNAL DETAILS
FOR ADDITIONAL INFORMATION.



FOUR–WAY STOP CONTROL
ON MAJOR/LOCAL INTERSECTION

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

TYPICAL SIGN PLACEMENT

(SCALE: NOT TO SCALE)

APPROVED BY:

DocuSigned by: Sukat kanwar — CITY ENGINEER
DocuSigned by: KHANG NGUYEN — CITY TRAFFIC ENGINEER
DocuSigned by: Carl Haddock — DIRECTOR OF HPW

EFF DATE: NOV–27–2023 | DWG NO: 01554–07

NO.	DATE	REVISION	APP.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713–953–4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F–533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P–6329

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

STANDARD SIGNAGE DETAILS (SHEET 2 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
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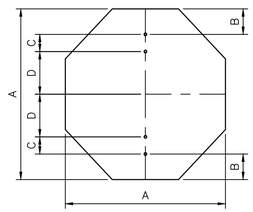
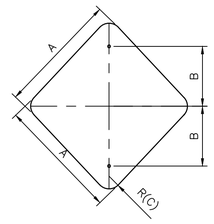
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 135 OF 169	



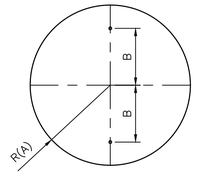
OCTAGONAL

A	B	C	D	T
24	3	3	12	0.08
36	3	3	24	0.08



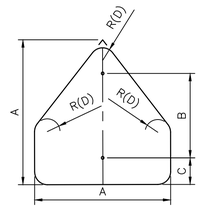
DIAMOND

A	B	C	T
24	12	1 1/2	0.08
30	15	1 1/2	0.08
36	18	1 1/2	0.08



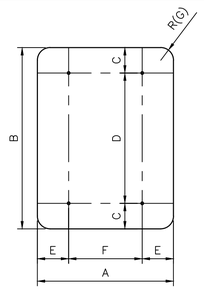
CIRCLE

A	B	T
15	15	0.08
18	12	0.08



PENTAGON (SCHOOL)

A	B	C	D	T
36	24	3	1 1/2	0.08

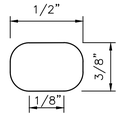


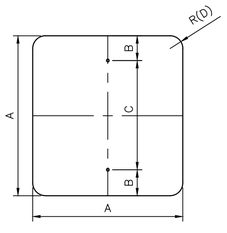
VERTICAL RECTANGLE

A	B	C	D	E	F	G	T
36	48	6	36	6	24	1 1/2	0.08
48	60	6	48	9	30	1 1/2	0.08
18	30	3	24	–	–	1 1/2	0.08

NOTES:

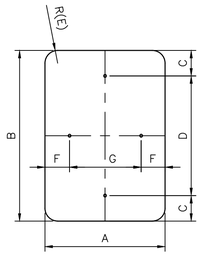
1. A 30" LONG OR GREATER PLATE SHALL BE USED WHEN A "NO OUTLET" SUPPLEMENT IS REQUIRED.
2. THE CITY OF HOUSTON "STOP" AND "YIELD" SIGNS SHALL BE A MINIMUM 36". SPECIAL PERMISSION FROM THE CITY TRAFFIC ENGINEER IS REQUIRED FOR LESS THAN 36" SIGNS.
3. ALL PUNCHED HOLES ARE 3/8"x 1/2" OVAL.
4. ALL CORNER RADII ARE 1 1/2".
5. ALL DIMENSIONS ARE IN INCHES.
6. T = THICKNESS





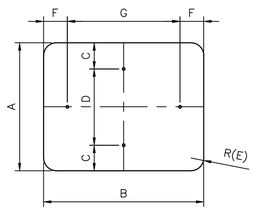
SQUARE (A)

A	B	C	D	T
18	3	12	1 1/2	0.08
24	3	18	1 1/2	0.08
36	3	30	1 1/2	0.08



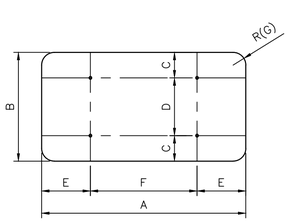
VERTICAL/HORIZONTAL RECTANGLE

A	B	C	D	E	F	G	T
12	18	1 1/2	15	1 1/2	1 1/2	9	0.08
12	36	3	30	1 1/2	1 1/2	9	0.08
18	24	3	18	1 1/2	1 1/2	15	0.08
24	30	3	24	1 1/2	3	18	0.08
24	36	3	30	1 1/2	3	18	0.08
24	48	3	36	1 1/2	3	18	0.08
30	36	3	30	1 1/2	3	24	0.08



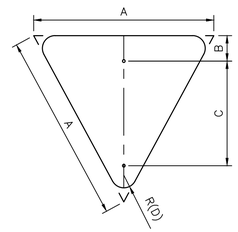
HORIZONTAL/VERTICAL RECTANGLE

A	B	C	D	E	F	G	T
12	6	–	–	1 1/2	1	4	0.08
18	6	–	–	1 1/2	1	4	0.08
12	9	1	10	1 1/2	–	–	0.08
24	12	1 1/2	9	1 1/2	2	8	0.08
24	18	3	12	1 1/2	2	14	0.08
30	24	3	18	1 1/2	3	18	0.08
36	12	1 1/2	9	1 1/2	2	8	0.08



HORIZONTAL RECTANGLE

A	B	C	D	E	F	G	T
36	24	3	18	6	24	1 1/2	0.08
48	24	3	18	9	30	1 1/2	0.08
48	36	6	24	9	30	1 1/2	0.08
60	24	3	18	12	36	1 1/2	0.08
60	36	6	24	12	36	1 1/2	0.08



EQUILATERAL TRIANGLE

A	B	C	D	T
36	3	21	1 1/2	0.08

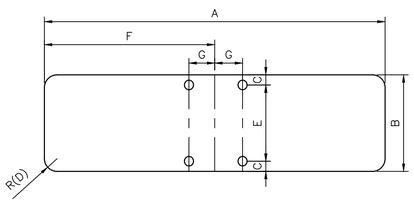


TABLE – D3 SIGNS (BRACKETS)

A	B	C	D	E	F	G	T
30	9	5/16	1 1/2	8 3/8	15	1 3/4	0.125
36	9	5/16	1 1/2	8 3/8	18	1 3/4	0.125
42	9	5/16	1 1/2	8 3/8	21	1 3/4	0.125
48	9	5/16	1 1/2	8 3/8	24	1 3/4	0.125

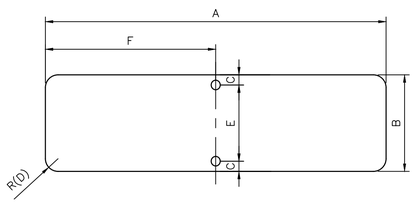


TABLE – D3 SIGNS

A	B	C	D	E	F	T
30	9	1 1/2	1 1/2	6	15	0.125
36	9	1 1/2	1 1/2	6	18	0.125
42	9	1 1/2	1 1/2	6	21	0.125
48	9	1 1/2	1 1/2	6	24	0.125

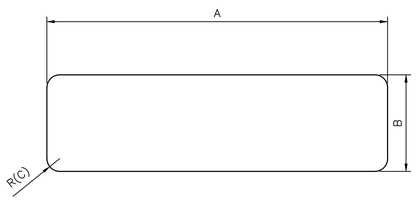


TABLE – D1 SIGNS

A	B	C	T
60	24	1 1/2	0.08
72	24	1 1/2	0.08
84	24	1 1/2	0.08
96	24	1 1/2	0.08

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DocuSigned by: Sukul Tanwar 9FF880C64 9F5478...	DocuSigned by: HUNG NGUYEN 95A2661FDA7584CD...
CITY ENGINEER	CITY TRAFFIC ENGINEER

APPROVED BY:
DocuSigned by: Carl Haddock A63C410972B3482...
DIRECTOR OF HOUSTON PUBLIC WORKS

EFF DATE: NOV-27-2023	DWG NO: 01554-06

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

GROUND MOUNTED SIGN SIZES

	FOR CITY OF HOUSTON USE ONLY
DRAWING SCALE	
NOT TO SCALE	

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

GROUND MOUNTED SIGN SIZES

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 136 OF 169	

NO.	DATE	REVISION	APP.

NO.	DATE	REVISION	APP.

REGULATORY SIGNS

SIGN	SIGN DESIGNATION	SIZE (IN.)
STOP	R1-1	36x36
YIELD	R1-2	36x36x36
ALL WAY PLAQUE	R1-3P	18x6
YIELD HERE TO PEDISTRIANS	R1-5a	36x48
EXCEPT RIGHT TURN (PLAQUE)	R1-10P(1)	24x18
EXCEPT BUSES (PLAQUE)	R1-10P(2)	24x18
SPEED LIMIT	R2-1	30x36
MINIMUM SPEED LIMIT (PLAQUE)	R2-4P	24x30
NO RIGHT TURNS	R3-1	36x36
NO LEFT TURNS	R3-2	36x36
NO U-TURNS	R3-4	36x36
LEFT/RIGHT TURN ONLY	R3-5	30x36
THRU ONLY	R3-5a	30x36
LEFT TURN/THRU	R3-6	30x36
LEFT/RIGHT LANE MUST TURN LEFT/RIGHT	R3-7	36x36
ADVANCE INTERSECTION LANE CONTROL (VARIES)	R3-8	VARIESx30
TWO-WAY LEFT TURN ONLY (OVERHEAD)	R3-9a	30x36
TWO-WAY LEFT TURN LANE (POST MOUNTED)	R3-9b	24x36
BEGIN	R3-9cP	30x12
END	R3-9dP	30x12
REVERSIBLE LANE CONTROL (SYMBOL)	R3-9e	108x48
REVERSIBLE LANE CONTROL (POST MOUNTED)	R3-9f	36x54
ADVANCE REVERSIBLE LANE CONTROL TRANSITION	R3-9g,9h	108x36
END REVERSIBLE LANE	R3-9i	108x48
BIKE LANE	R3-17	24x18
SLOWER TRAFFIC KEEP RIGHT	R4-3	24x30
BEGIN RIGHT TURN LANE YIELD TO BIKES	R4-4	36x30
KEEP RIGHT	R4-7	24x30
KEEP LEFT	R4-8	24x30
DO NOT DRIVE ON SHOULDER	R4-17	24x30
DO NOT PASS ON SHOULDER	R4-18	24x30
DO NOT ENTER	R5-1	36x36
WRONG WAY	R5-1a	42x30
NO TRUCKS (SYMBOL)	R5-2(1)	24x24
NO THRU TRUCKS (TEXT)	R5-2(2)	24x30
ONE WAY (LONG)	R6-1	54x18
ONE WAY	R6-2	30x36
ROUNDABOUT DIRECTIONAL (2 CHEVRONS)	R6-4	30x24
ROUNDABOUT CIRCULATION (PLAQUE)	R6-5P	30x30
BEGIN ONE WAY	R6-6	30x36
END ONE WAY	R6-7	30x36
PARKING RESTRICTION (ARROW)	R7-2(1)	12x18
PARKING RESTRICTION (TO CORNER)	R7-2(2)	12x18
PARKING RESTRICTION (BUS ZONE)	R7-2(3)	12x18

REGULATORY SIGNS

SIGN	SIGN DESIGNATION	SIZE (IN.)
PARKING RESTRICTION (VALET ZONE)	R7-2(4)	12x18
PARKING RESTRICTION (PEAK PERIOD)	R7-2(5)	12x18
PARKING RESTRICTION (EMERGENCY VEH. ONLY)	R7-2(6)	12x18
PARKING RESTRICTION (TAXI ZONE)	R7-2(7)	12x18
PARKING RESTRICTION (NO STOPPING OR STANDING)	R7-2(8)	12x18
PARKING RESTRICTION (JITNEY STOP)	R7-2(9)	12x18
PARKING RESTRICTION (PED-CAB ZONE)	R7-2(10)	12x18
PARKING RESTRICTION (LIMO ZONE)	R7-2(11)	12x18
PARKING RESTRICTION (COMMERCIAL VEH. ZONE)	R7-2(12)	12x18
PARKING RESTRICTION (FED/CITY AUTHORIZED VEH. ONLY)	R7-2(13)	12x18
PARKING RESTRICTION (U.S. MARSHAL PARKING ONLY)	R7-2(14)	12x18
PARKING RESTRICTION (EMERGENCY)	R7-2(15)	12x18
PARKING TIME LIMIT (VARIES)	R7-108	12x18
HANDICAPPED PARKING	R7-8T	12x18
TOW AWAY ZONE (PLAQUE)	R7-201P	12x6
PARKING METER (COH)	R7-110	12x18
ON TRACKS (PLAQUE)	R8-3eP	24x18
CROSS ONLY AT CROSSWALKS (SYMBOL)	R9-2	12x18
NO PEDESTRIAN CROSSING (SYMBOL)	R9-3	18x18
NO PEDESTRIAN CROSSING	R9-3a	12x18
PEDESTRIAN CROSSING	R9-8	36x18
SIDEWALK CLOSED	R9-9	24x12
SIDEWALK CLOSED-USE OTHER SIDE	R9-10	24x12
SIDEWALK CLOSED CROSS HERE	R9-11a	24x12
PUSH BUTTON FOR PEDESTRIAN CROSSING	R10-3e	9x15
LEFT ON GREEN ARROW ONLY	R10-5	30x36
STOP HERE ON RED	R10-6	24x36
DO NOT BLOCK INTERSECTION	R10-7	24x30
LEFT/RIGHT TURN SIGNAL	R10-10	30x36
NO TURN ON ROAD (TEXT)	R10-11a	36x48
LEFT TURN YIELD ON GREEN	R10-12	30x36
CROSSWALK, STOP ON RED	R10-23	24x30
KEEP OFF MEDIAN	R11-1	24x30
ROAD CLOSED	R11-2	48x30
ROAD CLOSED LOCAL TRAFFIC ONLY	R11-3a	60x30
BRIDGE OUT LOCAL TRAFFIC ONLY	R11-3b	60x30
ROAD CLOSED TO THRU TRAFFIC	R11-4	60x30
WEIGHT LIMIT XX TONS	R12-1	24x30
AXLE WEIGHT LIMIT XX TONS/LBS	R12-2	24x30
NO TRUCKS OVER XX TONS/LBS EMPTY WEIGHT	R12-3	24x36
WEIGHT LIMIT XX TONS PER AXLE XX TONS GROSS	R12-4	36x24
LOAD ZONED BRIDGE	R12aT	VARIESx36
TRUCK ROUTE	R14-1	24x18
GRADE CROSSING (CROSSBUCK)	R15-1	48x9
NUMBER OF TRACKS (PLAQUE)	R15-2P	27x18

REGULATORY SIGNS

SIGN	SIGN DESIGNATION	SIZE (IN.)
RIGHT ANGLE TURN	CW1-1	36X36
HORIZONTAL CURVE	CW1-2	36X36
REVERSE RIGHT ANGLE TURNS	CW1-3	36X36
REVERSE HORIZONTAL CURVES	CW1-4	36X36
REVERSE CURVE (2 LANES)	CW1-4b	36X36
REVERSE CURVE (MORE THAN 2 LANES)	CW1-4c	36X36
ONE-DIRECTION LARGE ARROW	CW1-6	48X24
UPWARD SLOPING ARROW	CW1-6aT	36X36
CHEVRON	CW1-8	18X24
STOP AHEAD	CW3-1	36X36
SIGNAL AHEAD	CW3-3	36X36
BE PREPARED TO STOP	CW3-4	36X36
ROAD NARROWS	CW5-1	36X36
NARROW BRIDGE	CW5-2	36X36
TWO-WAY TRAFFIC FLOW	CW6-3	36X36
TWO-WAY TRAFFIC	CW6-4	12X18
BUMP	CW8-1	36X36
DIP	CW8-2	36X36
SOFT SHOULDER	CW8-4	36X36
TRUCK CROSSING	CW8-6	36X36
ROUGH ROAD	CW8-8	36X36
UNEVEN LANES	CW8-11	36X36
LEFT LANE ENDS	CW9-1(1)	36X36
RIGHT LANE ENDS	CW9-1(2)	36X36
DOUBLE ARROW	CW12-1	30X30
ADVISORY SPEED (PLAQUE)	CW13-1P	24X24
XX FEET (PLAQUE)	CW16-2P	24X18
AHEAD (PLAQUE)	CW16-3	24X12
ROAD WORK AHEAD	CW20-1	36X36
DETOUR AHEAD	CW20-2	36X36
ROAD CLOSED AHEAD	CW20-3	36X36
ONE LANE ROAD	CW20-4	36X36
LEFT LANE CLOSED	CW20-5(1)	36X36
RIGHT LANE CLOSED	CW20-5(2)	36X36
FLAGGER (SYMBOL)	CW20-7	36X36
NARROW LANES AHEAD	CW20-8T	36X36
SHOULDER WORK AHEAD	CW21-5	36X36
UTILITY WORK AHEAD	CW21-7	36X36
DOUBLE REVERSE CURVE (1 LANE)	CW24-1	36X36
DOUBLE REVERSE CURVE (2 LANE)	CW24-1a	36X36
DOUBLE REVERSE CURVE (3 LANE)	CW24-1b	36X36
END ROAD WORK	G20-2	36X18
DETOUR WITH ARROWS	M4-9	30X24
END DETOUR	M4-8a	24X18
PEDESTRIAN DETOUR	M4-9b	30X24
DETOUR	M4-10	48X18

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DocuSigned by: Sukul kanwar 9FF8B0C64 1F5478...	DocuSigned by: HANG NGUYEN 85A26FFDA7584C0...
CITY ENGINEER	CITY TRAFFIC ENGINEER
APPROVED BY: DocuSigned by: Carl Stadelbacher A63C41097282445...	
DIRECTOR OF HOUSTON PUBLIC WORKS	
EFF DATE: NOV-27-2023	DWG NO: 01554-06

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

GROUND MOUNTED SIGN SIZES

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TBPE REGISTRATION NO. F-533

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FB NO. P-6329

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

TYPICAL CITY OF HOUSTON SIGNS (SHEET 1 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 137 OF 169	

WARNING SIGNS		
SIGN	SIGN DESIGNATION	SIZE (IN.)
RIGHT ANGLE TURN CURVE	W1-1	30x30
RIGHT ANGLE TURN WITH SPEED LIMIT	W1-1a	36x36
HORIZONTAL CURVE	W1-2	30x30
HORIZONTAL CURVE WITH SPEED LIMIT	W1-2a	36x36
REVERSE RIGHT ANGLE TURN	W1-3	30x30
REVERSE HORIZONTAL CURVE	W1-4	30x30
WINDING ROAD	W1-5	30x30
ONE DIRECTION LARGE ARROW	W1-6	48x24
TWO DIRECTION LARGE ARROW	W1-7	48x24
CHEVRON ALIGNMNET	W1-8	18x24
HAIRPIN CURVE	W1-11	30x30
TRUCK ROLLOVER	W1-13	36x36
CROSS ROAD	W2-1	30x30
SIDE STREET T-INTERSECTION (SYMBOL)	W2-2	30x30
T- INTERSECTION (SYMBOL)	W2-4	30x30
Y- INTERSECTION (SYMBOL)	W2-5	30x30
ROUNDABOUT (SYMBOL)	W2-6	30x30
STOP AHEAD	W3-1	30x30
SIGNAL AHEAD	W3-3	30x30
REDUCED SPEED LIMIT AHEAD	W3-5	36x36
MERGE	W4-1	36x36
LANE ENDS	W4-2	36x36
ADDED LANE	W4-3	36x36
CROSS TRAFFIC DOES NOT STOP (PLAQUE)	W4-4P	24x12
ROAD NARROWS	W5-1	36x36
NARROW BRIDGE	W5-2	36x36
DIVIDED HIGHWAY	W6-1	36x36
DIVIDED HIGHWAY ENDS	W6-2	36x36
TWO WAY TRAFFIC (SYMBOL)	W6-3	36x36
BUMP	W8-1	30x30
DIP	W8-2	30x30
PAVEMENT ENDS	W8-3	36x36
SOFT SHOULDER	W8-4	36x36
TRUCK CROSSING	W8-6	36x36
LOOSE GRAVEL	W8-7	36x36
ROUGH ROAD	W8-8	36x36
UNEVEN LANES	W8-11	36x36
WATCH FOR ICE ON BRIDGE	W8-13T	36x36
SHOULDER DROP-OFF (SYMBOL)	W8-17	30x30
SHOULDER DROP-OFF (PLAQUE)	W8-17P	24x18

WARNING SIGNS		
SIGN	SIGN DESIGNATION	SIZE (IN.)
FLOOD GAUGE	W8-19	12X72
NO SHOULDER	W8-23	36x36
SHOULDER ENDS	W8-25	36x36
LEFT LANE ENDS	W9-1(1)	36x36
RIGHT LANE ENDS	W9-1(2)	36x36
LANE ENDS MERGE LEFT	W9-2(1)	36x36
LANE ENDS MERGE RIGHT	W9-2(2)	36x36
GRADE CROSSING ADVANCE WARNING	W10-1	30 DIA
NO TRAIN HORN	W10-9	36x36
NO TRAIN HORN (PLAQUE)	W10-9P	30x24
BICYCLE	W11-1	30x30
PEDESTRIAN	W11-2	36x36
EMERGENGY VEHICLE	W11-8	30x30
HANDICAPPED	W11-9	30x30
TRUCK	W11-10	30x30
EMERGENGY SIGNAL AHEAD (PLAQUE)	W11-12P	36x30
BICYCLE/PEDESTRIAN	W11-15	30x30
TRAIL CROSSING (PLAQUE)	W11-15P	24x18
DOUBLE ARROW	W12-1	30x30
LOW CLEARANCE WITH ARROWS	W12-2	36x36
LOW CLEARANCE	W12-2a	78x24
LOADED ZONED BRIDGE	W12-5T	36x36
ADVISORY SPEED (PLAQUE)	W13-1P	18x18
NO OUTLET	W14-2	24x24
NO OUTLET WITH ARROW	W14-2a	36x6
SHARE THE ROAD (PLAQUE)	W16-1P	18x24
XX FEET (PLAQUE)	W16-2P	24x18
NEXT XX FEET (PLAQUE)	W16-4P	30x24
SUPPLEMENTAL LEFT ARROW (PLAQUE)	W16-5P(1)	24x18
SUPPLEMENTAL RIGHT ARROW (PLAQUE)	W16-5P(2)	24x18
DIAGONAL ARROW (PLAQUE)	W16-7P	24x12
AHEAD (PLAQUE)	W16-9P	24x12
WHEN FLASHING (PLAQUE)	W16-13P	24x18
ROUNDABOUT (PLAQUE)	W16-17	24x12
SPEED HUMP	W17-1	30x30
TYPE 3 OBJECT MARKER (LEFT)	OM3-L	12x36
TYPE 3 OBJECT MARKER (RIGHT)	OM3-R	12x36
TYPE 3 OBJECT MARKER (CENTER)	OM3-C	12x36
TYPE 4 OBJECT MARKER	OM4-1	18x18

BICYCLE SIGNS		
SIGN	SIGN DESIGNATION	SIZE (IN.)
STOP	R1-1	18x18
STREET NAME	D3-1	VARIESx6
YIELD	R1-2	18x18x18
TO REQUEST GREEN WAIT ON SYMBOL	R10-22	12x18
YIELD TO PEDESTRIAN	R9-6	18x18
NO PARKING BIKE LANE	R7-9	12x18
BIKE ROUTE	D11-1	24x18
BIKE ROUTE TO DOWNTOWN	D11-1c	24x18
BIKE SIGN AUXILARY SIGNS	M4-1, M4-14	12x6
BICYCLE ROUTE ROUTE ARROW SIGNS	M5-1,2; M6-1,2,3,4,5,6,7	12x9
WALK YOUR BIKE (CUSTOM SIGN)	R9-8 CoH	12x18
YIELD TO PED/BIKE (CUSTOM SIGN)	R1-5PB	36x36
TURNING VEHICLES YIELD TO PED/BIKE (CUSTOM SIGN)	R10-15PB	36x36
STOP FOR PED/BIKE (CUSTOM SIGN)	R1-5PBb	36x36
TURNING VEHICLES STOP FOR PED/BIKE (CUSTOM SIGN)	R10-15PBa	36x36
CROSSWALK STOP ON RED (CUSTOM SIGN)	R10-23 (CoH)	42x30
PEDESTRAIN CROSSING (CUSTOM SIGN)	W11-2 (HAWK)	48x30
LOOK BOTH WAYS (CUSTOM SIGN)	W4-4Pa (BIKE) W4-4Pb (BIKE)	VARIES
TURN WIDE (CUSTOM SIGN)	R3-8 (BIKE)	30x36
BIKE MERGE AHEAD (CUSTOM SIGN)	W11-1 (MERGE)	36x36

SCHOOL SIGNS		
SIGN	SIGN DESIGNATION	SIZE (IN.)
SCHOOL	S1-1(FYG)	36x36
X:XX TO X:XX AM AND PM (PLAQUE)	S4-1P	24x10
SCHOOL (PLAQUE)	S4-3P(FYG)	24x8
WHEN FLASHING (PLAQUE)	S4-4P	24x10
REDUCED SCHOOL SPEED LIMIT AHEAD	S4-5a(FYG)	36x36
SCHOOL SPEED LIMIT XX WHEN FLASHING	S5-1(FYG)	24x48
END SCHOOL ZONE	S5-2	24x30
END SCHOOL ZONE (PLAQUE)	S5-2aTP	24x10
CELL PHONE USE PROHIBITED	S7-1T	24x18
TURN ARROW (PLAQUE)	SW16-5P(FYG)	24x12
ADVANCE TURN ARROW (PLAQUE)	SW16-6P(FYG)	24x12
DIAGONAL ARROW (PLAQUE)	SW16-7P(FYG)	24x12
AHEAD (PLAQUE)	S16-9P(FYG)	24x12

FYG- FLUORESCENT YELLOW-GREEN BACKGROUND COLOR

NO.	DATE	REVISION	APP.

APPROVED BY:	APPROVED BY:
DocuSigned by: Sulad kanwar 9EF880C64F5478...	DocuSigned by: kathleen Walker 55A39EFDA758404CD...
CITY ENGINEER	CITY TRAFFIC ENGINEER
APPROVED BY: DocuSigned by: Carol Haddock A80C410B72B0483...	
DIRECTOR OF HOUSTON PUBLIC WORKS	
EFF DATE: NOV-27-2023	DWG NO: 01554-06

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

GROUND MOUNTED SIGN SIZES

	FOR CITY OF HOUSTON USE ONLY
DRAWING SCALE	
NOT TO SCALE	

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

TYPICAL CITY OF HOUSTON SIGNS (SHEETS 2 OF 2)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 138 OF 169	

SUMMARY OF SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN TEXT	DIMENSIONS	SQUARE POST	SIGNAL MOUNT	ROUND POST (PERMISSION NEEDED FROM CITY TRAFFIC ENGINEER)	NUMBER OF POSTS (1 OR 2)	SIGN AREA SQ.FT (FOR INFORMATION ONLY,NOT INTENDED FOR BID)	SIGN POST SIZE (TABLE A)
75	1	R1-1	STOP	36X36	Y			1		1-3/4"X1-3/4"
		R6-2	ONE WAY	24X30						
75	2	R7-2(1)	PARKING RESTRICTION (ARROW)	12X18	Y			1		1-3/4"X1-3/4"
		R7-201P	TOW AWAY ZONE (PLAQUE)	12x6						
75	3	R7-201P	TOW AWAY ZONE (PLAQUE)	12x6	Y			1		1-3/4"X1-3/4"
75	4	R7-2(1)	PARKING RESTRICTION (ARROW)	12x18	Y			1		1-3/4"X1-3/4"
		R7-201P	TOW AWAY ZONE (PLAQUE)	12x6						
75	5	R2-1	SPEED LIMIT	24x36	Y			1		1-3/4"X1-3/4"
75	6	R2-1	SPEED LIMIT	24x36	Y			1		1-3/4"X1-3/4"
75	7	R7-2(1)	PARKING RESTRICTION (ARROW)	12x18	Y			1		1-3/4"X1-3/4"
		R7-201P	TOW AWAY ZONE (PLAQUE)	12x6						
75	8	R10-7	DO NOT BLOCK INTERSECTION	24x30	Y			1		1-3/4"X1-3/4"

NO.	DATE	REVISION	APP.

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
TO METRO CORRIDOR TO SWPS

SUMMARY OF SMALL SIGNS

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 139 OF 169	

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GENERAL NOTES

1. THE CONTRACTOR SHALL PROVIDE AND INSTALL TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH PART VI OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD) LATEST EDITION WITIH REVISIONS DURING THE ENTIRE CONSTRUCTION PERIOD.
2. ALL SIGNS AND TRAFFIC CONTROL DEVICES SHALL CONFORM THE LATEST VERSION OF THE TMUTCD.
3. NO LANES SHALL BE CLOSED DURING THE HOURS OF 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM MONDAY THRU FRIDAY WITHOUT APPROVAL OF THE CITY TRAFFIC ENGINEER.
4. NO WORK SHALL BE PERFORMED IN RESIDENTIAL AREAS FROM 7:00 PM TO 7:00 AM.
5. CONTRACTOR SHALL MAINTAIN APPROVED NUMBER OF THROUGH LANES OF TRAFFIC IN EACH DIRECTION DURING CONSTRUCTION WORKING HOURS. TRAFFIC CONTROL PLANS SHALL INCLUDE ONE–WAY AND/OR DETOUR PLANS. CONTRACTOR SHALL MAINTAIN ADA COMPLIANT PEDESTRIAN ACCESS TO BUS STOPS AND ADEQUATE BUS ACCESS TO ALL THE BUS STOPS.
6. CONTRACTOR SHALL MAINTAIN TRAFFIC LANES AND DETOURS ACCORDING TO TRAFFIC CONTROL PLANS DURING WORKING HOURS.
7. CONTRACTOR SHALL COVER OPEN PAVEMENT EXCAVATIONS FOR MINOR UTILITY WORK WITH ANCHORED STEEL PLATES DURING NON–WORKING HOURS, AND OPEN LANES FOR NORMAL TRAFFIC FLOW WHEN FEASIBLE.
8. IF THE CONTRACTOR CHOOSES TO USE A DIFFERENT METHOD OF "TRAFFIC CONTROL PLANS" DURING THE CONSTRUCTION THAN WHAT IS OUTLINED IN THE CONTRACT DRAWINGS, THE CONTRACTOR SHALL BE RESPONSIBLE TO PREPARE AND SUBMIT AN ALTERNATE SET OF TRAFFIC CONTROL PLANS TO THE CITY OF HOUSTON PROJECT MANAGER FOR APPROVAL TEN WORKING DAYS PRIOR TO IMPLEMENTATION. THESE PLANS SHALL BE DRAWN TO SCALE ON REPRODUCIBLE MYLARS AND SHALL BE SEALED BY A LICENSED ENGINEER IN THE STATE OF TEXAS. OFFICE OF CITY ENGINEER, MOBILITY PERMITS SECTION REPRESENTATIVE APPROVAL IS REQUIRED TO ACCEPT THE PROPOSED CHANGES.
9. CONTRACTOR SHALL SECURE LANE/SIDEWALK/BICYCLE FACILITY CLOSURE PERMITS FROM OFFICE OF CITY ENGINEER (MOBILITY PERMIT SECTION AT https://geohub.houstontx.gov) BEFORE IMPLEMENTING THE TRAFFIC CONTROL PLAN. THE APPLICATION MUST BE SUBMITTED AT LEAST TEN DAYS PRIOR TO THE IMPLEMENTATION OF THE TRAFFIC CONTROL PLAN AND/OR BEGINNING CONSTRUCTION WORK. THE CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL PLANS, CONSTRUCTION SEQUENCING, AND CONSTRUCTION SCHEDULE WITH THE APPLICATION.
10. CONTRACTOR SHALL HAVE APPROVED TRAFFIC CONTROL PLAN AND PERMIT AT THE JOB SITE FOR INSPECTION AT ALL TIMES.
11. DURING PAVEMENT SURFACE RESTORATION PROJECTS; THE CONTRACTOR SHALL NOT OPEN CLOSED LANES UNTIL THE PAVEMENT SURFACE HAS CURED ENOUGH TO ALLOW VEHICULAR TRAFFIC ACCORDING TO CITY OF HOUSTON STANDARD SPECIFICATIONS.
12. THE CONTRACTOR IS RESPONSIBLE FOR SCHEDULING AND COORDINATING ALL CONSTRUCTION ACTIVITIES WITH STAKE HOLDERS IN THE VICINITY INCLUDING EMERGENCY RESPONSE AGENCIES SUCH AS HOUSTON POLICE DEPARTMENT, HOUSTON FIRE DEPARTMENT, AND METROPOLITAN TRANSIT AUTHORITY.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR ISSUING ALL WORK DIRECTIVES TO ALL SUB–CONTRACTORS, UTILITY COMPANIES, AND ALL OTHER ENTITIES PERFORMING CONSTRUCTION WORK ASSOCIATED WITH THE PROJECT.
14. NOTHING IN THESE NOTES OR PLANS SHALL RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT; INCLUDING SAFETY OF ALL MODES OF TRANSPORTATION, PERSONS, AND PROPERTY, AND THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO WORKING HOURS.
15. THE OFFICE OF CITY ENGINEER (MOBILITY PERMITS GROUP) PER THE DIRECTION OF THE CITY TRAFFIC ENGINEER HAVE THE RIGHT TO DEMAND THE INSTALLATION OF ADDITIONAL TRAFFIC CONTROL DEVICES OR MODIFICATIONS OF THESE PLANS AND NOTES, AS DEEMED NECESSARY TO PROMOTE THE SAFE AND ORDERLY FLOW OF TRAFFIC, INCLUDING PEDESTRIANS AND BICYCLES, THROUGH THE CONSTRUCTION WORK ZONE. THE CONTRACTOR SHALL COMPLY WITH THESE ADDITIONAL REQUESTS OR MODIFICATIONS WITH DUE DILIGENCE.
16. ALL EXISTING TRAFFIC CONTROL SIGNS AND PAVEMENT MARKINGS SHALL BE MAINTAINED IN VISIBLE LOCATIONS DURING CONSTRUCTION UNLESS PRIOR WRITTEN APPROVAL IS OBTAINED FROM CITY OF HOUSTON PROJECT MANAGER. THE CONTRACTOR SHALL RESTORE OR REPLACE (AT THE DISCRETION OF THE CITY TRAFFIC ENGINEER) ANY PAVEMENT MARKING OR SIGNING DAMAGE DURING CONSTRUCTION OPERATIONS, INCLUDING RAISED PAVEMENT MARKERS (RPMS).
17. WHEN ENTERING OR LEAVING ROADWAYS CARRYING PUBLIC TRAFFIC, THE CONTRACTOR'S EQUIPMENT, WHETHER EMPTY OR LOADED SHALL IN ALL CASES YIELD TO PUBLIC TRAFFIC WITH THE ASSISTANCE OF CONTRACTOR PROVIDED CERTIFIED FLAGGER/PEACE OFFICER.
18. ACCESS TO DRIVEWAYS ADJACENT TO THE CONSTRUCTION WORK ZONE SHALL BE MAINTAINED AT ALL TIMES AS MUCH AS POSSIBLE. ADDITIONAL CONES AND/OR DELINEATORS MAY BE REQUIRED TO DELINEATE THE DRIVEWAY ACCESS ROUTE THROUGH THE CONSTRUCTION WORK ZONE. A MINIMUM OF ONE TRAVEL LANE SHALL BE MAINTAINED ACROSS THE DRIVEWAYS, UNLESS PRIOR WRITTEN APPROVAL IS OBTAINED FROM CITY OF HOUSTON PROJECT MANAGER.
19. SPILLAGE RESULTING FROM HAULING OPERATIONS ALONG OR ACROSS ANY PUBLIC TRAVELED WAY SHALL BE REMOVED IMMEDIATELY BY THE CONTRACTOR.
20. THE CONTRACTOR SHALL SUBMIT AN APPLICATION FOR TEMPORARY PARKING RESTRICTIONS IF THERE ARE PARKING METERS LOCATED AT THE PROPOSED LANE CLOSURES FROM PARKING MANAGEMENT DIVISION (832–393–8690) AT LEAST TEN BUSINESS DAYS BEFORE IMPLEMENTATION OF LANE CLOSURES. IN ADDITION, TEMPORARY NO PARKING SIGNS SHALL BE POSTED 24 HOURS PRIOR TO COMMENCEMENT OF WORK.
21. ADDITIONAL OFF DUTY OFFICERS/FLAGGERS MAY BE REQUESTED TO DIRECT TRAFFIC WHEN LANES ARE BLOCKED AT THE DISCRETION OF THE CITY PROJECT MANAGER EVEN IF THEY ARE NOT SPECIFICALLY IDENTIFIED ON THE PROJECT PLANS.
22. THE CONTRACTOR SHALL REPLACE WITHIN 72 HOURS, ALL TRAFFIC SIGNAL LOOP DETECTORS DAMAGED DURING CONSTRUCTION.
23. IN GENERAL, A SOLAR POWERED FLASHING ARROW BOARD SHALL BE REQUIRED ON ALL MAJOR THOROUGHFARE LANES CLOSURES. EXCEPTIONS TO FLASHING ARROW BOARDS AND/OR IMPLEMENTATION ON RESIDENTIAL LANE CLOSURES SHALL BE APPROVED BY CITY TRAFFIC ENGINEER.
24. APPROVED TRAFFIC CONTROL PLAN SHALL BE IN PLACE BEFORE STARTING ANY EXCAVATION.
25. WATER FILLED BARRIERS CAN BE USED AS INSTRUCTED BY THE ENGINEER AND APPROVED BY THE CITY FOR PROJECTS WHERE SPACE IS LIMITED AND HEAVY EQUIPMENT TO PLACE CONCRETE BARRIERS IS NOT FEASIBLE. WATER FILLED BARRIERS SHALL NOT BE USED ON ROADWAYS WITH A POSTED SPEED LIMIT MORE THAN 45 MPH.
26. WATER FILLED BARRIERS MUST BE INSTALLED AND MAINTAINED PER THE MANUFACTURER'S REQUIREMENTS AND ROUTINELY INSPECTED FOR DEFECTS.
27. IF WATER FILLED BARRIER IS PROVIDED, USE ENVIRONMENTALLY SAFE ANTI–FREEZING AGENT IN THE WATER WHEN IT IS APPLICABLE PER MANUFACTURER SPECIFICATIONS AND RECOVER AGENT WHEN THE BARRIER IS DRAINED.
28. DISPOSE OF WATER AND AGENT PROPERLY. DO NOT DRAIN WATER FILLED BARRIER INTO OR ACROSS AN EXISTING TRAVEL LANE.
29. PROVIDE BARRIER UNITS THAT ARE CAPABLE OF BEING LIFTED AND MOVED WHEN FILLED IF DRAINING IS NOT POSSIBLE.
30. PROVIDE WATER FILLED BARRIER THAT ACTS AS ITS OWN FREE STANDING, NON–REDIRECTIVE END TREATMENT.
31. WHEN WATER FILLED BARRIERS ARE USED TO CHANNELIZE PEDESTRIANS, THEY MUST HAVE A CONTINUOUS DETECTABLE BOTTOM FOR USERS OF LONG CANES AND THE TOP OF THE UNIT SHALL NOT BE LESS THAN 32 INCHES IN HEIGHT.
32. ANY CLOSURE OF A PEDESTRIAN OR BICYCLE FACILITY SHALL REQUIRE THE SHORTEST DETOUR THAT MAINTAINS THE SAFETY OF PEDESTRIAN AND/OR BICYCLISTS.

SPACING FOR CHANNELIZING DEVICES

A. PLASTIC DRUMS ON MERGING TAPER @ 30' C – C WITH CHEVRON SIGN @ 60' C – C AND WARNING LIGHTS FOR OVERNIGHT CLOSURE.

B. PLASTIC DRUMS ON DOWNSTREAM TAPER @ 30' C – C (RETURN TAPER AND BARRICADE ARE OPTIONAL AND DIVIDED ROADWAY SECTION)

C. PLASTIC DRUMS ON RADII @ 35' C –C.

D. PLASTIC DRUMS ON TANGENT @ 35' C – C WITH VERTICAL PANEL AT 70' C – C AND APPROVED WARNING LIGHT @ 70' C – C (FOR OVERNIGHT CLOSURE).

E. PLASTIC DRUMS IN FRONT OF CONSTRUCTION ZONE @ 20' C – C WITH VERTICAL PANEL AT 40' C – C AND APPROVED WARNING LIGHT @ 40' C – C (FOR OVERNIGHT CLOSURE).

F. CONCRETE TRAFFIC BARRIER (CTB) OR LOW PROFILE CONCRETE TRAFFIC BARRIER (LPCTB) WITH APPROVED REFLECTORS @ 10' C – C IF PAVEMENT DROP IS GREATER THAN 1 FOOT.

G. PLASTIC DRUMS W/GUARD RAIL MOUNTED.

H. SELF– RIGHTING VERTICAL PANEL SPACING.
– 4 LANES TO 2 LANES UNDIVIDED ROADWAY SECTION @ 20' C – C.
– 4 LANES DIVIDED ROADWAY TO ONE SIDE TWO WAY ROADWAY @ 20' C – C.
– LEFT LANE AND RIGHT LANE STORAGE BAYS @ 15' C – C.

I. SPACING SHOWN ON TRAFFIC CONTROL SHALL SUPERSEDE THE ABOVE SPACING.

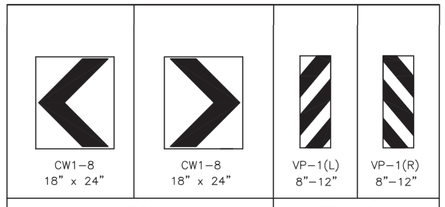
J. SPACING MAY BE ADJUSTED TO PROVIDE DRIVEWAYS, INTERSECTIONS AND /OR MEDIAN OPENINGS.

TABLE C3 – TYPICAL SIGN SPACING, TAPER LENGTHS, AND SUGGESTED SPACING OF CHANNELIZATION DEVICES

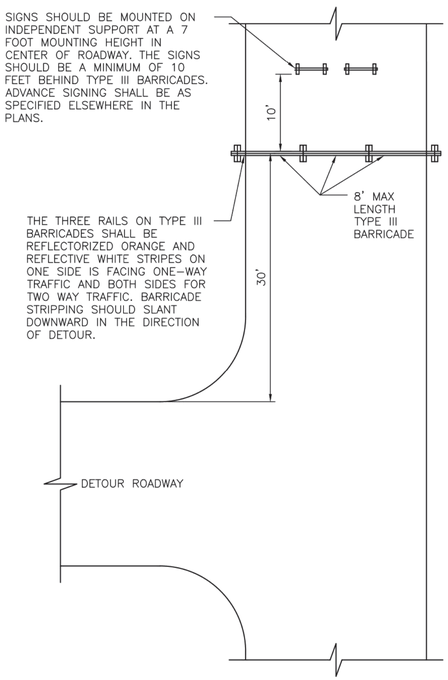
POSTED SPEED (MPH)	SIGN SPACING "X" (FEET)	MIN. DESIRABLE TAPER LENGTH "L"			SUGGESTED MAXIMUM SPACING OF DEVICE	
		10' OFFSET	11' OFFSET	12' OFFSET	ON A TAPER	ON A TANGENT
30	120'	150'	165'	180'	30'	60'–75'
35	160'	205'	225'	245'	35'	70'–90'
40	240'	265'	295'	320'	40'	80'–100'
45	320'	450'	495'	540'	45'	90'–110'
50	400'	500'	550'	600'	50'	100'–125'
55	500'	550'	605'	660'	55'	110'–140'

TABLE C4 – STOPPING SIGHT DISTANCE AS A FUNCTION OF SPEED

POSTED SPEED (MPH)	DISTANCE "D" (FEET)
30	200
35	250
40	305
45	360
50	425
55	495



CHANNELIZATION AND BARRICADES



PLAN VIEW
TYPE III BARRICADE (POST AND SKID)
TYPICAL APPLICATION

LEGEND:

- SIGN
- FLAGGER
- APPROVED CHANNELIZATION DEVICE
- BARRICADE
- FLASHING ARROW PANEL
- AREA UNDER CONSTRUCTION
- EXISTING TRAVEL WAY
- TRAFFIC CONTROL PLAN DETOUR TRAVEL WAY

APPROVED BY:	APPROVED BY:
DocuSigned by: Suhail Kanwar 9EF8B0C641F5478...	DocuSigned by: KHANG NGUYEN 95A29EFDA7584CD...
CITY ENGINEER	CITY TRAFFIC ENGINEER

APPROVED BY:
DocuSigned by: Carol Haddock A93C41057283453...
DIRECTOR OF HOUSTON PUBLIC WORKS

EFF DATE: NOV–27–2023 | DWG NO: 01555–01

AMANI ENGINEERING, INC.
11011 RICHMOND AVE., SUITE 700
HOUSTON, TEXAS 77042
TEL: (713) 270–5700
Texas Registered Engineering Firm No. F–4528
Texas Registered Surveying Firm No. 100282–00

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P – 6329

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MAHESH DUTTA 114252
NAME P.E. NO.
DATE 08/28/2025
TBPELS FIRM #F–4528

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. FROM METRO CORRIDOR TO SWPS

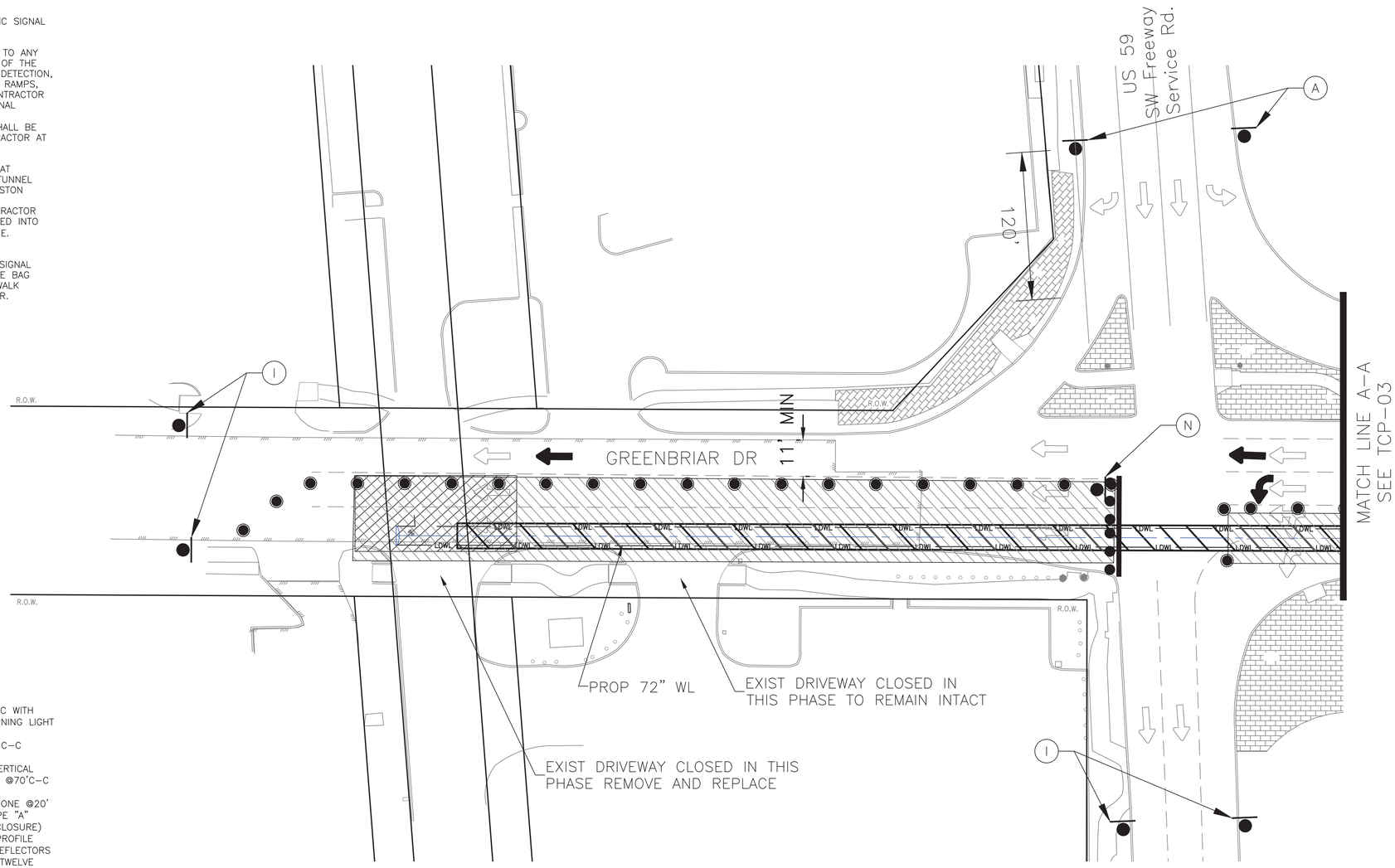
TCP NOTES CHANNELIZING DEVICES AND BARRICADES

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 140 OF 169	

DISCLAIMER:
THE USE OF THIS STANDARD IS GOVERNED BY THE TEXAS ENGINEERING PRACTICE ACT. THE DESIGN REQUIREMENTS ON THIS STANDARD DO NOT PURPORT TO ADDRESS ALL OF THE SAFETY CONCERNS ASSOCIATED WITH THEIR USE. THE ENGINEER OF RECORD (EOR) IS TO REVIEW THESE DESIGN REQUIREMENTS AND BY AUTHORIZING THEIR USE, ACCEPTS RESPONSIBILITY FOR THEIR APPLICABILITY, ADEQUACY AND SAFETY. NO WARRANTY OF ANY KIND IS MADE BY THE CITY OF HOUSTON FOR ANY PURPOSES WHATSOEVER. THE CITY OF HOUSTON ASSUMES NO RESPONSIBILITY FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

NOTE:

1. CONTRACTOR SHALL ADJUST LOCATION OF TRAFFIC SIGNAL HEADS AND OVERHEAD SIGNS TO LINE–UP WITH TEMPORARY TRAFFIC LANES AT ALL TIMES.
2. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO ANY OF THE TRAFFIC SIGNAL COMPONENTS AND ANY OF THE INTERSECTION PHYSICAL CONDITIONS INCLUDING, DETECTION, UNDERGROUND WIRES AND CABLES, WHEELCHAIR RAMPS, CROSSWALKS, BUTTONS, AND CABINETS. THE CONTRACTOR IS TO RESTORE THE INTERSECTION AND THE SIGNAL OPERATION TO ITS ORIGINAL CONDITIONS.
3. A 10' MINIMUM LANE WIDTH FOR EMERGENCY SHALL BE MADE AVAILABLE AND MAINTAINED BY THE CONTRACTOR AT ALL TIME.
4. FOR DIMENSIONS REFER TO SHEET 01512–01.
5. CONTRACTOR TO PROVIDE A SECURITY FENCE THAT SURROUND THE SURFACE WORK SITE FOR THE TUNNEL SHAFTS IN ACCORDANCE WITH THE CITY OF HOUSTON SPECIFICATIONS.
6. CONTRACTOR TO OPERATE A ROLLING TCP. CONTRACTOR TO ENSURE THAT WORK ZONE SHOULD BE DIVIDED INTO SEGMENTS NOT GREATER THAN 800' AT ONE TIME.
7. EXISTING NO PARKING SIGNS TO REMAIN.
8. THE CONTRACTOR SHALL MAINTAIN PEDESTRIAN ACCESSIBILITY TO PUSH BUTTONS AND PROPER SIGNAL ALIGNMENT THROUGHOUT TCP STAGES. OTHERWISE BAG PEDESTRIAN SIGNAL HEADS AND INSTALL CROSSWALK CLOSED SIGNS AND PROVIDE PEDESTRIAN DETOUR.



NOTE:
SEE SHEET TCP SHEET XX FOR GREENBRIAR DR. DETOUR.

POSTED SPEED LIMIT:
POSTED SPEED ON GREENBRIAR DR IS 30 MPH
POSTED SPEED ON US 59 FRONTAGE RD 40 MPH

SPACING FOR CHANNELING DEVICES

A. PLASTIC DRUMS ON MERGING TAPER @ 30' C–C WITH CHEVRON SIGN @ 60' C–C AND TYPE "C" WARNING LIGHT (FOR OVERNIGHT CLOSURE)
B. PLASTIC DRUMS ON DOWNSTREAM TAPER @30' C–C
C. PLASTIC DRUMS ON RADII @5'C–C
D. PLASTIC DRUMS ON TANGENT @35'C–C WITH VERTICAL PANEL @70'C–C AND TYPE "C" WARNING LIGHT @70'C–C (FOR OVERNIGHT CLOSURE)
E. PLASTIC DRUMS IN FRONT OF CONSTRUCTION ZONE @20' C–C WITH VERTICAL PANEL @40' C–C AND TYPE "A" WARNING LIGHT @ 40' C–C (FOR OVERNIGHT CLOSURE)
F. CONCRETE TRAFFIC BARRIER (C.T.B.) OR LOW PROFILE CONCRETE TRAFFIC BARRIER (L.P.C.T.B) WITH REFLECTORS @10' C–C IF PAVEMENT DROP IS MORE THAN TWELVE INCHES (12") OR PLASTIC DRUMS W/GUARD RAIL MOUNTED.

NOTE:– SPACINGS SHOWN ON TRAFFIC CONTROL PLANS SHALL BE SUPERSEDED BY THE ABOVE SPACINGS. SPACINGS MAY BE ADJUSTED TO PROVIDE DRIVEWAYS, INTERSECTIONS AND/OR MEDIAN OPENINGS.

Ⓐ ROAD WORK AHEAD CW20-1D (36"X36")	Ⓑ LEFT LANE CLOSED AHEAD CW20-5DL (36"X36")	Ⓒ CW4-2L (36"X36")	Ⓓ 2 LEFT LANES CLOSED CW20-5aTL (36"X36")	Ⓔ ROAD CLOSED TO THRU TRAFFIC R11-4 (60"X30")	Ⓕ THRU TRAFFIC MERGE LEFT CW4-1aL (36"X36")	Ⓖ THRU TRAFFIC MERGE RIGHT CW4-1aR (36"X36")
Ⓗ ROAD CLOSED R11-2 (48"X30")	Ⓘ END ROAD WORK G20-2a (36"X18")	Ⓙ ONE WAY R6-1R (30"X12")	Ⓚ SIDEWALK CLOSED → USE OTHER SIDE R9-10R 48"X24"	Ⓛ SIDEWALK CLOSED ← USE OTHER SIDE R9-10L 48"X24"	Ⓜ LEFT LANE MUST TURN LEFT R3-7L 30 X 30	Ⓝ ONLY R3-5L (30"X36")	Ⓞ ROAD CLOSED AHEAD W20-3 (36"X36")

LEGEND

- WORK ZONE
- TRAFFIC DIRECTION EXIST.
- TRAFFIC DIRECTION PROP.
- TRAFFIC CONT. SIGN
- PLASTIC DRUM
- TYPE III BARRICADE

ARCADIS
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TBPE REGISTRATION NO. F–533

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TEL: (713) 270–5700
Texas Registered Engineering Firm No. F–4528
Texas Registered Surveying Firm No. 100282–00

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P – 6329

PRELIMINARY

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ERIC LEWIS (NAME) 127613 (P.E. NO.)
DATE 11/5/2025
TBPELS FIRM #F-4528

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

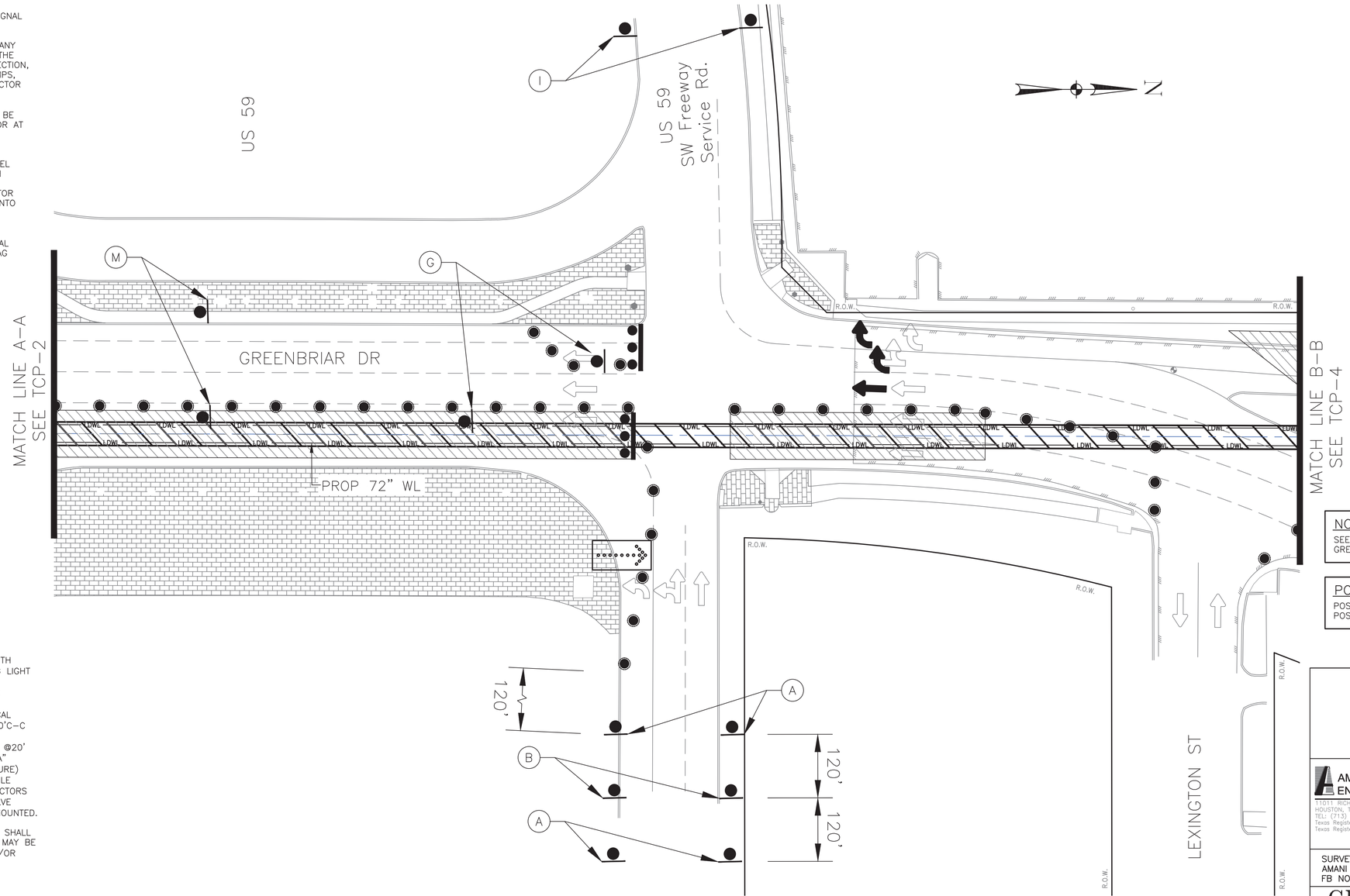
72–INCH WATER LINE ALONG GREENBRIAR DR.
FROM METRO CORRIDOR TO SWPS

WATER LINE
GREENBRIAR DR. – TCP
PHASE – 1
(SHEET 1 OF 4) TCP–02

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 141 OF 169	

NOTE:

1. CONTRACTOR SHALL ADJUST LOCATION OF TRAFFIC SIGNAL HEADS AND OVERHEAD SIGNS TO LINE–UP WITH TEMPORARY TRAFFIC LANES AT ALL TIMES.
2. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO ANY OF THE TRAFFIC SIGNAL COMPONENTS AND ANY OF THE INTERSECTION PHYSICAL CONDITIONS INCLUDING, DETECTION, UNDERGROUND WIRES AND CABLES, WHEELCHAIR RAMPS, CROSSWALKS, BUTTONS, AND CABINETS. THE CONTRACTOR IS TO RESTORE THE INTERSECTION AND THE SIGNAL OPERATION TO ITS ORIGINAL CONDITIONS.
3. A 10' MINIMUM LANE WIDTH FOR EMERGENCY SHALL BE MADE AVAILABLE AND MAINTAINED BY THE CONTRACTOR AT ALL TIME.
4. FOR DIMENSIONS REFER TO SHEET 01512–01.
5. CONTRACTOR TO PROVIDE A SECURITY FENCE THAT SURROUND THE SURFACE WORK SITE FOR THE TUNNEL SHAFTS IN ACCORDANCE WITH THE CITY OF HOUSTON SPECIFICATIONS.
6. CONTRACTOR TO OPERATE A ROLLING TCP. CONTRACTOR TO ENSURE THAT WORK ZONE SHOULD BE DIVIDED INTO SEGMENTS NOT GREATER THAN 800' AT ONE TIME.
7. EXISTING NO PARKING SIGNS TO REMAIN.
8. THE CONTRACTOR SHALL MAINTAIN PEDESTRIAN ACCESSIBILITY TO PUSH BUTTONS AND PROPER SIGNAL ALIGNMENT THROUGHOUT TCP STAGES. OTHERWISE BAG PEDESTRIAN SIGNAL HEADS AND INSTALL CROSSWALK CLOSED SIGNS AND PROVIDE PEDESTRIAN DETOUR.



NOTE:
SEE SHEET TCP SHEET XX FOR GREENBRIAR DR. DETOUR.

POSTED SPEED LIMIT:
POSTED SPEED ON GREENBRIAR DR IS 30 MPH
POSTED SPEED ON US 59 FRONTAGE RD 40 MPH

SPACING FOR CHANNELING DEVICES

A. PLASTIC DRUMS ON MERGING TAPER @ 30' C–C WITH CHEVRON SIGN @ 60' C–C AND TYPE "C" WARNING LIGHT (FOR OVERNIGHT CLOSURE)
B. PLASTIC DRUMS ON DOWNSTREAM TAPER @30' C–C
C. PLASTIC DRUMS ON RADII @5'C–C
D. PLASTIC DRUMS ON TANGENT @35'C–C WITH VERTICAL PANEL @70'C–C AND TYPE "C" WARNING LIGHT @70'C–C (FOR OVERNIGHT CLOSURE)
E. PLASTIC DRUMS IN FRONT OF CONSTRUCTION ZONE @20' C–C WITH VERTICAL PANEL @40' C–C AND TYPE "A" WARNING LIGHT @ 40' C–C (FOR OVERNIGHT CLOSURE)
F. CONCRETE TRAFFIC BARRIER (C.T.B.) OR LOW PROFILE CONCRETE TRAFFIC BARRIER (L.P.C.T.B) WITH REFLECTORS @10' C–C IF PAVEMENT DROP IS MORE THAN TWELVE INCHES (12") OR PLASTIC DRUMS W/GUARD RAIL MOUNTED.

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(A) ROAD WORK AHEAD CW20-1D (36"X36")	(B) LEFT LANE CLOSED AHEAD CW20-5DL (36"X36")	(C) CW4-2L (36"X36")	(D) 2 LEFT LANES CLOSED CW20-5aTL (36"X36")	(E) ROAD CLOSED TO THRU TRAFFIC R11-4 (60"X30")	(F) THRU TRAFFIC MERGE LEFT CW4-1aL (36"X36")	(G) THRU TRAFFIC MERGE RIGHT CW4-1aR (36"X36")
(H) ROAD CLOSED R11-2 (48"X30")	(I) END ROAD WORK G20-2a (36"X18")	(J) ONE WAY R6-1R (30"X12")	(K) SIDEWALK CLOSED USE OTHER SIDE R9-10R 48"X24"	(L) SIDEWALK CLOSED USE OTHER SIDE R9-10L 48"X24"	(M) LEFT LANE MUST TURN LEFT R3-7L 30 X 30	(N) ONLY R3-5L (30"X36")

(O) ROAD CLOSED AHEAD
W20-3
(36"X36")

LEGEND

WORK ZONE
TRAFFIC DIRECTION EXIST.
TRAFFIC DIRECTION PROP.
TRAFFIC CONT. SIGN
PLASTIC DRUM
TYPE III BARRICADE
FLASHING ARROW PANEL

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ERIC LEWIS	127613
NAME	P.E. NO.
DATE	11/5/2025

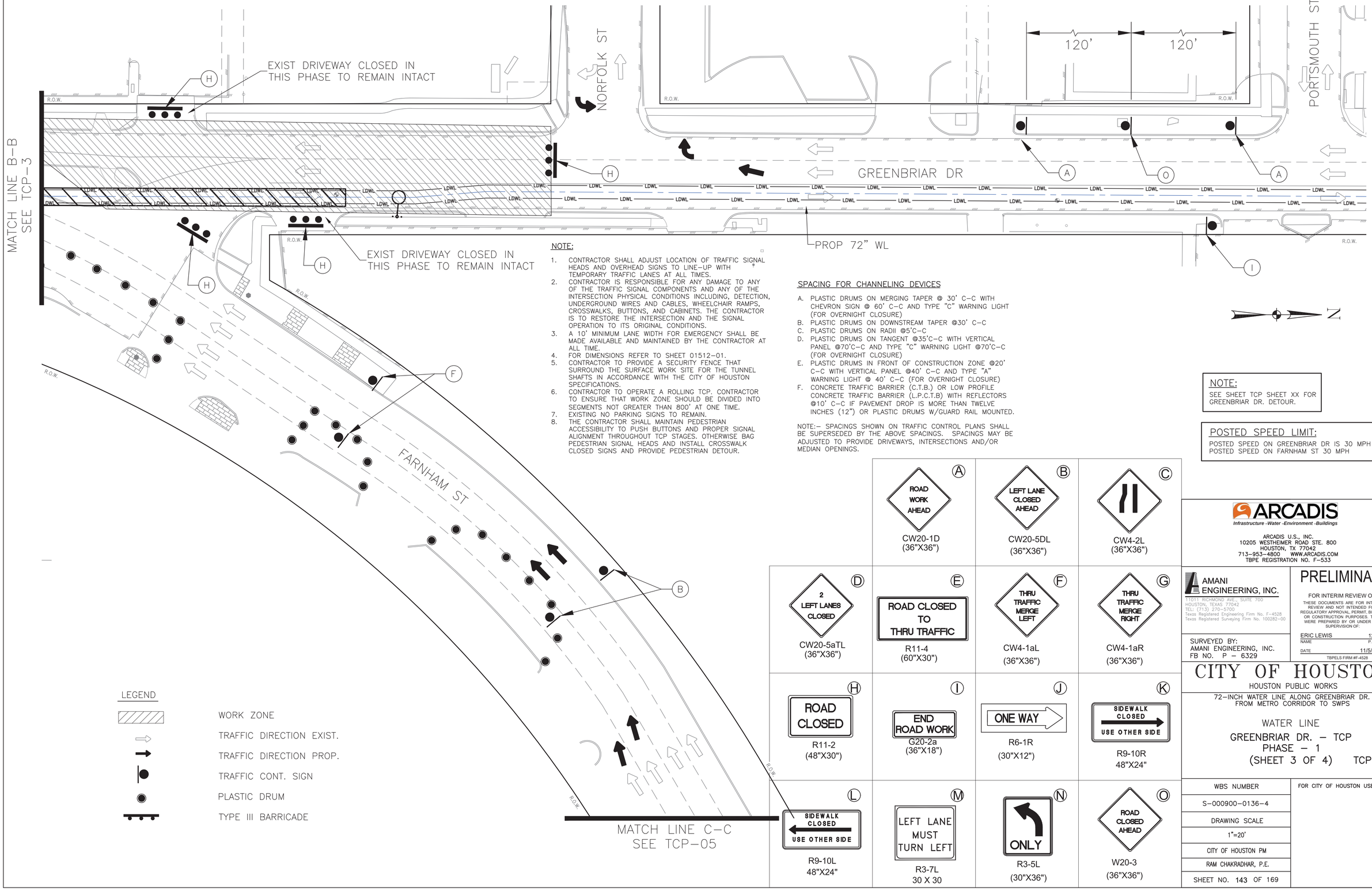
TBPELS FIRM #F–4528

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
FROM METRO CORRIDOR TO SWPS

WATER LINE
GREENBRIAR DR. – TCP
PHASE – 1
(SHEET 2 OF 4) TCP–03

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 142 OF 169	



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SPACING FOR CHANNELING DEVICES

A. PLASTIC DRUMS ON MERGING TAPER @ 30' C–C WITH CHEVRON SIGN @ 60' C–C AND TYPE "C" WARNING LIGHT (FOR OVERNIGHT CLOSURE)
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N

NOTE:
SEE SHEET TCP SHEET XX FOR GREENBRIAR DR. DETOUR.

POSTED SPEED LIMIT:
POSTED SPEED ON GREENBRIAR DR IS 30 MPH
POSTED SPEED ON FARNHAM ST 30 MPH

LEGEND

- WORK ZONE
- TRAFFIC DIRECTION EXIST.
- TRAFFIC DIRECTION PROP.
- TRAFFIC CONT. SIGN
- PLASTIC DRUM
- TYPE III BARRICADE

	A ROAD WORK AHEAD CW20-1D (36"X36")	B LEFT LANE CLOSED AHEAD CW20-5DL (36"X36")	C CW4-2L (36"X36")
D 2 LEFT LANES CLOSED CW20-5aTL (36"X36")	E ROAD CLOSED TO THRU TRAFFIC R11-4 (60"X30")	F THRU TRAFFIC MERGE LEFT CW4-1aL (36"X36")	G THRU TRAFFIC MERGE RIGHT CW4-1aR (36"X36")
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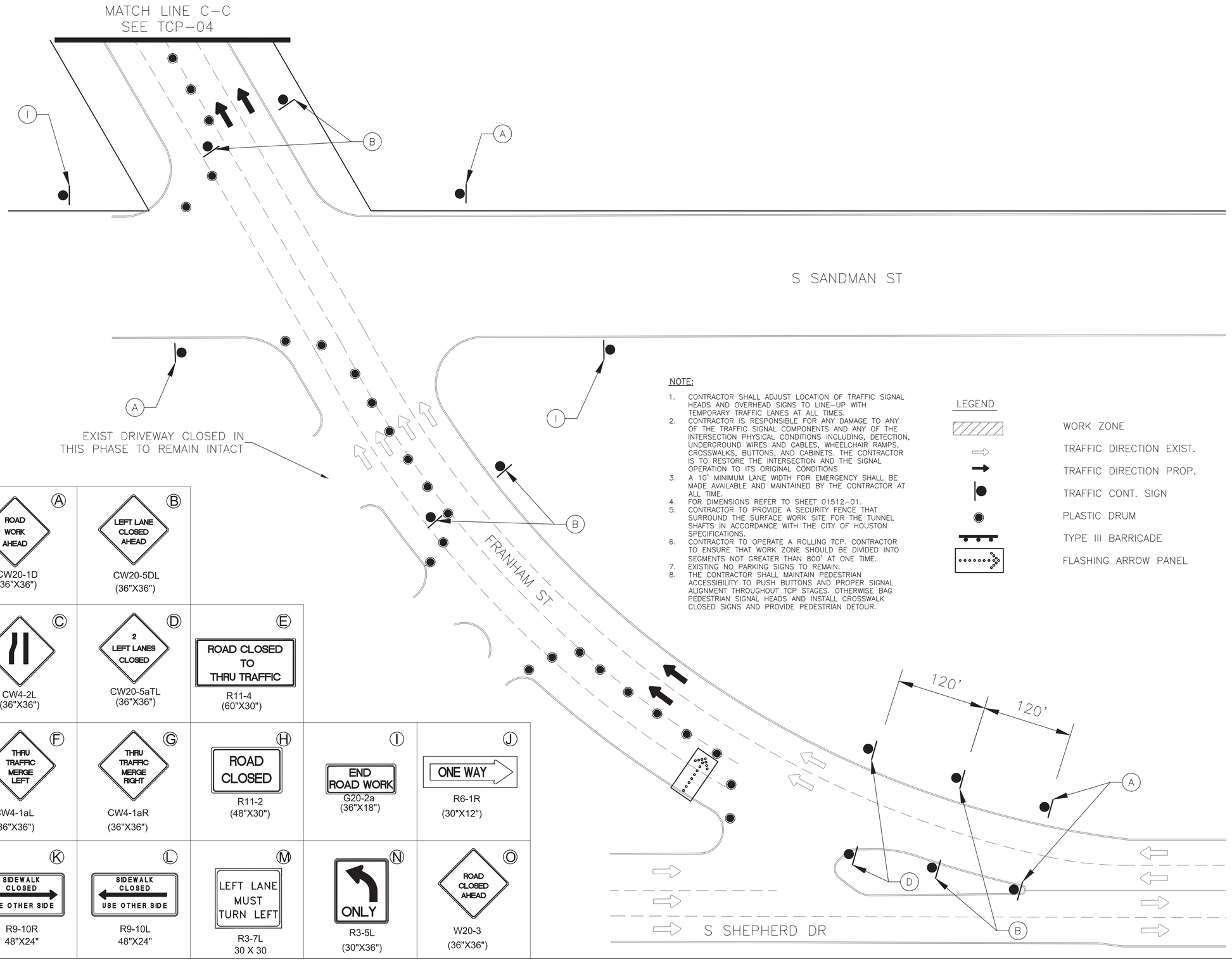
ERIC LEWIS — NAME
127613 — P.E. NO.
11/5/2025 — DATE
TBPELS FIRM #F-4528

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
FROM METRO CORRIDOR TO SWPS

WATER LINE
GREENBRIAR DR. – TCP
PHASE – 1
(SHEET 3 OF 4) TCP–04

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 143 OF 169	



N

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LEGEND

	WORK ZONE
	TRAFFIC DIRECTION EXIST.
	TRAFFIC DIRECTION PROP.
	TRAFFIC CONT. SIGN
	PLASTIC DRUM
	TYPE III BARRICADE
	FLASHING ARROW PANEL

SPACING FOR CHANNELING DEVICES

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NOTE:
SEE SHEET TCP SHEET XX FOR GREENBRIAR DR. DETOUR.

POSTED SPEED LIMIT:
POSTED SPEED ON GREENBRIAR DR IS 30 MPH
POSTED SPEED ON FARNHAM ST 30 MPH

Ⓐ ROAD WORK AHEAD — CW20-1D (36"X36")	Ⓑ LEFT LANE CLOSED AHEAD — CW20-5DL (36"X36")			
Ⓒ CW4-2L (36"X36")	Ⓓ 2 LEFT LANES CLOSED — CW20-5aTL (36"X36")	Ⓔ ROAD CLOSED TO THRU TRAFFIC — R11-4 (60"X30")		
Ⓕ THRU TRAFFIC MERGE LEFT — CW4-1aL (36"X36")	Ⓖ THRU TRAFFIC MERGE RIGHT — CW4-1aR (36"X36")	Ⓗ ROAD CLOSED — R11-2 (48"X30")	Ⓘ END ROAD WORK — G20-2a (36"X18")	Ⓙ ONE WAY — R6-1R (30"X12")
Ⓚ SIDEWALK CLOSED USE OTHER SIDE — R9-10R 48"X24"	Ⓛ SIDEWALK CLOSED USE OTHER SIDE — R9-10L 48"X24"	Ⓜ LEFT LANE MUST TURN LEFT — R3-7L 30 X 30	Ⓝ ONLY — R3-5L (30"X36")	Ⓞ ROAD CLOSED AHEAD — W20-3 (36"X36")

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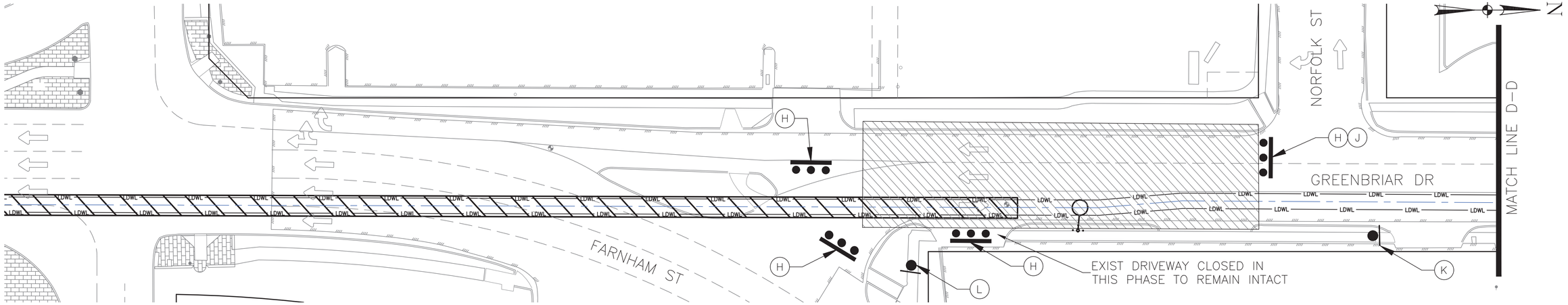
NAME P.E. NO.
DATE 11/5/2025
TBPELS FIRM #F-4528

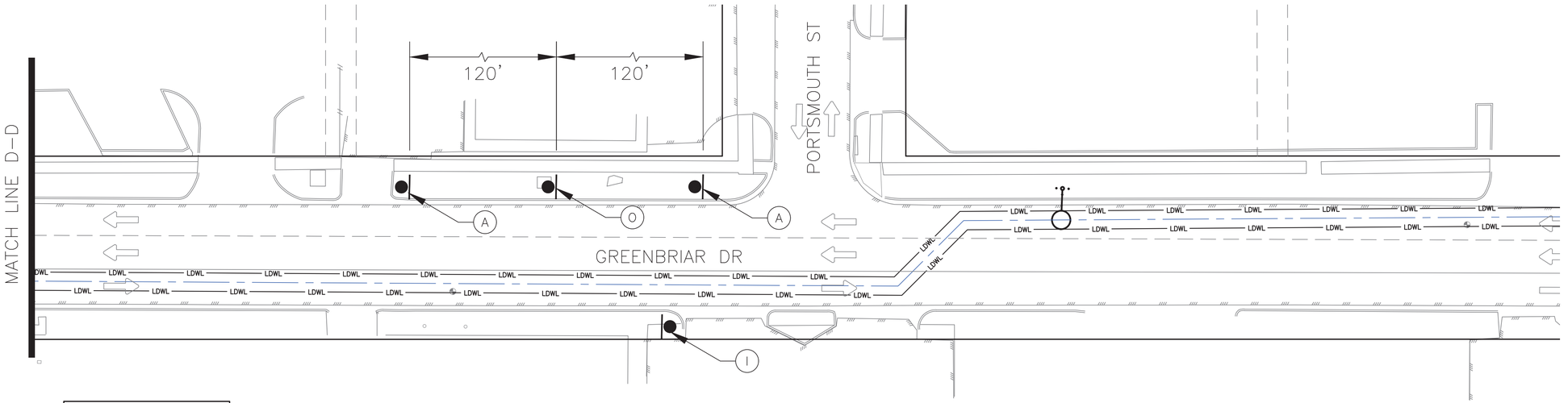
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
FROM METRO CORRIDOR TO SWPS

WATER LINE
GREENBRIAR DR. – TCP
PHASE – 1
(SHEET 4 OF 4) TCP–05

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 144 OF 169	





NOTE:

SEE SHEET TCP SHEET XX FOR GREENBRIAR DR. DETOUR.

POSTED SPEED LIMIT:

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POSTED SPEED ON FARNHAM ST 30 MPH

(A) ROAD WORK AHEAD CW20-1D (36"X36")	(B) LEFT LANE CLOSED AHEAD CW20-5DL (36"X36")	(C) CW4-2L (36"X36")	(D) 2 LEFT LANES CLOSED CW20-5aTL (36"X36")	(E) ROAD CLOSED TO THRU TRAFFIC R11-4 (60"X30")	(F) THRU TRAFFIC MERGE LEFT CW4-1aL (36"X36")	(G) THRU TRAFFIC MERGE RIGHT CW4-1aR (36"X36")
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						(O) ROAD CLOSED AHEAD W20-3 (36"X36")

LEGEND

WORK ZONE

TRAFFIC DIRECTION EXIST.

TRAFFIC DIRECTION PROP.

TRAFFIC CONT. SIGN

PLASTIC DRUM

TYPE III BARRICADE

SPACING FOR CHANNELING DEVICES

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HOUSTON PUBLIC WORKS

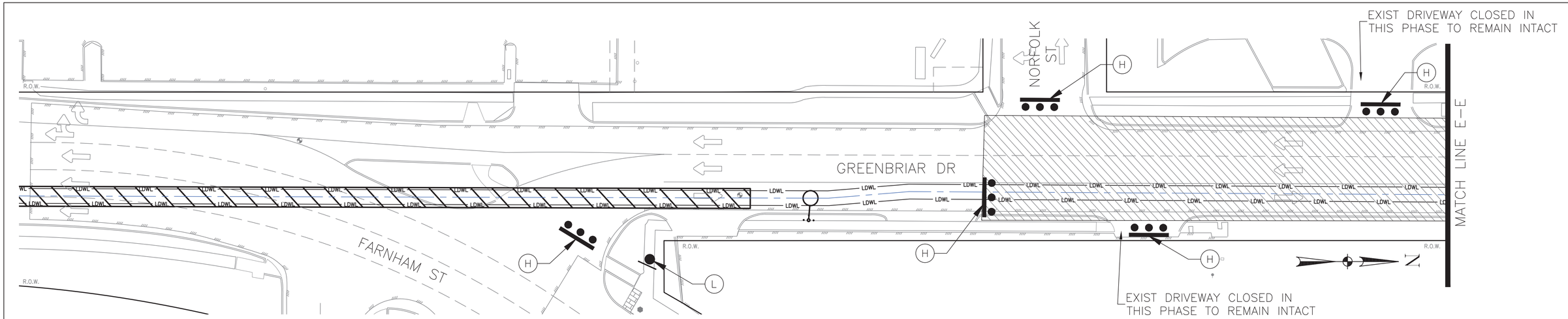
72-INCH WATER LINE ALONG GREENBRIAR DR.
FROM METRO CORRIDOR TO SWPS

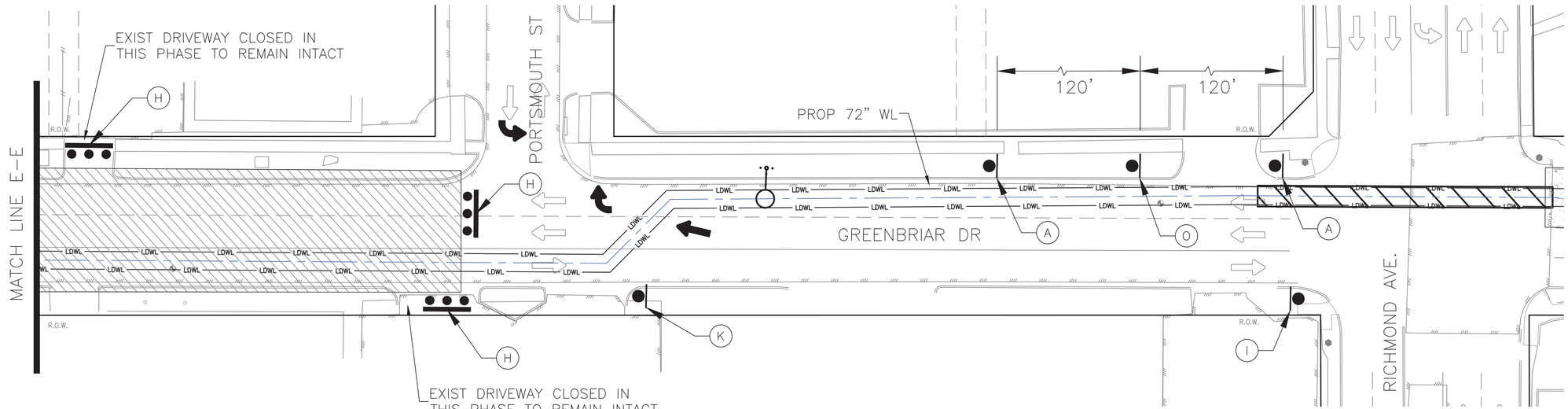
WATER LINE

GREENBRIAR DR. - TCP
PHASE - 2

TCP-06

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 145 OF 169	





NOTE:

1. CONTRACTOR SHALL ADJUST LOCATION OF TRAFFIC SIGNAL HEADS AND OVERHEAD SIGNS TO LINE–UP WITH TEMPORARY TRAFFIC LANES AT ALL TIMES.
2. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO ANY OF THE TRAFFIC SIGNAL COMPONENTS AND ANY OF THE INTERSECTION PHYSICAL CONDITIONS INCLUDING, DETECTION, UNDERGROUND WIRES AND CABLES, WHEELCHAIR RAMPS, CROSSWALKS, BUTTONS, AND CABINETS. THE CONTRACTOR IS TO RESTORE THE INTERSECTION AND THE SIGNAL OPERATION TO ITS ORIGINAL CONDITIONS.
3. A 10' MINIMUM LANE WIDTH FOR EMERGENCY SHALL BE MADE AVAILABLE AND MAINTAINED BY THE CONTRACTOR AT ALL TIME.
4. FOR DIMENSIONS REFER TO SHEET 01512–01.
5. CONTRACTOR TO PROVIDE A SECURITY FENCE THAT SURROUND THE SURFACE WORK SITE FOR THE TUNNEL SHAFTS IN ACCORDANCE WITH THE CITY OF HOUSTON SPECIFICATIONS.
6. CONTRACTOR TO OPERATE A ROLLING TCP. CONTRACTOR TO ENSURE THAT WORK ZONE SHOULD BE DIVIDED INTO SEGMENTS NOT GREATER THAN 800' AT ONE TIME.
7. EXISTING NO PARKING SIGNS TO REMAIN.
8. THE CONTRACTOR SHALL MAINTAIN PEDESTRIAN ACCESSIBILITY TO PUSH BUTTONS AND PROPER SIGNAL ALIGNMENT THROUGHOUT TCP STAGES. OTHERWISE BAG PEDESTRIAN SIGNAL HEADS AND INSTALL CROSSWALK CLOSED SIGNS AND PROVIDE PEDESTRIAN DETOUR.

NOTE:
SEE SHEET TCP SHEET XX FOR GREENBRIAR DR. DETOUR.

POSTED SPEED LIMIT:
POSTED SPEED ON GREENBRIAR DR IS 30 MPH
POSTED SPEED ON RICHMOND AVE. 35 MPH

(A) ROAD WORK AHEAD CW20-1D (36"X36")	(B) LEFT LANE CLOSED AHEAD CW20-5DL (36"X36")	(C) CW4-2L (36"X36")	(D) 2 LEFT LANES CLOSED CW20-5aTL (36"X36")	(E) ROAD CLOSED TO THRU TRAFFIC R11-4 (60"X30")	(F) THRU TRAFFIC MERGE LEFT CW4-1aL (36"X36")	(G) THRU TRAFFIC MERGE RIGHT CW4-1aR (36"X36")
(H) ROAD CLOSED R11-2 (48"X30")	(I) END ROAD WORK G20-2a (36"X18")	(J) ONE WAY R6-1R (30"X12")	(K) SIDEWALK CLOSED USE OTHER SIDE R9-10R 48"X24"	(L) SIDEWALK CLOSED USE OTHER SIDE R9-10L 48"X24"	(M) LEFT LANE MUST TURN LEFT R3-7L 30 X 30	(N) ONLY R3-5L (30"X36")	(O) ROAD CLOSED AHEAD W20-3 (36"X36")

LEGEND

WORK ZONE

TRAFFIC DIRECTION EXIST.

TRAFFIC DIRECTION PROP.

TRAFFIC CONT. SIGN

PLASTIC DRUM

TYPE III BARRICADE

SPACING FOR CHANNELING DEVICES

A. PLASTIC DRUMS ON MERGING TAPER @ 30' C–C WITH CHEVRON SIGN @ 60' C–C AND TYPE "C" WARNING LIGHT (FOR OVERNIGHT CLOSURE)
B. PLASTIC DRUMS ON DOWNSTREAM TAPER @30' C–C
C. PLASTIC DRUMS ON RADII @5'C–C
D. PLASTIC DRUMS ON TANGENT @35'C–C WITH VERTICAL PANEL @70'C–C AND TYPE "C" WARNING LIGHT @70'C–C (FOR OVERNIGHT CLOSURE)
E. PLASTIC DRUMS IN FRONT OF CONSTRUCTION ZONE @20' C–C WITH VERTICAL PANEL @40' C–C AND TYPE "A" WARNING LIGHT @ 40' C–C (FOR OVERNIGHT CLOSURE)
F. CONCRETE TRAFFIC BARRIER (C.T.B.) OR LOW PROFILE CONCRETE TRAFFIC BARRIER (L.P.C.T.B) WITH REFLECTORS @10' C–C IF PAVEMENT DROP IS MORE THAN TWELVE INCHES (12") OR PLASTIC DRUMS W/GUARD RAIL MOUNTED.

NOTE:– SPACINGS SHOWN ON TRAFFIC CONTROL PLANS SHALL BE SUPERSEDED BY THE ABOVE SPACINGS. SPACINGS MAY BE ADJUSTED TO PROVIDE DRIVEWAYS, INTERSECTIONS AND/OR MEDIAN OPENINGS.

ARCADIS
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TBPE REGISTRATION NO. F–533

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11011 RICHMOND AVE., SUITE 700
HOUSTON, TEXAS 77042
TEL: (713) 270–5700
Texas Registered Engineering Firm No. F–4528
Texas Registered Surveying Firm No. 100282–00

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P – 6329

PRELIMINARY

FOR INTERIM REVIEW ONLY

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ERIC LEWIS 127613
NAME P.E. NO.
DATE 11/5/2025
TBPELS FIRM #F-4528

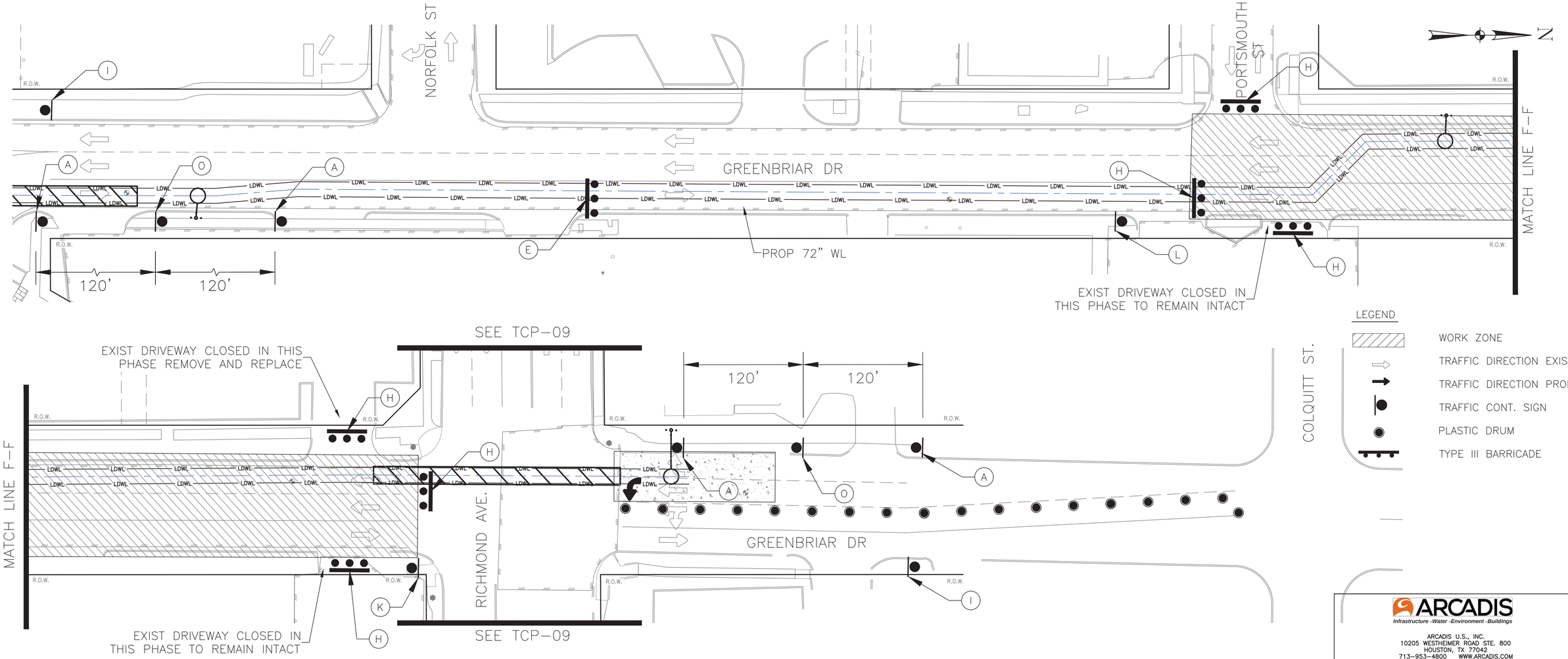
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR.
FROM METRO CORRIDOR TO SWPS

WATER LINE
GREENBRIAR DR. – TCP
PHASE – 3

TCP–07

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 146 OF 169	



NOTE:
SEE SHEET TCP SHEET XX FOR GREENBRIAR DR. DETOUR.

POSTED SPEED LIMIT:
POSTED SPEED ON GREENBRIAR DR IS 30 MPH
POSTED SPEED ON RICHMOND AVE. 35 MPH

(A) ROAD WORK AHEAD CW20-1D (36"X36")	(B) LEFT LANE CLOSED AHEAD CW20-5DL (36"X36")	(C) CW4-2L (36"X36")	(D) 2 LEFT LANES CLOSED CW20-5aTL (36"X36")	(E) ROAD CLOSED TO THRU TRAFFIC R11-4 (60"X30")	(F) THRU TRAFFIC MERGE LEFT CW4-1aL (36"X36")	(G) THRU TRAFFIC MERGE RIGHT CW4-1aR (36"X36")
(H) ROAD CLOSED R11-2 (48"X30")	(I) END ROAD WORK G20-2a (36"X18")	(J) ONE WAY R6-1R (30"X12")	(K) SIDEWALK CLOSED USE OTHER SIDE R9-10R 48"X24"	(L) SIDEWALK CLOSED USE OTHER SIDE R9-10L 48"X24"	(M) LEFT LANE MUST TURN LEFT R3-7L 30 X 30	(N) ONLY R3-5L (30"X36")	(O) ROAD CLOSED AHEAD W20-3 (36"X36")

SPACING FOR CHANNELING DEVICES

A. PLASTIC DRUMS ON MERGING TAPER @ 30' C-C WITH CHEVRON SIGN @ 60' C-C AND TYPE "C" WARNING LIGHT (FOR OVERNIGHT CLOSURE)
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E. PLASTIC DRUMS IN FRONT OF CONSTRUCTION ZONE @20' C-C WITH VERTICAL PANEL @40' C-C AND TYPE "A" WARNING LIGHT @ 40' C-C (FOR OVERNIGHT CLOSURE)
F. CONCRETE TRAFFIC BARRIER (C.T.B.) OR LOW PROFILE CONCRETE TRAFFIC BARRIER (L.P.C.T.B) WITH REFLECTORS @10' C-C IF PAVEMENT DROP IS MORE THAN TWELVE INCHES (12") OR PLASTIC DRUMS W/GUARD RAIL MOUNTED.

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NAME	P.E. NO.
ERIC LEWIS	127613
DATE	11/5/2025

TBPELS FIRM #F-4528

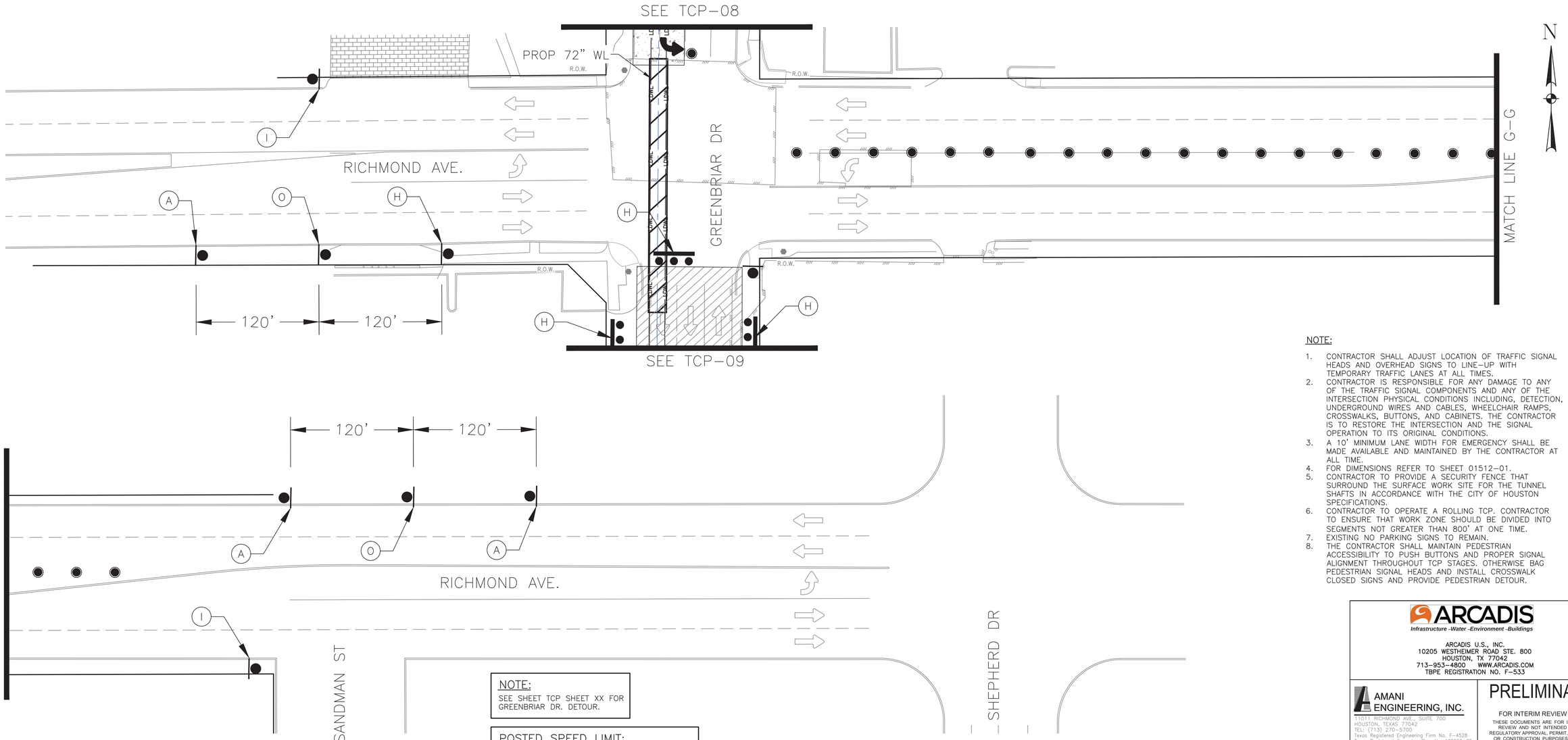
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
FROM METRO CORRIDOR TO SWPS

WATER LINE
GREENBRIAR DR. - TCP
PHASE - 4
(SHEET 1 OF 2) TCP-08

WBS NUMBER	S-000900-0136-4
DRAWING SCALE	1"=20'
CITY OF HOUSTON PM	RAM CHAKRADHAR, P.E.
SHEET NO. 147 OF 169	

FOR CITY OF HOUSTON USE ONLY



NOTE:
SEE SHEET TCP SHEET XX FOR GREENBRIAR DR. DETOUR.

POSTED SPEED LIMIT:
POSTED SPEED ON GREENBRIAR DR IS 30 MPH
POSTED SPEED ON RICHMOND AVE. 35 MPH

LEGEND

- WORK ZONE
- TRAFFIC DIRECTION EXIST.
- TRAFFIC DIRECTION PROP.
- TRAFFIC CONT. SIGN
- PLASTIC DRUM
- TYPE III BARRICADE

Ⓐ ROAD WORK AHEAD CW20-1D (36"X36")	Ⓑ LEFT LANE CLOSED AHEAD CW20-5DL (36"X36")	Ⓒ CW4-2L (36"X36")	Ⓓ 2 LEFT LANES CLOSED CW20-5aTL (36"X36")	Ⓔ ROAD CLOSED TO THRU TRAFFIC R11-4 (60"X30")	Ⓕ THRU TRAFFIC MERGE LEFT CW4-1aL (36"X36")	Ⓖ THRU TRAFFIC MERGE RIGHT CW4-1aR (36"X36")
Ⓗ ROAD CLOSED R11-2 (48"X30")	Ⓘ END ROAD WORK G20-2a (36"X18")	Ⓙ ONE WAY R6-1R (30"X12")	Ⓚ SIDEWALK CLOSED USE OTHER SIDE R9-10R 48"X24"	Ⓛ SIDEWALK CLOSED USE OTHER SIDE R9-10L 48"X24"	Ⓜ LEFT LANE MUST TURN LEFT R3-7L 30 X 30	Ⓝ ONLY R3-5L (30"X36")
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ERIC LEWIS 127613
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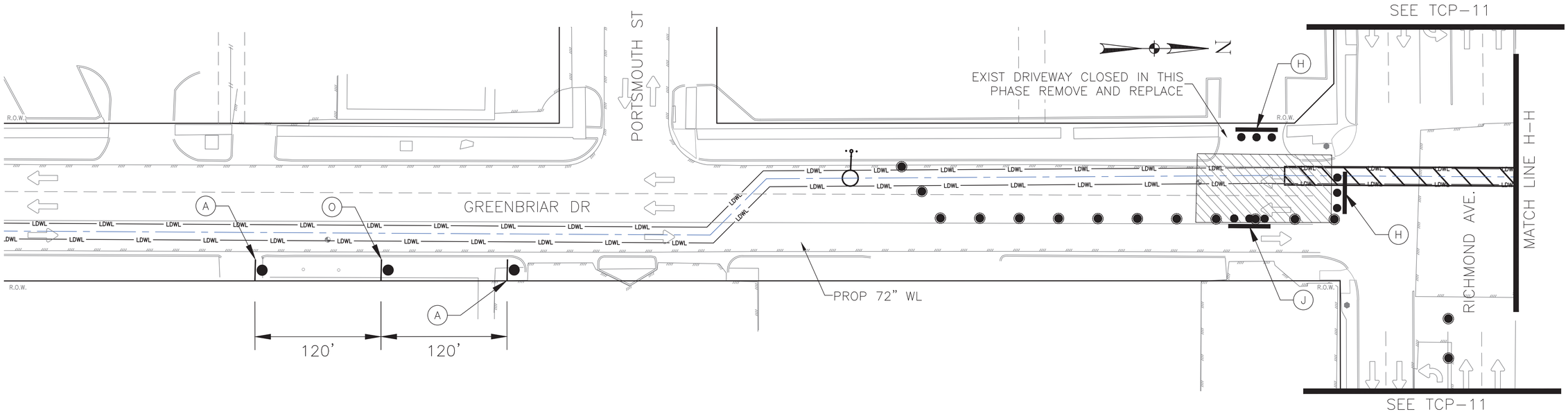
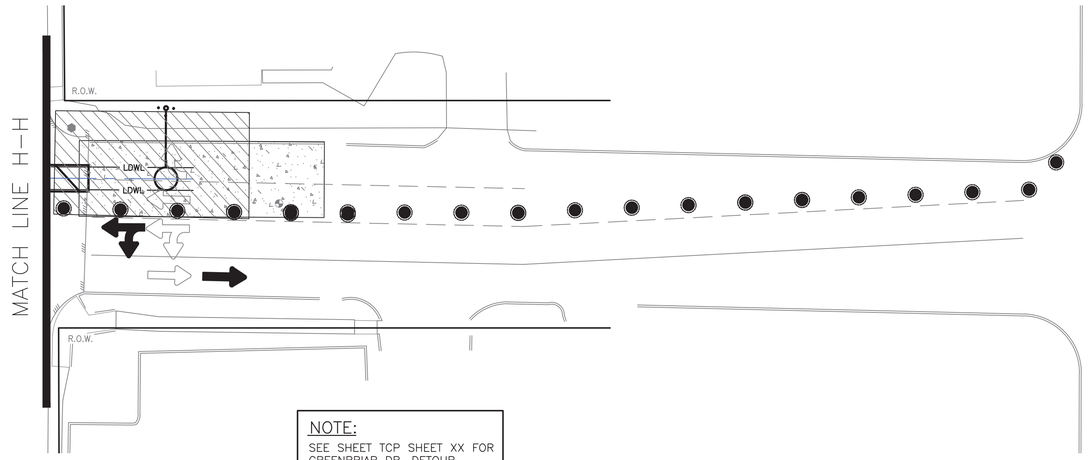
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
FROM METRO CORRIDOR TO SWPS

WATER LINE
GREENBRIAR DR. - TCP
PHASE - 4
(SHEET 2 OF 2) TCP-09

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 148 OF 169	





NOTE:
SEE SHEET TCP SHEET XX FOR GREENBRIAR DR. DETOUR.

POSTED SPEED LIMIT:
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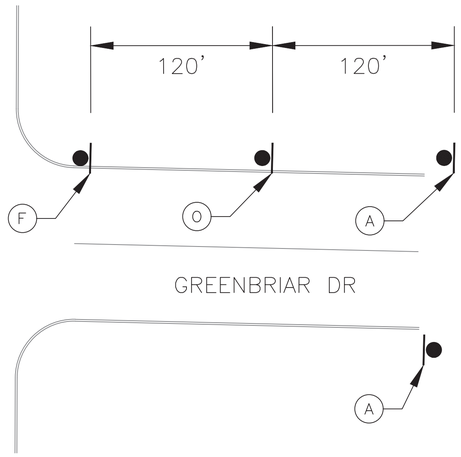
POSTED SPEED ON RICHMOND AVE. 35 MPH



LEGEND

- WORK ZONE
- TRAFFIC DIRECTION EXIST.
- TRAFFIC DIRECTION PROP.
- TRAFFIC CONT. SIGN
- PLASTIC DRUM
- TYPE III BARRICADE

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NAME P.E. NO.
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TBPELS FIRM #F-4528

CITY OF HOUSTON

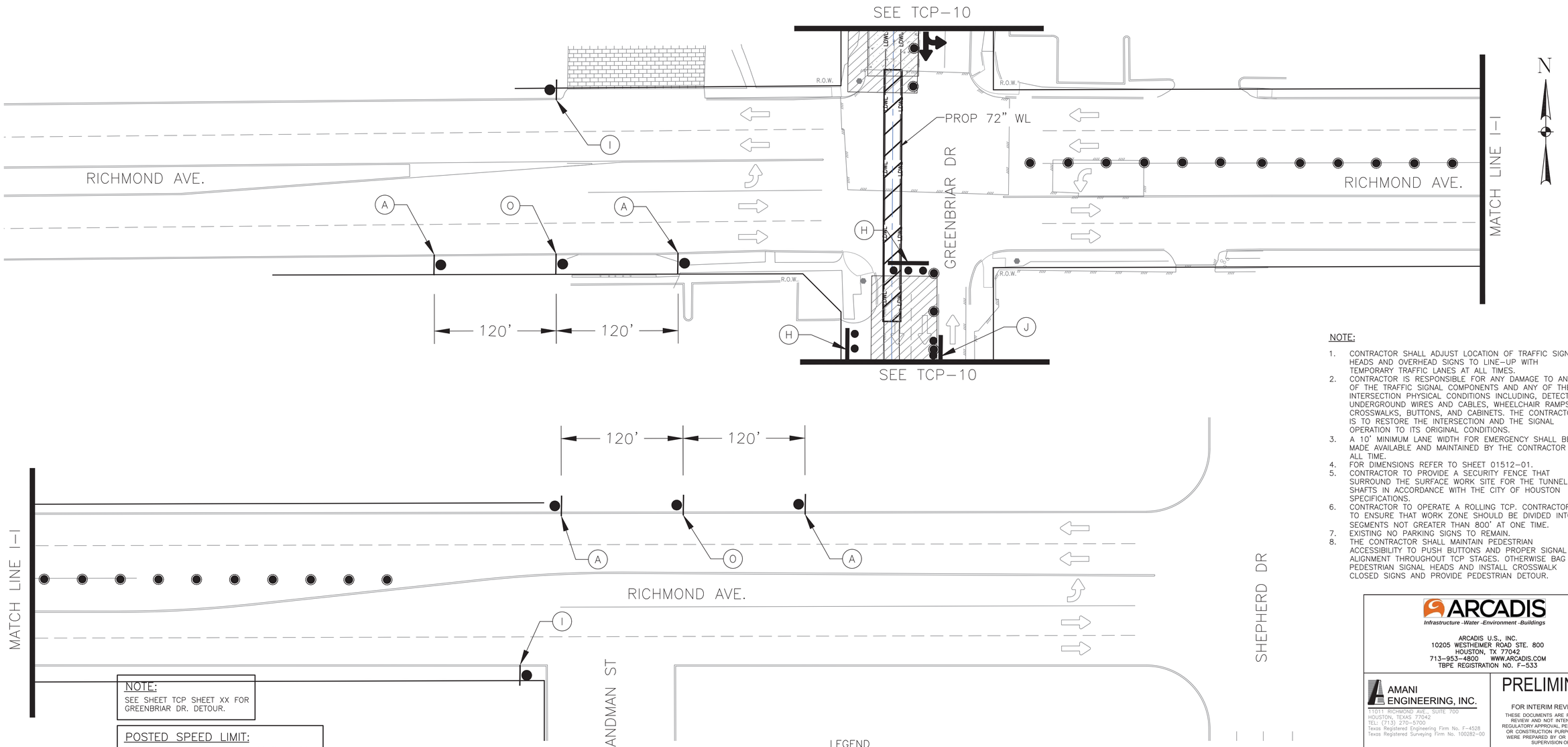
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
FROM METRO CORRIDOR TO SWPS

WATER LINE

GREENBRIAR DR. - TCP
PHASE - 5
(SHEET 1 OF 2) TCP-10

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 149 OF 169	



NOTE:
SEE SHEET TCP SHEET XX FOR GREENBRIAR DR. DETOUR.

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POSTED SPEED ON GREENBRIAR DR IS 30 MPH
POSTED SPEED ON RICHMOND AVE. 35 MPH

NOTE:

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4. FOR DIMENSIONS REFER TO SHEET 01512-01.
5. CONTRACTOR TO PROVIDE A SECURITY FENCE THAT SURROUND THE SURFACE WORK SITE FOR THE TUNNEL SHAFTS IN ACCORDANCE WITH THE CITY OF HOUSTON SPECIFICATIONS.
6. CONTRACTOR TO OPERATE A ROLLING TCP. CONTRACTOR TO ENSURE THAT WORK ZONE SHOULD BE DIVIDED INTO SEGMENTS NOT GREATER THAN 800' AT ONE TIME.
7. EXISTING NO PARKING SIGNS TO REMAIN.
8. THE CONTRACTOR SHALL MAINTAIN PEDESTRIAN ACCESSIBILITY TO PUSH BUTTONS AND PROPER SIGNAL ALIGNMENT THROUGHOUT TCP STAGES. OTHERWISE BAG PEDESTRIAN SIGNAL HEADS AND INSTALL CROSSWALK CLOSED SIGNS AND PROVIDE PEDESTRIAN DETOUR.

LEGEND

- WORK ZONE
- TRAFFIC DIRECTION EXIST.
- TRAFFIC DIRECTION PROP.
- TRAFFIC CONT. SIGN
- PLASTIC DRUM
- TYPE III BARRICADE

SPACING FOR CHANNELING DEVICES

A. PLASTIC DRUMS ON MERGING TAPER @ 30' C-C WITH CHEVRON SIGN @ 60' C-C AND TYPE "C" WARNING LIGHT (FOR OVERNIGHT CLOSURE)
B. PLASTIC DRUMS ON DOWNSTREAM TAPER @30' C-C
C. PLASTIC DRUMS ON RADII @5'C-C
D. PLASTIC DRUMS ON TANGENT @35'C-C WITH VERTICAL PANEL @70'C-C AND TYPE "C" WARNING LIGHT @70'C-C (FOR OVERNIGHT CLOSURE)
E. PLASTIC DRUMS IN FRONT OF CONSTRUCTION ZONE @20' C-C WITH VERTICAL PANEL @40' C-C AND TYPE "A" WARNING LIGHT @ 40' C-C (FOR OVERNIGHT CLOSURE)
F. CONCRETE TRAFFIC BARRIER (C.T.B.) OR LOW PROFILE CONCRETE TRAFFIC BARRIER (L.P.C.T.B) WITH REFLECTORS @10' C-C IF PAVEMENT DROP IS MORE THAN TWELVE INCHES (12") OR PLASTIC DRUMS W/GUARD RAIL MOUNTED.

NOTE:- SPACINGS SHOWN ON TRAFFIC CONTROL PLANS SHALL BE SUPERSEDED BY THE ABOVE SPACINGS. SPACINGS MAY BE ADJUSTED TO PROVIDE DRIVEWAYS, INTERSECTIONS AND/OR MEDIAN OPENINGS.

(A) ROAD WORK AHEAD CW20-1D (36"X36")	(B) LEFT LANE CLOSED AHEAD CW20-5DL (36"X36")	(C) CW4-2L (36"X36")	(D) 2 LEFT LANES CLOSED CW20-5aTL (36"X36")	(E) ROAD CLOSED TO THRU TRAFFIC R11-4 (60"X30")	(F) THRU TRAFFIC MERGE LEFT CW4-1aL (36"X36")	(G) THRU TRAFFIC MERGE RIGHT CW4-1aR (36"X36")
(H) ROAD CLOSED R11-2 (48"X30")	(I) END ROAD WORK G20-2a (36"X18")	(J) ONE WAY R6-1R (30"X12")	(K) SIDEWALK CLOSED USE OTHER SIDE R9-10R 48"X24"	(L) SIDEWALK CLOSED USE OTHER SIDE R9-10L 48"X24"	(M) LEFT LANE MUST TURN LEFT R3-7L 30 X 30	(N) ONLY R3-5L (30"X36")

(O) ROAD CLOSED AHEAD
W20-3
(36"X36")

ARCADIS
Infrastructure -Water -Environment -Buildings
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713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

AMANI ENGINEERING, INC.
11011 RICHMOND AVE., SUITE 700
HOUSTON, TEXAS 77042
TEL: (713) 270-5700
Texas Registered Engineering Firm No. F-4528
Texas Registered Surveying Firm No. 100282-00

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P - 6329

PRELIMINARY

FOR INTERIM REVIEW ONLY

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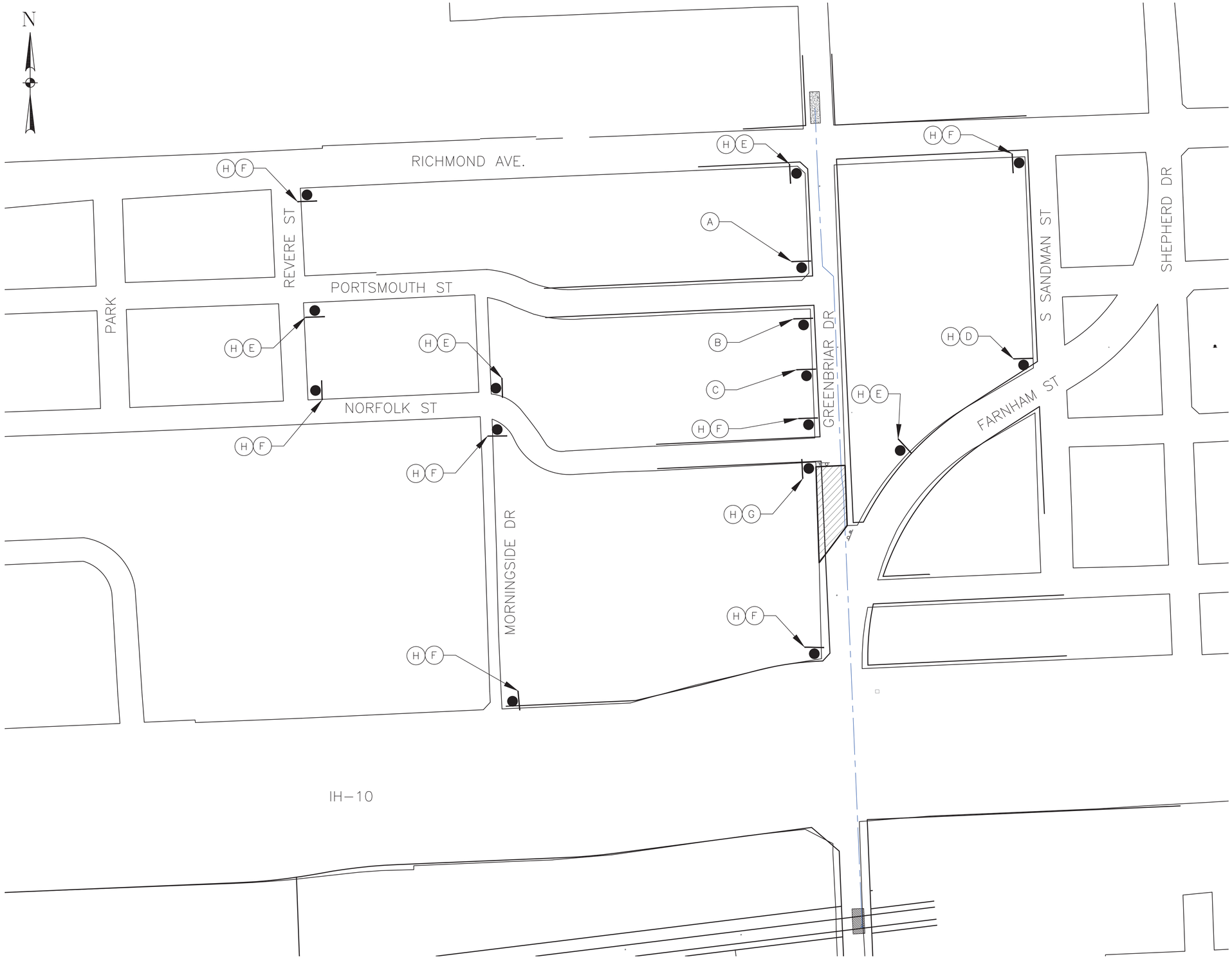
ERIC LEWIS 127613
NAME P.E. NO.
DATE 11/5/2025
TBPELS FIRM #F-4528

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR.
FROM METRO CORRIDOR TO SWPS

WATER LINE
GREENBRIAR DR. - TCP
PHASE - 5
(SHEET 2 OF 2) TCP-11

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=20'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 150 OF 169	



LEGEND

WORKZONE

SIGN

TYPE III BARRICADE

(A) ROAD WORK AHEAD CW20-1D (48"X48")	(B) ROAD CLOSED AHEAD CW20-3D (48"X48")	(C) DETOUR AHEAD CW20-2D (48"X48")	(D) END DETOUR M4-8a (18"x24")
(E) DETOUR M4-9S (30"X24")	(F) DETOUR M4-9R (30"X24")	(G) DETOUR M4-9L (30"X24")	(H) GREENBRIAR DR. M4-9N

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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

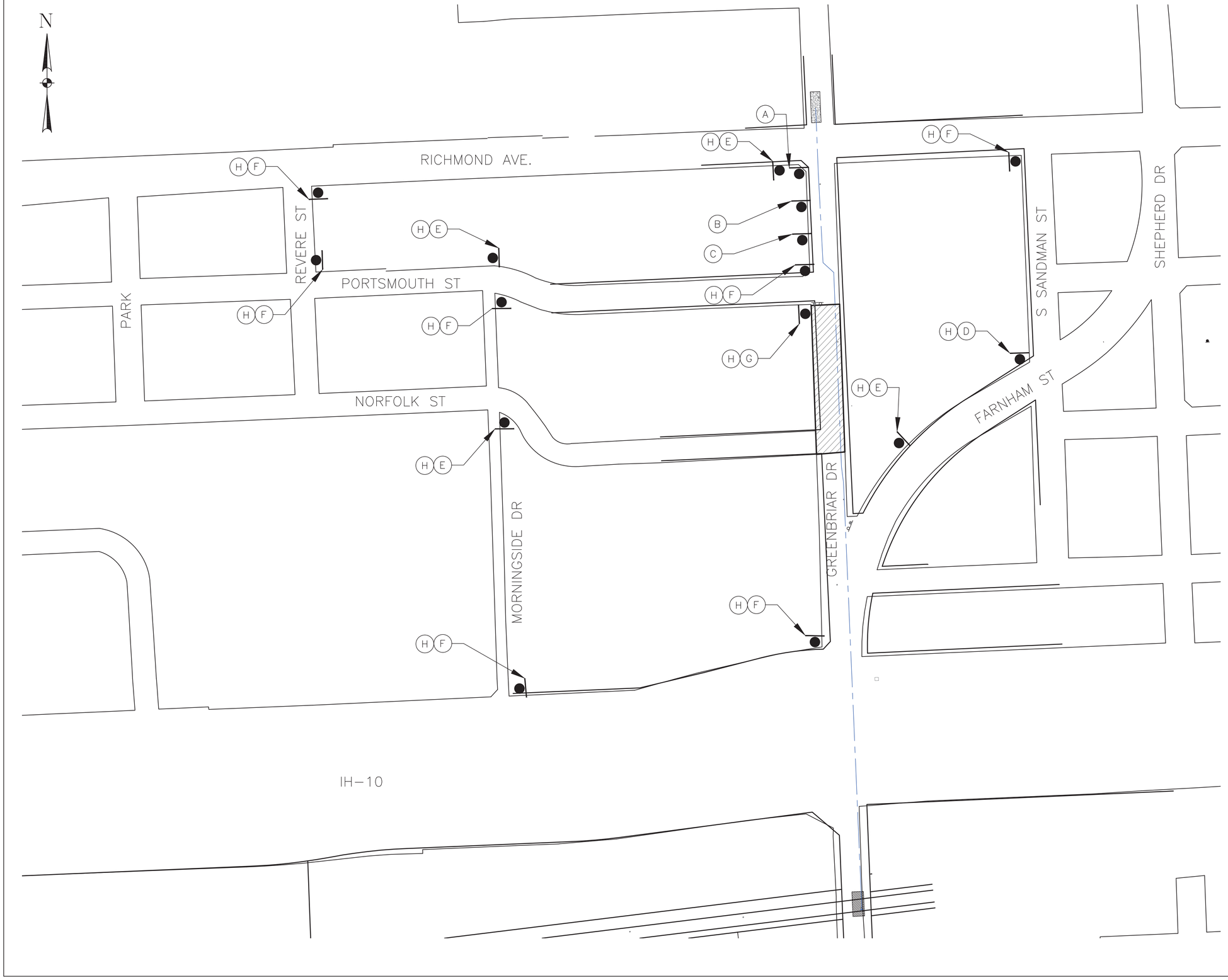
72–INCH WATER LINE ALONG GREENBRIAR DR.
FROM METRO CORRIDOR TO SWPS

WATER LINE

DETOUR 1

TCP–12

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"=100'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 151 OF 169	



LEGEND

WORKZONE

SIGN

TYPE III BARRICADE

(A) ROAD WORK AHEAD CW20-1D (48"X48")	(B) ROAD CLOSED AHEAD CW20-3D (48"X48")	(C) DETOUR AHEAD CW20-2D (48"X48")	(D) END DETOUR M4-8a (18"x24")
(E) DETOUR ↑ M4-9S (30"X24")	(F) DETOUR → M4-9R (30"X24")	(G) DETOUR ← M4-9L (30"X24")	(H) GREENBRIAR DR. M4-9N

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DATE 11/5/2025

TBPELS FIRM #F-4528

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

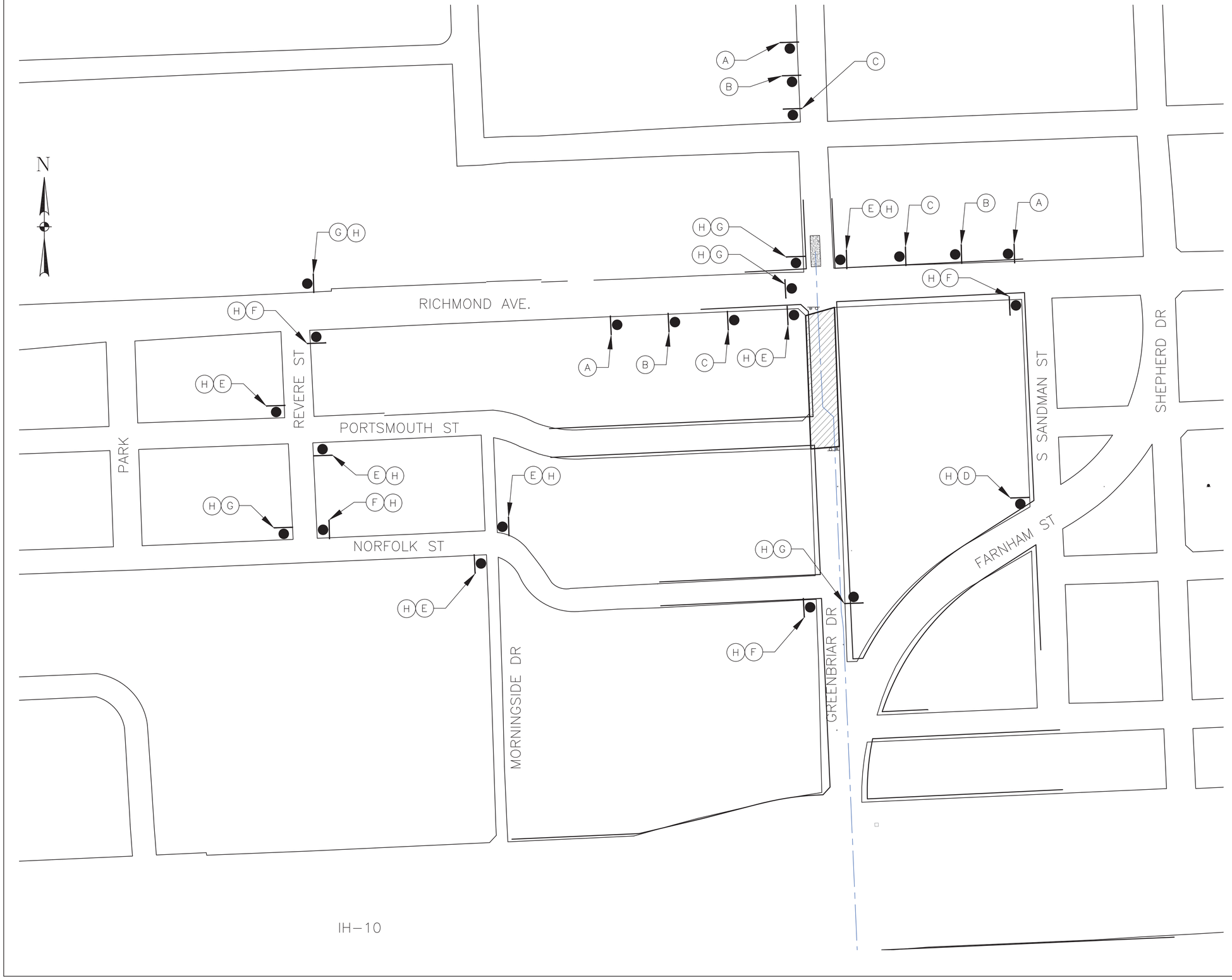
72-INCH WATER LINE ALONG GREENBRIAR DR.
FROM METRO CORRIDOR TO SWPS

WATER LINE

DETOUR 2

TCP-13

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=100'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 152 OF 169	



LEGEND

- WORKZONE
- SIGN
- TYPE III BARRICADE

(A) ROAD WORK AHEAD CW20-1D (48"X48")	(B) ROAD CLOSED AHEAD CW20-3D (48"X48")	(C) DETOUR AHEAD CW20-2D (48"X48")	(D) END DETOUR M4-8a (18"x24")
(E) DETOUR M4-9S (30"X24")	(F) DETOUR M4-9R (30"X24")	(G) DETOUR M4-9L (30"X24")	(H) GREENBRIAR DR. M4-9N

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NAME P.E. NO.

DATE 11/5/2025

TBPELS FIRM #F-4528

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

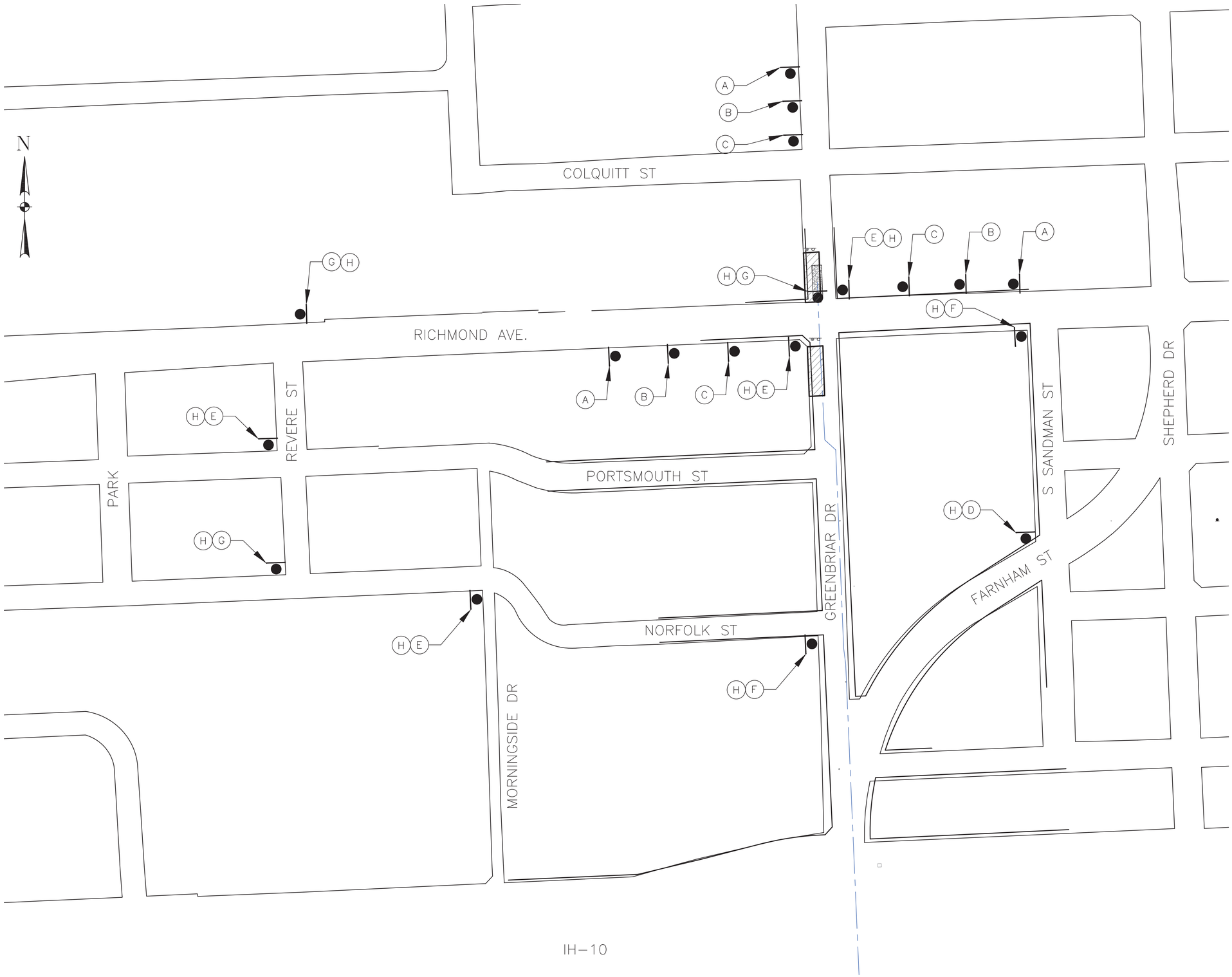
72-INCH WATER LINE ALONG GREENBRIAR DR.
FROM METRO CORRIDOR TO SWPS

WATER LINE

DETOUR 3

TCP-14

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=100'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 153 OF 169	



LEGEND

- WORKZONE
- SIGN
- TYPE III BARRICADE

(A) ROAD WORK AHEAD CW20-1D (48"X48")	(B) ROAD CLOSED AHEAD CW20-3D (48"X48")	(C) DETOUR AHEAD CW20-2D (48"X48")	(D) END DETOUR M4-8a (18"x24")
(E) DETOUR M4-9S (30"X24")	(F) DETOUR M4-9R (30"X24")	(G) DETOUR M4-9L (30"X24")	(H) GREENBRIAR DR. M4-9N

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713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

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ERIC LEWIS (NAME) 127613 (P.E. NO.)
DATE 11/5/2025
TBPELS FIRM #F-4528

CITY OF HOUSTON

HOUSTON PUBLIC WORKS

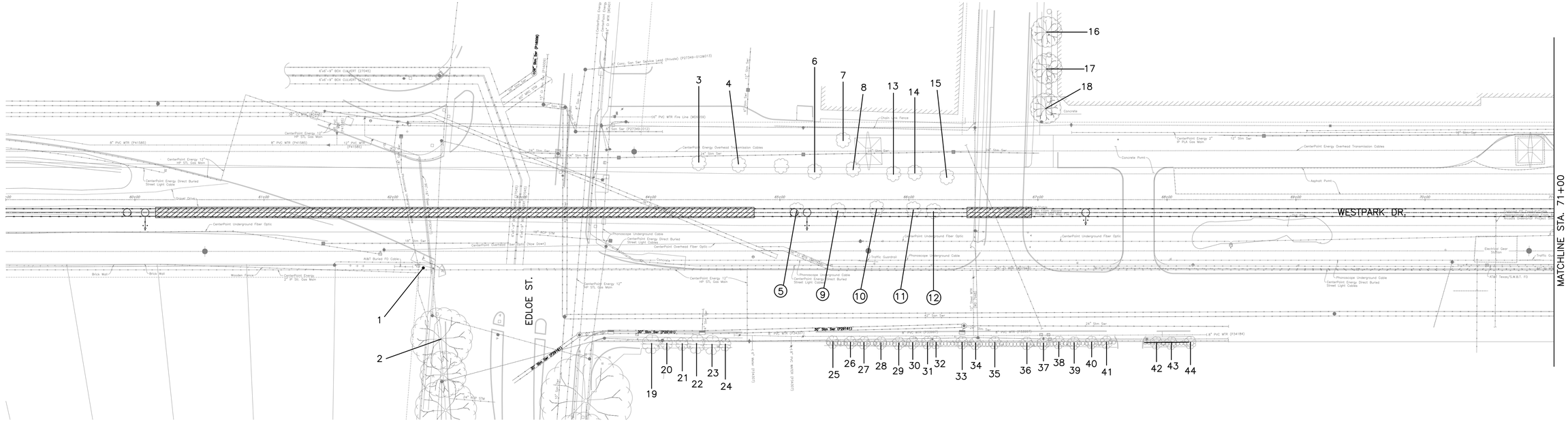
72-INCH WATER LINE ALONG GREENBRIAR DR.
FROM METRO CORRIDOR TO SWPS

WATER LINE

DETOUR 4

TCP-15

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=100'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 154 OF 169	



Tree No.	Location	Description	Chapter 33 Status	Comments	Treatment
Trees along Metro Easement					
1	5100 Edloe	17" Sugarberry	Not ordinance tree	Topped by CPE, Not impacted	
2	5100 Edloe	18" Live Oak	Ordinance tree	Not impacted	
3	3277 SW Freeway	2" Baccharis	Not ordinance tree	Private tree, Not impacted	
4	3277 SW Freeway	5" Crepe Myrtle	Not ordinance tree	CPE ROW, Not impacted	
5	3277 SW Freeway	8" Crepe Myrtle	Not ordinance tree	Metro ROW, Remove for WL	Remove easement tree, no replacement plantings required
6	3277 SW Freeway	5" Crepe Myrtle	Not ordinance tree	CPE ROW, Not impacted	
7	3277 SW Freeway	5" Crepe Myrtle	Not ordinance tree	CPE ROW, Not impacted	
8	3277 SW Freeway	6" Crepe Myrtle	Not ordinance tree	CPE ROW, Not impacted	
9	3277 SW Freeway	9" Crepe Myrtle	Not ordinance tree	Metro ROW, Remove for WL	Remove easement tree, no replacement plantings required
10	3277 SW Freeway	8" Crepe Myrtle	Not ordinance tree	Metro ROW, Remove for WL	Remove easement tree, no replacement plantings required
11	3277 SW Freeway	9" Crepe Myrtle	Not ordinance tree	Metro ROW, Remove for WL	Remove easement tree, no replacement plantings required
12	3277 SW Freeway	8" Crepe Myrtle	Not ordinance tree	Metro ROW, Remove for WL	Remove easement tree, no replacement plantings required
13	3277 SW Freeway	7" Crepe Myrtle	Not ordinance tree	CPE ROW, Dead	
14	3277 SW Freeway	Tree removed			
15	3277 SW Freeway	8" Crepe Myrtle	Not ordinance tree	CPE ROW, Not impacted	
16	3257 SW Freeway	9" Holly	Private tree	Not impacted	
17	3257 SW Freeway	9" Holly	Private tree	Not impacted	
18	3257 SW Freeway	11" Holly	Private tree	Not impacted	
19	5151 Edloe	7" Crepe Myrtle	Private tree	Not impacted	
20	5151 Edloe	9" Crepe Myrtle	Private tree	Not impacted	
21	5151 Edloe	6" Crepe Myrtle	Private tree	Not impacted	
22	5151 Edloe	10" Crepe Myrtle	Private tree	Not impacted	

Tree No.	Location	Description	Chapter 33 Status	Comments	Treatment
Trees along Metro Easement					
23	5151 Edloe	8" Crepe Myrtle	Private tree	Not impacted	
24	5151 Edloe	6" Crepe Myrtle	Private tree	Not impacted	
25	5151 Edloe	7" Crepe Myrtle	Private tree	Not impacted	
26	5151 Edloe	8" Crepe Myrtle	Private tree	Not impacted	
27	5151 Edloe	6" Crepe Myrtle	Private tree	Not impacted	
28	5151 Edloe	7" Crepe Myrtle	Private tree	Not impacted	
29	5151 Edloe	7" Crepe Myrtle	Private tree	Not impacted	
30	5151 Edloe	8" Crepe Myrtle	Private tree	Not impacted	
31	5151 Edloe	7" Crepe Myrtle	Private tree	Not impacted	
32	5151 Edloe	7" Crepe Myrtle	Private tree	Not impacted	
33	5151 Edloe	6" Crepe Myrtle	Private tree	Not impacted	
34	5151 Edloe	7" Crepe Myrtle	Private tree	Not impacted	
35	5151 Edloe	7" Crepe Myrtle	Private tree	Not impacted	
36	5151 Edloe	6" Crepe Myrtle	Private tree	Not impacted	
37	5151 Edloe	7" Crepe Myrtle	Private tree	Not impacted	
38	5151 Edloe	7" Crepe Myrtle	Private tree	Not impacted	
39	5151 Edloe	6" Crepe Myrtle	Private tree	Not impacted	
40	5151 Edloe	7" Crepe Myrtle	Private tree	Not impacted	
41	5151 Edloe	7" Crepe Myrtle	Private tree	Not impacted	
42	5151 Edloe	7" Crepe Myrtle	Private tree	Not impacted	
43	5151 Edloe	6" Crepe Myrtle	Private tree	Not impacted	
44	5151 Edloe	7" Crepe Myrtle	Private tree	Not impacted	

TREE PRESERVATION PLAN LEGEND

- 1 — TREE NUMBER/LOCATION
- (1) — TREE TO BE REMOVED
- —X—X— TREE PROTECTION FENCE
- ⊙ REPLACEMENT PLANTING SPECIES AND SIZE/TYPE
- ⊢------⊣ ROOT PRUNING TRENCH
- ⊢—OCC—⊣ ZERO CUTBACK CURB

1. THIS TREE PROTECTION PLAN WAS DEVELOPED WITH INFORMATION PROVIDED BY DESIGN ENGINEER IN DRAWINGS DATED SEPTEMBER 2025. THE PLAN CONSIDERS ALL FITTINGS, VERTICAL OFFSETS AND AREAS OF NECESSARY EXCAVATION. CHANGES MADE TO DESIGN MAY COMPROMISE THE TREE PROTECTION PLAN. REFER SPECIFICATIONS 01562 AND 02915.
2. CN KOEHL URBAN FORESTRY, INC. HAS NOT BEEN CONTRACTED TO COMPLETE ANY TREE RISK ASSESSMENTS ON THIS PROJECT–THIS TPP INCLUDES PROTECTION MEASURES FOR SPECIES OF TREES PROTECTED BY APPLICABLE ORDINANCE ONLY. CN KOEHL URBAN FORESTRY, INC. DOES NOT GUARANTEE CONDITION OR STRUCTUAL INTEGRITY OF ANY TREE LOCATED ON OR ADJACENT TO THIS PROJECT.
3. IN AREAS WHERE INDIVIDUAL TREES HAVE NOT BEEN TIED IN BY SURVEY, APPROXIMATE LOCATION IS INDICATED ON TPP WITH A DOT AND TREE NUMBER. ACCURACY OF REPRESENTED LOCATION IS NOT GUARANTEED BY CN KOEHL URBAN FORESTRY, INC.
4. THE CONTRACTOR'S ARBORIST WILL MARK LOCATIONS OF TREES TO BE PLANTED AND OBTAIN APPROVAL BY CITY ENGINEER AND CITY FORESTER BEFORE PURCHASING OR EXCAVATING PLANTING HOLE OF EACH TREE.

N

40 0 40 80

SCALE: 1"=40'

NO.	DATE	REVISION	APP.

C.N. Koehl
Urban Forestry, Inc.
210 Stone Bush Ct. ◦ Katy, Texas 77493

APPROVED: Craig N. Koehl 11–18–2025

ARCADIS
ARCADIS U.S., INC.
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TBPE REGISTRATION NO. F–533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P–6329

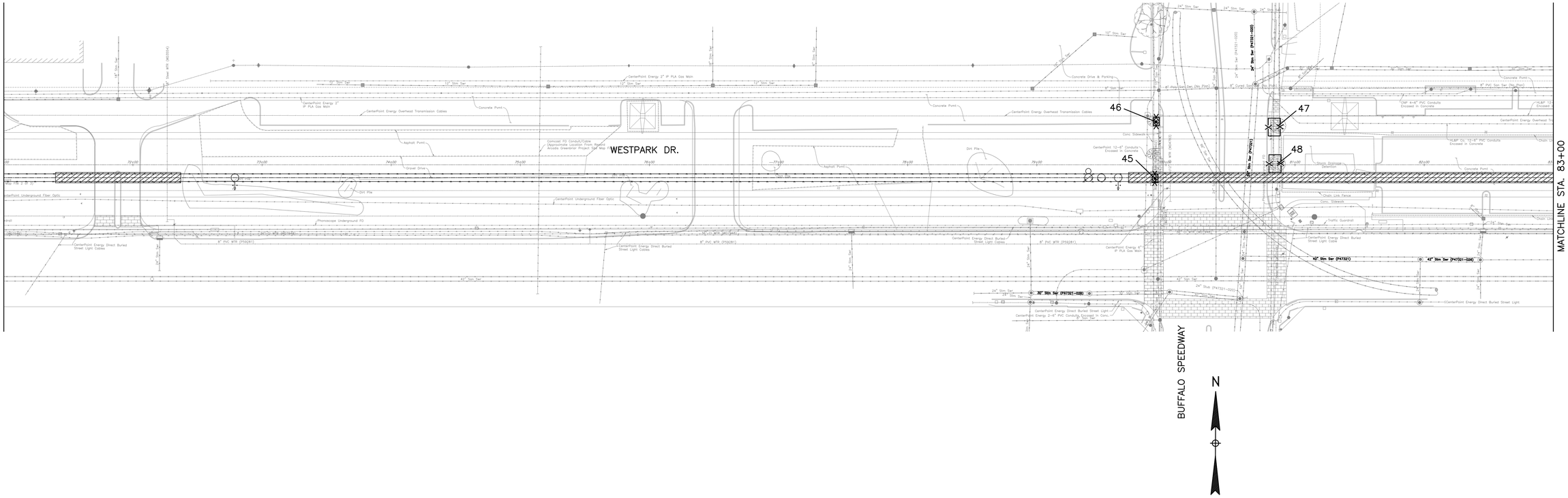
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

TREE PROTECTION PLAN

SHEET 1 OF 7

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"=40'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 155 OF 169	



NO.	DATE	REVISION	APP.

Tree No.	Location	Description	Chapter 33 Status	Comments	Treatment
Trees along Metro Easement					
45	3203 SW Freeway	5" Overcup Oak	Ordinance tree		Trenchless construction, Fence
46	3203 SW Freeway	5" Chinese Pistache	Ordinance tree		Fence
47	3190 Westpark	5" Chinese Pistache	Ordinance tree	Root bound	Fence
48	3190 Westpark	5" Chinese Pistache	Ordinance tree	Root bound	Trenchless construction, Fence

TREE PRESERVATION PLAN LEGEND

- 1 — TREE NUMBER/LOCATION
- (1) — TREE TO BE REMOVED
- —X—X— TREE PROTECTION FENCE
- ⊙ — REPLACEMENT PLANTING SPECIES AND SIZE/TYPE
- ⊢------⊣ ROOT PRUNING TRENCH
- ⊢OCC⊣ ZERO CUTBACK CURB

40 0 40 80

SCALE: 1"=40'

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APPROVED: Craig N. Koehl 11–18–2025

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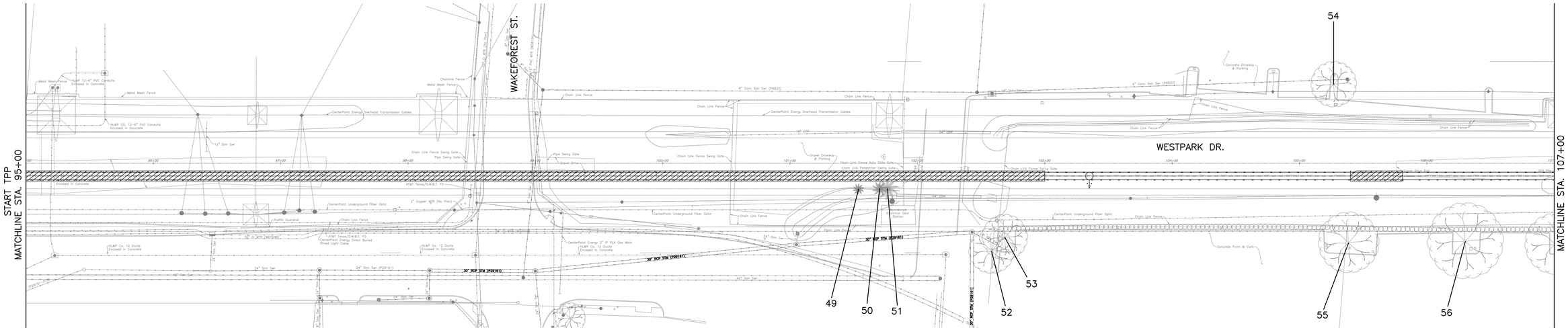
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

TREE PROTECTION PLAN

SHEET 2 OF 7

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"=40'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 156 OF 169	



Tree No.	Location	Description	Chapter 33 Status	Comments	Treatment
Trees along Metro Easement					
49	2735 SW Freeway	3' Palm	Not ordinance tree	Metro ROW, Not impacted	
50	2735 SW Freeway	4' Palm	Not ordinance tree	Metro ROW, Not impacted	
51	2735 SW Freeway	3' Palm	Not ordinance tree	Metro ROW, Not impacted	
52	2234 Westpark	18" Live Oak	Private tree	Not impacted	
53	2234 Westpark	18" Live Oak	Private tree	Not impacted	
54	2615 SW Freeway	15" Live Oak	Private tree	Not impacted	
55	2234 Westpark	20" Live Oak	Private tree	Pruned by CPE, Not impacted	
56	2234 Westpark	25" Live Oak	Private tree	Pruned by CPE, Not impacted	

TREE PRESERVATION PLAN LEGEND

- 1 — TREE NUMBER/LOCATION
- (1) — TREE TO BE REMOVED
- —X—X— TREE PROTECTION FENCE
- ⊙ — REPLACEMENT PLANTING SPECIES AND SIZE/TYPE
- ⊢------⊣ ROOT PRUNING TRENCH
- ⊢—OCC—⊣ ZERO CUTBACK CURB

N

40 0 40 80

SCALE: 1"=40'

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4. THE CONTRACTOR'S ARBORIST WILL MARK LOCATIONS OF TREES TO BE PLANTED AND OBTAIN APPROVAL BY CITY ENGINEER AND CITY FORESTER BEFORE PURCHASING OR EXCAVATING PLANTING HOLE OF EACH TREE.

NO.	DATE	REVISION	APP.

C.N. Koehl
Urban Forestry, Inc.
210 Stone Bush Ct. ◦ Katy, Texas 77493

APPROVED: Craig N. Koehl 11-18-2025

ARCADIS
ARCADIS U.S., INC.
1330 POST OAK BLVD., STE. 2250
HOUSTON, TX 77056
713-953-4800 WWW.ARCADIS.COM
TBPE REGISTRATION NO. F-533

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

CITY OF HOUSTON

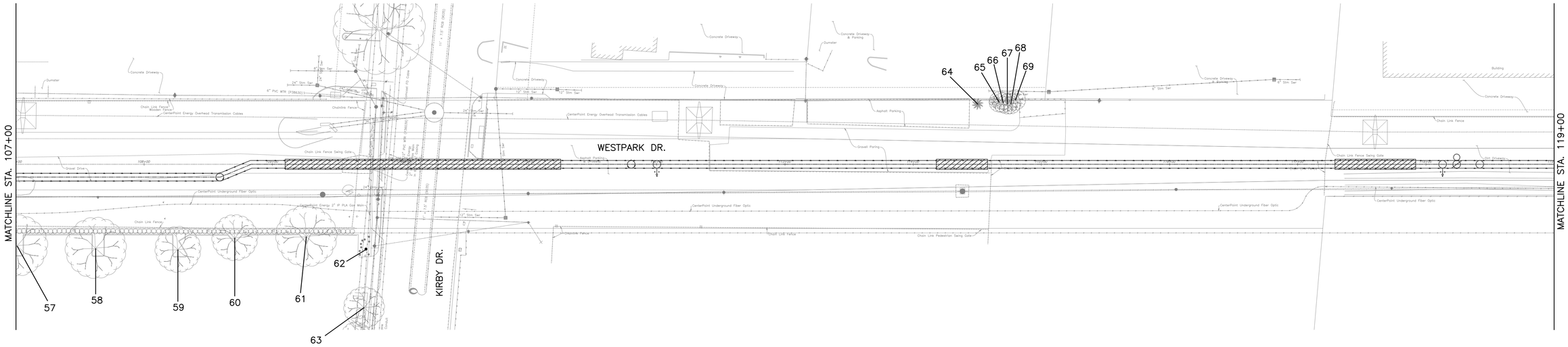
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

TREE PROTECTION PLAN

SHEET 3 OF 7

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=40'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 157 OF 169	



Tree No.	Location	Description	Chapter 33 Status	Comments	Treatment
Trees along Metro Easement					
57	2234 Westpark	19" Live Oak	Private tree	Pruned by CPE, Not impacted	
58	2234 Westpark	17" Live Oak	Private tree	Pruned by CPE, Not impacted	
59	2600 Westpark	20" Live Oak	Private tree	Pruned by CPE, Not impacted	
60	2600 Westpark	17" Live Oak	Private tree	Pruned by CPE, Not impacted	
61	2600 Westpark	21" Live Oak	Private tree	Pruned by CPE, Not impacted	
62	2600 Westpark	27" Live Oak	Ordinance tree	Not impacted	
63	2600 Westpark	14" Live Oak	Ordinance tree	Not impacted	
64	2519 SW Freeway	5' Palm	Private tree	CPE ROW, Not impacted	
65	2519 SW Freeway	4" Crepe Myrtle	Private tree	CPE ROW, Not impacted	
66	2519 SW Freeway	8" Mulberry	Private tree	CPE ROW, Not impacted	
67	2519 SW Freeway	5" Tallow	Private tree	CPE ROW, Not impacted	
68	2519 SW Freeway	5" Tallow	Private tree	CPE ROW, Not impacted	
69	2519 SW Freeway	3" Sugarberry	Private tree	CPE ROW, Not impacted	

TREE PRESERVATION PLAN LEGEND

- 1 — TREE NUMBER/LOCATION
- (1) — TREE TO BE REMOVED
- —X—X— TREE PROTECTION FENCE
- REPLACEMENT PLANTING SPECIES AND SIZE/TYPE
- ROOT PRUNING TRENCH
- —OCC— ZERO CUTBACK CURB

N

40 0 40 80

SCALE: 1"=40'

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NO.	DATE	REVISION	APP.

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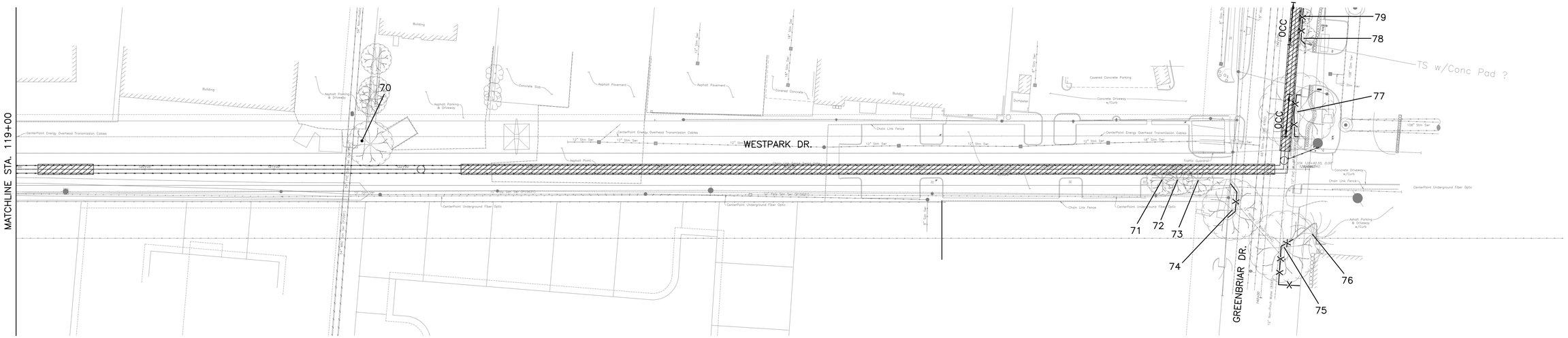
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

TREE PROTECTION PLAN

SHEET 4 OF 7

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"=40'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 158 OF 169	



Tree No.	Location	Description	Chapter 33 Status	Comments	Treatment
Trees along Metro Easement					
70	2321 SW Freeway	12" Mulberry	Private tree	CPE ROW, Not impacted	
71	4100 Greenbriar	8" Yaupon	Not ordinance tree	Metro ROW, Not impacted	
72	4100 Greenbriar	8" Yaupon	Not ordinance tree	Metro ROW, Not impacted	
73	4100 Greenbriar	8" Yaupon	Not ordinance tree	Metro ROW, Not impacted	
Trees along Greenbriar Drive					
74	4100 Greenbriar	22" Live Oak	Ordinance tree	Topped by CPE	Fence

TREE PRESERVATION PLAN LEGEND

- 1 — TREE NUMBER/LOCATION
- (1) — TREE TO BE REMOVED
- —X—X— TREE PROTECTION FENCE
- ⊙ — REPLACEMENT PLANTING SPECIES AND SIZE/TYPE
- ⊢------⊣ ROOT PRUNING TRENCH
- ⊢0CC⊣ ZERO CUTBACK CURB

N

40 0 40 80

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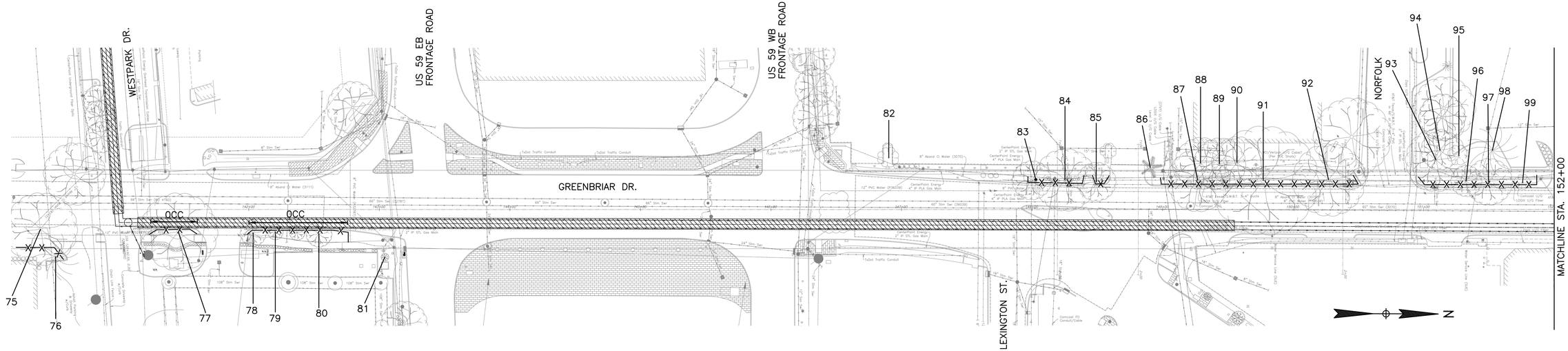
CITY OF HOUSTON
HOUSTON PUBLIC WORKS

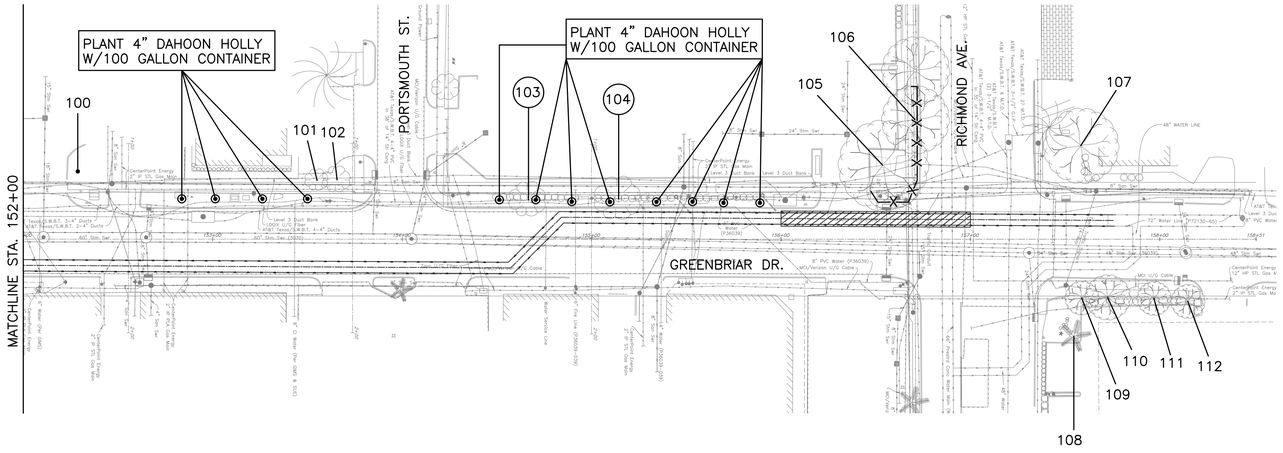
72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

TREE PROTECTION PLAN

SHEET 5 OF 7

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"=40'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 159 OF 169	





40 0 40 80

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TREE PRESERVATION PLAN LEGEND

- 1 — TREE NUMBER/LOCATION
- (1) — TREE TO BE REMOVED
- –X–X– — TREE PROTECTION FENCE
- ⊙ — REPLACEMENT PLANTING SPECIES AND SIZE/TYPE
- ------ — ROOT PRUNING TRENCH
- ⊢0CC⊣ — ZERO CUTBACK CURB

Tree No.	Location	Description	Chapter 33 Status	Comments	Treatment
Trees along Greenbriar Drive					
74	4100 Greenbriar	22" Live Oak	Ordinance tree	Topped by CPE	Fence
75	4101 Greenbriar	20" Live Oak	Ordinance tree		Fence
76	4101 Greenbriar	14" Spruce Pine	Private tree	Not impacted	
77	4007 Greenbriar	23" Live Oak	Ordinance tree		Hand dig for 12" waterline connections, Zero curb cutback, Fence, Clearance prune, Trenchless waterline construction
78	4007 Greenbriar	13" Live Oak	Ordinance tree	Retail pruned, Interior foliage stripped from canopy	Zero curb cutback, Fence, Trenchless waterline construction, Clearance prune
79	4007 Greenbriar	4" Live Oak	Ordinance tree		Zero curb cutback, Fence, Trenchless waterline construction, Clearance prune
80	4007 Greenbriar	15" Live Oak	Ordinance tree		Zero curb cutback, Fence, Trenchless waterline construction, Clearance prune
81	4007 Greenbriar	5" American Elm	Private tree	Not impacted	
82	2200 SW Freeway	10" Crepe Myrtle	Private tree	Not impacted	
83	2200 SW Freeway	19" Live Oak	Ordinance tree	Pruned by CPE	Fence, Clearance prune
84	2200 SW Freeway	17" Live Oak	Ordinance tree	Pruned by CPE	Fence, Clearance prune
85	2200 SW Freeway	11" Live Oak	Ordinance tree	Pruned by CPE	Fence, Clearance prune
86	2200 SW Freeway	12' Palm	Private tree	Not impacted	
87	2211 Norfolk	21" Live Oak	Ordinance tree	Pruned by CPE	Fence, Clearance prune
88	2211 Norfolk	17" Lacebark Elm	Private tree	Pruned by CPE	Fence
89	2211 Norfolk	18" Lacebark Elm	Private tree	Pruned by CPE	Fence

Tree No.	Location	Description	Chapter 33 Status	Comments	Treatment
Trees along Greenbriar Drive					
90	2211 Norfolk	14" Lacebark Elm	Private tree	Pruned by CPE	Fence
91	2211 Norfolk	43" Live Oak	Ordinance tree	Pruned by CPE	Fence, Clearance prune
92	2211 Norfolk	22" Live Oak	Ordinance tree	Pruned by CPE	Fence, Clearance prune
93	3740 Greenbriar	20" White Oak	Ordinance tree	Corridor Tree	Fence
94	3740 Greenbriar	10" Mexican Plum	Private tree	Not impacted	
95	3740 Greenbriar	10" Crepe Myrtle	Private tree	Not impacted	
96	3740 Greenbriar	11" Live Oak	Ordinance tree	Suppressed	Fence, Clearance prune
97	3740 Greenbriar	18" Live Oak	Ordinance tree	Pruned by CPE	Fence, Clearance prune
98	3740 Greenbriar	17" Eastern Red Cedar	Private tree	Suppressed, Not impacted	
99	3740 Greenbriar	12" Crepe Myrtle	Not ordinance tree	Topped, Not impacted	
100	3740 Greenbriar	17" Sugarberry	Private tree	Pruned by CPE, Not impacted	
101	3700 Greenbriar	14" Crepe Myrtle	Private tree	Topped, Not impacted	
102	3700 Greenbriar	16" Crepe Myrtle	Private tree	Topped, Not impacted	
103	3636 Greenbriar	23" Crepe Myrtle	Ordinance tree	Topped, Remove for waterline	Remove tree, provide 23" in replacement planting
104	3636 Greenbriar	22" Crepe Myrtle	Ordinance tree	Topped, Remove for waterline	Remove tree, provide 22" in replacement planting
105	3636 Greenbriar	25" Live Oak	Ordinance tree	Corridor Tree	Fence
106	3636 Greenbriar	14" Live Oak	Ordinance tree	Retail pruned, Interior foliage stripped from canopy	Fence
107	2202 Richmond	23" Chinaberry	Private tree	Not impacted	
108	2150 Richmond	20' Palm	Private tree	Not impacted	
109	2150 Richmond	11" Live Oak	Ordinance tree	Not impacted	
110	2150 Richmond	15" Live Oak	Ordinance tree	Not impacted	
111	2150 Richmond	10" Live Oak	Ordinance tree	Not impacted	
112	2150 Richmond	9" Live Oak	Ordinance tree	Not impacted	

NO.	DATE	REVISION	APP.

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72–INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

TREE PROTECTION PLAN

SHEET 6 OF 7

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S–000900–0136–4	
DRAWING SCALE	
1"=40'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 160 OF 169	

Tree Removal List

Tree No.	Location	Description	Replacement requirement
103	3636 Greenbriar	23" Crepe Myrtle	23
104	3636 Greenbriar	22" Crepe Myrtle	22
		TOTAL REPLACEMENT INCHES REQUIRED	**45**

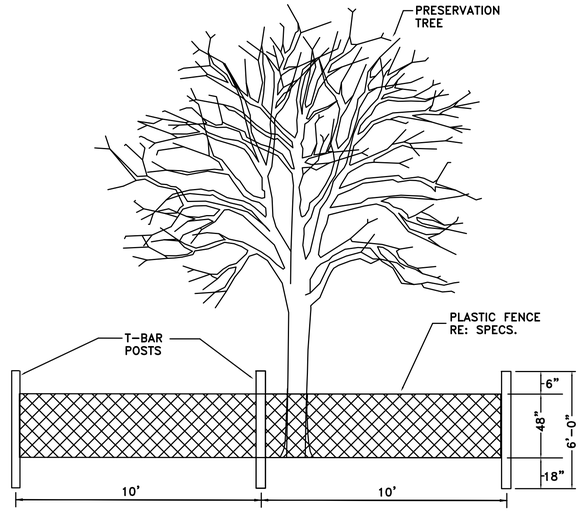
Tree Replacement List

Quantity	Caliper Size	Species	Container/Tree Spade size
12	4	Dahoon Holly (*Ilex cassine*)	100 gallon container
		TOTAL REPLACEMENT INCHES INCLUDED IN PLAN	**48**

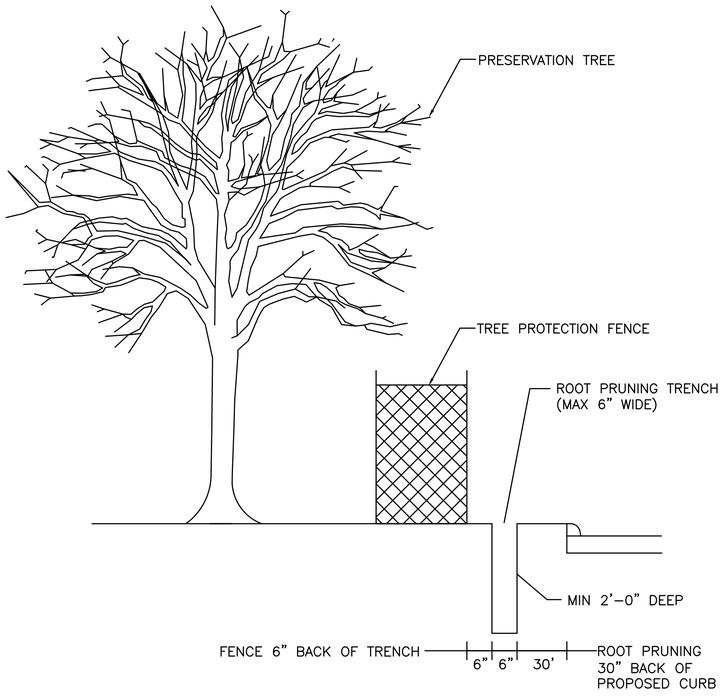
NOTE: Tree replacement locations are not shown on plans. Contractor must coordinate with City of Houston Urban Forestry and Houston Public Works prior to PURCHASING trees. This project may not have adequate room for all required replacement trees without creating regulatory sign or traffic/pedestrian visibility issues. Number of trees and planting locations will be determined by City of Houston Urban Forestry in construction phase. Trees that are planted are to be maintained and watered for 2 years following planting per standard spec 02915. Timing of planting may be delayed in periods of drought with mandatory water restrictions in place-timing to be coordinated with City of Houston Urban Forestry. Trees in esplanade groupings to be planted in common bed with 4" of hardwood mulch between trees.

Trees are to be maintained and watered for 2 years following planting per standard spec 02915. Timing of planting may be delayed in periods of drought with mandatory water restrictions in place-timing to be coordinated with City of Houston Forestry.

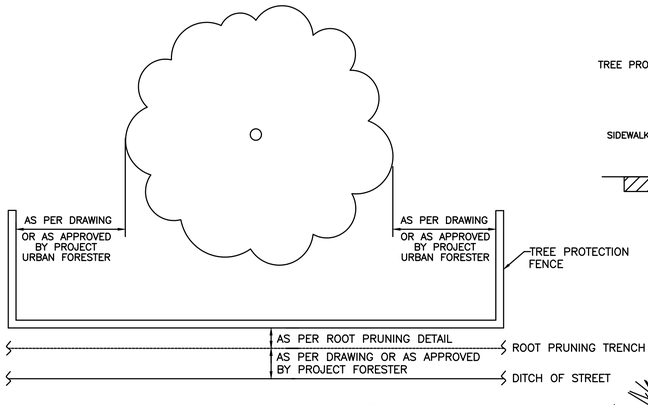
Tree replacement locations shall comply with Houston Public Works spec sections 02811, 02911, 02912, 02915, 02921 & 02922. In general trees along sides of street right of ways shall be no closer than 3' to back of curb or 20' from another tree. Trees in medians shall be no closer than 6' back of curb, 75' from an intersection, 50' to a median cut, or 20' from another tree. Contractor to coordinate locations with City Forestry and HPW prior to PURCHASING trees. All replacement trees called out on plans may not be planted on project relative to coordination with listed parties.



TREE PROTECTION FENCING DETAIL A
NOT TO SCALE



ROOT PRUNE FOR STREET-CURB & GUTTER - NO 0CC
NOT TO SCALE

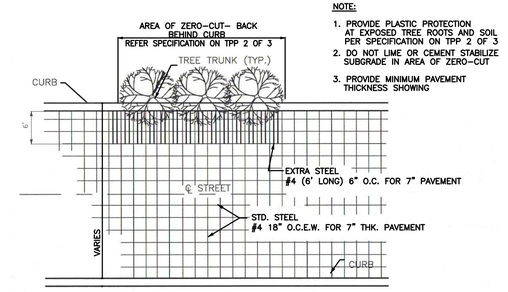


TREE PROTECTION FENCING DETAIL B
NOT TO SCALE

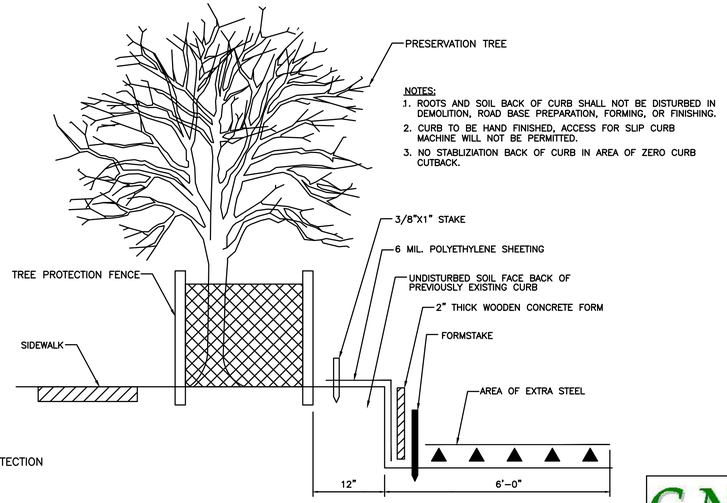
Arboriculturally Significant Tree List

Tree No.	Location	Description
56	2234 Westpark	25" Live Oak
62	2600 Westpark	27" Live Oak
91	2211 Norfolk	43" Live Oak
105	3636 Greenbriar	25" Live Oak

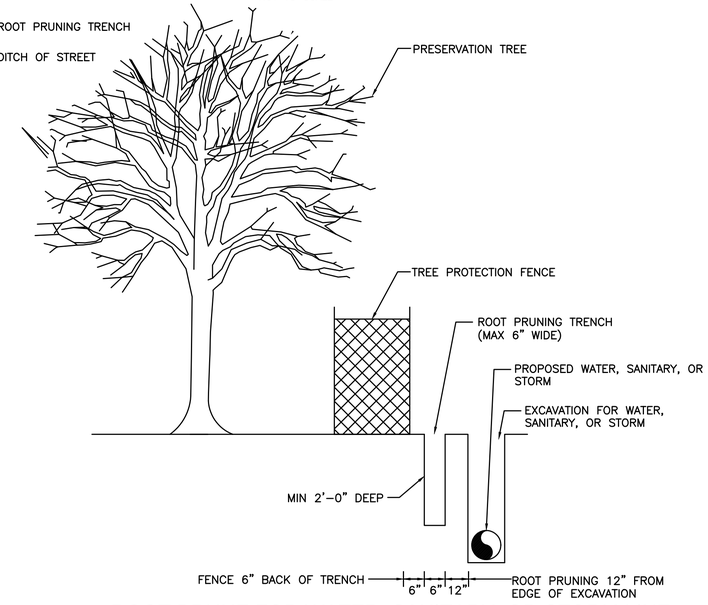
Trees Identified by City of Houston Forestry/Parks & Recreation Department as Arboriculturally Significant are identified here and/or in treatment schedule included on TPP sheets. Arboriculturally Significant trees are to be pruned under direct supervision of City of Houston Forestry. Minimal pruning will be allowed for construction equipment access, and in some cases no pruning will be allowed. Contractor must review conditions around and/or under the canopy of Arboriculturally Significant trees and consider restrictions when preparing cost estimate and planning construction equipment that will be necessary to accomplish design installation with minimal to no tree pruning.



ZERO CURB CUTBACK DETAIL
EXTRA STEEL BEHIND CURB
NOT TO SCALE



ZERO CURB CUTBACK DETAIL-PROFILE VIEW
NOT TO SCALE



ROOT PRUNE FOR WATER, SANITARY, OR STORM LINE
NOT TO SCALE

NO.	DATE	REVISION	APP.

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TREE PROTECTION PLAN

SHEET 7 OF 7

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=40'	
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RAM CHAKRADHAR, P.E.	
SHEET NO. 161 OF 169	

GENERAL CONSTRUCTION SWPP NOTES

(THESE NOTES CONTROL EXCEPT AS NOTED OTHERWISE IN PLANS, DETAILS AND/OR SPECIFICATIONS)

1. EROSION CONTROL DEVICES AS SHOWN ON THE SWPPP FOR THE PROJECT SHALL BE INSTALLED PRIOR TO THE START OF LAND DISTURBING ACTIVITIES.
2. ALL EROSION CONTROL DEVICES ARE TO BE INSTALLED IN ACCORDANCE WITH THE APPROVED PLANS, SPECIFICATIONS AND STORM WATER POLLUTION PREVENTION PLAN (SWPPP) FOR THE PROJECT. CHANGES ARE TO BE REVIEWED BY THE DESIGN ENGINEER AND THE STORM WATER INSPECTOR PRIOR TO IMPLEMENTATION.
3. CONTRACTOR SHALL IMPLEMENT INLET PROTECTION DEVICES AND REINFORCED FILER FABRIC BARRIER ALONG ROAD AND SIDE DITCHES AT LOCATIONS SHOWN ON THE TYPICAL STORM WATER POLLUTION PREVENTION (SWPP) PLANS TO KEEP SILT AND OR EXCAVATED MATERIALS FROM ENTERING INTO THE STORM WATER INLETS AND DITCHES EVENTUALLY POLLUTING THE RECEIVING STORM.
4. DURING THE EXCAVATION PHASE OF THE PROJECT, CONTRACTOR SHALL SCHEDULE THE WORK IN SHORT SEGMENTS SO THAT EXCAVATION MATERIAL CAN BE QUICKLY HAULED AWAY FROM THE SITE AND TO PREVENT IT FROM STAYING UNCOLLECTED ON THE EXISTING PAVEMENT. ANY LOOSE EXCAVATED MATERIAL WHICH FALLS ON PAVEMENTS OR DRIVEWAYS SHALL BE SWEPT BACK INTO THE EXCAVATED AREA.
5. THE BUILDER AND DEVELOPER WILL BE RESPONSIBLE FOR ENSURING THAT THE STREET IN FRONT OF THEIR LOTS STAYS FREE FROM THE ACCUMULATION OF TRASH, SEDIMENT, DIRT, AND ALL OTHER DEBRIS. STREET CLEANING WILL BE DONE BY STREET SCRAPING OR BY USING A VACUUM SWEEPER. WASHING SEDIMENTS INTO THE SEWER INLETS IS PROHIBITED BY THE EPA.
6. CONTRACTOR SHALL FOLLOW GOOD HOUSEKEEPING PRACTICES DURING THE CONSTRUCTION OF THE PROJECT, ALWAYS CLEANING UP DIRT AND LOOSE MATERIAL AS CONSTRUCTION PROGRESSES.
7. CONTRACTOR TO INSPECT AND MAINTAIN THE AREAS LISTED BELOW AT LEAST ONCE EVERY FOURTEEN (14) CALENDAR DAYS AND WITHIN 24 HOURS OF THE END OF A STORM EVENT OF 0.5 INCHES OR GREATER.
   - DISTURBED AREAS OF THE CONSTRUCTION SITE THAT HAVE NOT BEEN FINALLY STABILIZED.
   - AREAS USED FOR STORAGE OF MATERIALS THAT ARE EXPOSED TO PRECIPITATION.
   - STRUCTURAL CONTROL MEASURES.
   - LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE.
8. CONTRACTOR TO BE RESPONSIBLE TO MAINTAIN EXISTING DITCHES AND OR CULVERTS FOR UNOBSTRUCTED DRAINAGE AT ALL TIMES. WHERE SODDING IS DISTURBED BY EXCAVATION ON BACKFILLING OPERATIONS, SUCH AREAS SHALL BE REPLACED BY SEEDING OR SODDING. SLOPES 4:1 OR STEEPER SHALL BE REPLACED BY BLOCK SODDING.
9. A DOUBLE ROW REINFORCED SILT FENCING SHALL BE PLACED ALONG DETENTION POND SIDE AND AROUND THE VEGETATIVE BUFFERS AND WETLAND AREA.
10. IF THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AS APPROVED CANNOT APPROPRIATELY CONTROL EROSION AND OFF-SITE SEDIMENTATION FROM THE PROJECT, THE SWPPP IS REQUIRED TO BE REVISED AND ANY CHANGES REPORTED TO THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ), WHEN APPLICABLE.
11. CONTRACTOR WILL SWEEP STREETS AND CURB LINES ONCE A DAY UNTIL ALL CONCRETE/PAVING IS IN PLACE. ALL MATERIAL SPILLED, DROPPED, WASHED OR TRACKED FROM VEHICLES ONTO ROADWAYS OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY.
12. ALL WASH WATER (CONCRETE TRUCKS, VEHICLE CLEANING, EQUIPMENT CLEANING, ETC.) SHALL BE DISPOSED OF IN A MATTER THAT PREVENTS CONTACT BETWEEN THESE MATERIALS AND STORM WATER THAT IS DISCHARGED FROM THE SITE.
13. DUST SHALL BE CONTROLLED BY SPRAYING WATER ON DRY AREAS OF THE SITE. THE USE OF MOTOR OILS AND OTHER PETROLEUM BASED OR TOXIC LIQUIDS FOR DUST SUPPRESSION OPERATIONS IS PROHIBITED.
14. NO RUBBISH, TRASH, GARBAGE OR OTHER SUCH MATERIALS SHALL BE DISCHARGED INTO DRAINAGE DITCHES OR WATERS OF THE STATE.
15. DISTURBED PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITY WILL STOP FOR AT LEAST 21 DAYS SHALL BE TEMPORARILY SEEDED WITHIN 14 DAYS.
16. CONTRACTORS WILL BE RESPONSIBLE FOR REMOVING SEDIMENT IN THE DETENTION POND AFTER THE STABILIZATION OF THE SITE AND ANY SEDIMENT THAT MAY HAVE COLLECTED IN THE STORM SEWER DRAINAGE SYSTEMS.
17. IF SOIL STOCKPILING IS EMPLOYED ON THIS SITE, SILT FENCES SHALL BE USED TO HELP CONTAIN THE SEDIMENT.
18. SEDIMENT BASINS ARE ATTRACTIVE TO CHILDREN AND CAN BE VERY DANGEROUS. IN ALL CASES, LOCAL ORDINANCES AND REGULATIONS REGARDING HEALTH AND SAFETY MUST BE ADHERED TO.
19. THE PROJECT SHALL MAINTAIN EXISTING DRAINAGE PATTERNS AS MUCH AS PRACTICAL, CONTROL THE RATE OF STORMWATER RUNOFF RESULTING FROM THE DEVELOPMENT, AND MITIGATE POTENTIAL IMPACTS ON WATER QUALITY AND EROSION GENERATED DURING AND AFTER CONSTRUCTION.
20. LIMIT DISTURBED AREAS TO ONLY THOSE NECESSARY FOR THE CONSTRUCTION OF THIS PROJECT. IF IT BECOMES NECESSARY TO DISTURB AREAS OUTSIDE OF THE CONSTRUCTION LIMITS, THESE AREAS SHALL BE RESTORED TO PRE-CONSTRUCTION CONDITION OR BETTER.

CONCRETE WASH-OUT SITE:

EACH BUILDER WILL PROVIDE A SINGLE, DEDICATED CONCRETE WASH-OUT SITE ON ONE OF THE BUILDER'S RESERVED LOTS, FOR USE DURING CONSTRUCTION OR WILL USE A SITE DESIGNATED BY THE DEVELOPER. THE SITE SELECTED WILL BE REVIEWED WITH THE DISTRICT AND DEVELOPER, AND AN IDENTIFICATION SIGN MUST BE ERECTED ON THE SITE BY THE BUILDER PRIOR TO USE.

THE BUILDER WILL CLEAN AND MAINTAIN THE SITE AS NECESSARY AND IS RESPONSIBLE FOR THE PROPER AND LEGAL DISPOSAL OF CONCRETE. SILT FENCING MUST BE INSTALLED ALONG THE CURB IN FRONT OF THE WASH-OUT SITE AS WELL AS AN ACCESS PAD.

THE BUILDER WILL INFORM ITS SUBCONTRACTORS OF THE LOCATION AND PURPOSE OF THE CONCRETE WASH-OUT SITE.

21. DEWATERING OPERATIONS:
   - DEWATERING ACTIVITIES SHALL BE CONDUCTED IN A MANNER THAT PREVENTS THE DISCHARGE OF TURBID WATER INTO STORMWATER DRAINS, WATERCOURSES, OR OTHER SENSITIVE AREAS. PROPER SEDIMENT FILTRATION MUST BE PROVIDED FOR ALL DEWATERING DISCHARGES, AND WATER SHOULD BE TESTED FOR TURBIDITY PRIOR TO DISCHARGE..
   - DEWATERING DISCHARGE POINTS MUST BE CAREFULLY LOCATED TO AVOID EROSION AND SEDIMENTATION IMPACTS, AND SHOULD NOT IMPACT ADJACENT PROPERTIES OR WATERWAYSSTRUCTURAL CONTROL MEASURES.
22. STORMWATER MANAGEMENT DURING RAIN EVENTS:
   - THE CONTRACTOR SHALL CEASE ALL LAND-DISTURBING ACTIVITIES 24 HOURS PRIOR TO A FORECASTED STORM EVENT AND MAY NOT RESUME UNTIL THE SITE IS STABILIZED, AND IT IS SAFE TO CONTINUE WORK.
   - THE CONTRACTOR SHALL CEASE ALL LAND-DISTURBING ACTIVITIES 24 HOURS PRIOR TO A FORECASTED STORM EVENT AND MAY NOT RESUME UNTIL THE SITE IS STABILIZED, AND IT IS SAFE TO CONTINUE WORK.
23. MAINTENANCE OF EROSION CONTROL DEVICES:
   - EROSION CONTROL DEVICES MUST BE INSPECTED REGULARLY, PARTICULARLY AFTER SIGNIFICANT RAIN EVENTS. DAMAGED DEVICES MUST BE PROMPTLY REPAIRED OR REPLACED, AND ANY ACCUMULATED SEDIMENT SHOULD BE REMOVED TO MAINTAIN THEIR EFFECTIVENESS.
   - SEDIMENT REMOVAL FROM BARRIERS, SILT FENCES, SEDIMENT PONDS, AND TRAPS MUST BE DONE BEFORE THEY REACH HALF OF THEIR SEDIMENT HOLDING CAPACITY.
24. PERMANENT EROSION CONTROL MEASURES:
   - UPON COMPLETION OF CONSTRUCTION ACTIVITIES, THE CONTRACTOR IS REQUIRED TO INSTALL PERMANENT VEGETATION OR OTHER APPROVED STABILIZATION MEASURES WITHIN 7 DAYS TO CONTROL EROSION AND RUNOFF FROM EXPOSED SOILS.
   - ALL DISTURBED AREAS THAT ARE NOT IMMEDIATELY UNDER CONSTRUCTION MUST BE SEEDED, SODDED, OR OTHERWISE STABILIZED WITHIN 14 DAYS OF CESSATION OF CONSTRUCTION ACTIVITY TO PREVENT SEDIMENT RUNOFF..
25. MINIMIZING DUST GENERATION:
   - DUST CONTROL SHALL BE PERFORMED BY APPLYING WATER OR DUST PALLIATIVE AGENTS TO UNPAVED ROADWAYS.
   - DUST SUPPRESSION MATERIALS THAT MAY BE HARMFUL TO THE ENVIRONMENT, SUCH AS OILS OR CHEMICALS, SHALL NOT BE USED.
26. WASTEWATER DISPOSAL:
   - ANY WASTEWATER GENERATED FROM ACTIVITIES SUCH AS CONCRETE CUTTING, WASHING, OR EQUIPMENT WASHING MUST BE CONTAINED ON-SITE AND DISPOSED OF ACCORDING TO LOCAL REGULATIONS. IT IS PROHIBITED TO ALLOW ANY WASTEWATER TO ENTER STORMWATER DRAINS OR WATER BODIES.
   - .A DESIGNATED WASH WATER AREA MUST BE PROVIDED WITH PROPER CONTAINMENT TO PREVENT SPILLAGE OR SEEPAGE INTO THE ENVIRONMENT.

27. CONTROL OF SPILLED MATERIALS:
   - THE CONTRACTOR IS REQUIRED TO IMMEDIATELY CONTAIN AND CLEAN UP ANY SPILLS OF HAZARDOUS MATERIALS, FUELS, LUBRICANTS, OR CHEMICALS. SPILL KITS AND ABSORBENT MATERIALS SHOULD BE READILY AVAILABLE ON-SITE
   - ALL SPILLS MUST BE REPORTED TO THE APPROPRIATE REGULATORY AUTHORITY AND CLEANED UP FOLLOWING EPA GUIDELINES.

28. SEDIMENT CONTROL DURING STOCKPILING
   - ALL STOCKPILE MATERIALS SUCH AS SOIL, SAND, GRAVEL, AND CONSTRUCTION DEBRIS SHALL BE COVERED WITH TARPS OR OTHER MATERIALS TO PREVENT WIND AND WATER EROSION. TEMPORARY BARRIERS SHOULD BE INSTALLED AROUND THE STOCKPILES TO PREVENT SEDIMENT RUNOFF.
   - STOCKPILE LOCATIONS SHOULD BE POSITIONED AWAY FROM STORM DRAINS AND SENSITIVE AREAS, AND DRAINAGE AROUND STOCKPILES SHOULD BE DIRECTED TO SEDIMENT CONTROL DEVICES.

29. MONITORING BY A QUALIFIED STORMWATER INSPECTOR:
   - A QUALIFIED STORMWATER POLLUTION PREVENTION PLAN (SWPPP) INSPECTOR MUST BE ASSIGNED TO THE PROJECT. THIS INDIVIDUAL SHALL BE RESPONSIBLE FOR OVERSEEING THE IMPLEMENTATION OF EROSION CONTROL PRACTICES AND ENSURING COMPLIANCE WITH THE SWPPP.
   - THE INSPECTOR SHALL CONDUCT REGULAR SITE AUDITS AND PROVIDE WRITTEN REPORTS OF THEIR FINDINGS TO THE PROJECT MANAGER, NOTING ANY VIOLATIONS AND CORRECTIVE ACTIONS TAKEN.

NO.	DATE	REVISION	APP.
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1	MAY 2024	30% DESIGN	HS

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PHONE: (713) 268-1666
FIRM NUMBER: F-8029

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FB NO. P-6329

STATE OF TEXAS
NKEMDI I. OHALETE
79423
REGISTERED PROFESSIONAL ENGINEER

CITY OF HOUSTON

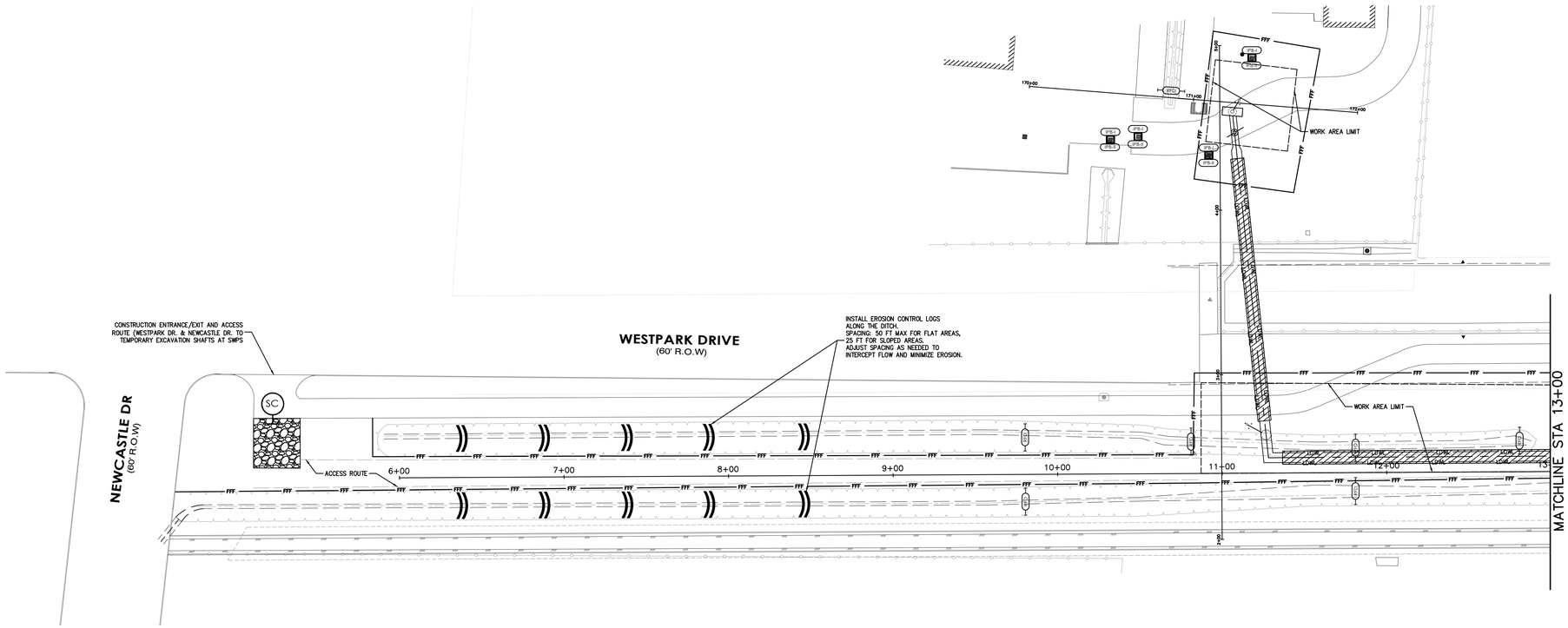
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS

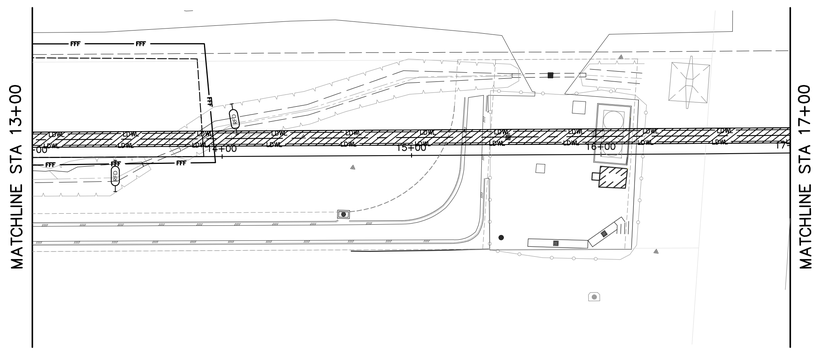
STORM WATER POLLUTION PREVENTION GENERAL NOTES

(SHEET 1 OF 8)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
AS SHOWN	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 162 OF 169	



SWPS & STA 0+00- 13+00



STA 13+00- 17+00

NO.	DATE	REVISION	APP.
2	AUG 2024	60% DESIGN	HS
1	MAY 2024	30% DESIGN	HS

LEGEND

- ROW
- LOT LINE
- DRAINAGE SWALE
- DITCH TOP OF BANK
- FFF — REINFORCED FILTER FABRIC BARRIER
- CATCH BASIN / JUNCTION BOX
- CATCH BASIN PROTECTION BARRIER
- IPB-I — INLET PROTECTION BARRIER FOR STAGE I
- IPB-II — INLET PROTECTION BARRIER FOR STAGE II
- SC — STABILIZED CONSTRUCTION ACCESS
- RFD — ROCK FILTER DAM
- LDWL — 72" WATERLINE (OPEN CUT)
- LDWL — 72" WATERLINE (IN TUNNEL)

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HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS
STORM WATER POLLUTION PREVENTION PLAN
SWPS & METRO EASMENT
STA 0+00 TO STA17+00

(SHEET 2 OF 8)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
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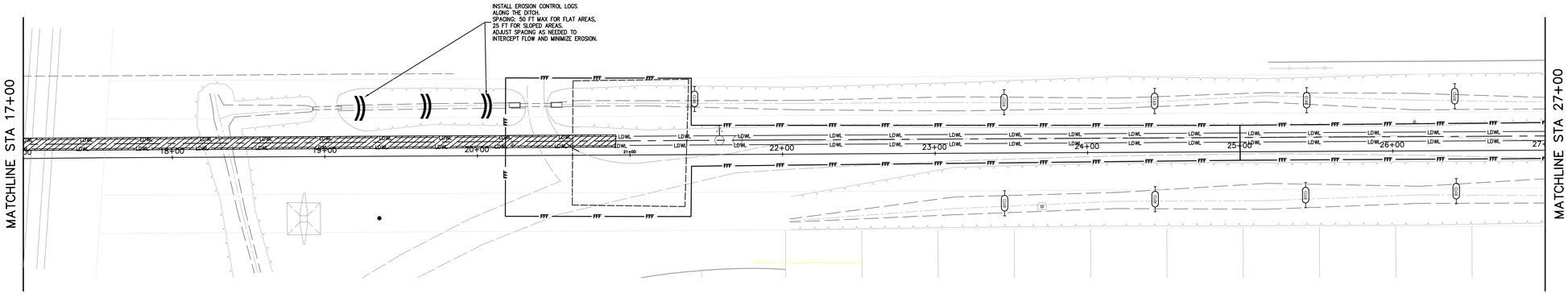
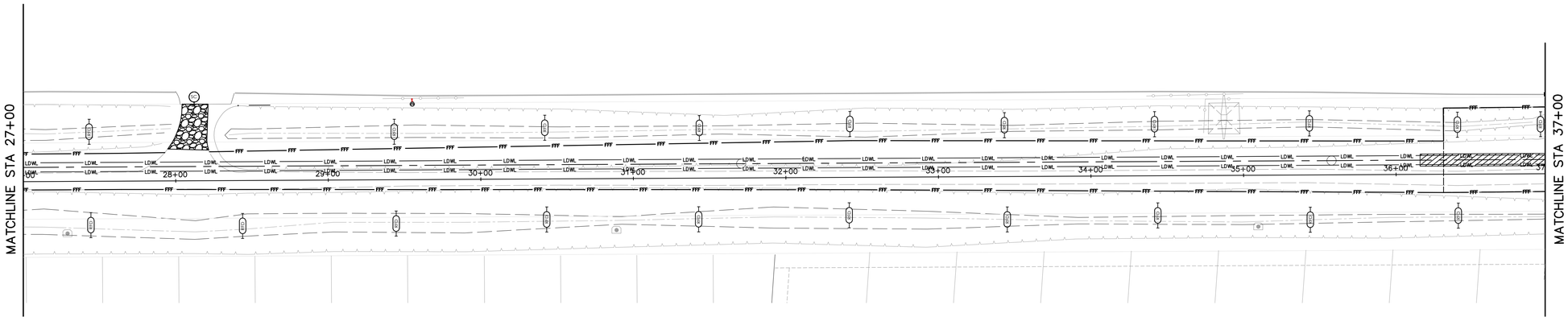
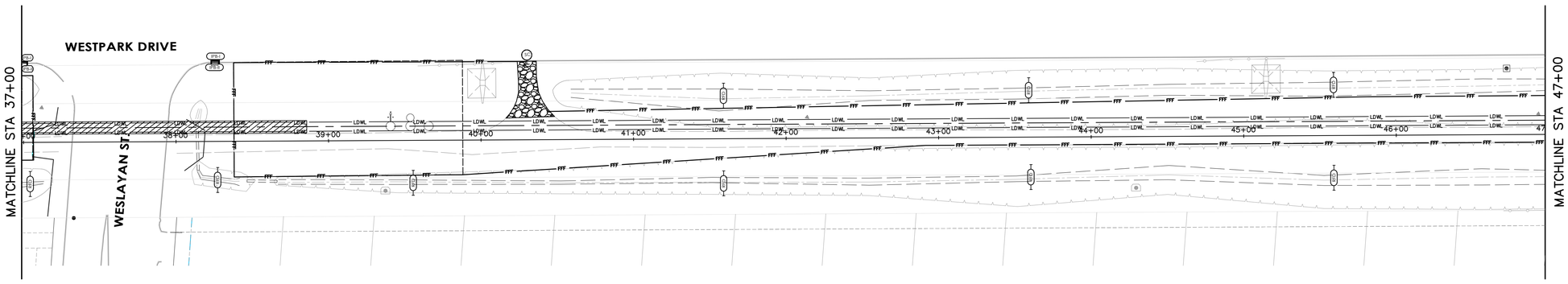
1"=40'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 163 OF 169	



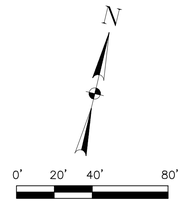
STA 17+00- 27+00



STA 27+00- 37+00



STA 37+00- 47+00



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LEGEND

- ROW
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CITY OF HOUSTON

HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS
STORM WATER POLLUTION PREVENTION PLAN
METRO EASMENT
STA17+00 TO STA47+00

(SHEET 3 OF 8)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
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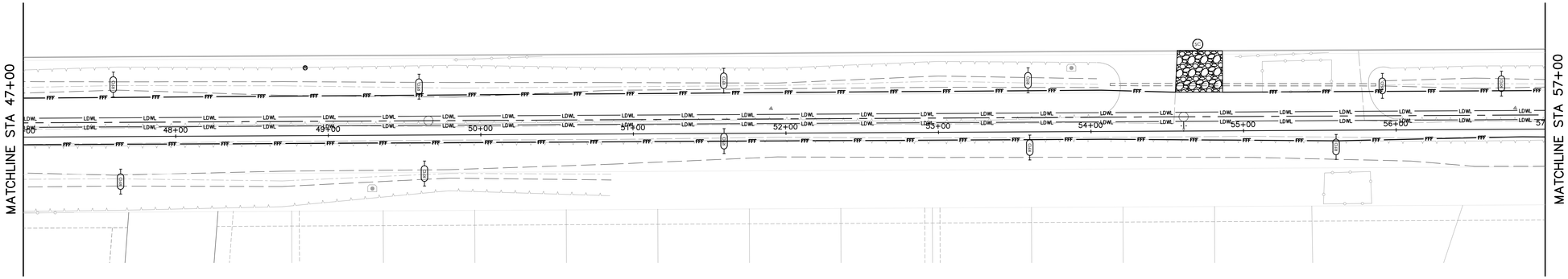
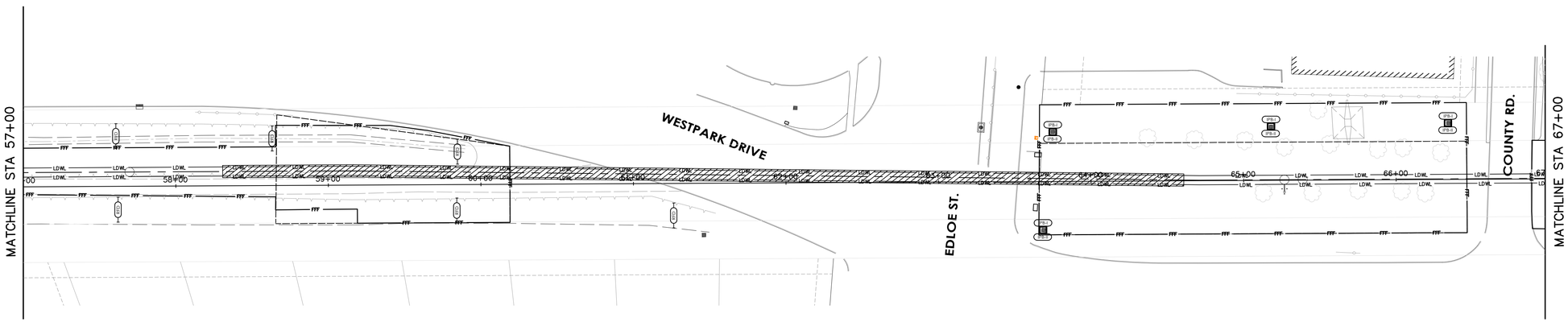
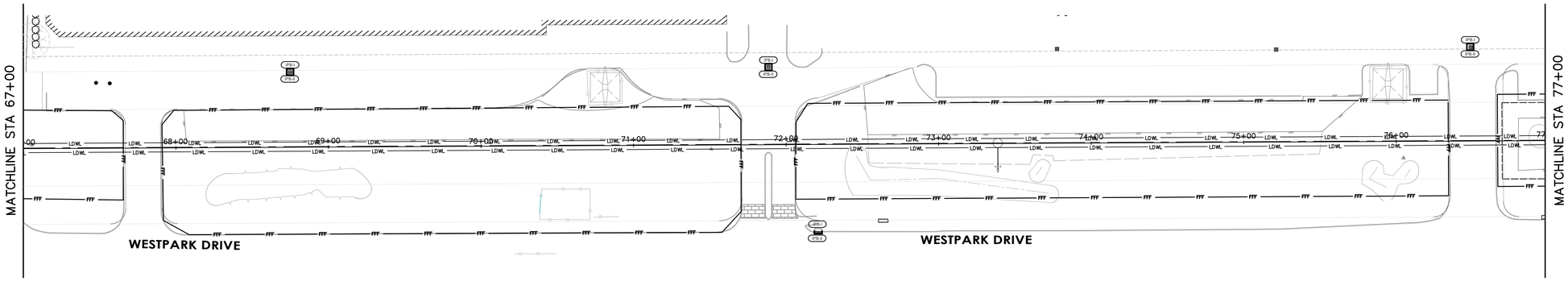
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 164 OF 169	



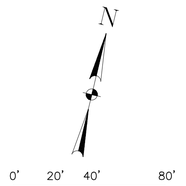
STA 47+00- 57+00



STA 57+00- 67+00



STA 67+00- 77+00



NO.	DATE	REVISION	APP.
2	AUG 2024	60% DESIGN	HS
1	MAY 2024	30% DESIGN	HS

LEGEND

- ROW
- LOT LINE
- DRAINAGE SWALE
- DITCH TOP OF BANK
- REINFORCED FILTER FABRIC BARRIER
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- IPB-I — INLET PROTECTION BARRIER FOR STAGE I
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- RFD — ROCK FILTER DAM
- LDWL — 72" WATERLINE (OPEN CUT)
- 72" WATERLINE (IN TUNNEL)

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HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS
STORM WATER POLLUTION PREVENTION PLAN
METRO EASMENT
STA47+00 TO STA77+00

(SHEET 4 OF 8)

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S-000900-0136-4	
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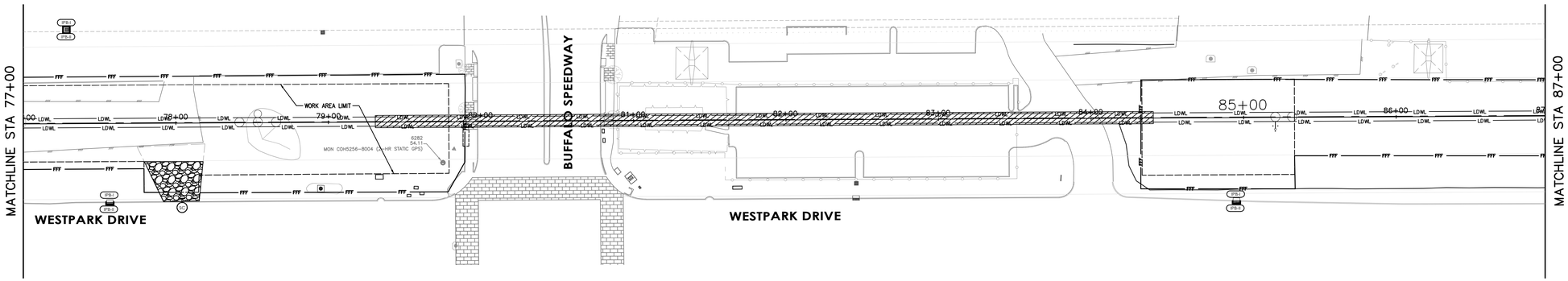
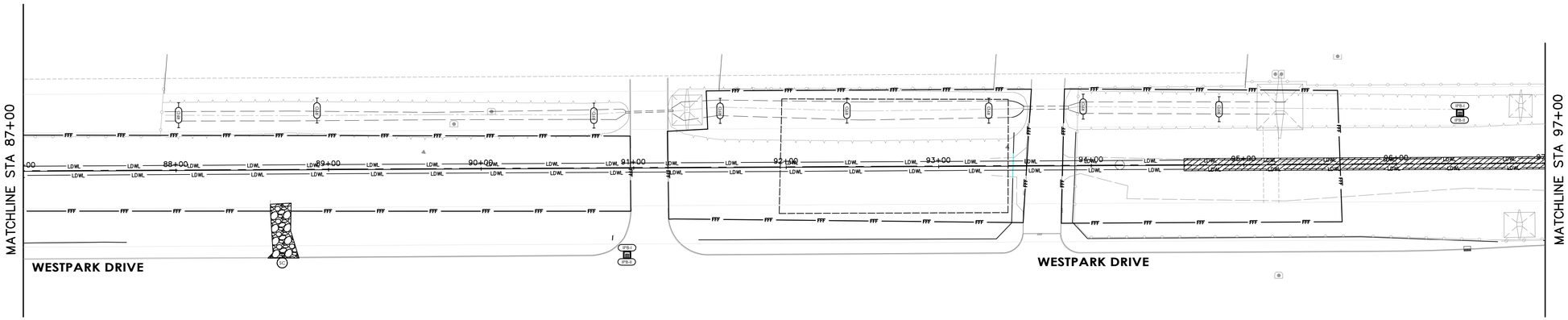
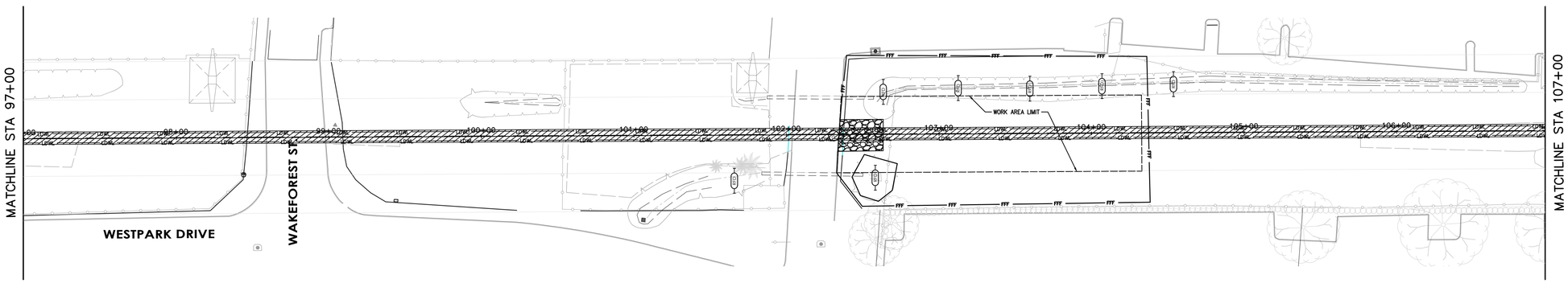
1"=40'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 165 OF 169	



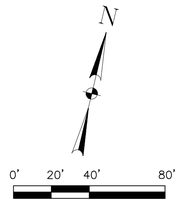
STA 77+00- 87+00



STA 87+00- 97+00



STA 97+00- 107+00



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LEGEND

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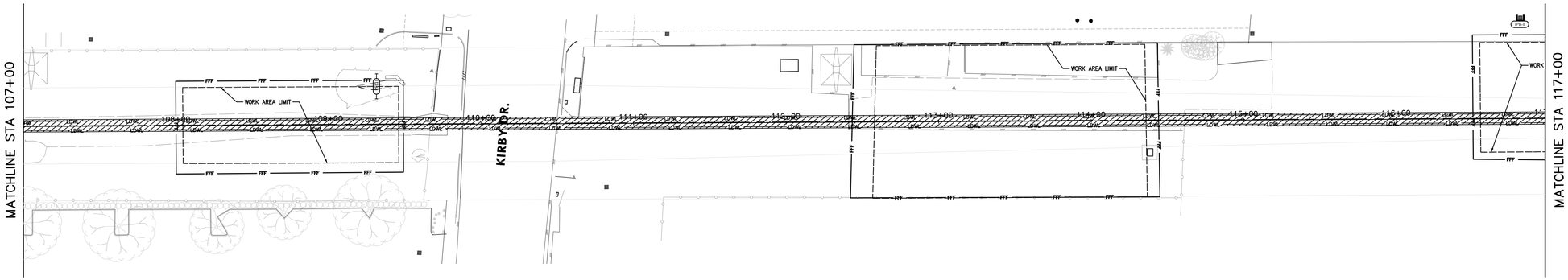
CITY OF HOUSTON

HOUSTON PUBLIC WORKS

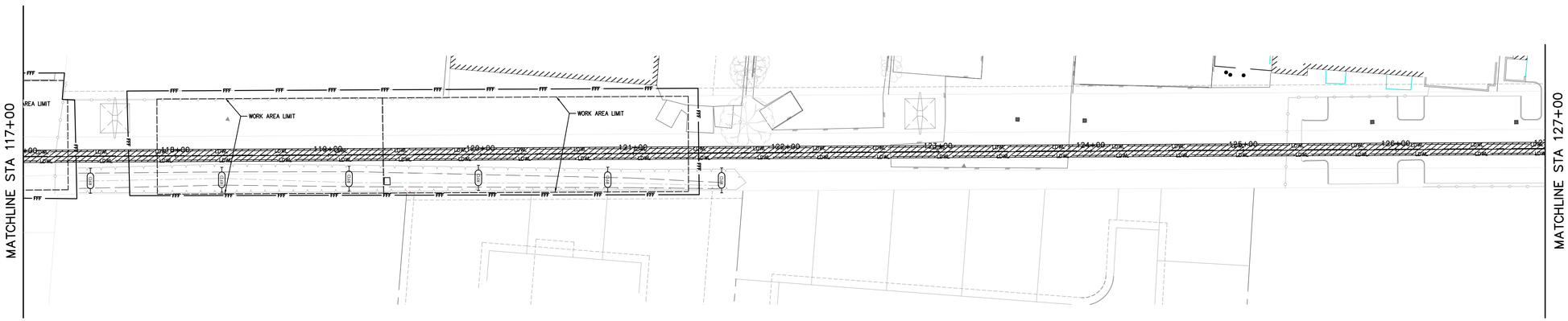
72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS
STORM WATER POLLUTION PREVENTION PLAN
METRO EASMENT
STA77+00 TO STA 107+00

(SHEET 5 OF 8)

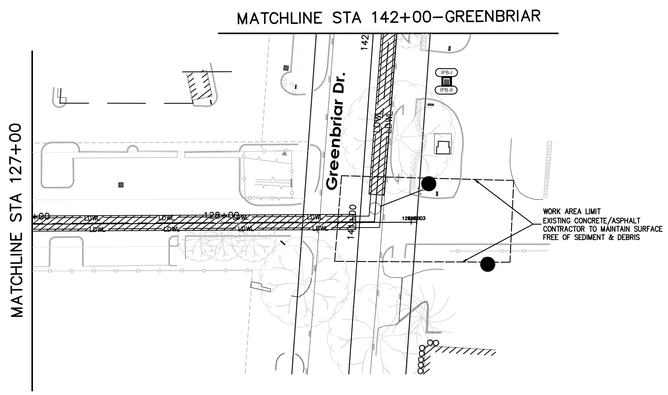
WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=40'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 166 OF 169	



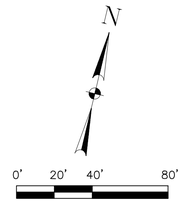
STA 107+00- 117+00



STA 117+00- 127+00



STA 127+00- 129+00



NO.	DATE	REVISION	APP.
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ROW

LOT LINE

DRAINAGE SWALE

DITCH TOP OF BANK

FFF REINFORCED FILTER FABRIC BARRIER

CATCH BASIN / JUNCTION BOX

CATCH BASIN PROTECTION BARRIER

IPB-I INLET PROTECTION BARRIER FOR STAGE I

IPB-II INLET PROTECTION BARRIER FOR STAGE II

SCA STABILIZED CONSTRUCTION ACCESS

RFD ROCK FILTER DAM

LDWL 72" WATERLINE (OPEN CUT)

72" WATERLINE (IN TUNNEL)

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HOUSTON, TX 77056
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TBPE REGISTRATION NO. F-533

NEDU ENGINEERING SERVICES, INC.
ENGINEERS, PROJECT MANAGERS,ESTIMATORS,INSPECTORS
6464 SAVOY DR, Suite 610 HOUSTON, TEXAS 77036
www.NeduEngineers.com
PHONE: (713) 268-1666
FIRM NUMBER: F-8029

SURVEYED BY:
AMANI ENGINEERING, INC.
FB NO. P-6329

STATE OF TEXAS
NKEMDI I. OHALETE
79423
REGISTERED
PROFESSIONAL ENGINEER

CITY OF HOUSTON

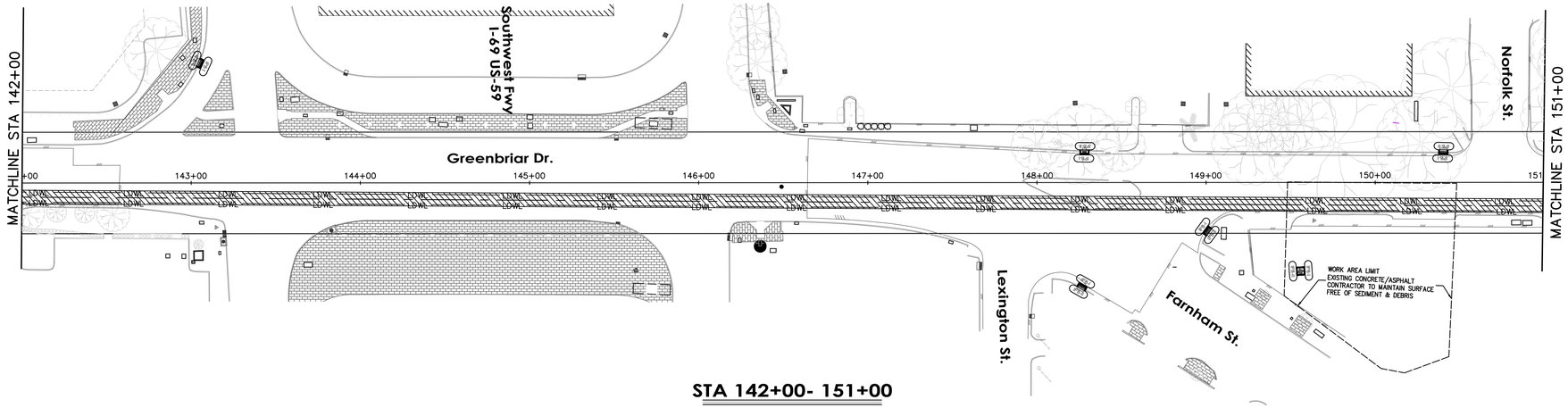
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS STORM WATER POLLUTION PREVENTION PLAN METRO EASMENT

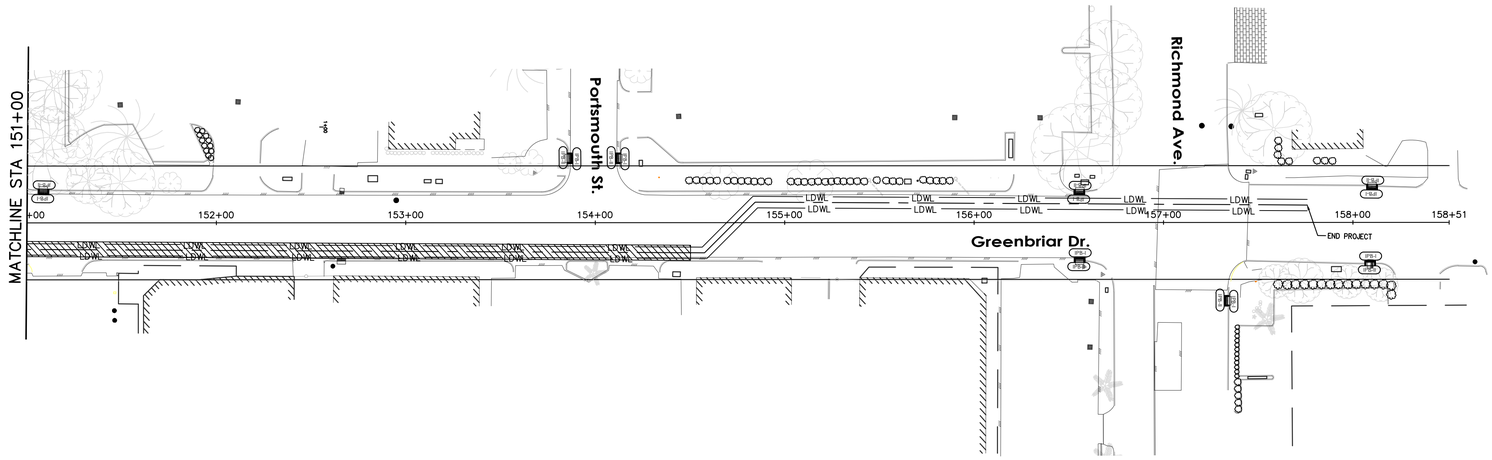
STA 107+00 TO STA129+00

(SHEET 6 OF 8)

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
S-000900-0136-4	
DRAWING SCALE	
1"=40'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 167 OF 169	



STA 142+00- 151+00



STA 151+00- 158+00

NO.	DATE	REVISION	APP.
2	AUG 2024	60% DESIGN	HS
1	MAY 2024	30% DESIGN	HS

0' 20' 40' 80'

SCALE: 1"=40'

- ROW
- LOT LINE
- DRAINAGE SWALE
- DITCH TOP OF BANK
- REINFORCED FILTER FABRIC BARRIER
- CATCH BASIN / JUNCTION BOX
- CATCH BASIN PROTECTION BARRIER
- IPB-I — INLET PROTECTION BARRIER FOR STAGE I
- IPB-II — INLET PROTECTION BARRIER FOR STAGE II
- STABILIZED CONSTRUCTION ACCESS
- RFD — ROCK FILTER DAM
- 72" WATERLINE (OPEN CUT)
- 72" WATERLINE (IN TUNNEL)

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HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS STORM WATER POLLUTION PREVENTION PLAN

GREENBRIAR

STA 142+00TO STA158+00

(SHEET 7 OF 8)

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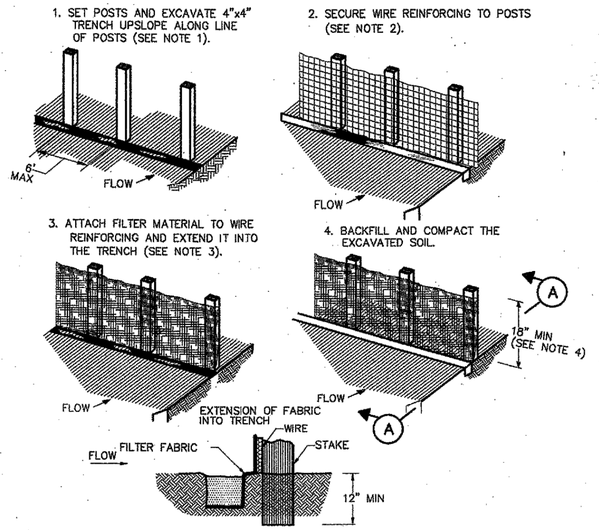
S-000900-0136-4	
DRAWING SCALE	
1"=40'	
CITY OF HOUSTON PM	
RAM CHAKRADHAR, P.E.	
SHEET NO. 168 OF 169	

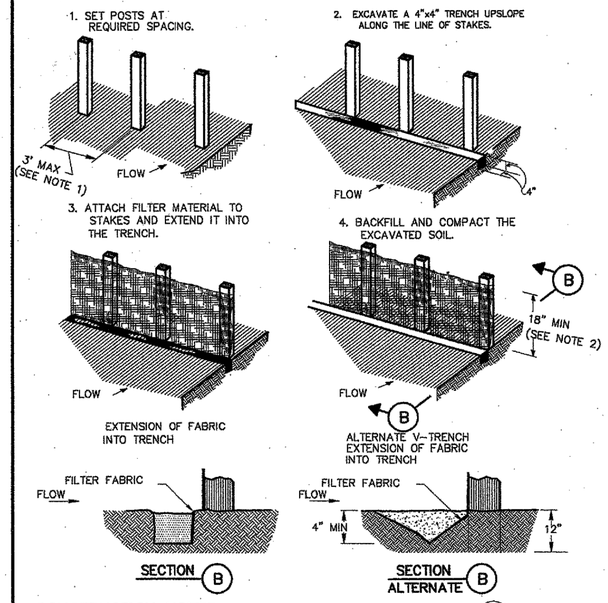


CONSTRUCTION NOTES:

1. SET 2 INCH BY 2 INCH WOODEN STAKES SPACED A MAX OF 6 FEET APART AND EMBEDDED A MIN OF 12 INCHES.
2. WOVEN WIRE REINFORCING TO BE FASTENED SECURELY TO BARRIER POSTS WITH STAPLES.
3. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE REINFORCING, WITH TIES SPACED EVERY 24 INCHES AT TOP AND MIDSECTION.
4. MINIMUM HEIGHT OF FILTER SHOULD BE 18 INCHES AND A MAXIMUM OF 36 INCHES ABOVE NATURAL GROUND.
5. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED 6 INCHES AT THE POSTS, AND FOLDED.
6. SEE COH STANDARD SPECIFICATION FOR FILTER FABRIC BARRIER.

×— (RFB) —× SYMBOL

REINFORCED FILTER FABRIC BARRIER

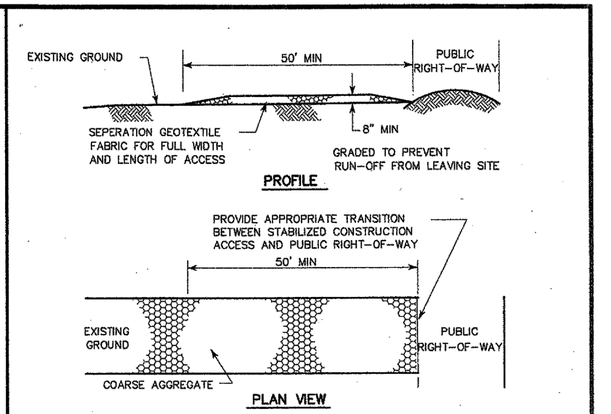


CONSTRUCTION NOTES:

1. 2 INCH THICK BY 2 INCH WOODEN STAKES TO BE SET AT MAX SPACING OF 3 FEET AND EMBEDDED A MIN OF 8 INCHES. IF PREASSEMBLED BARRIER WITH SUPPORT NETTING IS USED, SPACING OF POST MAY BE INCREASED TO 8 FEET MAX.
2. ATTACH FILTER FABRIC TO WOODEN STAKES. FILTER FABRIC BARRIER SHALL HAVE A MIN HEIGHT OF 18 INCHES AND MAX HEIGHT OF 36 INCHES ABOVE NATURAL GROUND.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHOULD BE OVERLAPPED 6 INCHES AT THE POSTS, AND FOLDED.
4. SEE COH STANDARD SPECIFICATION FOR FILTER FABRIC BARRIER.

×— (FF) —× SYMBOL

FILTER FABRIC BARRIER

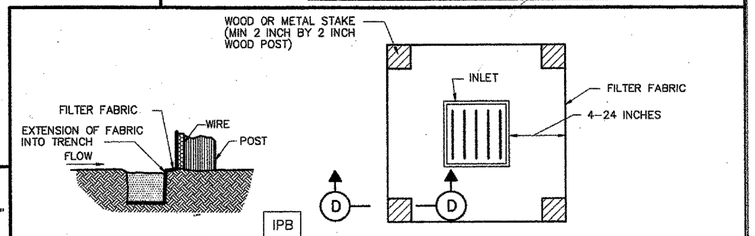


CONSTRUCTION NOTES:

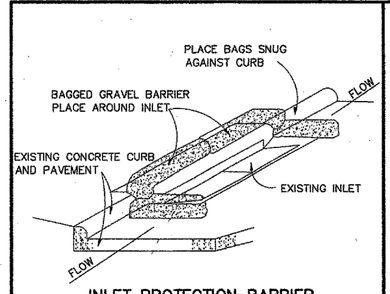
1. LENGTH SHALL BE AS SHOWN ON THE CONSTRUCTION DRAWINGS, BUT NOT LESS THAN 50 FEET.
2. THICKNESS SHALL BE NOT LESS THAN 8 INCHES.
3. WIDTH SHALL BE NOT LESS THAN FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS.
4. STABILIZATION FOR OTHER AREAS SHALL HAVE THE SAME AGGREGATE THICKNESS AND WIDTH REQUIREMENTS AS THE STABILIZED CONSTRUCTION ACCESS, UNLESS OTHERWISE SHOWN ON THE CONSTRUCTION DRAWINGS.
5. STABILIZED AREA MAY BE WIDENED OR LENGTHENED TO ACCOMODATE A WASHING AREA. AN OUTLET SEDIMENT TRAP MUST BE PROVIDED FOR THE WASHING AREA.
6. COH STANDARD SPECIFICATION FOR STABILIZED CONSTRUCTION ACCESS.
7. STABILIZED CONSTRUCTION ACCESS SHALL BE MAINTAINED FREE OF SEDIMENT FOR THE DURATION OF THE PROJECT.

(SC) SYMBOL

STABILIZED CONSTRUCTION ACCESS

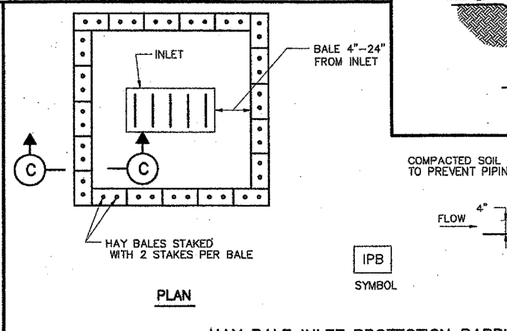


SILT FENCE INLET PROTECTION BARRIER



INLET PROTECTION BARRIER

(FOR STAGE II INLETS)
BAGGED GRAVEL BARRIER



HAY BALE INLET PROTECTION BARRIER

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

STORM WATER POLLUTION PREVENTION PLAN DETAILS

(NOT TO SCALE)

APPROVED: CITY ENGINEER	APPROVED: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: JULY-01-2010	DWG NO: 01571-01

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CITY OF HOUSTON
HOUSTON PUBLIC WORKS

72-INCH WATER LINE ALONG GREENBRIAR DR. TO METRO CORRIDOR TO SWPS
STORM WATER POLLUTION PREVENTION PLAN

STANDARD DETAILS

(SHEET 8 OF 8)

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S-000900-0136-4	
DRAWING SCALE	
AS SHOWN	
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SHEET NO. 169 OF 169	