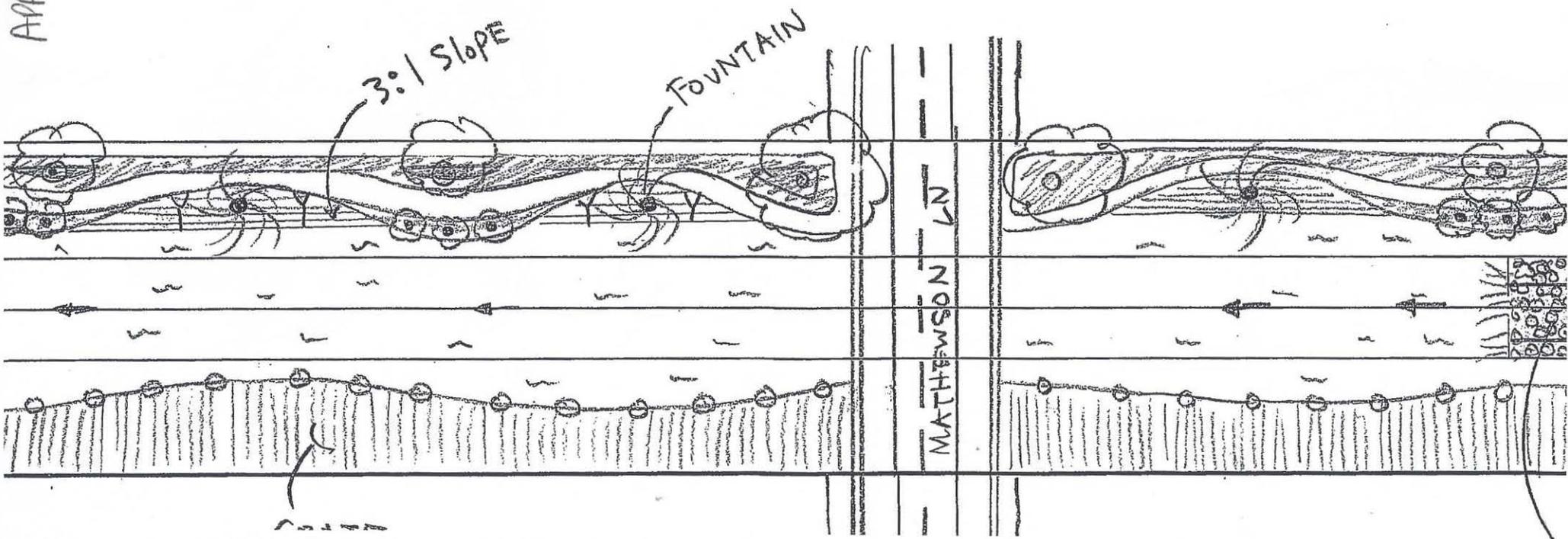
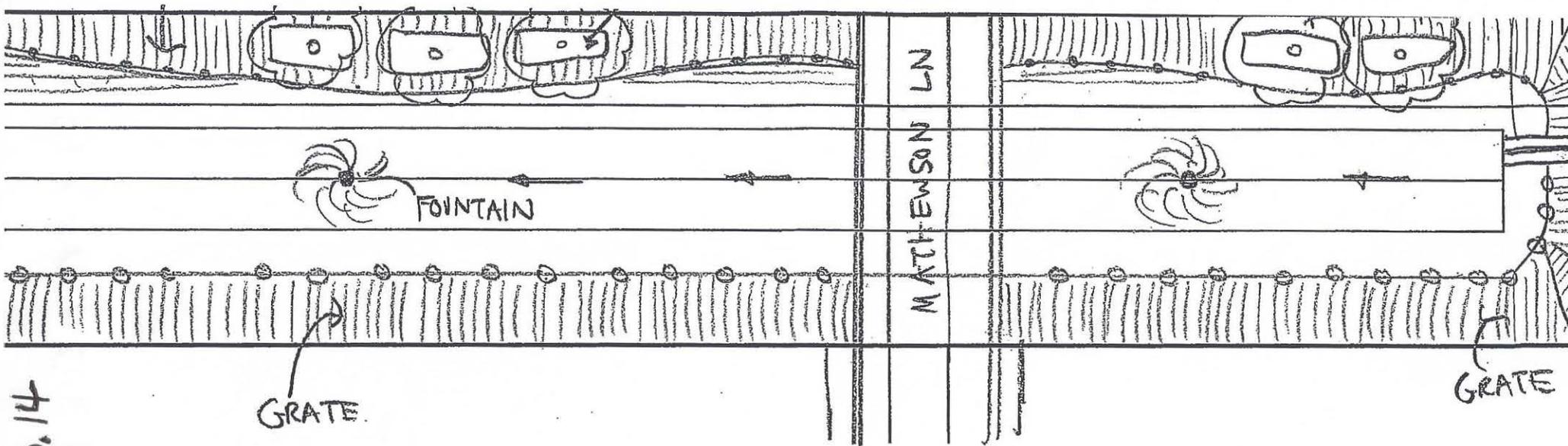
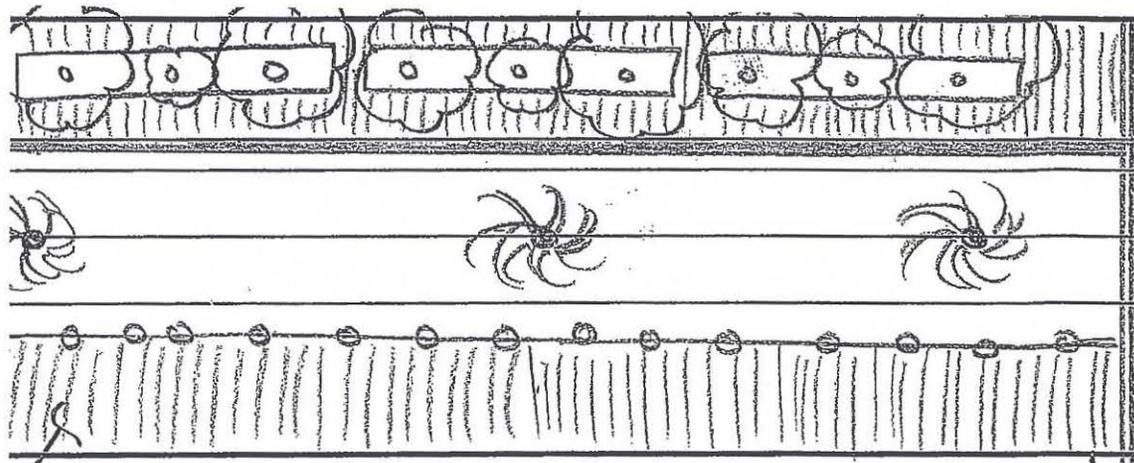


APPENDIX D - p. 14

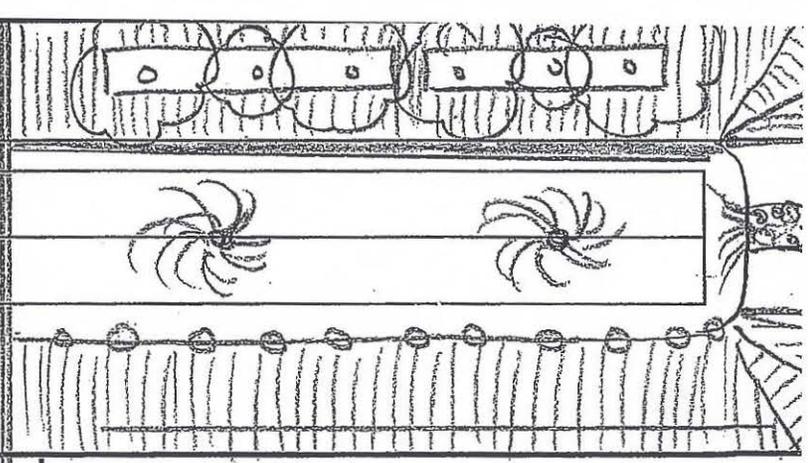


APPENDIX D - p. 15

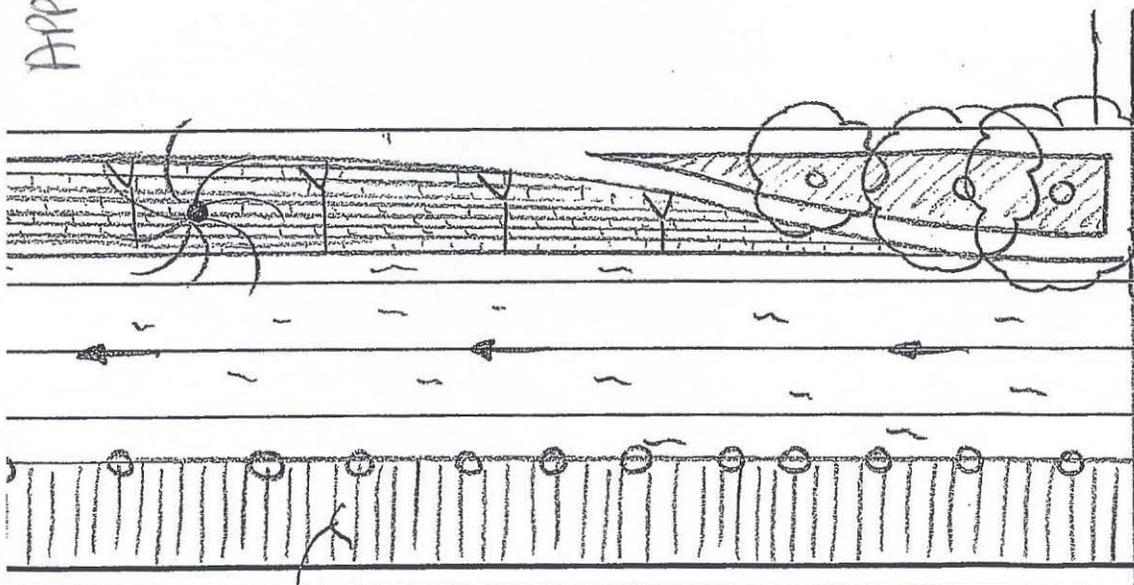


LN

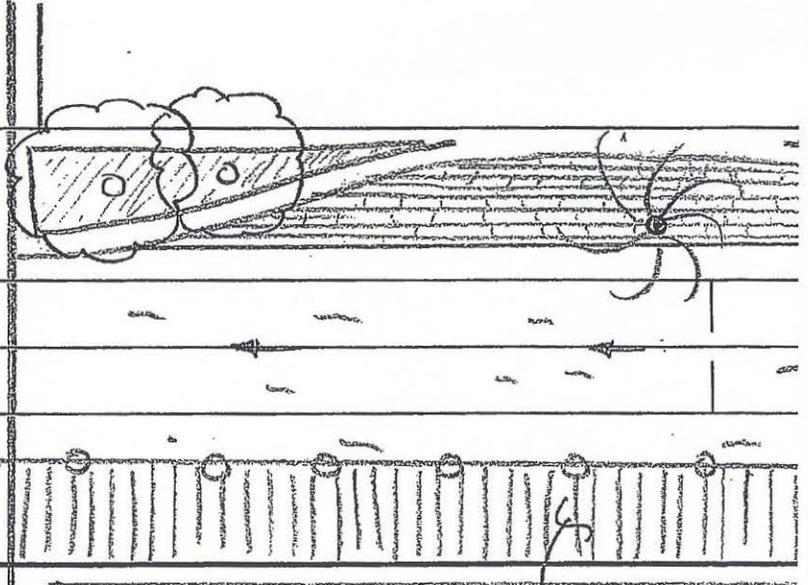
MATHEWSON



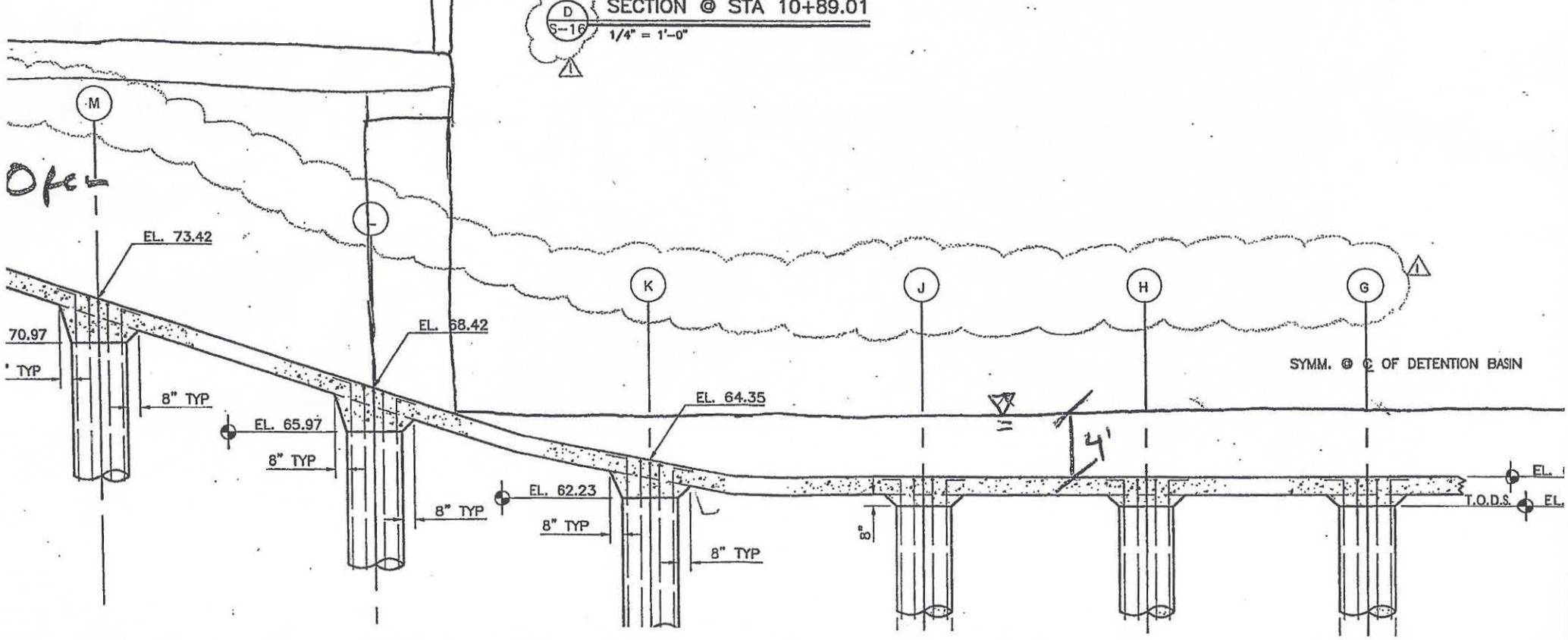
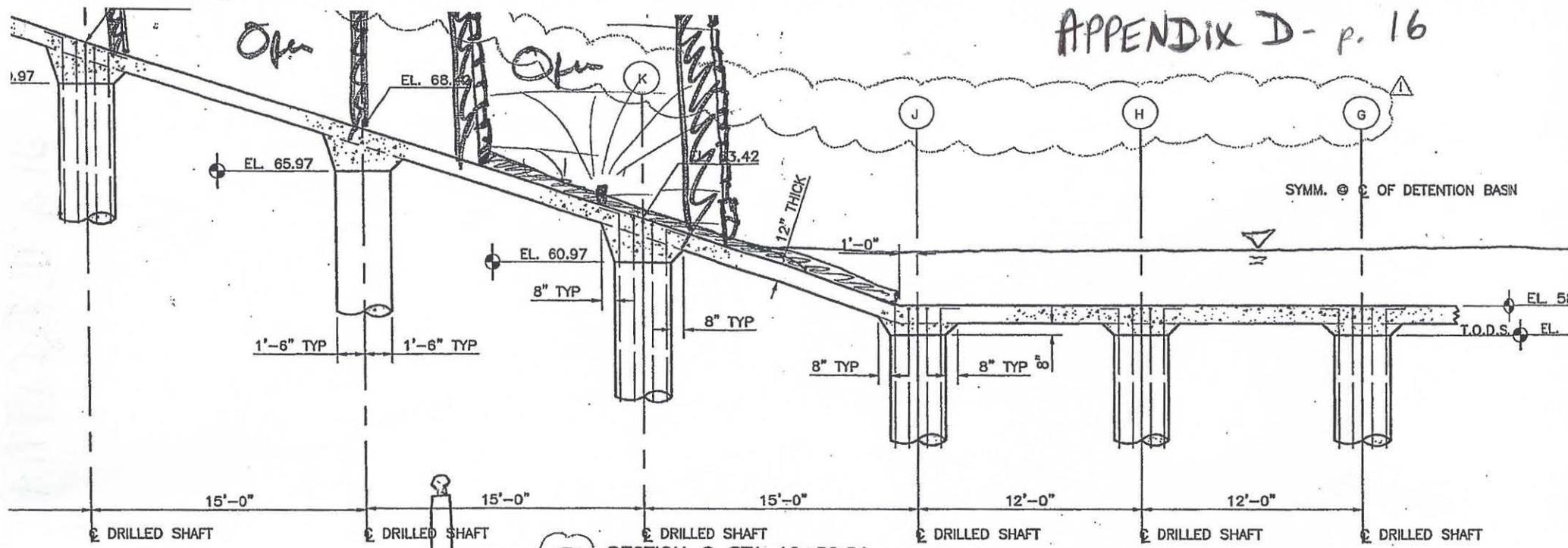
DATE



MATHEWSON

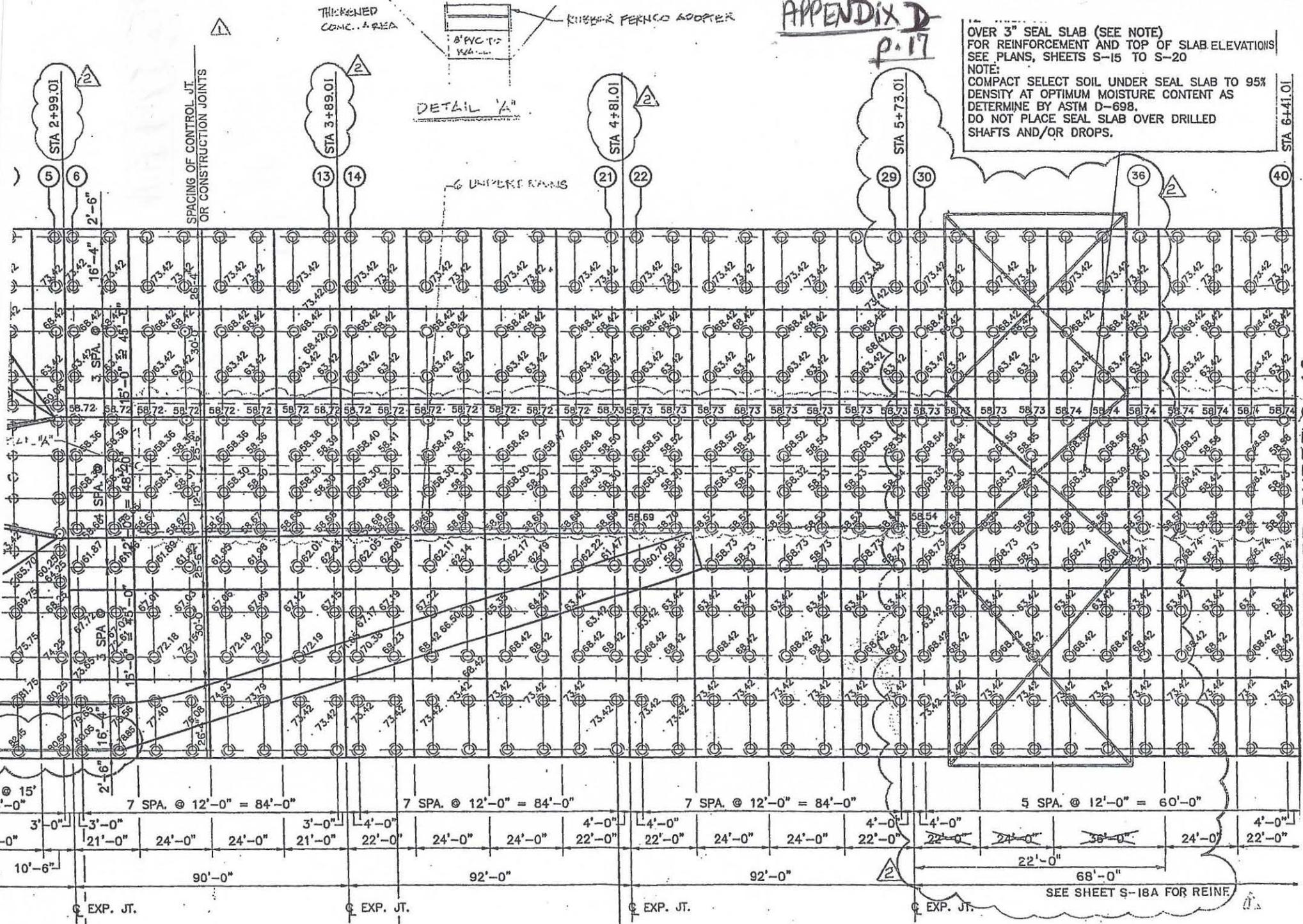
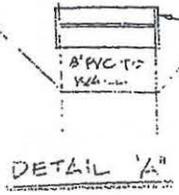


DATE



OVER 3" SEAL SLAB (SEE NOTE)
FOR REINFORCEMENT AND TOP OF SLAB ELEVATIONS
SEE PLANS, SHEETS S-15 TO S-20
NOTE:
COMPACT SELECT SOIL UNDER SEAL SLAB TO 95%
DENSITY AT OPTIMUM MOISTURE CONTENT AS
DETERMINE BY ASTM D-698.
DO NOT PLACE SEAL SLAB OVER DRILLED
SHAFTS AND/OR DROPS.

THICKENED
CONC. AREA

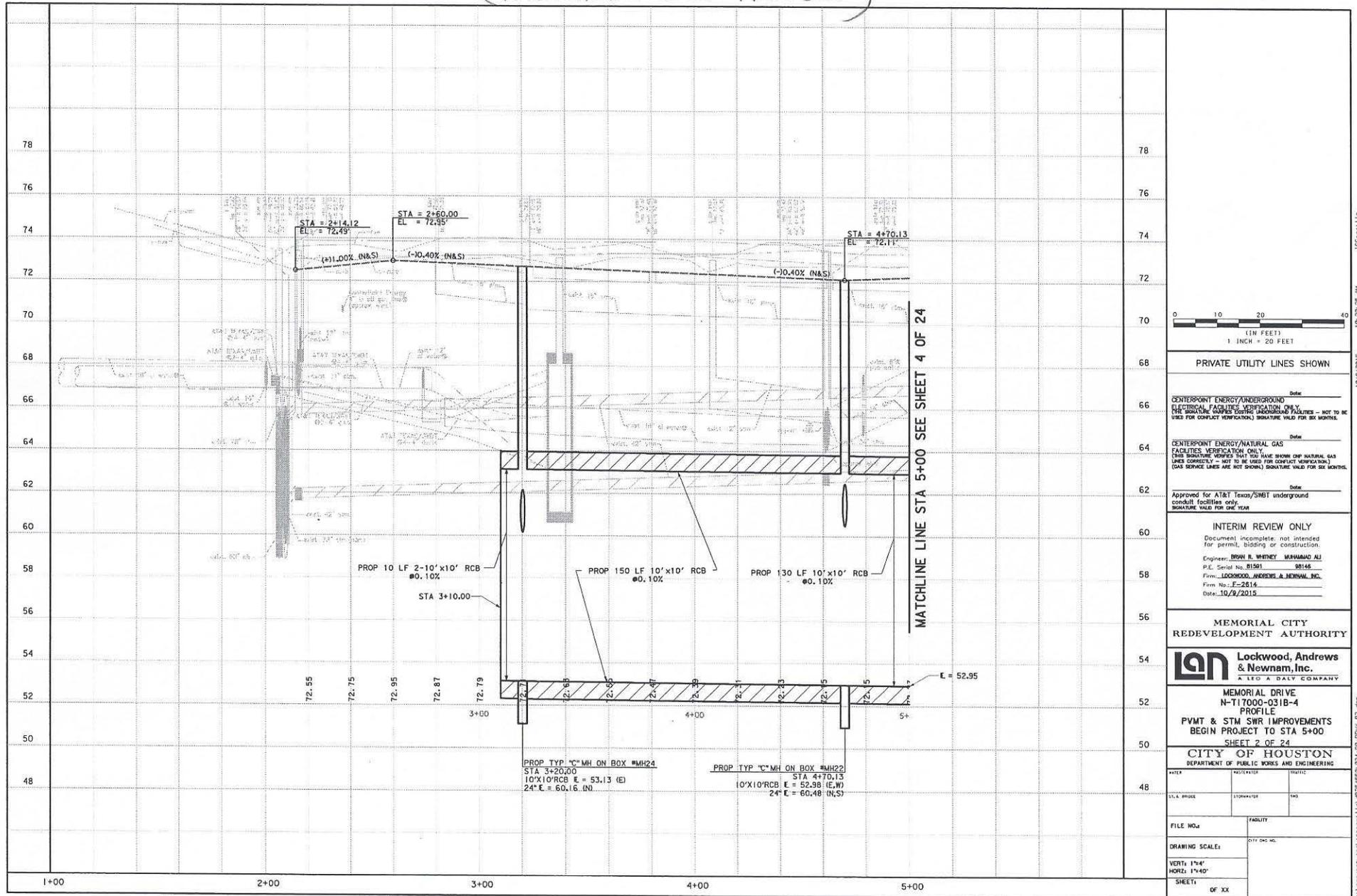


NOTE:
1. ELEVATIONS SHOWN ON PLAN ARE TOP
OF SLAB ELEVATIONS.

SHEET 16

PRELIMINARY ENG. REPORT (MEMORIAL DR. PROJECT)

APPENDIX E - p.3



PRIVATE UTILITY LINES SHOWN

Date: _____

CENTERPOINT ENERGY/UNDERGROUND
ELECTRICAL FACILITIES VERIFICATION ONLY.
(THE SIGNATURE, DATES, ETC. OF UNDERGROUND FACILITIES - NOT TO BE USED FOR CONFLICT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.

Date: _____

CENTERPOINT ENERGY/NATURAL GAS
FACILITIES VERIFICATION ONLY.
(THIS SIGNATURE, DATES, ETC. HAVE SHOWN ON NATURAL GAS LINE CONDUITS - NOT TO BE USED FOR CONFLICT VERIFICATION.)
(GAS SERVICE LINES ARE NOT SHOWN) SIGNATURE VALID FOR SIX MONTHS.

Date: _____

Approved for AT&T Texas/SWBT underground conduit facilities only.
SIGNATURE VALID FOR ONE YEAR

INTERIM REVIEW ONLY
Document incomplete; not intended for permit, bidding or construction.

Engineer: **BROWN B. WHITNEY** MURHAMAD ALI
P.E. Serial No. 81561 98148
Firm: **LOCKWOOD, ANDREWS & NEWMAN, INC.**
Form No. E-2816
Date: 10/9/2015

MEMORIAL CITY REDEVELOPMENT AUTHORITY

Lockwood, Andrews & Newman, Inc.
A LEO A DALY COMPANY

**MEMORIAL DRIVE
N-T17000-031B-4
PROFILE
PVTM & STM SWR IMPROVEMENTS
BEGIN PROJECT TO STA 5+00
SHEET 2 OF 24**

**CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING**

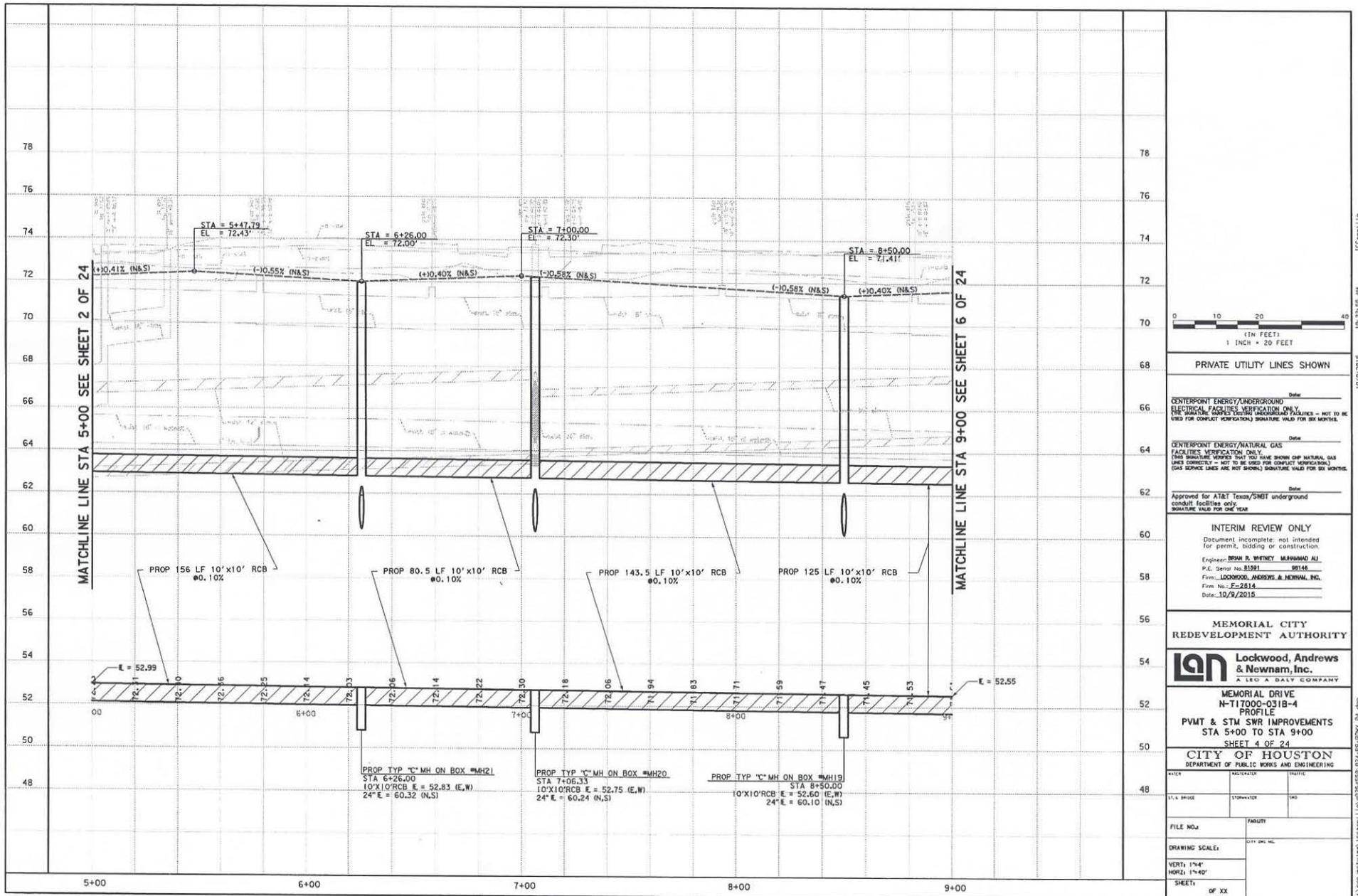
DATE	REVISION	REVISION

FILE NO. _____

DRAWING SCALE:
VERT: 1"=4'
HORIZ: 1"=40'

SHEET: _____ OF XX

10/20/2015 10:20:38 AM 10/9/2015



DATE: _____

PRIVATE UTILITY LINES SHOWN

DATE: _____

CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY
THIS SIGNATURE VERIFIES EXISTING UNDERGROUND FACILITIES - NOT TO BE USED FOR COMPLETE VERIFICATION. SIGNATURE VALID FOR SIX MONTHS.

DATE: _____

CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY
THIS SIGNATURE VERIFIES EXISTING NATURAL GAS LINES SERVICES - NOT TO BE USED FOR COMPLETE VERIFICATION. (GAS SERVICE LINES ARE NOT SHOWN). SIGNATURE VALID FOR SIX MONTHS.

DATE: _____

Approved for AT&T Texas/SMBT underground conduit facilities only:
SIGNATURE VALID FOR ONE YEAR

DATE: _____

INTERIM REVIEW ONLY
Document incomplete; not intended for permit, bidding or construction.

Engineer: **BRIAN R. WHITNEY MUHAMMAD ALI**
P.E. Serial No. 81591 08146
Firm: **LOCKWOOD, ANDREWS & NEWNAM, INC.**
Form No. EA-2214
Date: 10/8/2015

MEMORIAL CITY REDEVELOPMENT AUTHORITY

LAN Lockwood, Andrews & Newnam, Inc.
A LEQ A DAILY COMPANY

MEMORIAL DRIVE N-T17000-031B-4 PROFILE
PVMT & STM SWR IMPROVEMENTS
STA 5+00 TO STA 9+00
SHEET 4 OF 24

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

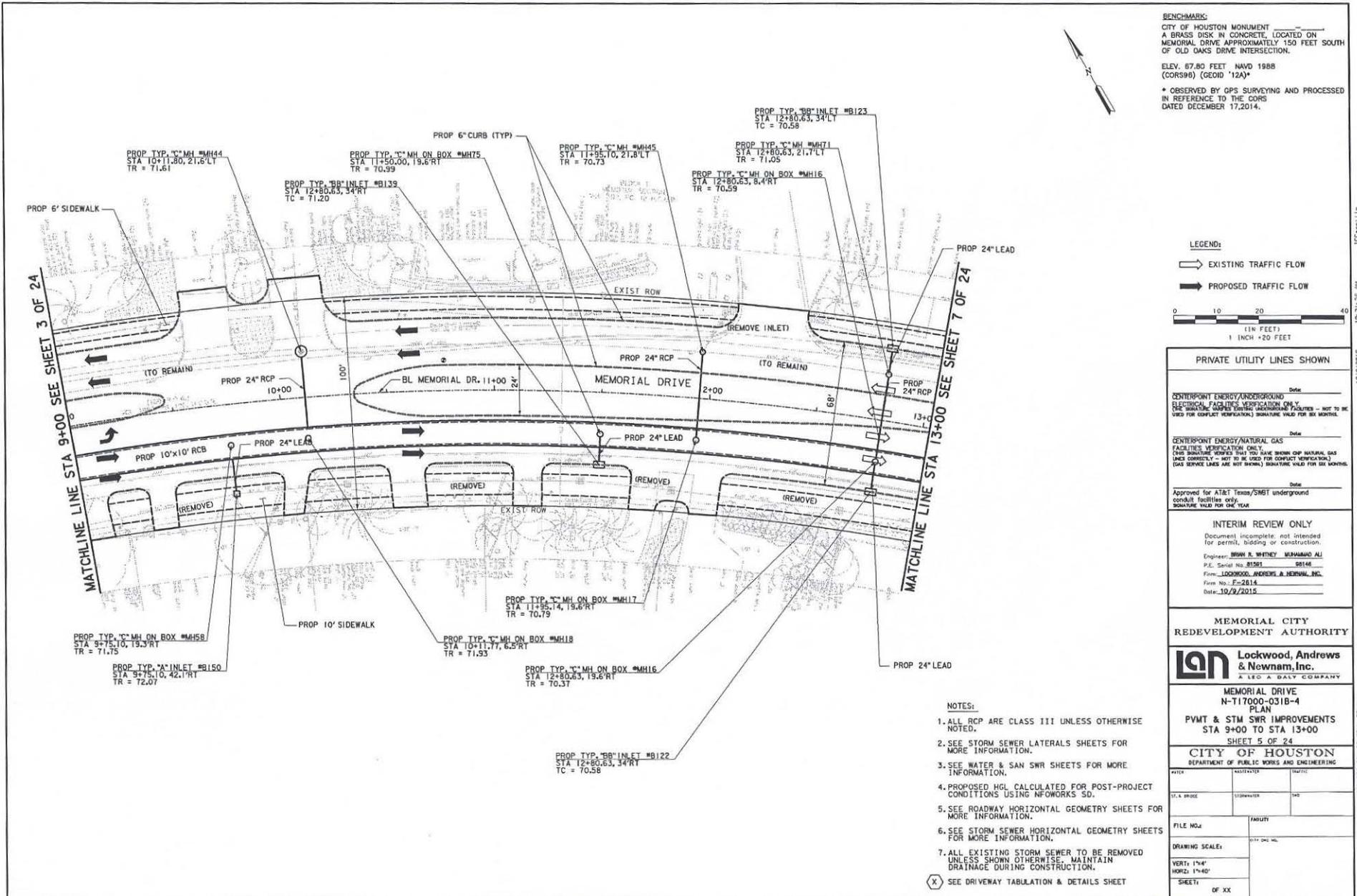
DATE	REVISION	DATE

FILE NO. _____

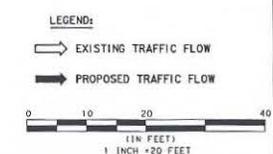
DRAWING SCALES:
VERT: 1"=4'
HORIZ: 1"=40'

SHEET: _____ OF XX

10/20/2015 10:20:35 AM
 C:\pwworkspace\testproj\17000\031B-4\24-PFM-031B.dwg
 10/8/2015



BENCHMARK:
 CITY OF HOUSTON MONUMENT
 A BRASS DISK IN CONCRETE, LOCATED ON
 MEMORIAL DRIVE APPROXIMATELY 150 FEET SOUTH
 OF OLD OAKS DRIVE INTERSECTION.
 ELEV. 67.80 FEET NAVD 1988
 (CORS98) (GEOID '12A')
 * OBSERVED BY GPS SURVEYING AND PROCESSED
 IN REFERENCE TO THE CORRS
 DATED DECEMBER 17, 2014.



PRIVATE UTILITY LINES SHOWN

Date: _____
 CENTERPOINT ENERGY/UNDERGROUND
 ELECTRICAL FACILITIES VERIFICATION ONLY
 (THIS DOCUMENT STATES THAT YOU HAVE SHOWN CAP NATURAL GAS
 LINES CORRECTLY - NOT TO BE USED FOR CONTACT VERIFICATION)
 (GAS SERVICE LINES ARE NOT SHOWN) SIGNATURE VALID FOR SIX MONTHS.

Date: _____
 CENTERPOINT ENERGY/NATURAL GAS
 FACILITIES VERIFICATION ONLY
 (THIS DOCUMENT STATES THAT YOU HAVE SHOWN CAP NATURAL GAS
 LINES CORRECTLY - NOT TO BE USED FOR CONTACT VERIFICATION)
 (GAS SERVICE LINES ARE NOT SHOWN) SIGNATURE VALID FOR SIX MONTHS.

Date: _____
 Approved for AT&T Texas/SBTG underground
 conduit facilities only.
 SIGNATURE VALID FOR ONE YEAR.

INTERIM REVIEW ONLY
 Document incomplete, not intended
 for permit, bidding or construction.
 Engineer: **BRIAN R. WATNEY** **MURRAY A. ALI**
 P.E. Serial No. 81561 81614
 Firm: **LOCKWOOD, ANDREWS & NEWNAM, INC.**
 Firm No.: F-2614
 Date: 10/9/2015

**MEMORIAL CITY
 REDEVELOPMENT AUTHORITY**

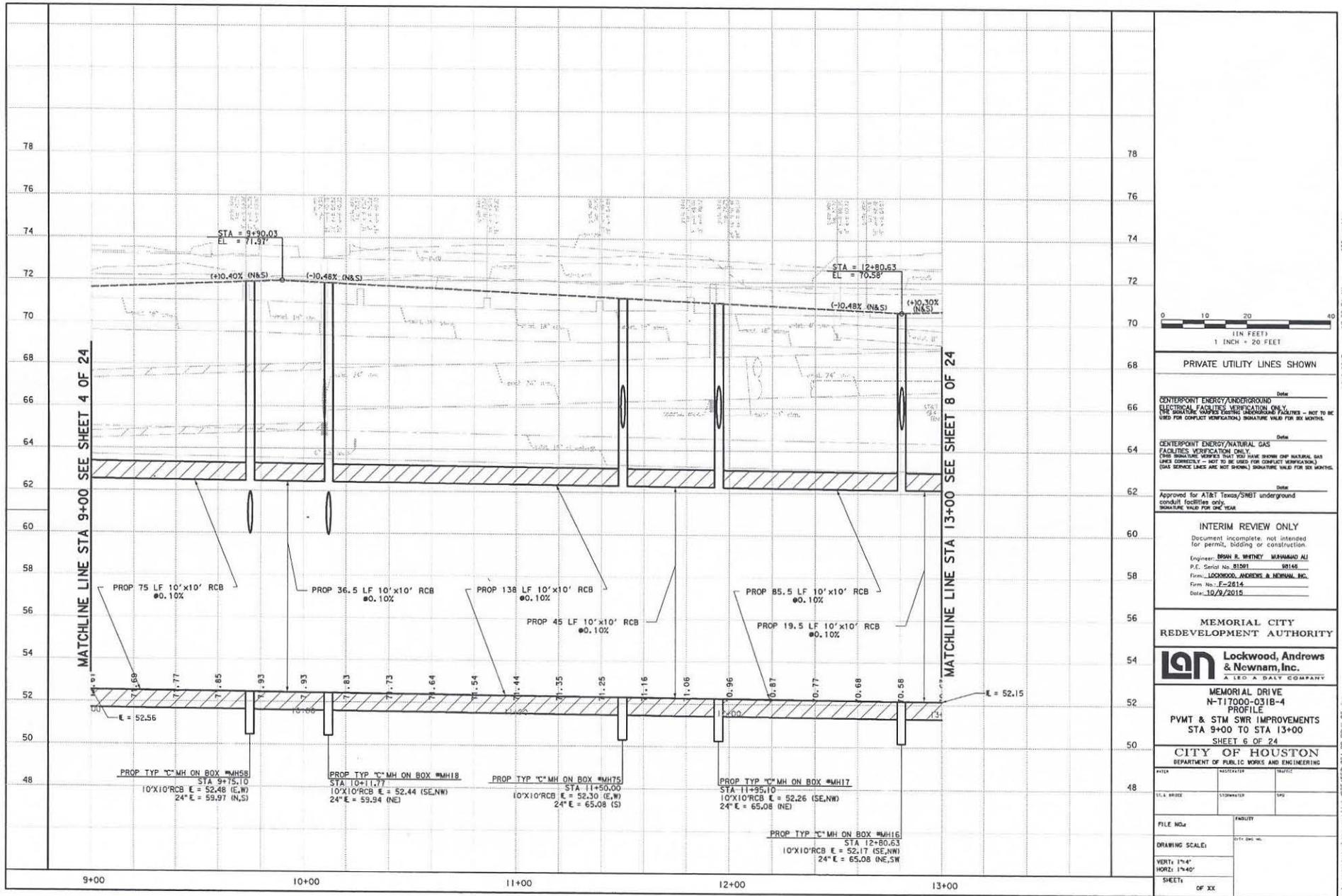
L&N Lockwood, Andrews
 & Newnam, Inc.
 A LEG A DALY COMPANY

**MEMORIAL DRIVE
 N-T17000-031B-4
 PLAN
 PVMT & STM SWR IMPROVEMENTS
 STA 9+00 TO STA 13+00
 SHEET 5 OF 24
 CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING**

WATER	SEWER	TRAFFIC
ST. & BRIDGE	SEWER	ST&B
FILE NO.	FACILITY	
DRAWING SCALE:	DATE PLOTTED:	
VERT: 1/4" = 1'-0"	HORIZ: 1/4" = 40'	
SHEET:	OF XX	

- NOTES:**
- ALL RCP ARE CLASS III UNLESS OTHERWISE NOTED.
 - SEE STORM SEWER LATERALS SHEETS FOR MORE INFORMATION.
 - SEE WATER & SAN SWR SHEETS FOR MORE INFORMATION.
 - PROPOSED HGL CALCULATED FOR POST-PROJECT CONDITIONS USING NFOWORKS SD.
 - SEE ROADWAY HORIZONTAL GEOMETRY SHEETS FOR MORE INFORMATION.
 - SEE STORM SEWER HORIZONTAL GEOMETRY SHEETS FOR MORE INFORMATION.
 - ALL EXISTING STORM SEWER TO BE REMOVED UNLESS SHOWN OTHERWISE. MAINTAIN DRAINAGE DURING CONSTRUCTION.
- (X) SEE DRIVEWAY TABULATION & DETAILS SHEET

10/9/2015 10:31:35 AM ICC041116



PRIVATE UTILITY LINES SHOWN

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: _____
 CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN OUP NATURAL GAS LINES CORRECTLY - NOT TO BE USED FOR CONFLICT VERIFICATION. GAS SERVICE LINES ARE NOT SHOWN. SIGNATURE VALID FOR SIX MONTHS.

DATE: _____
 Approved for AT&T Texas/SMBT underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR.

INTERIM REVIEW ONLY
 Document incomplete not intended for permit, bidding or construction.

Engineer: **BRIAN R. WHITNEY** MICHIGAN 00148
 P.E. Serial No. 81581
 Firm: **LOCKWOOD, ANDREWS & NEWMAN, INC.**
 Firm No. E-2814
 Date: 10/9/2015

MEMORIAL CITY REDEVELOPMENT AUTHORITY

Lockwood, Andrews & Newman, Inc.
 A LEO A DALY COMPANY

MEMORIAL DRIVE N-T17000-031B-4 PROFILE
 PVMT & STM SWR IMPROVEMENTS
 STA 9+00 TO STA 13+00
 SHEET 6 OF 24

DATE	APPROVED	DATE
FILE NO.	FACILITY	DATE
DRAWING SCALE:		
VERT: 1"=4'		
HORIZ: 1"=40'		
SHEETS OF XX		

10/9/2015 10:20:54 AM 10/9/2015 10:20:54 AM



APPENDIX E - p. 8

(PART A)

LAN LETTER shows intent to re-route HCTRA & TR DOT pipes under WBeltway 8 to go eastward under Memorial Dr to W-153 drain pipe, already overflows. See Next page.

August 12, 2014

Ann Givens, Chair of the Board
Memorial City Redevelopment Authority / TIRZ 17
8955 Katy Freeway, Suite 215
Houston, Texas 77024

Attention: Mrs. Ann Givens

Re: **Memorial Drive Drainage and Mobility Improvements TIRZ 17 CIP No. T-1731B Proposal for Phase I Preliminary Engineering Report**

Dear Mrs. Givens,

Lockwood, Andrews and Newnam, Inc. (LAN) is pleased to submit this proposal for engineering services consisting of the preparation of a Preliminary Engineering Report (PER) for drainage, roadway, pedestrian, public utilities and traffic improvements along Memorial Drive between Beltway 8 frontage road and Tallowood Road.

The report will be prepared in accordance with the current City of Houston Infrastructure Design Manual and will focus on evaluation of existing storm sewers and overland flow patterns, roadway geometrics, pedestrian facilities, traffic operations, access management, right of way encroachments and assessment, utility coordination and assessment, environmental assessment, geotechnical investigation, tree impacts, detailed survey, pavement condition, and 30% plan and profile drawings.

The proposed project is identified in the current TIRZ 17 five-year Capital Improvement Plan. The PER is Phase I of the overall project development and will identify the impacts associated with the implementation of the drainage, roadway, pedestrian, public utilities, and traffic recommendations. The PER will be presented to the City of Houston Technical Review Committee for review and comment.

We propose to perform PER services for an amount of \$428,600.00. A detailed Scope of Services can be found in Exhibit "A". Exhibit "B" provides a detailed breakdown estimate of the fees for the basic engineering services and additional services respectively. We are prepared to begin this work immediately.

Please feel free to contact me at (713)266-6900 if you have any questions or need additional information.

Sincerely,

Muhammad Ali, P.E.
Project Manager

MA:RO:KG

Accepted For
Memorial City Redevelopment Authority

Signature

Date

Print

4. Drainage Impact Analysis

* Drainage impacts associated with the proposed roadway improvement will be evaluated and mitigation measures necessary to ensure no adverse impacts will be proposed. Potential drainage impacts associated with the proposed improvements including effects of additional increased impervious cover, a reduction in storm water storage, and modifications to overland sheetflow patterns. The proposed roadway will discharge the Beltway 8 drainage system and directly to W153-00-00 or Buffalo Bayou. These systems are regulated by TxDOT. Zero increase in peak runoff, water surface elevations, and flow volume will be allowed.

- a. **Increased Impervious Cover** – An evaluation of the existing and proposed impervious cover will be performed to identify the changes associated with the proposed roadway improvements.
- b. **Changes in Storage** – The proposed roadway, anticipated to be a curb and gutter cross section, will be evaluated to account for any changes in storage.
- c. **Overland Sheetflow** – The proposed roadway improvements will be evaluated to identify and quantify overland sheetflow impacts.
- d. **Mitigation Options** – Mitigation option concepts will be developed to determine the most effective means (both cost and function) of eliminating potential impacts. Potential mitigation options include; (1) storage beneath the roadway in the form of oversized or additional storm sewer, (2) above ground offsite storage, and (3) sub-surface offsite storage.

5. Proposed System Analysis

Multiple improvement options will be evaluated and presented to the TIRZ board for review and selection. A recommended alternative will be identified that meets the City's criteria and cost effectively maximizes benefit for the region. Necessary sizing, location, elevation, and cover requirements of the proposed trunkline will be determined for each alternative. The inlets and laterals will be refined as necessary to ensure sufficient intake & conduit capacity and to maintain a hydraulic grade line (HGL) below or at the gutter elevation of the roadway for the length of the project for the 2-year event. The proposed storm sewer system will be evaluated and improved in order to meet overland flow and Maximum Ponding Elevation criteria for the 100-year event. A 2 dimensional model of the proposed storm sewer system(s) will be constructed and analyzed for the 2-year and 100-year frequencies.

- a. **Minimum City of Houston Criteria System** – The systems will be designed to meet the minimum City of Houston Criteria. The proposed improvement will be self-mitigating, meaning the systems will not increase discharge to the receiving channel or drainage system.
- b. **Regional Improvement System** – The regional improvements identified in the RDS update will be evaluated in detail with the incorporated project survey. Restricted outfall and non-restricted outfall improvement scenarios will be evaluated. Two alternative solutions will be evaluated for the W153-00-00 watershed.
- c. **Ultimate System** – The maximum constructible box size will be determined for the each of the storm sewer sections. A simulation will be performed to evaluate the benefit of the maximum storm sewer.

6. Improvement Option Cost Estimates

Planning level cost estimates will be prepared to assist in determining the value of each improvement option.

APPENDIX E - p. 10
(PART B - City letter)

①

Memorial Dr. RDAL
December 1, 2015

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
OFFICE OF CITY ENGINEER
TRAFFIC AND TRANSPORTATION SECTION
WASTEWATER OPERATIONS SECTION
WATER ENGINEERING SECTION
FINANCE SECTION

See PPS. 3 & 5
of this letter.

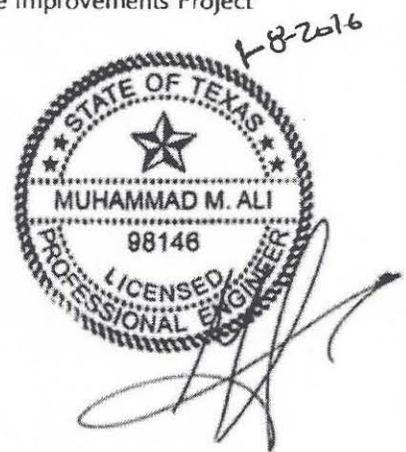
SUMMARY OF
TECHNICAL REVIEW COMMITTEE MEETING
AND RECORD OF DECISIONS AND ACTION ITEMS

DATE PREPARED: January 7, 2015
PROJECT TITLE: TIRZ 17
Memorial Drive West Mobility and Drainage Improvements Project
WBS NO.: WBS No. T-17000-0031B-7
DESIGN CONSULTANT: Lockwood, Andrews & Newnam, Inc.
SUPERVISING ENGINEER: Thomas Artz, PE
TRC DATE: December 1, 2015

Attendees:

City of Houston:
Tommy Artz Joaquin Lopez Mazen Abdulrazzak
T. Rebagay JoAnne Kamman Kent Wu
Mitchell Ramon Gary Hill Mohd Warrad

Lockwood, Andrews & Newnam, Inc.:
Muhammad Ali Derek St. John Ricky Gonzalez



Lockwood, Andrews &
Newnam, Inc.
F-2614

I. Purpose

To review and discuss the recommendations provided by the engineering consultant, make decisions and provide directives. The recommendations are detailed in the Preliminary Engineering Report (PER) titled, "Memorial Drive Mobility and Drainage Improvements Project Preliminary Engineering Report", dated October 2015, prepared by Lockwood, Andrews & Newnam, Inc.

The purpose of the Memorial Drive Project is to Improve Mobility, Safety, Drainage Deficiencies, and Quality of Life.

The project proposes to improve the Mobility and Safety by converting the existing 4-lane asphalt open ditch roadway to a 4-lane concrete curb and gutter section with a raised median. The project will require full roadway reconstruction of Memorial Drive, from the northbound Beltway 8 frontage road to Tallowood Rd. As part of the roadway reconstruction, the aging or deficient public utilities shall be replaced and private utilities shall be evaluated and relocated or replaced as necessary.

The project proposes to improve Drainage Deficiencies with the installation of reinforced concrete storm sewer boxes; ranging from 10'x5' to 10'x10', which will result in increased conveyance and storage, an increase in storm level protection, reduction in overland flow leaving the project area, reduction in roadway ponding and reduction in surrounding area residential flooding.

2

APPENDIX E - p. 11
(PART B - City Letter)

Memorial Dr. RDAI
December 1, 2015

The project proposes to improve Quality of Life by installing 8-foot wide shared use paths along both sides of the Memorial Drive project corridor, replacing existing traffic signals, providing ADA compliant sidewalks and wheel chair ramps, and installing hardscape and softscape features along the project.

II. Project Background

A. Introduction

Lockwood, Andrews & Newnam, Inc. (LAN) was retained by the Tax Increment Reinvestment Zone No. 17 (TIRZ 17) to perform a Preliminary Engineering Study for Memorial Drive Mobility and Drainage Improvements Project. In addition to the general mobility improvement, another important objective is to address documented drainage issues in the immediate area. The Memorial Drive Mobility and Drainage project was identified in the City of Houston (City) approved TIRZ17 Project Plan and Capital Improvement Plan (CIP No. T-1717).

B. October 2015 PER Findings & Recommendations

Three main roadway improvement alternatives were considered and analyzed. The impacts of each alternative to existing right-of-way, access management, pedestrian amenities, tree inventories, and underground utilities were considered. The alternative selected is the most optimal solution based on benefit, cost and constructability. It will involve complete reconstruction of Memorial Drive, within the existing ROW, with the addition of sub-surface, in-line detention. The recommended proposed improvement will improve overall mobility and safety, drainage deficiencies, and quality of life.

The following recommendations are based on the results from the preliminary geometric evaluation and condition assessment, and drainage analysis:

Roadway:

Existing:

Centered within an existing .100' right-of-way, Memorial Drive is an existing, undivided 44-foot asphalt roadway with a combination of shallow open ditches and curb and gutter sections; with two 11-foot lanes in each direction, from the northbound Beltway 8 intersection, east to Tallowood Rd. Memorial Drive is currently classified as a major thoroughfare per the 2014 City Major Thoroughfare and Freeway Plan (MTFP). The posted speed limit along Memorial Drive is 35 mph within the project limits. Existing sidewalks are 4-feet wide and discontinuous along the project alignment.

There are two (2) existing signalized intersections along the project limits; Beltway 8 frontage road and W. Bough/Broken Bough intersections. There are also eight (8) unsignalized intersection along the project limits. The City Pavement Condition Rating (PCR) scores along the project alignment vary from the mid 60's to the mid 70's.

Proposed:

The Recommended Alternate 1 proposes a 4-11-foot wide lanes, two way concrete curb and gutter roadway divided by a 24-foot wide raised median with left turn lanes at each median opening. Per the 2015 COH IDM the pavement will be 11-inches thick concrete. The median opening locations were based on an access management study and feedback from the public.

Proposed 8-foot wide Shared Use Paths will be constructed along both sides of Memorial Drive. The proposed Shared Use Path, along the south side of Memorial Drive, is intended to tie into the future TxDOT shared use path project from Terry Hershey Park to the southeast corner of the Beltway 8 northbound frontage road and Memorial Drive. There will be minimum 4-foot buffer space separating the roadway from the shared use paths. ADA compliant wheel chair ramps will also be constructed at both signalized intersections.

Both signalized intersections will up replaced to meet current City of Houston criteria.

No additional ROW is required for the proposed Memorial Drive project with the exception of a 25'x25' corner clip at the northeast corner of Memorial Drive and Beltway 8 northbound frontage road, and a 20'x20' corner clip at the northwest corner of Memorial Drive and W. Bough Lane. These corner clips are required for proposed sidewalk continuity, ADA compliant pedestrian ramps, and proposed traffic signal improvements.

APPENDIX E - p. 12
(PART B - City Letter)

3

Memorial Dr. RDAI
December 1, 2015

Drainage:

Existing:

*
Impt

The entire study area is part of the W153-00-00 watershed and is generally drained by roadside ditches and storm sewers existing along the project alignment, ultimately out-falling to W153-00-00. The western limits of the project from W. Bough Lane/Broken Bough Drive to Beltway 8 drain to the Beltway 8 storm sewer trunkline before continuing downstream to Buffalo Bayou. A Regional Drainage Study performed in 2012, then updated in 2014, documented significant deficiencies within the watershed. Significant structural flood damage was reported in the April 2009 rain event as well as the more recent May 2015 rain event. The existing Memorial Drive Drainage System does not currently meet the City's 2-yr or 100-yr drainage criteria. Flooding is partially due to the limited capacity of the Memorial Drive drainage infrastructure and overflow from W153 itself. At the peak of a major rain event, W153 becomes overwhelmed and overland flows into Memorial Drive ROW from W153 via adjacent properties, thus putting adjacent properties at risk of structural flooding. The capacity of the Memorial Drive crossing at W153 is further reduced by the significant tailwater in Buffalo Bayou. Additionally, the area south of Memorial Drive is inundated due to the Buffalo Bayou 100yr floodplain. Neither of these issues can be resolved by the local drainage improvements proposed as part of the roadway project.

Proposed:

Five (5) drainage improvements options were evaluated for the project. The recommended Option I is designed to meet the City's 2-year criteria and maximize the benefit of the drainage improvements, while minimizing impacts to W153 and adjacent properties. The proposed drainage option does not change the existing drainage patterns of the current Memorial Drive system. A proposed single 10'x10' RCB will be installed from W. Bough/Broken Bough to Beltway 8. Dual 10'x5' RCB's will be installed from W. Bough/Broken Bough to Boheme. A smaller 10'x5' box is required at the Boheme intersection, so as to not impact an existing 48-inch sanitary sewer crossing. Dual 10'x10' RCB's will continue from east of Boheme to W153. Restrictors are proposed at the Beltway 8 and W153 outfalls to maintain or reduce existing flow rates and water surface elevations. Throughout the dual RCB's, equalizers will be installed to properly convey flows.

Option I results in a net sub-surface detention volume of approximately 12(+) acre-feet. The project will match or lower flow rates to the receiving storm sewer. This option will also provide a 10-year level of protection.

Public Utilities

A. Water lines:

The project area is serviced by a 16-inch ductile iron waterline that runs primarily along the southern ROW of Memorial Drive, from east of Beltway 8, for the extent of the project. This line was installed in 1995 and is not recommended to be replaced.

A 12-inch asbestos concrete (AC) water line located at Beltway 8 and continues east to tie into the 16-inch ductile iron water line was installed in 1969 and is recommend to be replaced due to its age and material.

There are seven (7) water line crossings that run perpendicular to Memorial Drive, ranging in size from 8-inch, 12-inch and 16-inch. All water line crossings are recommended to be replaced due to pipe material, conflicts with proposed improvements, and to eliminate any future water line projects that may impact the proposed future roadway.

New fire hydrants will be installed per City spacing requirements. The existing fire hydrants will be removed and salvaged, whenever possible, to reduce costs.

B. Sanitary Sewer:

There are four (4) sanitary sewer lines that run parallel to Memorial Drive: A 48-inch gravity line, a 15-inch gravity line, a 12-inch gravity line and a 10-inch gravity line. The existing 48-inch line, installed in 1997 crosses Memorial Drive at Boheme and traverses east along the northern side of Memorial Drive to W153. It is not recommended to replace this line. The 15-inch polyethylene line is located in back lot sanitary sewer easements between Beltway 8 and Boheme. It is not recommended this line be replaced. The 12-inch line runs along the north/east ROW from approximately Old Oaks Drive and Boheme Drive. For the first 290 feet, the pipe was replaced in 1999 using polyethylene pipe. The remaining 285 feet is made of unreinforced concrete that was

(PART B - City Letter)

Memorial Dr. RDAI
December 1, 2015

installed in 1960. It is recommended that only the older 285 feet of the sanitary sewer line be replaced. The 10-inch line runs along the north/east ROW between Huntingwick Drive and Boheme Drive. This extra strength concrete line runs parallel to the 12-inch line and was installed in 1966. It is recommended that this line be replaced due to its age and pipe material. During detailed design, LAN will study the option of combining the 12-inch and 10-inch lines into one single line.

There are ten (10) sanitary sewer line crossings that run perpendicular to Memorial Drive. They range in size from 8-inch to 24-inch. Seven (7) lines were installed in the 1950's and 1960's and CCTV footage depicted irregularities in the lines. Therefore, it is recommended that these seven (7) sanitary sewer crossings be replaced. The remaining three (3) lines are 1~6-inch ductile iron force main; 1~6-inch cast iron force main, and 1~10-inch ductile iron force main, installed in the 1970's and 1980's. The 6-inch cast iron line is in conflict with proposed improvements and is recommended to be replaced. The 6-inch ductile iron line is also recommended to be replaced due to its age and pipe material.

Traffic Signals

The two existing traffic signals at Beltway 8 and West Bough/Broken Bough will be replaced to meet current City standards.

Private Utilities

CenterPoint Energy has underground gas lines, underground conduits and overhead electric lines. Southwestern Bell Company (SBC or AT&T) has underground cables fiber optic cables, and duct banks. and PVC conduits in the project limits. Coordination with private utility entities will be conducted early in the design process as needed.

Existing Trees:

Approximately 293 existing trees are located within the construction area of the project. 75 trees will be impacted by the project resulting in 393 replacement inches. Landscaping plans and tree protection plans will be necessary in Phase II to comply with City Tree Ordinance.

Geotechnical Study:

The geotechnical report by Aviles Engineering recommends a rigid concrete pavement thickness of 11-inches with an 8-inch lime stabilized subgrade, consistent with the latest City IDM requirements for a 50-year life span pavement.

Environmental Site Assessment:

The Phase I ESA conducted by Aviles Engineering identified seven (7) Recognized Environmental Concerns (REC). Research found a fault line along the project limits, but Aviles' site reconnaissance found no evidence of a fault line. A detailed Phase II ESA is recommended during detailed design along with a fault study to confirm if a fault line exists.

Right-of-way/Easement Acquisition:

No additional ROW is required for the proposed Memorial Drive project with the exception of a 25'x25' corner clip at the northeast corner of Memorial Drive and Beltway 8 northbound frontage road, and a 20'x20' corner clip at the northwest corner of Memorial Drive and W. Bough Lane. These corner clips are required for proposed sidewalk continuity, ADA compliant wheel chair ramps and proposed traffic signal improvements.

Project Coordination:

Project coordination will continue throughout the final design with the City of Houston, TIRZ 17, TxDOT, METRO, Harris County Toll Road Authority, Harris County Flood Control District, adjacent property owners, and several private utility entities. Coordination meetings will be scheduled with the City of Houston as needed throughout the design phase to coordinate design. Upon completion of 60% and 90% design, drawings will be submitted to the City Engineer's Office for review and approval. Early coordination with private utility entities will also be conducted in design.

Traffic Control:

The traffic control plan and construction sequencing will require two main phases to minimize disruption to the traveling public, pedestrians, and adjacent properties. During the first construction phase, the south half of the project will be constructed including storm sewer boxes, and concrete pavement. Temporary pavement along the north side of Memorial Drive will need to be installed to accommodate one lane in each direction, along with a continuous two way left turn lane. The

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(PART B - City Letter)

5

Memorial Dr. RDAI
December 1, 2015

second phase of construction will move traffic to the newly constructed pavement and maintain the same three lane configuration, then complete the construction of the remaining items along the north side of the project.

Lighting/Landscaping:

Standard City Street lighting will be installed along the project. A detailed landscaping and pedestrian lighting plan will also be developed during construction. These improvements are meant to promote a pedestrian friendly environment along the proposed project corridor.

C. TRC Decisions and Directives

1. LAN will provide 11-foot lanes during construction to accommodate bus traffic.
2. LAN to revise design to reflect 8-foot wide shared-use paths on both sides of Memorial Drive due to the long distances between legal street crossing locations. This will provide the north and south side neighborhoods an equal opportunity to utilize these amenities.
3. Use High Early strength concrete at all intersections.
4. The 100-year storm event City Criteria cannot be met due to W153's limited capacity and back water from Buffalo Bayou. A regional solution is needed for the area but this is beyond the project's scope.
5. TIRZ 17 will handle the ROW acquisition for corner clips.
6. LAN will work with planning department to determine if there is a need for utility stub-outs for the Rebuild Houston project at Memorial Bend subdivision.
7. LAN will do a sight distance analysis at each intersection to evaluate if there are sign distance issues.

Based on the above directives and conclusions, the engineering consultant on behalf of TIRZ 17, will proceed with final design of the Memorial Drive Mobility and Drainage Improvements Project. Please contact Muhammad Ali at 713-266-6900, should this summary be inconsistent with the TRC findings and decisions.

Ravi Kaleyatodi
Ravi Kaleyatodi, P.E., CPM
Senior Assistant Director
City of Houston/PWE
Engineering Branch

Distribution:

CITY OF HOUSTON:

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Arthur Morris
Tim Vu ✓

Mazen Abdulrazzak *ML*
Ravi Kaleyatodi
T. Rebagay ✓

TIRZ 17:

Scott Bean, Executive Director

Lockwood, Andrews & Newnam, Inc.:

Muhammad Ali
Derek St. John
Ricky Gonzalez
Brian Whitney

*
IMPT!
City takes
No Responsibility
for possible
flooding
further
downstream
that
will
occur
due to
this project!

APPENDIX F - p. 1

THIS IS THE CONTRACT of 2003, signed by
BETWEEN CITY OF HOUSTON,
TIRZ 17, + Mem. City Management District



CITY OF HOUSTON
Legal Department

Lee P. Brown
Mayor

Anthony W. Hall, Jr.
City Attorney
Legal Department
P.O. Box 1562
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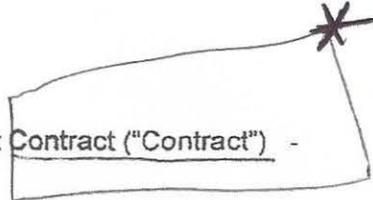
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JAN 22 2002

AEC

January 21, 2003

Trey Lary, Esq.
Vinson & Elkins
2300 First City Tower
1001 Fannin
Houston, Texas 77002



RE: Memorial City TIRZ Public Improvement Development Contract ("Contract") -

Dear Mr. Lary:

Enclosed is one fully signed original Public Improvement Development Contract regarding the above referenced subject for your file.

Should you have any questions, please call me at 713-247-1302.

Sincerely,

Kathryn J. Farley
Sr. Assistant City Attorney

Enclosure

12 F...
BERT LIBRINE

APPENDIX F - p. 2

THE CONTRACT of 2003,
Showing Exhibit A to be done by

WHEREAS, the Authority wishes to proceed with the design, construction and acquisition of right of way for those improvements identified in Exhibit "A" attached hereto and made a part hereof for all purposes (the "Projects"); and

WHEREAS, the City has authority and jurisdiction over the public streets located within the City; and

WHEREAS, the City finds it is in the public interest to enter into an agreement with the Authority to implement the Projects in order to reduce traffic congestion, improve pedestrian safety, aid drainage, and attract new business development within the Zone; and

WHEREAS, the City finds it in the public interest to authorize the design and construction of the Projects by the Authority and to cooperate in facilitating the acquisition and construction of the Project by the Authority; and

NOW THEREFORE, and in consideration of the mutual promises, covenants, benefits and obligations herein described, the City and the Authority hereby agree to the terms and conditions of this Contract.

ARTICLE I
DEFINITIONS

1.01. Certain Terms

As used in this Contract, the following words and phrases have the meanings set-out below unless a different meaning clearly appears from the context in which the term appears:

"Acquisition Fund" is defined in Section 3.02 hereof.

"Authority" is defined in the preamble hereof.

"Board of Directors" means and refers to the Board of Directors of the Authority.

"Bonds" means the bonds of the Authority.

"City" is defined in the preamble hereof.

"City Council" means and refers to the City Council of the City of Houston, Texas.

"Contract" is defined as this document, as amended from time-to-time in accordance with the provisions hereof.

"Date of Countersignature" means the date of the countersignature by the City's Controller.

"Notes" means the promissory notes issued by the Authority from time to time.

"Planning Director" means the Director of the City's Department of Planning and Development, his designee, or any other person who may be designated in writing by the Mayor

✓ City
TIRZ 17
Developers