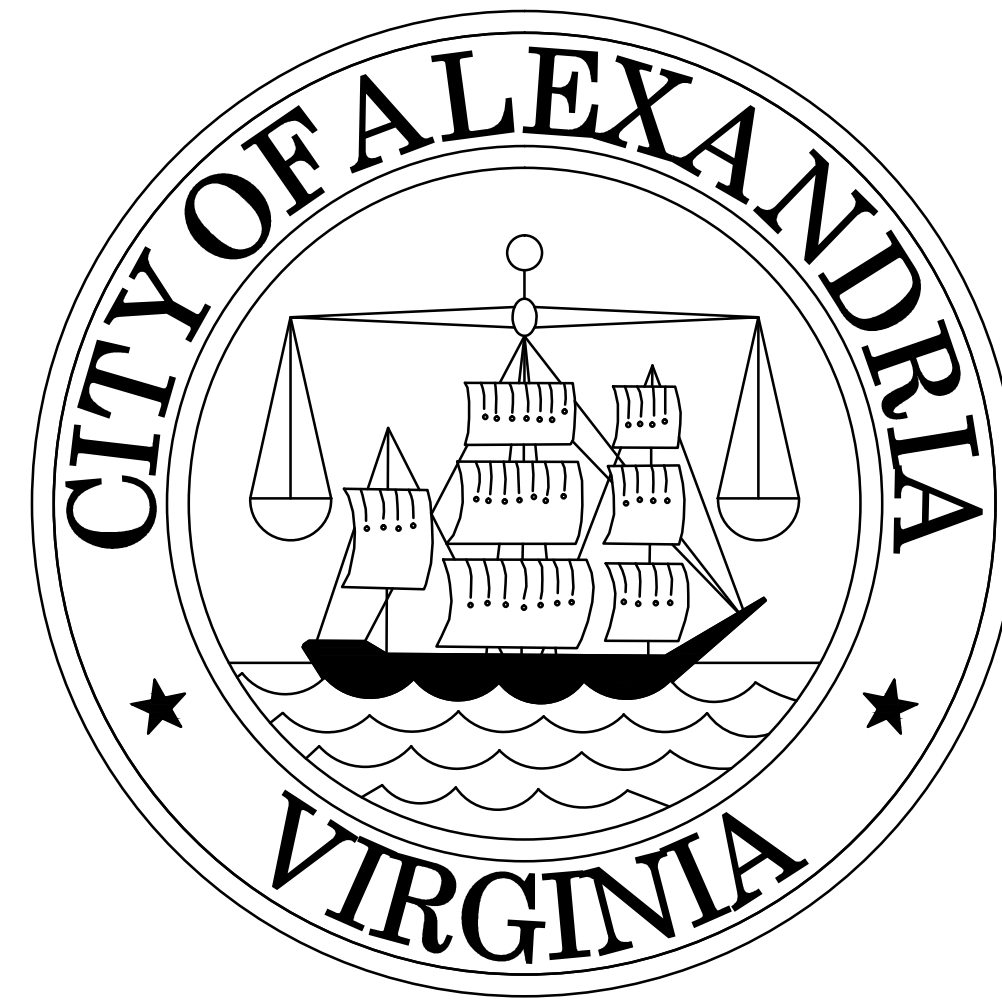


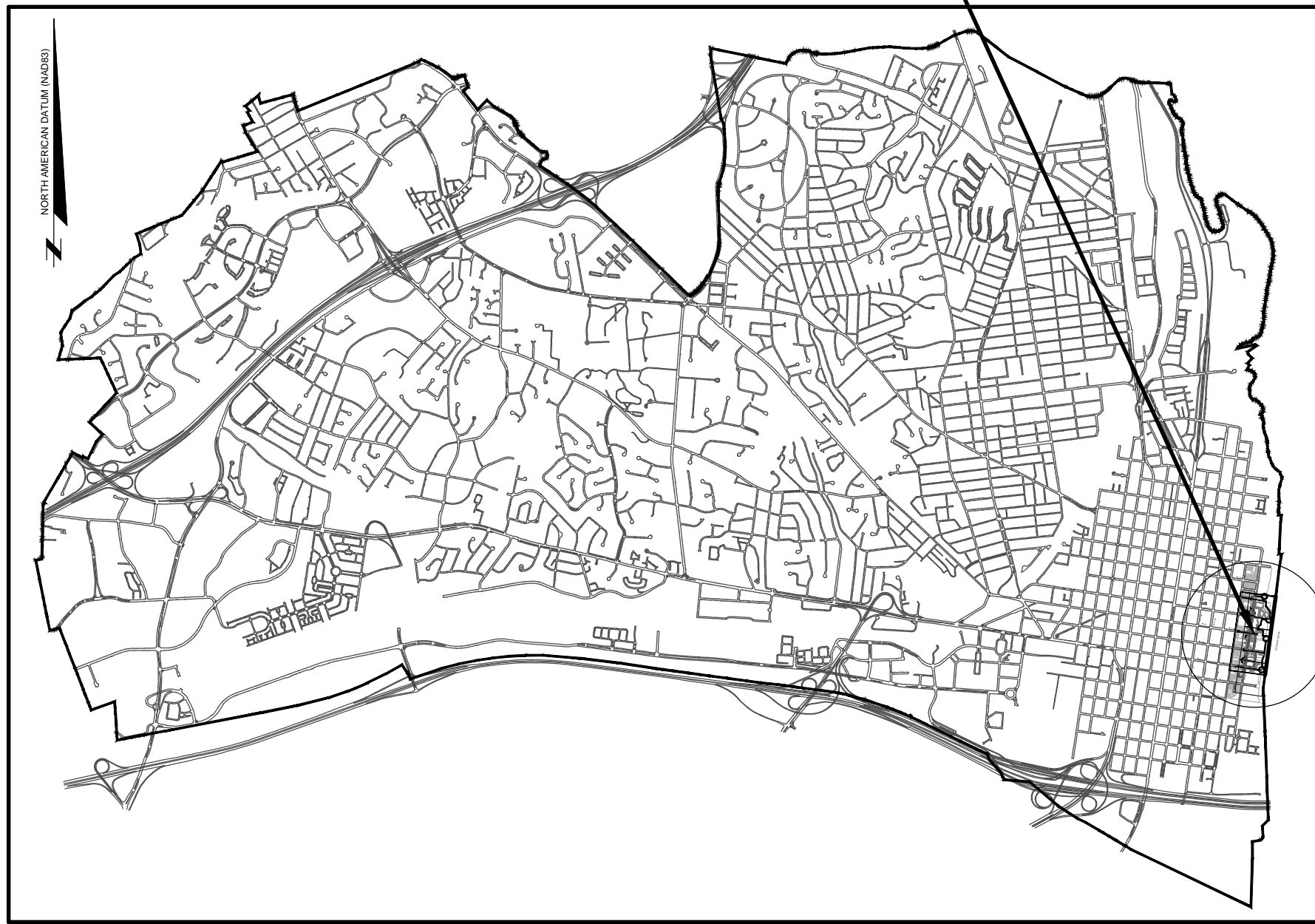
City of Alexandria, Virginia



DEPARTMENT OF PROJECT IMPLEMENTATION

WATERFRONT FLOOD MITIGATION PROJECT

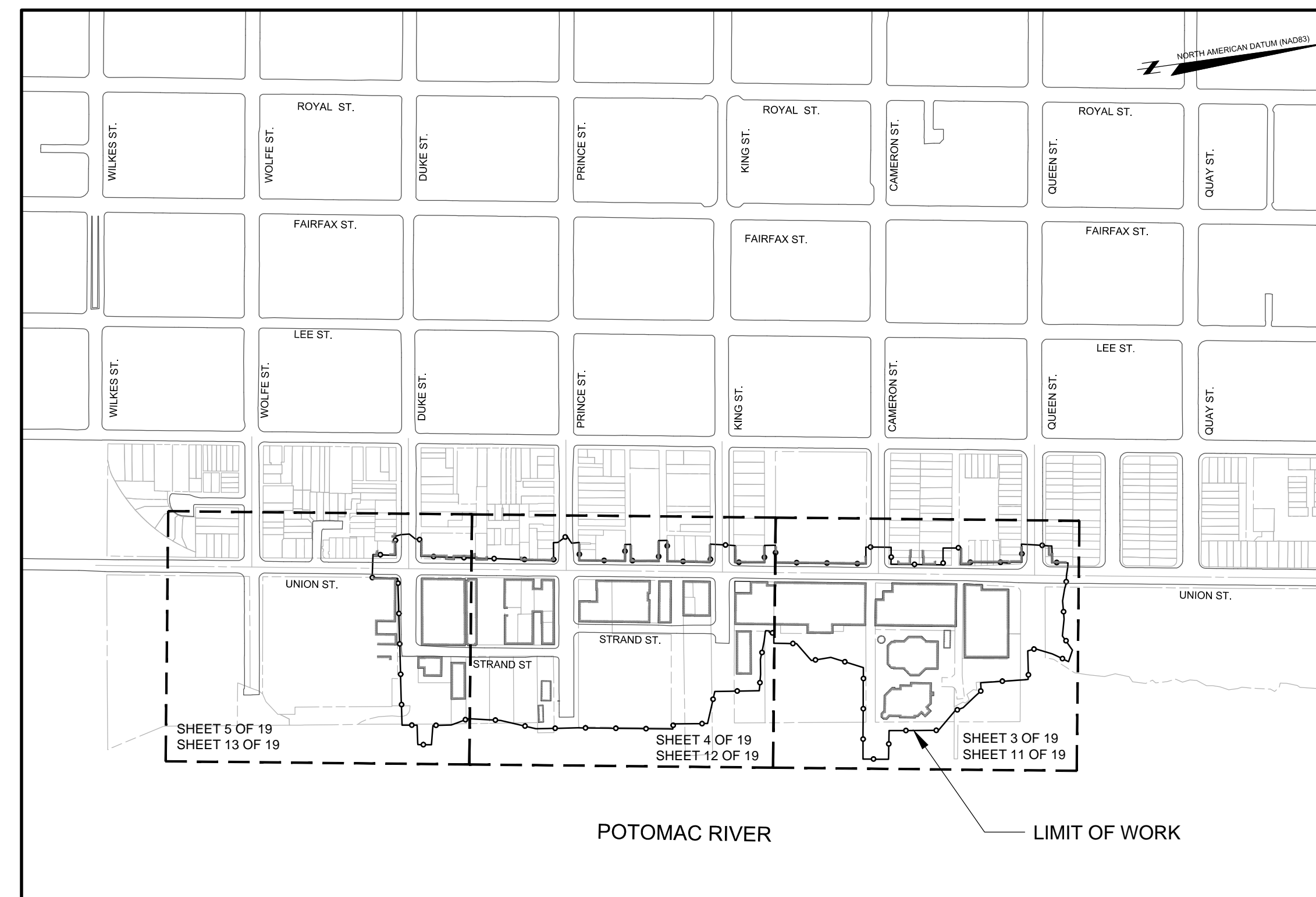
PROJECT LOCATION



CITY OF ALEXANDRIA
NTS

DRAWING INDEX

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| SHEET 18: | PROPOSED STORM DRAIN PROFILES |
| SHEET 19: | TYPICAL BULKHEAD SECTION AND NOTES |



VICINITY MAP
SCALE 1"=300'

OWNER
CITY OF ALEXANDRIA, VIRGINIA
301 KING STREET - ROOM 3200
ALEXANDRIA, VA 22314
PHONE: 703-746-4045

ARCHITECT
OLIN STUDIO
PUBLIC LEDGER BUILDING
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PHILADELPHIA, PA 19106
PHONE: 215-440-0030

ENGINEER
STAN ALDRIDGE, PE
URS CORPORATION
1242 MILESTONE CENTER DRIVE, SUITE 150
GERMANTOWN, MD 20876
PHONE : 301-820-3358

BENCHMARKS

| POINT | NORTHING | EASTING | ELEV | DESCRIPTION |
|--------|--------------|---------------|-------|--|
| HV9658 | 6,980,069.38 | 11,899,048.88 | 6.60 | NGS BRASS DISC IN CONCRETE AT FOUNDERS PARK |
| 105 | 6,979,627.06 | 11,898,925.14 | 4.92 | DRILL HOLE IN SIDEWALK AT UNION AND CAMERON STREET |
| 110 | 6,978,854.77 | 11,898,804.13 | 5.74 | DRILL HOLE IN SIDEWALK AT UNION AND PRINCE STREET |
| 114 | 6,978,380.15 | 11,898,735.77 | 11.55 | IRON PIPE WITH CAP AT UNION AND DUKE STREET |
| 115 | 6,978,366.49 | 11,898,993.00 | 6.39 | DRILL HOLE IN CATCH BASIN AT DUKE AND STRAND STREET |
| 116 | 6,978,874.17 | 11,899,049.11 | 5.47 | IRON PIPE WITH CAP SET IN PARK AT STRAND AND PRINCE STREET |
| 117 | 6,979,193.14 | 11,899,020.53 | 3.03 | DRILL HOLE IN SIDEWALK AT STRAND AND KING STREET |
| 119 | 6,979,572.98 | 11,899,379.48 | 7.11 | MAG NAIL SET ON DOCK |

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COVER SHEET

























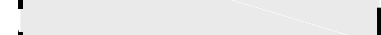




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GERMANTOWN, MD 20876

| REVISIONS | INITIALS | COMMENTS |
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| Date: | | |

Scale: Project No. Sheet 1 of 19

C:\Projects\ENG\City of Alexandria\Waterfront Small Area Plan Engineering Implementation\05_Dwgs\G-Sheet\G-002 LEGEND, ABBREVIATIONS AND GENERAL NOTES.dwg Plotted: 7/31/2014 4:16 PM by Chen, Alon

LEGEND:

-  EX. PROPERTY LINE
-  EX. CURB AND GUTTER
-  EX. CONTOURS
-  EX. BUILDING
-  EX. GAS LINE (ABDN)
-  EX. GAS LINE (ACTIVE)
-  EX. STORM DRAIN
-  EX. SEWER
-  EX. WATER LINE
-  EX. RPA LINE
-  EX. OVERHEAD UTILITY
-  EX. CENTER LINE OF ROAD
-  EX. EDGE OF PAVING
-  EX. FENCE
-  EX. LIGHT POLE
-  EX. FIRE HYDRANT
-  EX. WATER VALVE
-  EX. WATER METER
-  EX. UNDERGROUND ELEC MANHOLES
-  EX. UNDERGROUND UTILITY MANHOLES
-  EX. SPOT ELEVATION
-  DRAINAGE AREA INTERCEPTED AND BYPASSED VIA STORM DRAIN
-  PROPOSED DRAINAGE AREA DIVIDE FOR PUMP STATIONS
-  PROPOSED CONTOUR
-  PROPOSED BYPASS STORM DRAIN
-  EXISTING STORM DRAIN TO PUMP STATION
-  PROPOSED STORM DRAIN TO PUMP STATION
-  BORING B-X
-  EXISTING STORM DRAIN TO BE DEMOLISHED

ABBREVIATIONS:

- ABDN: ABANDONED
- AC: ACRES
- ANSI: AMERICAN NATIONAL STANDARDS INSTITUTE
- ASTM: AMERICAN SOCIETY FOR TESTING AND MATERIALS
- BMP: BEST MANAGEMENT PRACTICES
- CB: CATCH BASIN
- CI: CAST IRON
- CL: CENTERLINE
- CRLD: CERTIFIED RESPONSIBLE LAND DISTURBER
- DA: DRAINAGE AREA
- E&S: EROSION AND SEDIMENT
- ELEV: ELEVATION
- EPA: ENVIRONMENTAL PROTECTION AGENCY
- EX: EXISTING
- FFE: FIRST FLOOR ELEVATION
- INV: INVERT
- LOW: LIMIT OF WORK
- MH: MANHOLE
- MUTCD: MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES
- NAD83: NORTH AMERICAN DATUM 83
- NESHAPS: NATIONAL EMISSIONS STANDARDS FOR HAZARDOUS AIR POLLUTANTS
- NIOSH: NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH
- NTS: NOT TO SCALE
- O-#: OUTFALL #
- OSHA: OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
- OHU: OVERHEAD UTILITY
- PLA: PLASTIC
- RCP: REINFORCED CONCRETE PIPE
- RPA: RESOURCE PROTECTION AREA
- SD: STORM DRAIN
- SDMH: STORM DRAIN MANHOLE
- SG: SURFACE GRATE
- SS: SANITARY SEWER
- SSMH: SANITARY SEWER MANHOLE
- T&ES: TRANSPORTATION AND ENVIRONMENTAL SERVICES
- VDOT: VIRGINIA DEPARTMENT OF TRANSPORTATION
- VESCH: VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK
- VOSH: VIRGINIA OCCUPATIONAL AND SAFETY HEALTH
- VSWCB: VIRGINIA STATE WATER CONTROL BOARD
- W: WATER
- WRPD: WRAPPED
- WSE: WATER SURFACE ELEVATION

EXISTING CONDITIONS SURVEY NOTES:

1. THE HORIZONTAL DATUM SHOWN HEREON IS TIED TO THE NORTH AMERICAN DATUM OF 1983 (NAD83) AND THE VERTICAL DATUM SHOWN HEREON IS TIED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) BASED ARE BASED ON NGS MONUMENT HV9658.
2. UTILITY INFORMATION AS SHOWN HEREON, IS BASED ON A FILED RUN TOPOGRAPHIC SURVEY LOCATED VISIBLE SURFACE FEATURES PERFORMED BY CHARLES P. JOHNSON AND ASSOCIATED AND COMPLETED ON AUGUST 19, 2013. FOR EXACT LOCATIONS OF EXISTING UNDERGROUND UTILITIES, NOTIFY "MISS UTILITY" AT 1-800-257-7777 AND 811, 72 HOURS BEFORE THE START OF ANY EXCAVATION OR CONSTRUCTION. THE CONSTRUCTION WORKERS AND CONTRACOR(S) ARE ENCOURAGED TO VISIT DOMINION VIRGINIA POWER WEBSITE AT WWW.DOM.COM (KEYWORD SAFETY) FOR ADDITIONAL SAFETY INSTRUCTIONS.
3. LOCATION AND DEPTH OF ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED BY CONTRACTOR PRIOR TO CONSTRUCTION. CONTRACTOR/ENGINEER SHOULD DIG TEST PITS BY HAND AT ALL UTILITY CROSSINGS TO VERIFY EXACT LOCATIONS.
4. A BOUNDARY SURVEY HAS NOT BEEN PERFORMED. PROPERTY LINE INFORMATION SHOWN HEREON IS APPROXIMATE AND BASED ON G.I.S. INFORMATION OBTAINED FROM THE CITY OF ALEXANDRIA. A TITLE REPORT HAS NOT BEEN PROVIDED.
5. PROPERTY OWNERSHIP INFORMATION SHOWN HEREON (SEE PROPERTY OWNERSHIP TABLE) IS BASED ON CURRENT AVAILABLE TAX RECORDS, LAST UPDATED 12/27/2012.

WATERFRONT FLOOD MITIGATION PROJECT

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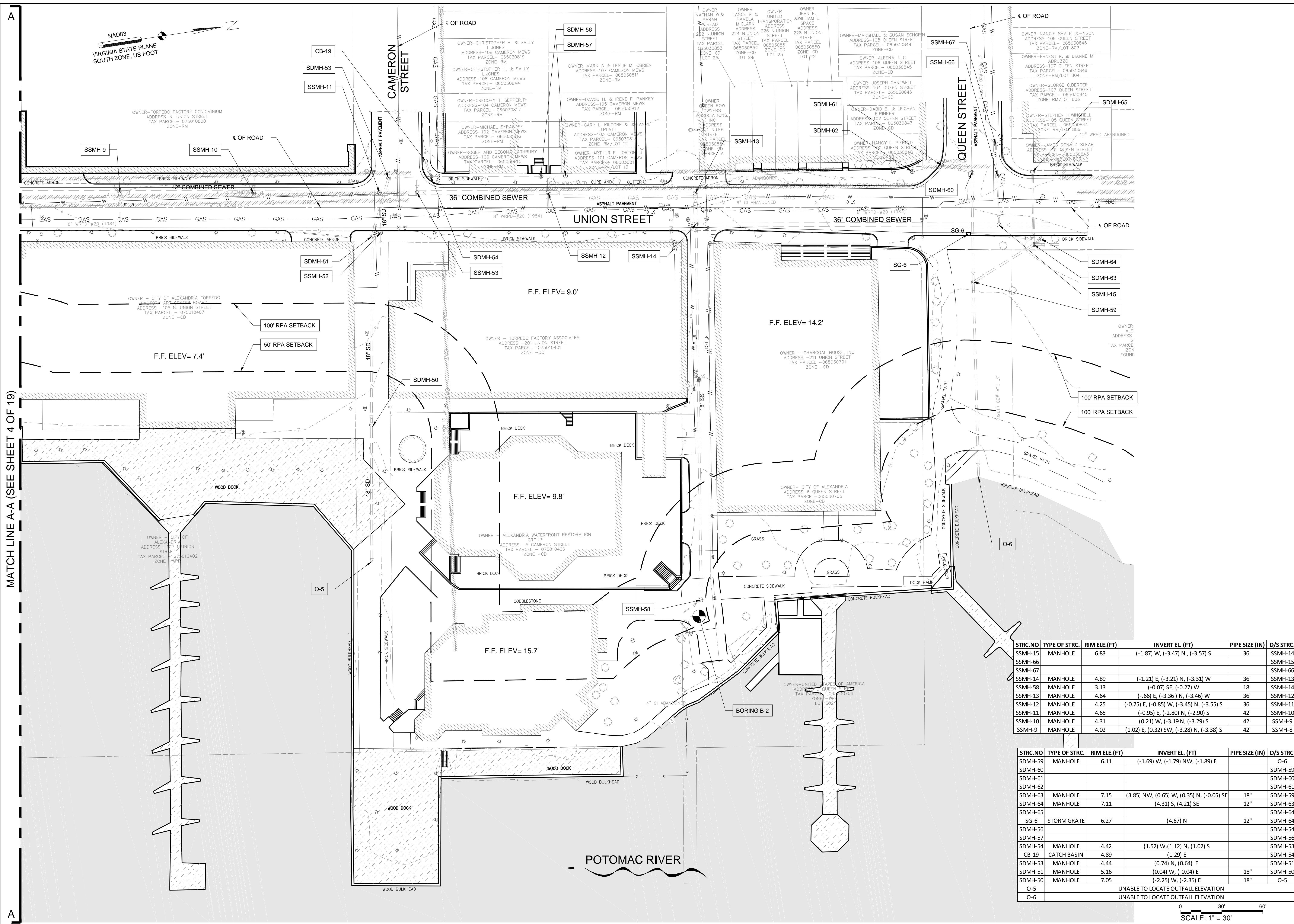
LEGEND, ABBREVIATIONS AND GENERAL NOTES

URS
 12420 MILESTONE CENTER DRIVE, SUITE 150
 GERMANTOWN, MD 20876

| Date: | INITIALS | COMMENTS |
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Scale: Project No. Sheet 2 of 19

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| STRC. NO | TYPE OF STRC. | RIM ELE. (FT) | INVERT EL. (FT) | PIPE SIZE (IN) | D/S STRC. |
|----------|---------------|---------------|--|----------------|-----------|
| SSMH-15 | MANHOLE | 6.83 | (-1.87) W, (-3.47) N, (-3.57) S | 36" | SSMH-14 |
| SSMH-66 | | | | | SSMH-15 |
| SSMH-67 | | | | | SSMH-66 |
| SSMH-14 | MANHOLE | 4.89 | (-1.21) E, (-3.21) N, (-3.31) W | 36" | SSMH-13 |
| SSMH-58 | MANHOLE | 3.13 | (-0.07) SE, (-0.27) W | 18" | SSMH-14 |
| SSMH-13 | MANHOLE | 4.64 | (-.66) E, (-3.36) N, (-3.46) W | 36" | SSMH-12 |
| SSMH-12 | MANHOLE | 4.25 | (-0.75) E, (-0.85) W, (-3.45) N, (-3.55) S | 36" | SSMH-11 |
| SSMH-11 | MANHOLE | 4.65 | (-0.95) E, (-2.80) N, (-2.90) S | 42" | SSMH-10 |
| SSMH-10 | MANHOLE | 4.31 | (0.21) W, (-3.19) N, (-3.29) S | 42" | SSMH-9 |
| SSMH-9 | MANHOLE | 4.02 | (1.02) E, (0.32) SW, (-3.28) N, (-3.38) S | 42" | SSMH-8 |

| STRC. NO | TYPE OF STRC. | RIM ELE. (FT) | INVERT EL. (FT) | PIPE SIZE (IN) | D/S STRC. |
|----------|------------------------------------|---------------|---|----------------|-----------|
| SDMH-59 | MANHOLE | 6.11 | (-1.69) W, (-1.79) NW, (-1.89) E | | O-6 |
| SDMH-60 | | | | | SDMH-59 |
| SDMH-61 | | | | | SDMH-60 |
| SDMH-62 | | | | | SDMH-61 |
| SDMH-63 | MANHOLE | 7.15 | (3.85) NW, (0.65) W, (0.35) N, (-0.05) SE | 18" | SDMH-59 |
| SDMH-64 | MANHOLE | 7.11 | (4.31) S, (4.21) SE | 12" | SDMH-63 |
| SDMH-65 | | | | | SDMH-64 |
| SG-6 | STORM GRATE | 6.27 | (4.67) N | 12" | SDMH-64 |
| SDMH-56 | | | | | SDMH-54 |
| SDMH-57 | | | | | SDMH-56 |
| SDMH-54 | MANHOLE | 4.42 | (1.52) W, (1.12) N, (1.02) S | | SDMH-53 |
| CB-19 | CATCH BASIN | 4.89 | (1.29) E | | SDMH-54 |
| SDMH-53 | MANHOLE | 4.44 | (0.74) N, (0.64) E | | SDMH-51 |
| SDMH-51 | MANHOLE | 5.16 | (0.04) W, (-0.04) E | 18" | SDMH-50 |
| SDMH-50 | MANHOLE | 7.05 | (-2.25) W, (-2.35) E | 18" | O-5 |
| O-5 | UNABLE TO LOCATE OUTFALL ELEVATION | | | | |
| O-6 | UNABLE TO LOCATE OUTFALL ELEVATION | | | | |

SCALE: 1" = 30'

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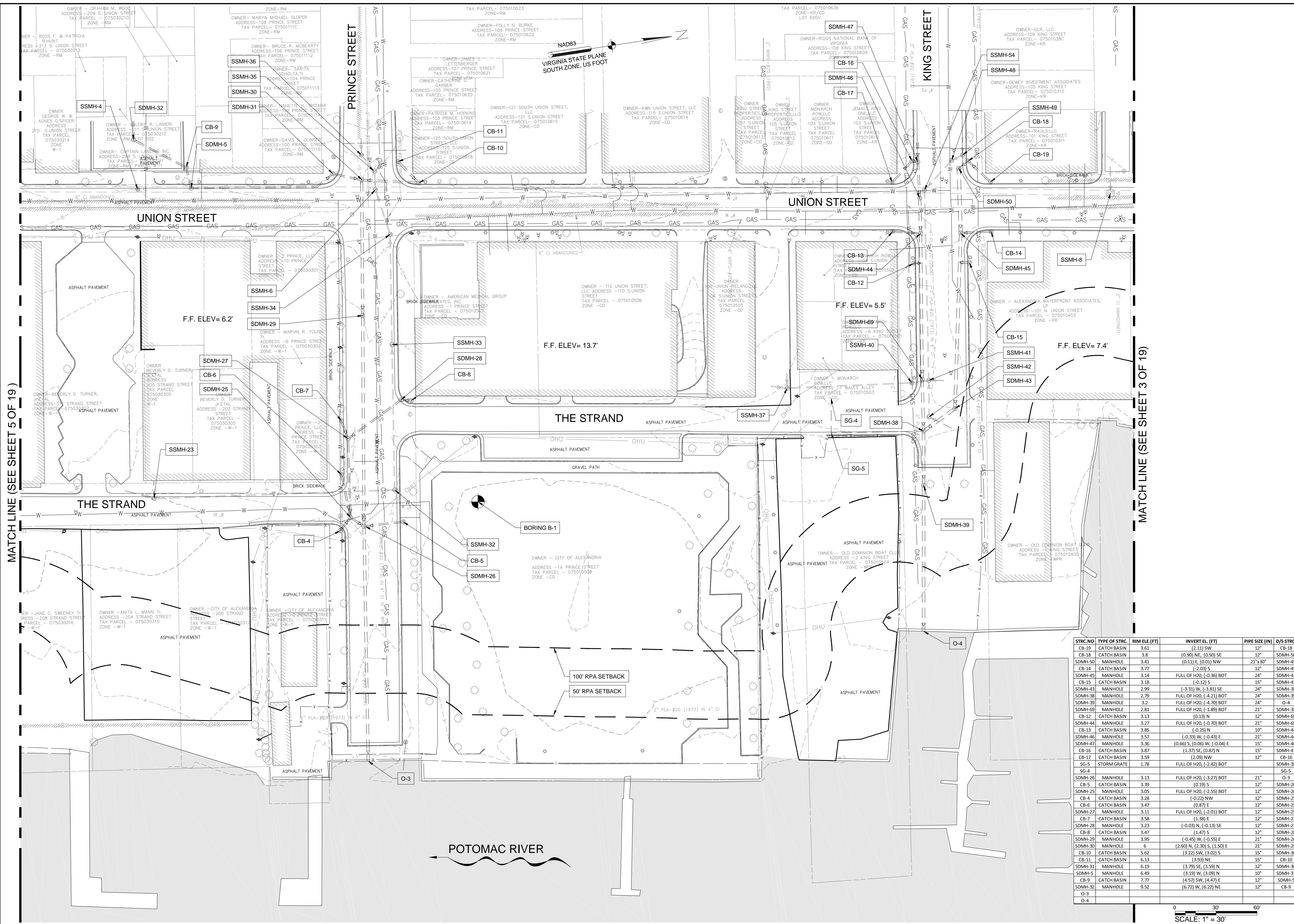
EXISTING CONDITIONS PLAN

12420 MILESTONE CENTER DRIVE, SUITE 150
 GERMANTOWN, MD 20876

| REVISIONS | INITIALS | COMMENTS |
|-----------|----------|----------|
| | | |

Date: _____

Scale: 1" = 30' Project No. _____



| STRUC. NO. | TYPE OF STRUC. | RIM ELE. (FT) | INVERT EL. (FT) | PIPE SIZE (IN) | D/S STRUC. |
|------------|----------------|---------------|-------------------------------|----------------|------------|
| CB-19 | CATCH BASIN | 3.61 | (2.11) SW | 12" | CB-18 |
| CB-18 | CATCH BASIN | 3.8 | (0.90) NE, (0.50) SE | 12" | SDMH-50 |
| SDMH-50 | MANHOLE | 3.41 | (0.11) E, (0.01) NW | 21"x30" | SDMH-45 |
| CB-14 | CATCH BASIN | 3.77 | (-2.03) S | 12" | SDMH-43 |
| SDMH-45 | MANHOLE | 3.14 | FULL OF H2O, (-0.36) BOT | 24" | SDMH-43 |
| CB-15 | CATCH BASIN | 3.18 | (-0.12) S | 15" | SDMH-43 |
| SDMH-43 | MANHOLE | 2.99 | (-3.31) W, (-3.81) SE | 24" | SDMH-38 |
| SDMH-38 | MANHOLE | 2.79 | FULL OF H2O, (-4.21) BOT | 24" | SDMH-39 |
| SDMH-39 | MANHOLE | 3.2 | FULL OF H2O, (-4.70) BOT | 24" | O-4 |
| SDMH-69 | MANHOLE | 2.81 | FULL OF H2O, (-1.89) BOT | 21" | SDMH-38 |
| CB-12 | CATCH BASIN | 3.13 | (0.13) N | 12" | SDMH-69 |
| SDMH-44 | MANHOLE | 3.27 | FULL OF H2O, (-0.70) BOT | 21" | SDMH-69 |
| CB-13 | CATCH BASIN | 3.85 | (-0.25) N | 10" | SDMH-44 |
| SDMH-46 | MANHOLE | 3.57 | (-0.33) W, (-0.43) E | 21" | SDMH-44 |
| SDMH-47 | MANHOLE | 3.36 | (0.66) S, (0.06) W, (-0.04) E | 15" | SDMH-46 |
| CB-16 | CATCH BASIN | 3.87 | (1.37) SE, (0.87) N | 15" | SDMH-47 |
| CB-17 | CATCH BASIN | 3.59 | (2.09) NW | 12" | CB-16 |
| SG-4 | STORM GRATE | 1.78 | FULL OF H2O, (-2.42) BOT | | SDMH-38 |
| SDMH-26 | MANHOLE | 3.13 | FULL OF H2O, (-3.27) BOT | 21" | O-3 |
| CB-5 | CATCH BASIN | 3.39 | (0.19) S | 12" | SDMH-26 |
| SDMH-25 | MANHOLE | 3.05 | FULL OF H2O, (-2.55) BOT | 12" | SDMH-26 |
| CB-4 | CATCH BASIN | 3.28 | (-0.22) NW | 12" | SDMH-25 |
| CB-6 | CATCH BASIN | 3.47 | (0.87) E | 12" | SDMH-25 |
| SDMH-27 | MANHOLE | 3.11 | FULL OF H2O, (-2.01) BOT | 12" | SDMH-25 |
| CB-7 | CATCH BASIN | 3.58 | (1.38) E | 12" | SDMH-27 |
| SDMH-28 | MANHOLE | 3.23 | (-0.03) N, (-0.13) SE | 12" | SDMH-27 |
| CB-8 | CATCH BASIN | 3.47 | (1.47) S | 12" | SDMH-28 |
| SDMH-29 | MANHOLE | 3.95 | (-0.45) W, (-0.55) E | 21" | SDMH-26 |
| SDMH-30 | MANHOLE | 6 | (2.60) N, (2.30) S, (1.50) E | 21" | SDMH-29 |
| CB-10 | CATCH BASIN | 5.62 | (3.22) SW, (3.02) S | 15" | SDMH-30 |
| CB-11 | CATCH BASIN | 6.13 | (3.93) NE | 15" | CB-10 |
| SDMH-31 | MANHOLE | 6.19 | (3.79) SE, (3.59) N | 12" | SDMH-30 |
| SDMH-5 | MANHOLE | 6.49 | (3.19) W, (3.09) N | 10" | SDMH-31 |
| CB-9 | CATCH BASIN | 7.77 | (4.57) SW, (4.47) E | 12" | SDMH-5 |
| SDMH-32 | MANHOLE | 9.52 | (6.72) W, (6.22) NE | 12" | CB-9 |
| O-3 | | | | | |
| O-4 | | | | | |

SCALE: 1" = 30'

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WATERFRONT FLOOD MITIGATION PROJECT

URS
 12420 MILESTONE CENTER DRIVE, SUITE 150
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EXISTING CONDITIONS PLAN

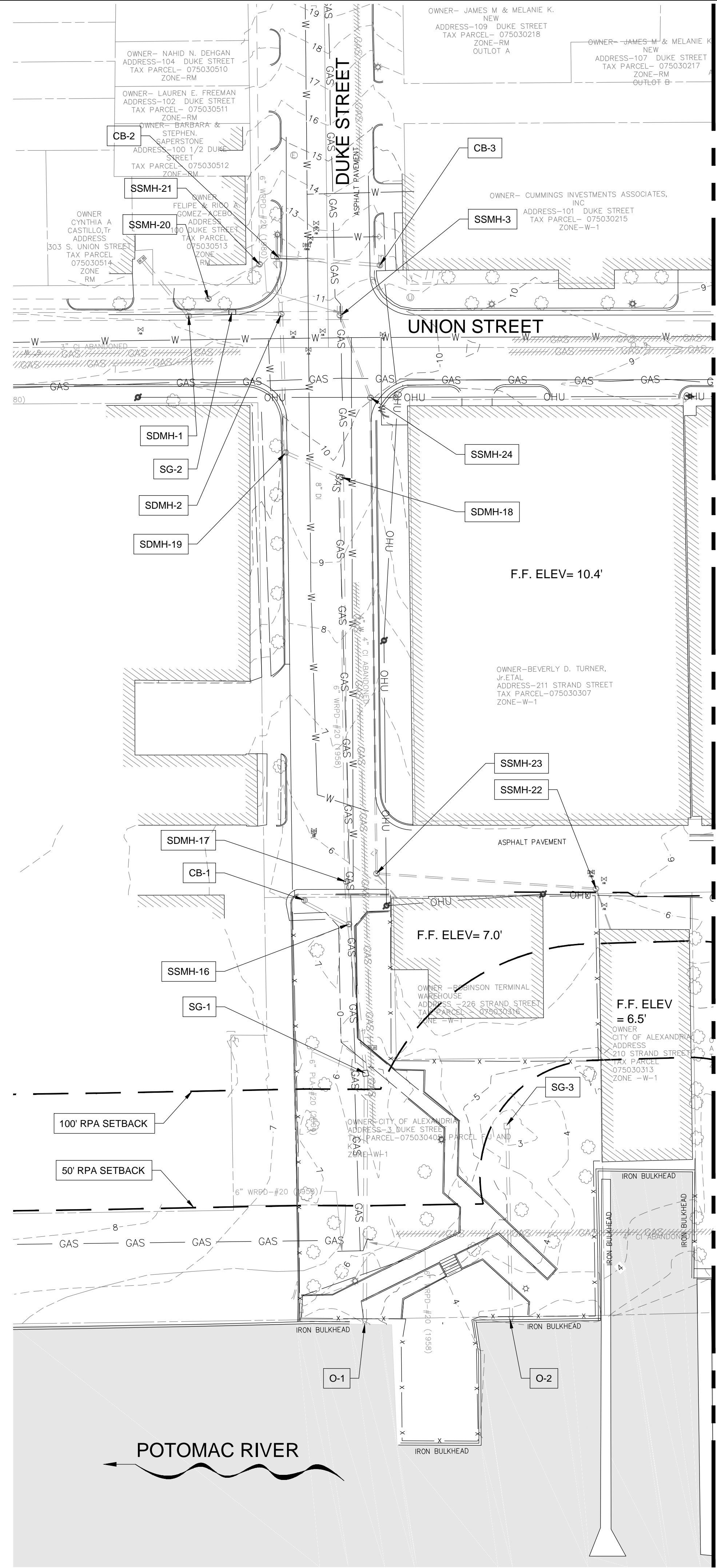
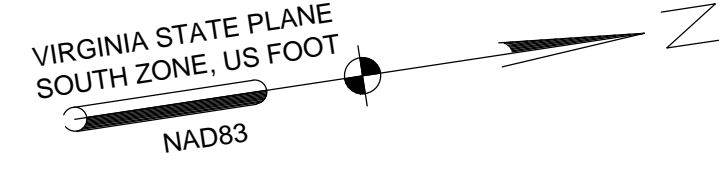
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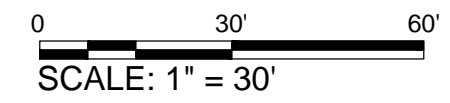
Scale: 1" = 30' Project No. Sheet 4 of 19

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MATCH LINE (SEE SHEET 4 OF 19)

| STRUC.NO | TYPE OF STRC. | RIM ELE.(FT) | INVERT EL. (FT) | PIPE SIZE (IN) | D/S STRC. |
|----------|---------------|--------------|-------------------------------|----------------|-----------|
| SG-1 | STORM GRATE | 4.52 | (0.72) W, (0.62) E | 18" | O-1 |
| SG-2 | STORM GRATE | 10.82 | (5.82) S, (5.72) N | 15" | SDMH-2 |
| SG-3 | STORM GRATE | 2.49 | (0.09) E | 15" | O-2 |
| SDMH-1 | MANHOLE | 11.04 | (6.14) W, (6.04) N | 15" | SG-2 |
| SDMH-2 | MANHOLE | 11.27 | (5.37) S, (5.32) W, (5.22) E | 15" | SDMH-19 |
| SDMH-16 | MANHOLE | 6.81 | (1.11) SW, (1.01) W, (0.91) E | 15" | SG-1 |
| SDMH-17 | MANHOLE | 6.01 | (1.51) W, (1.41) E | 15" | SDMH-16 |
| SDMH-18 | MANHOLE | 10.01 | (4.21) S, (4.11) E | 15" | SDMH-17 |
| SDMH-19 | MANHOLE | 9.71 | (5.01) W, (4.91) NE | 15" | SDMH-18 |
| CB-1 | CATCH BASIN | 6.35 | (1.35) NE | 15" | SDMH-16 |
| CB-2 | CATCH BASIN | 12.46 | (6.96) N, (6.26) W, (6.16) E | 15" | SDMH-2 |
| CB-3 | CATCH BASIN | 11.97 | (9.87) W, (8.97) S | 12" | CB-2 |
| O-1 | | | NOT AVAILABLE | | |
| O-2 | | | NOT AVAILABLE | | |



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EXISTING CONDITIONS PLAN

URS
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 GERMANTOWN, MD 20876

Date: _____
 REVISIONS INITIALS COMMENTS

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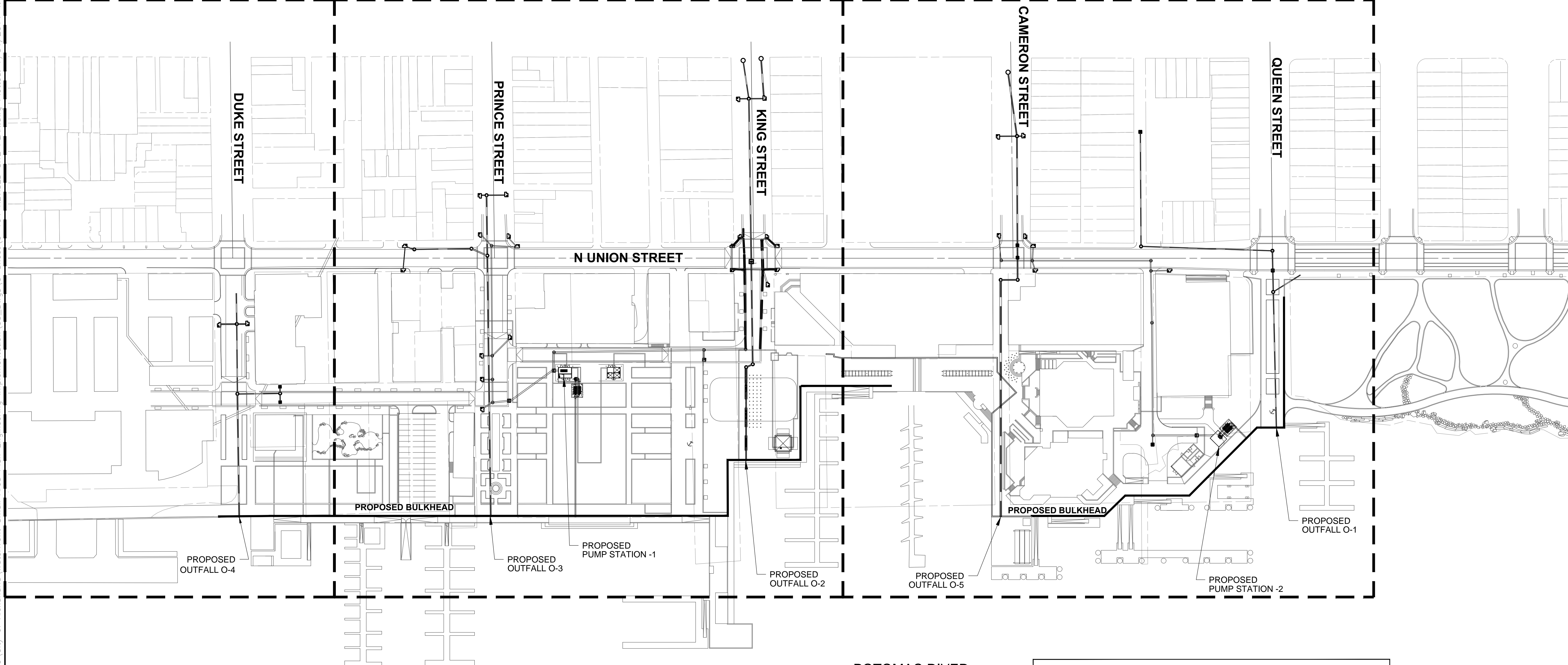
Sheet 5 of 19

NAD83
 VIRGINIA STATE PLANE
 SOUTH ZONE, US FOOT

SEE SHEET 13

SEE SHEET 12

SEE SHEET 11



POTOMAC RIVER

NOTE:
 THE PROPOSED SITE PLAN PROVIDED BY OLIN STUDIO DATED 07/22/2014

0 80' 160'
 SCALE: 1" = 80'

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**OVERALL PROPOSED
 FLOOD MITIGATION**

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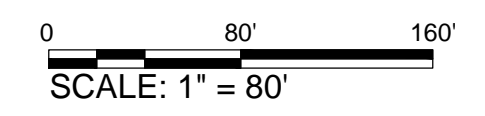
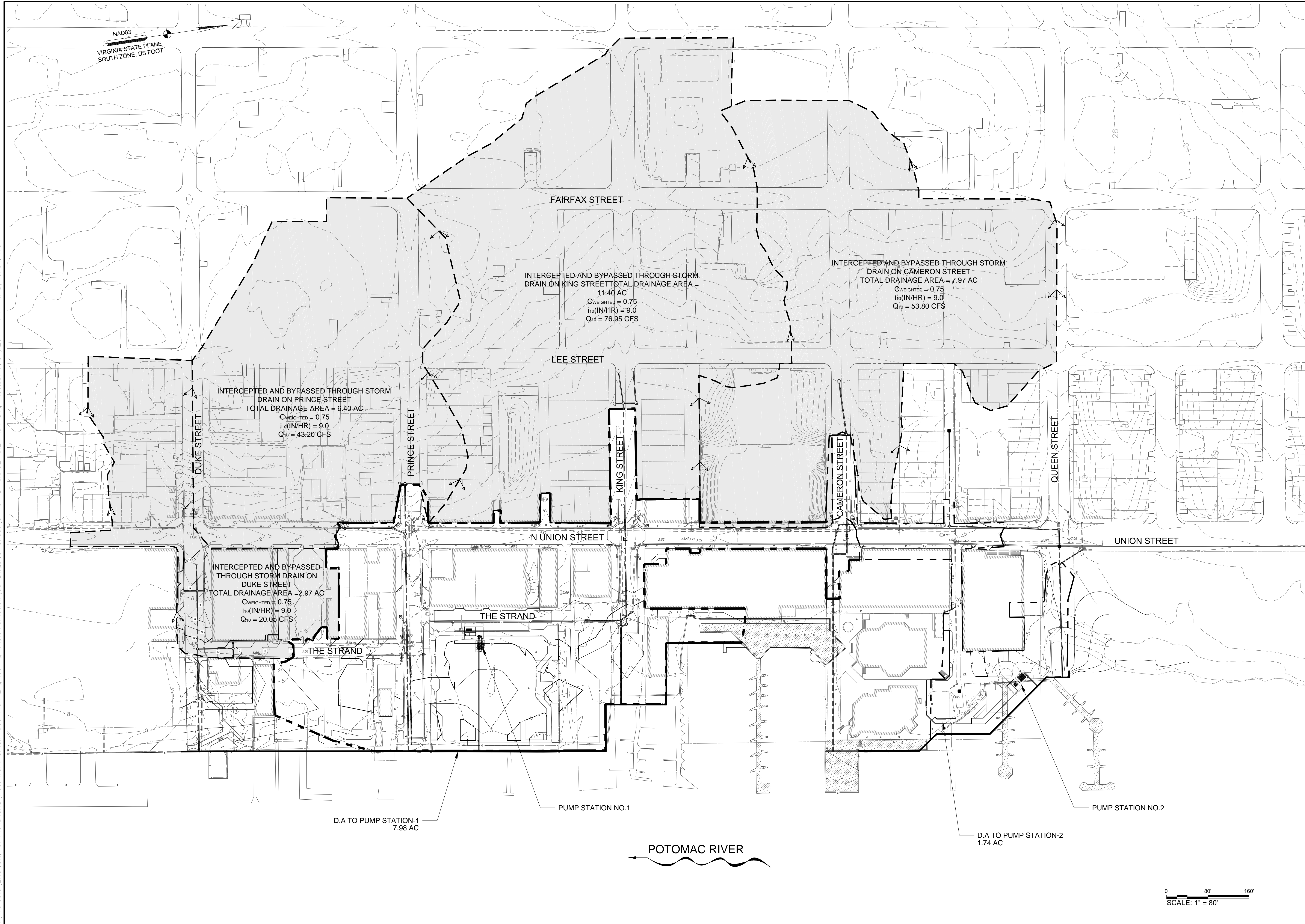
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Scale: 1" = 80' Project No.

Sheet 6 of 19

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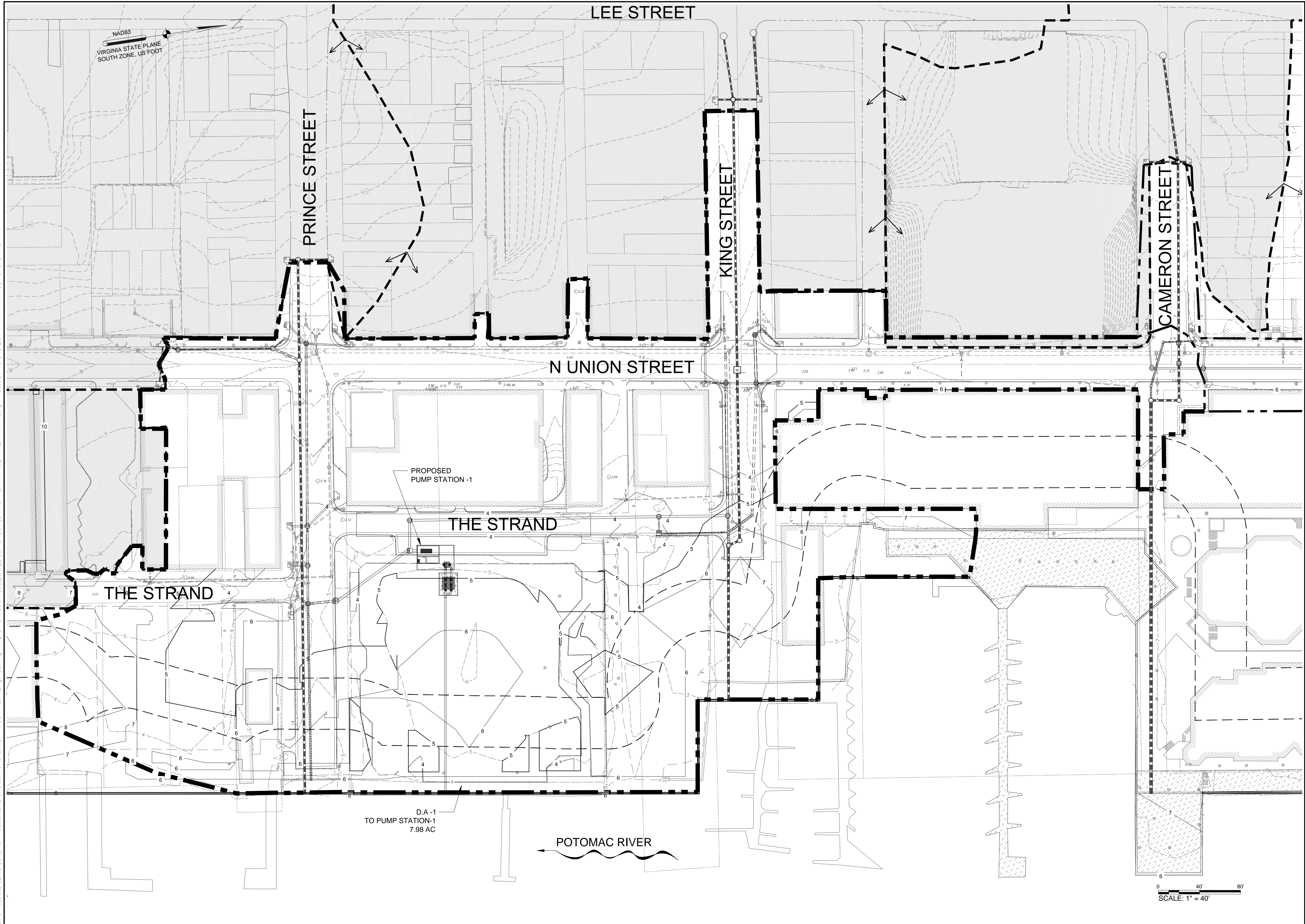
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DRAINAGE AREA MAP

| | |
|---|-------------|
| Date: | REVISIONS |
| | INITIALS |
| COMMENTS | |
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| Scale: 1" = 80' | Project No. |
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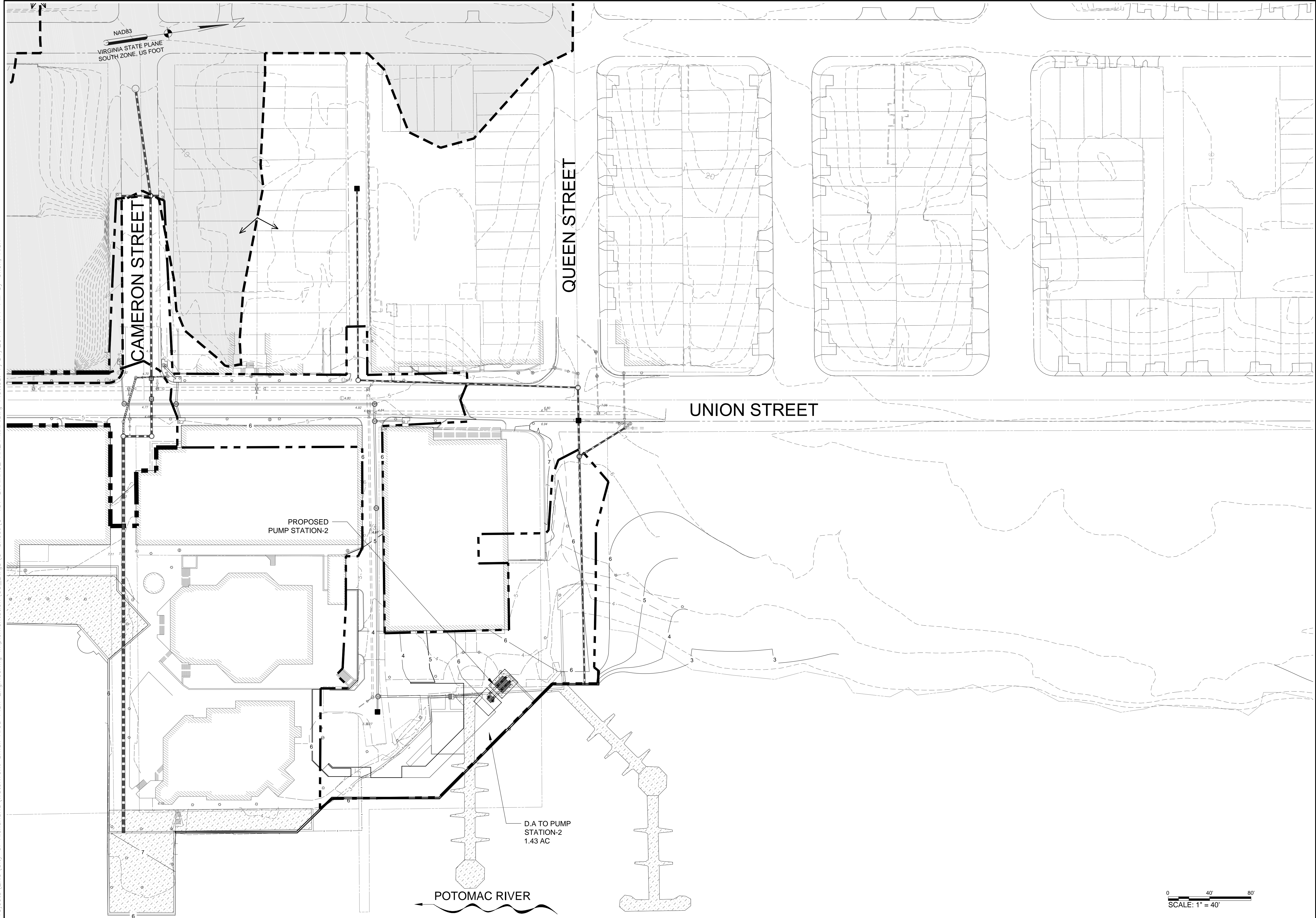
DRAINAGE AREA TO PUMP STATION -1

URS
 12420 MILESTONE CENTER DRIVE, SUITE 150
 GERMANTOWN, MD 20876

Date: _____
 REVISIONS INITIALS COMMENTS

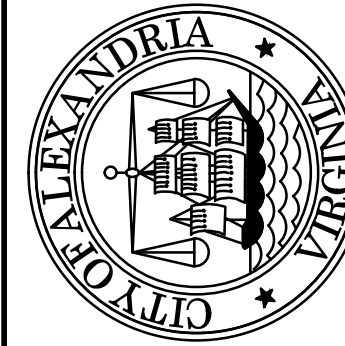
Scale: 1" = 40' Project No. _____

C:\Projects\ENG\City of Alexandria\Waterfront Small Area Plan Engineering Implementation\05_Dwgs\C-Sheet\C-107 DRAINAGE AREA MAP.dwg Plotted: 7/31/2014 4:17 PM by Chen, Alan



WATERFRONT FLOOD MITIGATION PROJECT

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DRAINAGE AREA TO PUMP STATION -2



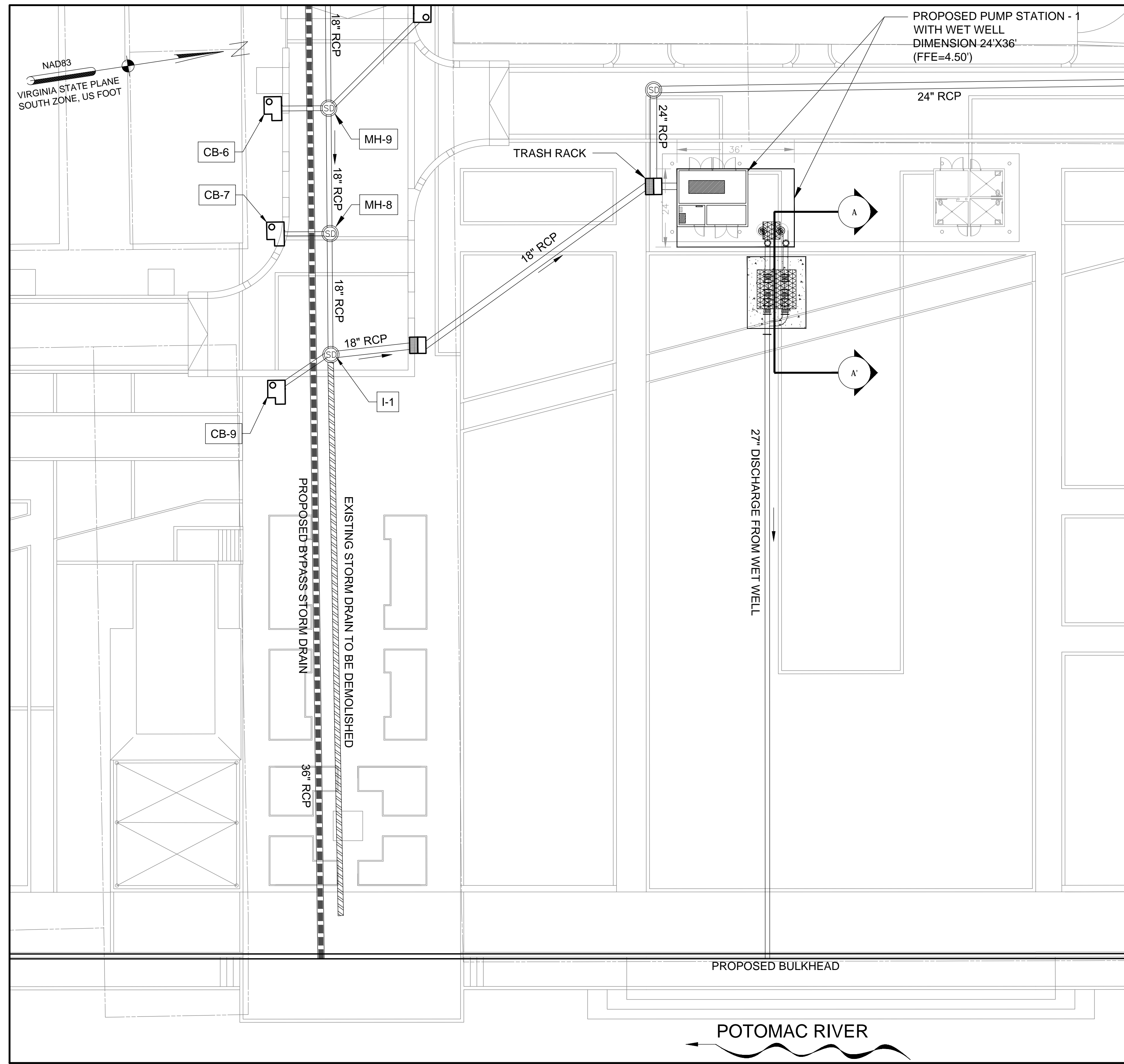
12420 MILESTONE CENTER DRIVE, SUITE 150
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| REVISIONS | COMMENTS |
|-----------|----------|
| Date: | |
| INITIALS | |

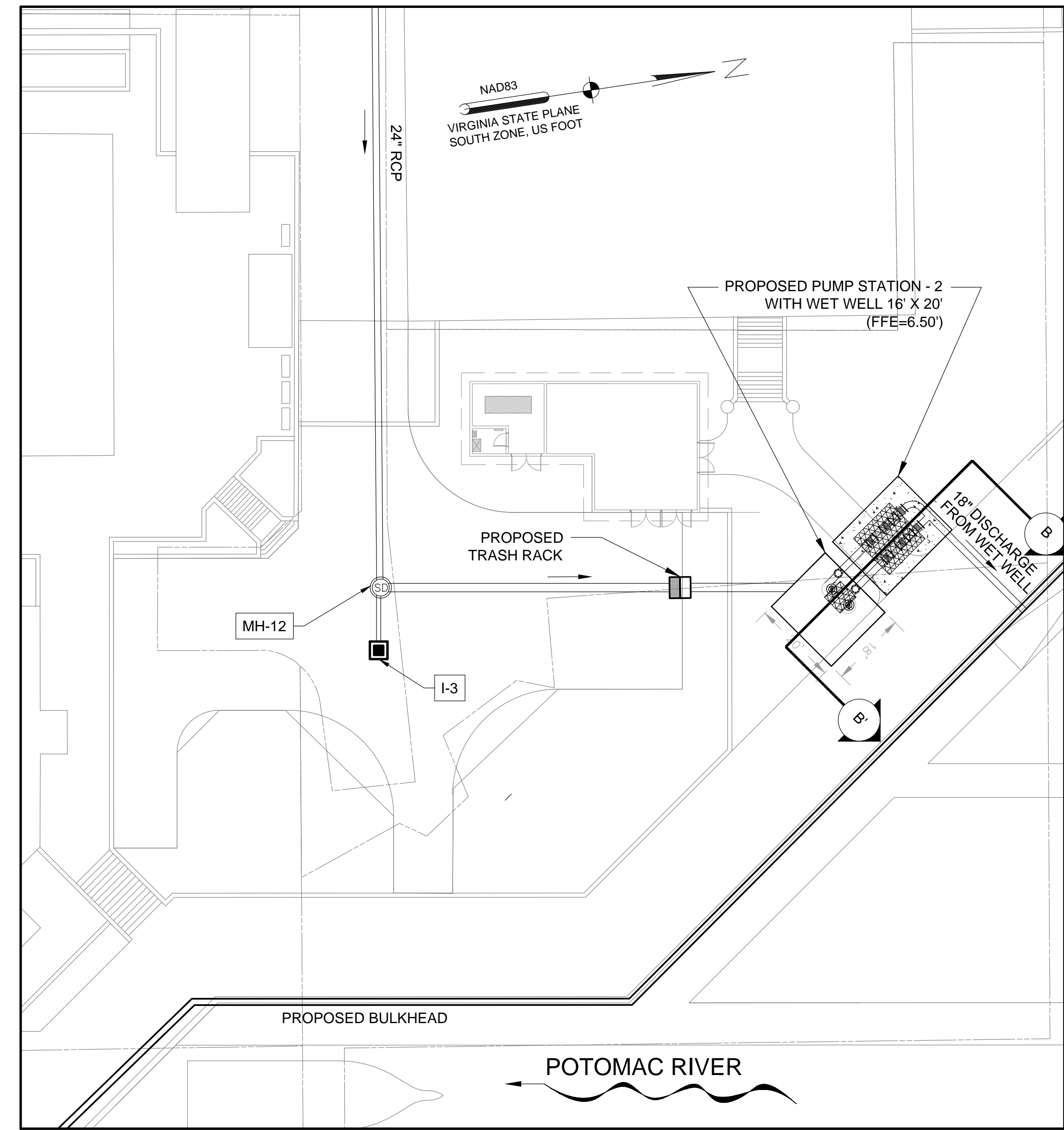
Scale: 1" = 40' Project No.

Sheet 9 of 19

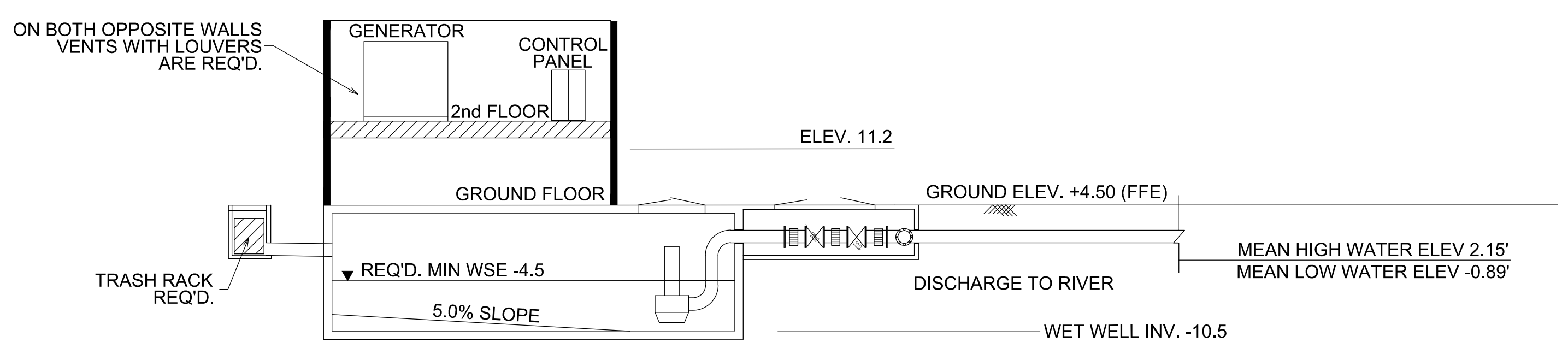
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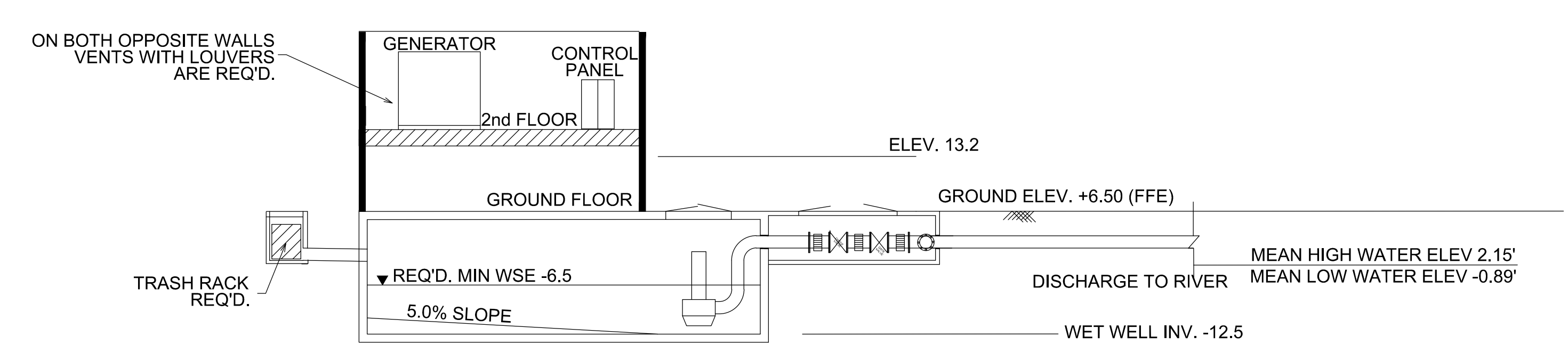
1 PUMP STATION - 1
SCALE: 1" = 20'



2 PUMP STATION - 2
SCALE: 1" = 20'



3 PROPOSED PUMP STATION-1 SECTION A-A
SCALE: N.T.S.



4 PROPOSED PUMP STATION -2 SECTION B-B
SCALE: N.T.S.

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PUMP STATION LAYOUT

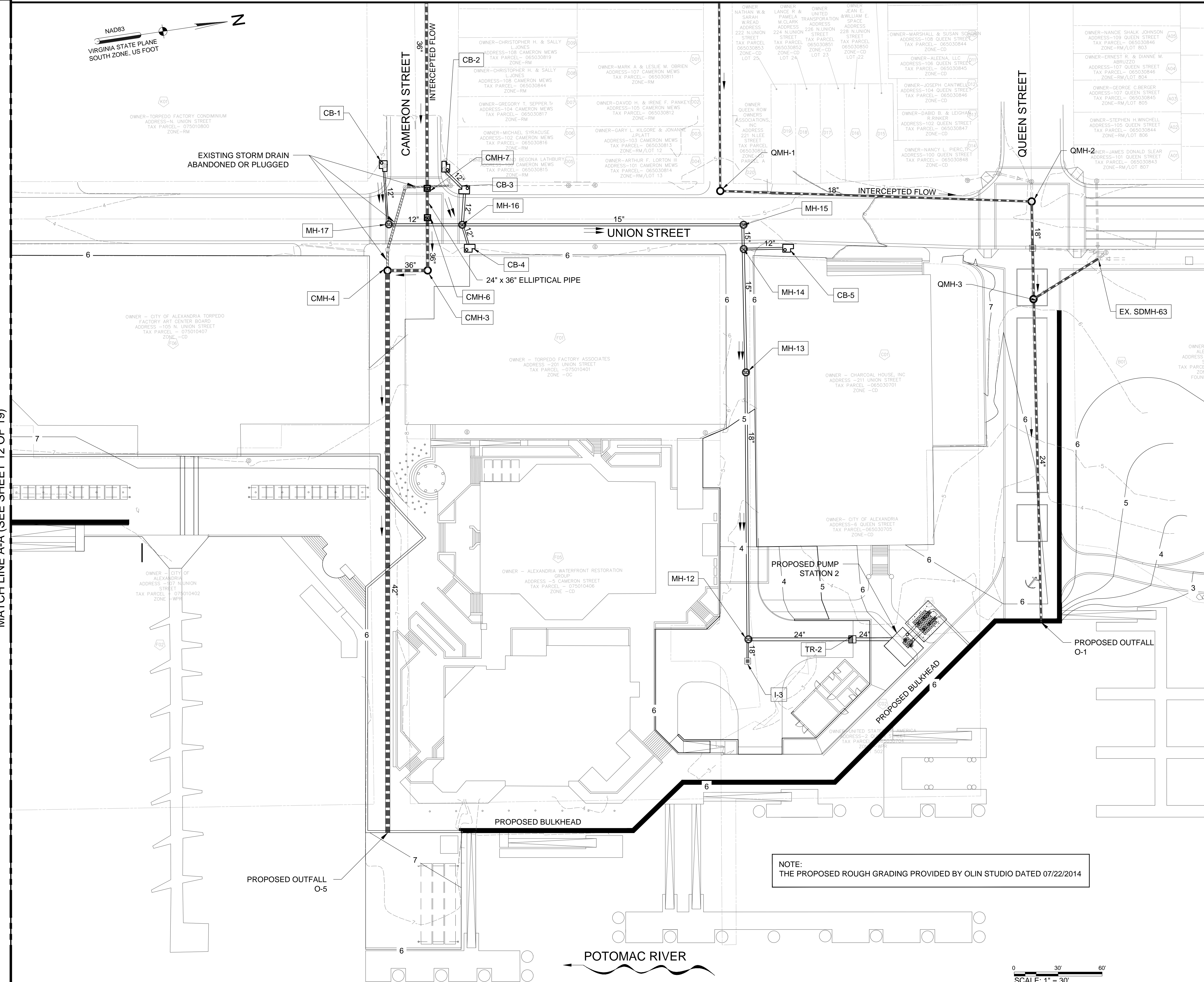
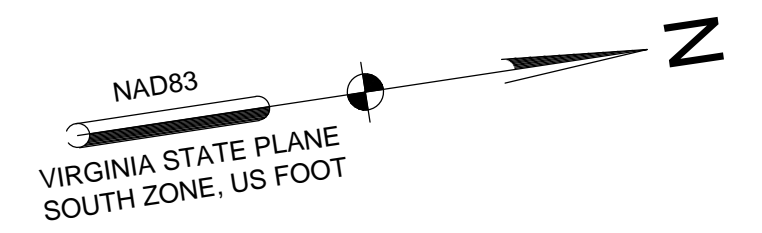
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| REVISIONS | INITIALS | COMMENTS |
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MATCH LINE A-A (SEE SHEET 12 OF 19)



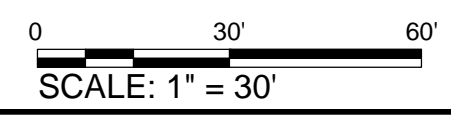
EXISTING STORM DRAIN
ABANDONED OR PLUGGED

INTERCEPTED FLOW

INTERCEPTED FLOW

PROPOSED BULKHEAD

NOTE:
THE PROPOSED ROUGH GRADING PROVIDED BY OLIN STUDIO DATED 07/22/2014



LEGEND:

- QMH-4 PROPOSED MANHOLE STRUCTURE ON QUEEN STREET
- QA-1 PROPOSED INLET STRUCTURE ON QUEEN STREET
- CMH-1 PROPOSED MANHOLE STRUCTURE ON CAMERON STREET
- CA-1 PROPOSED INLET STRUCTURE ON CAMERON STREET
- I-1 PROPOSED INLET TO PUMP STATION
- MH-1 PROPOSED MANHOLE TO PUMP STATION

WATERFRONT FLOOD MITIGATION PROJECT

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ROUGH GRADING
AND
STORM DRAIN PLAN

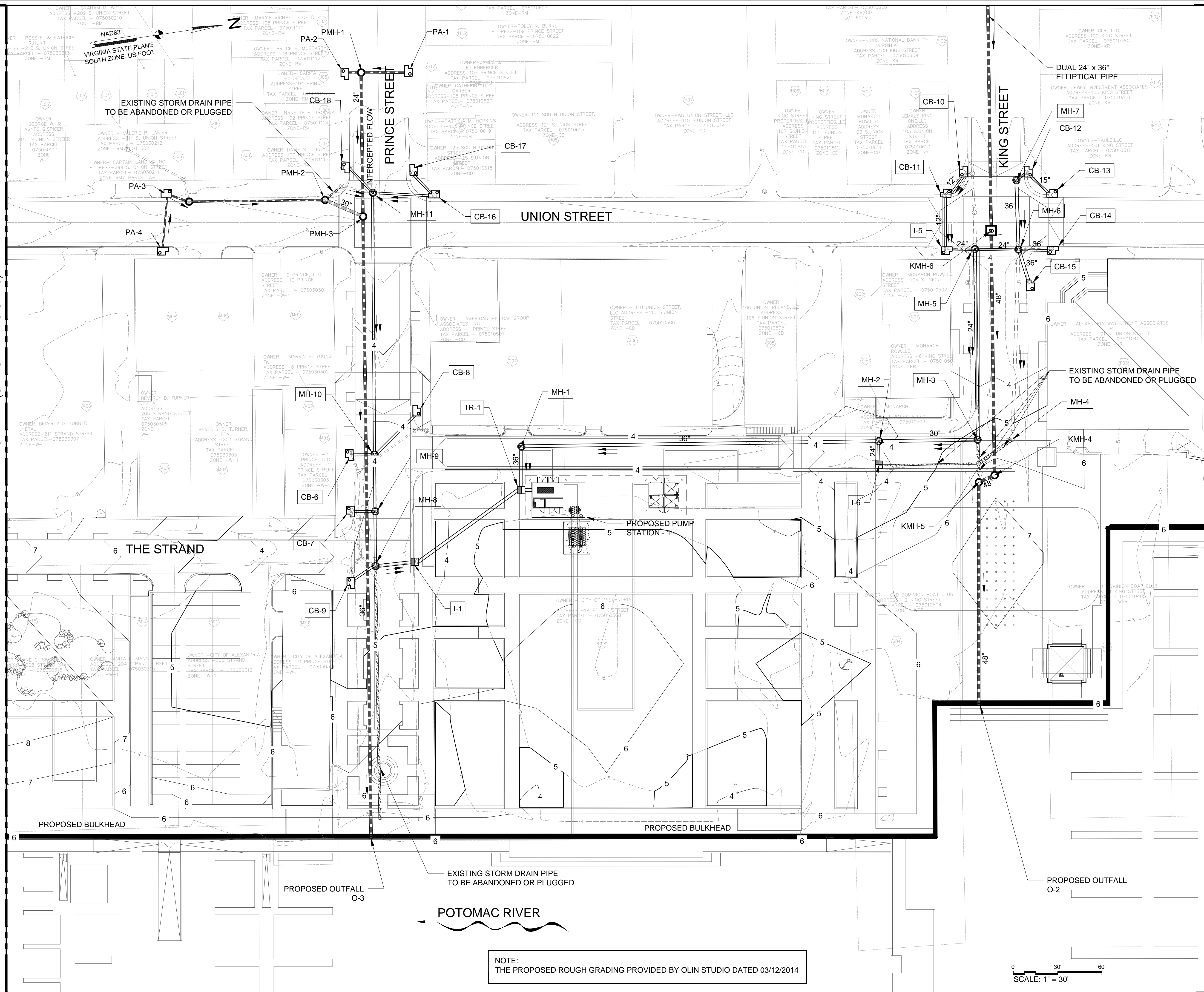


Scale: Project No.

| REVISIONS | COMMENTS |
|-----------|----------|
| Date: | INITIALS |

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MATCH LINE (SEE SHEET 13 OF 19)



MATCH LINE (SEE SHEET 11 OF 19)

- LEGEND:
- KMH-4 PROPOSED MANHOLE STRUCTURE ON KING STREET
 - KA-1 PROPOSED INLET STRUCTURE ON KING STREET
 - PMH-1 PROPOSED MANHOLE STRUCTURE ON PRINCE STREET
 - PA-1 PROPOSED INLET STRUCTURE ON PRINCE STREET
 - I-1 PROPOSED INLET TO PUMP STATION
 - MH-1 PROPOSED MANHOLE TO PUMP STATION

NOTE:
THE PROPOSED ROUGH GRADING PROVIDED BY OLIN STUDIO DATED 03/12/2014

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WATERFRONT FLOOD MITIGATION PROJECT



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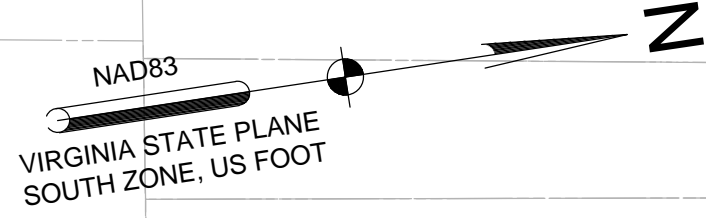
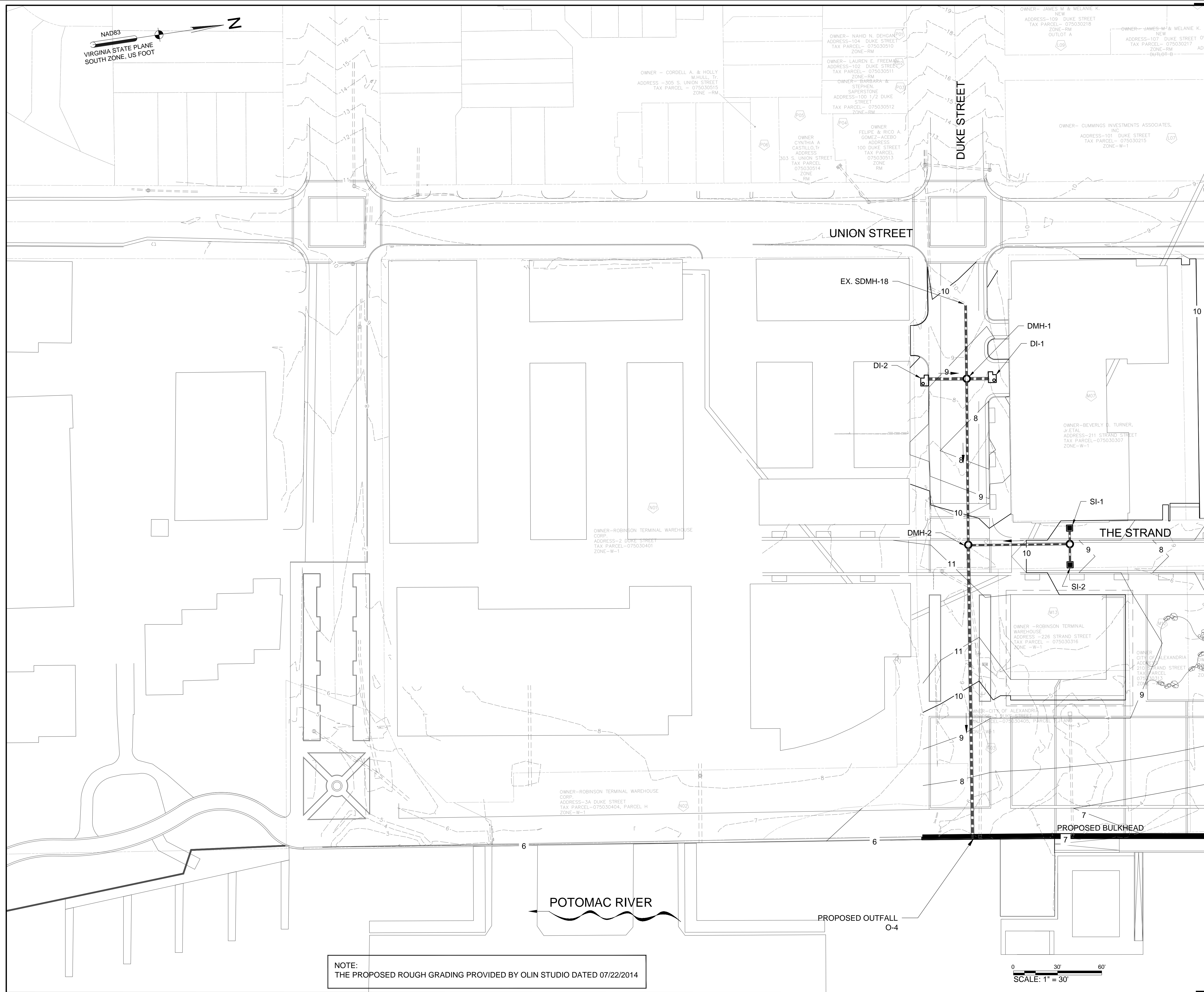
**ROUGH GRADING
AND
STORM DRAIN PLAN**

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 GERMANTOWN, MD 20876

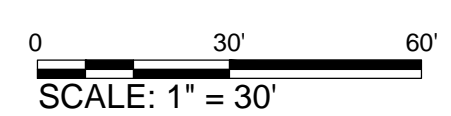
| REVISIONS | INITIALS | COMMENTS |
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Scale: Project No. Sheet 12 of 19

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NOTE:
THE PROPOSED ROUGH GRADING PROVIDED BY OLIN STUDIO DATED 07/22/2014



MATCH LINE A-A (SEE SHEET 12 OF 19)

- LEGEND:
- DMH-4 PROPOSED MANHOLE STRUCTURE ON DUKE STREET
 - DA-1 PROPOSED INLET STRUCTURE ON DUKE STREET
 - SMH-1 PROPOSED MANHOLE STRUCTURE ON STRAND STREET
 - SA-1 PROPOSED INLET STRUCTURE ON STRAND STREET
 - I-1 PROPOSED INLET TO PUMP STATION
 - MH-1 PROPOSED MANHOLE TO PUMP STATION

WATERFRONT FLOOD MITIGATION PROJECT

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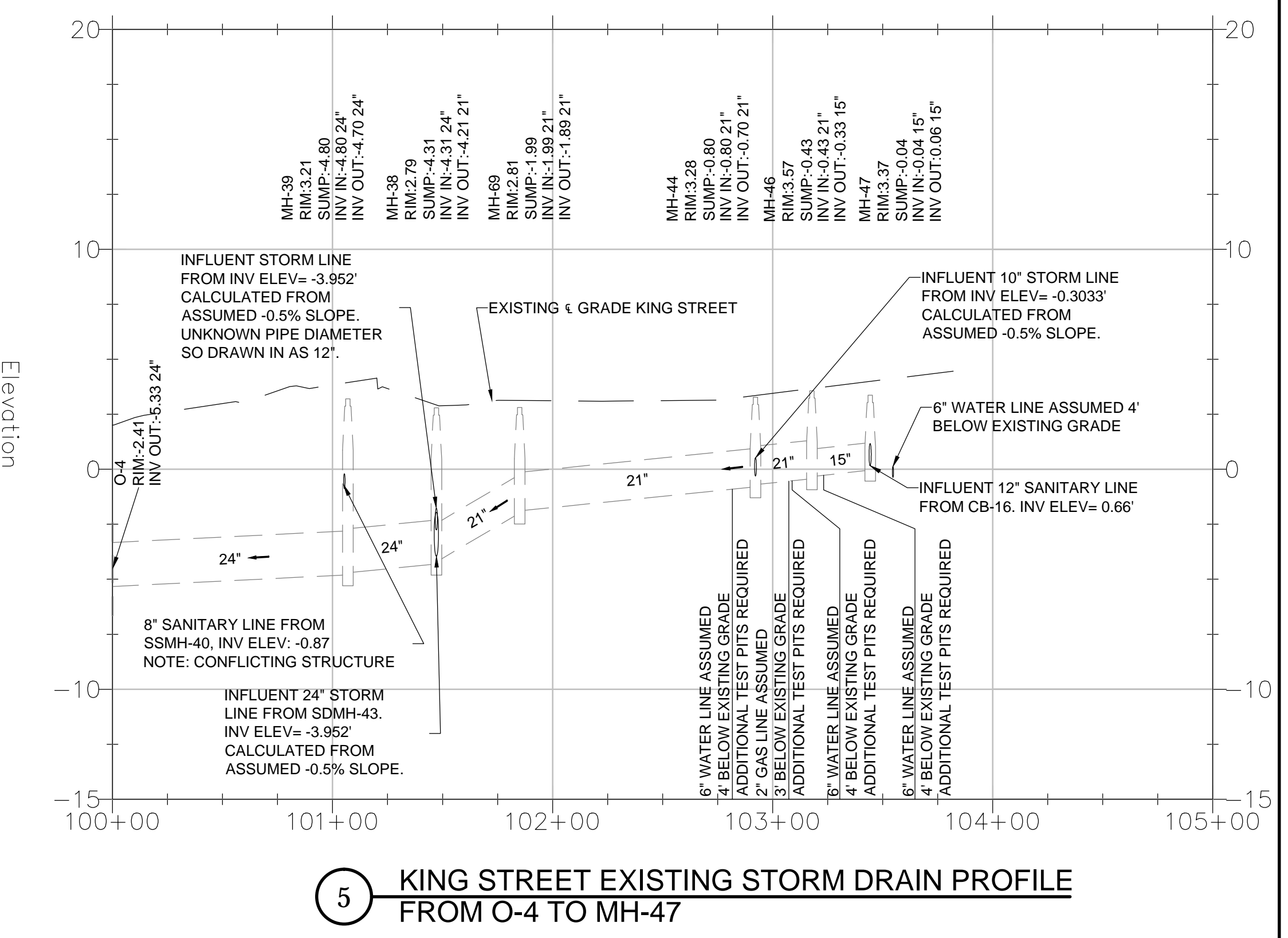
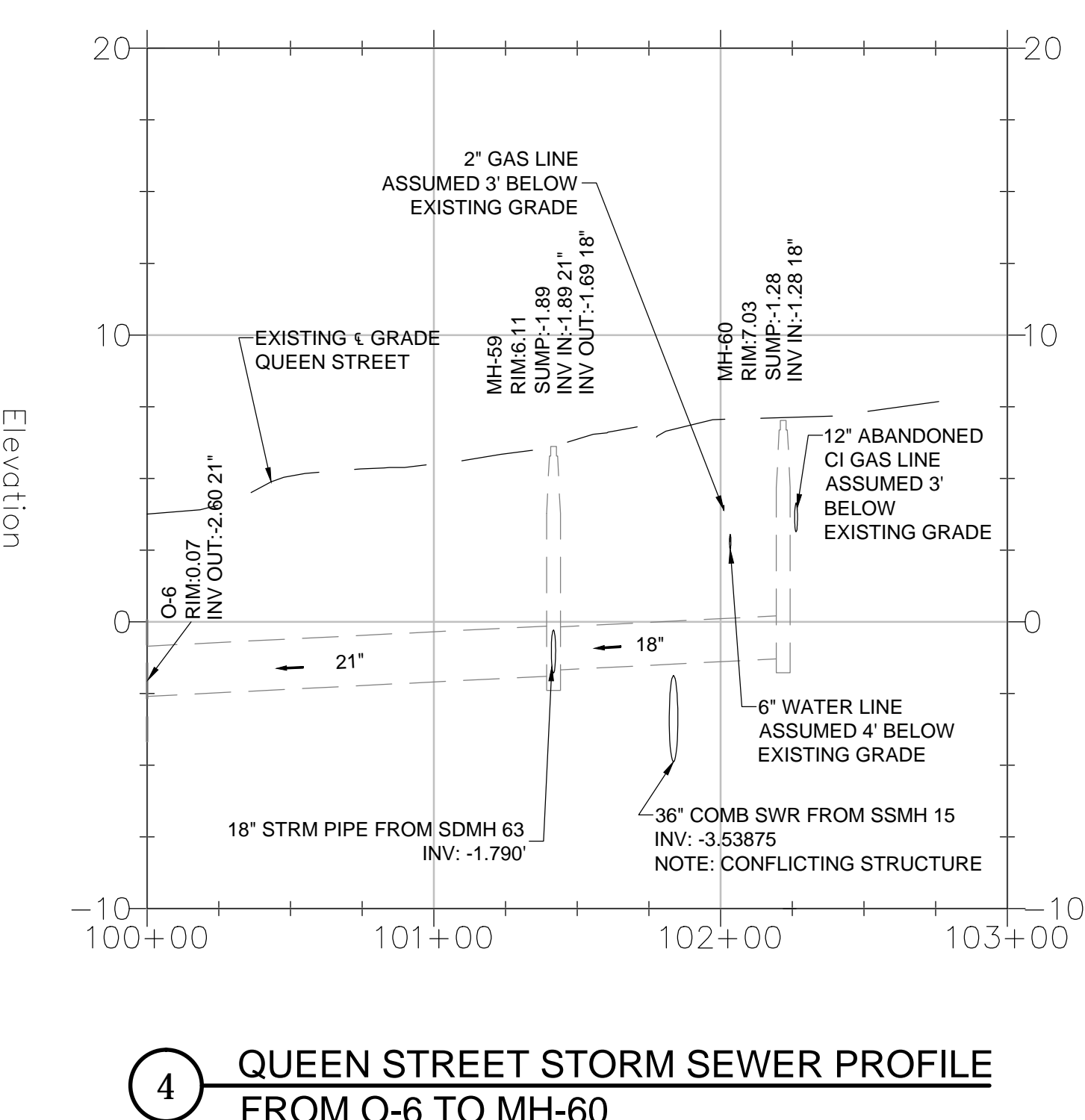
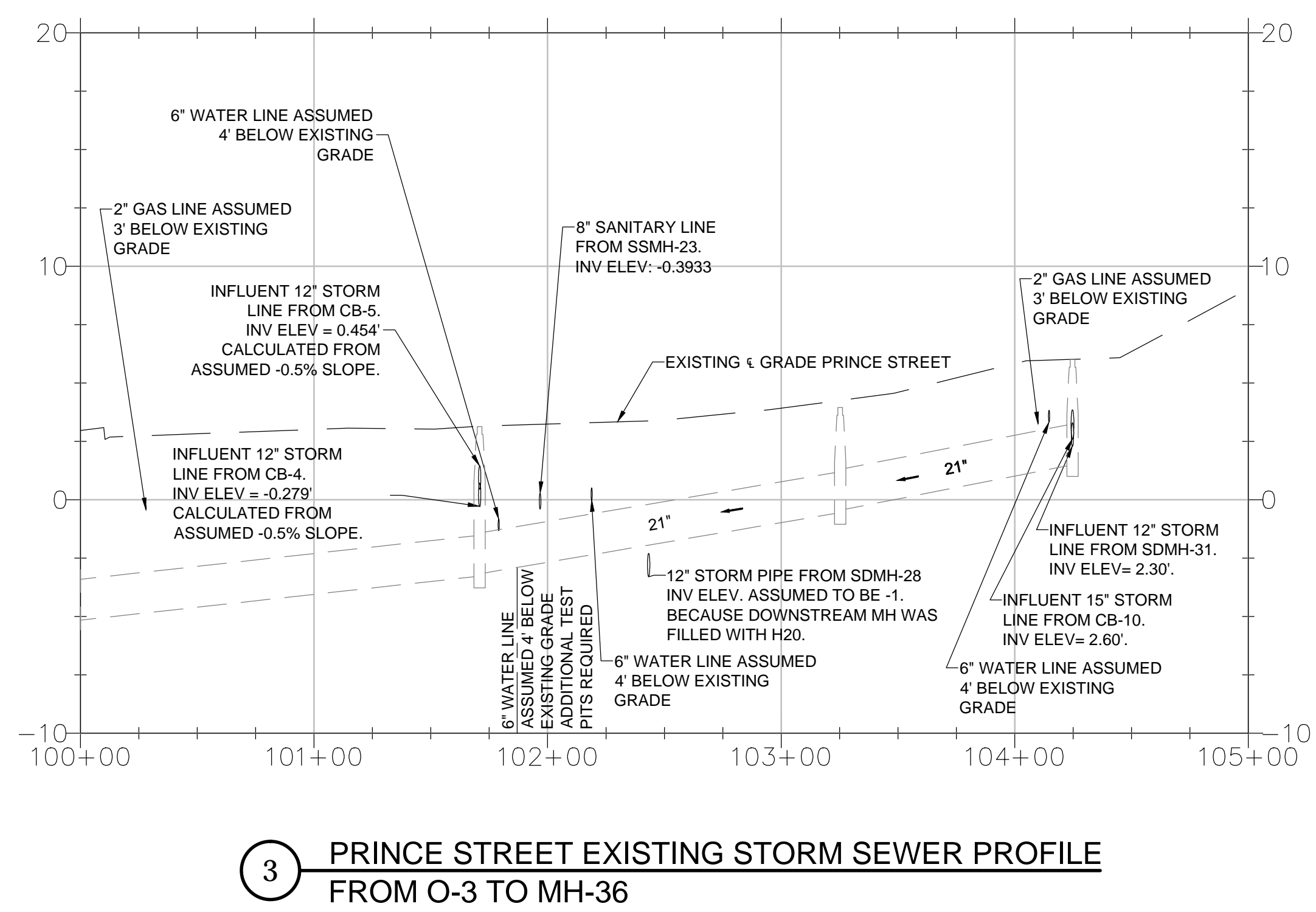
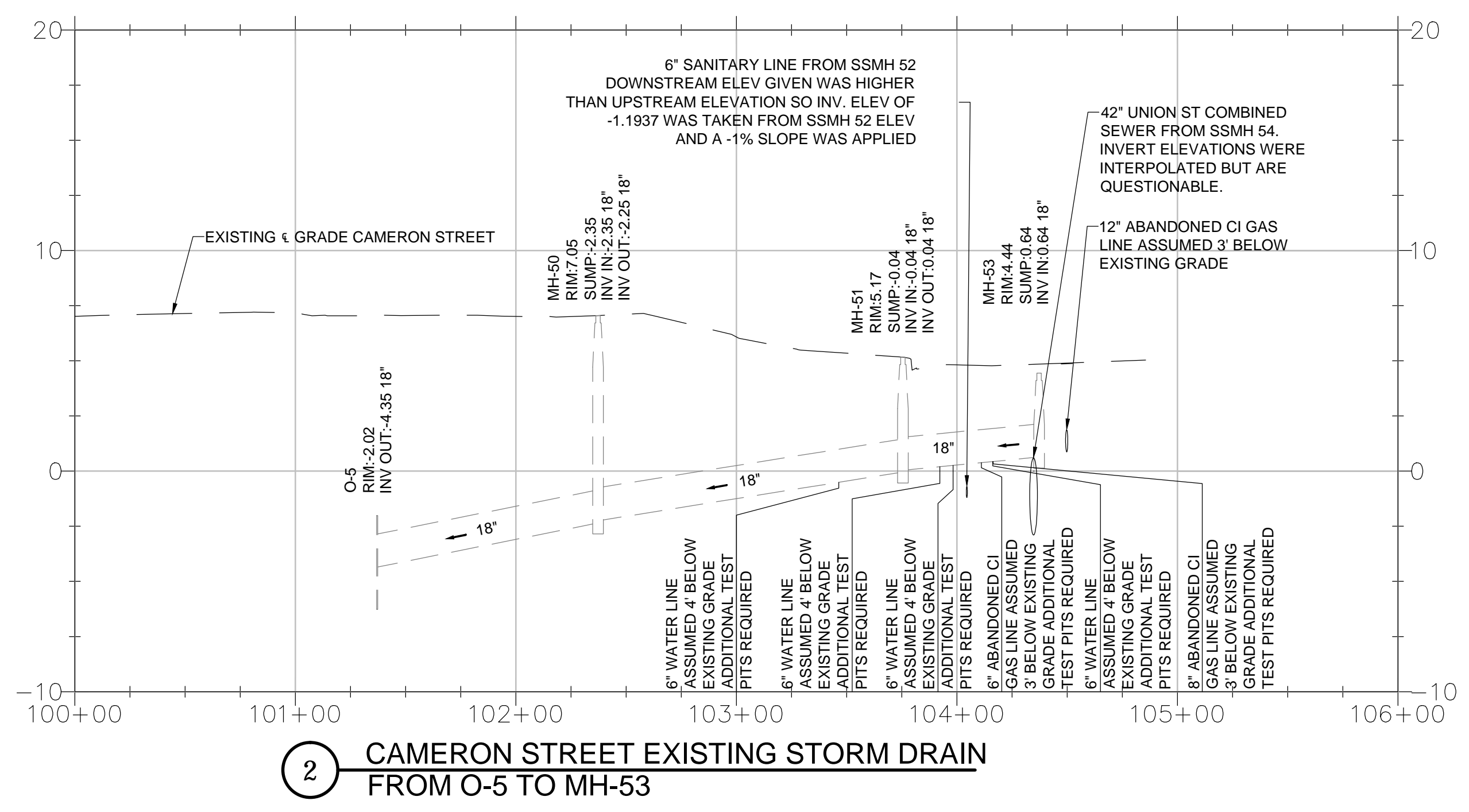
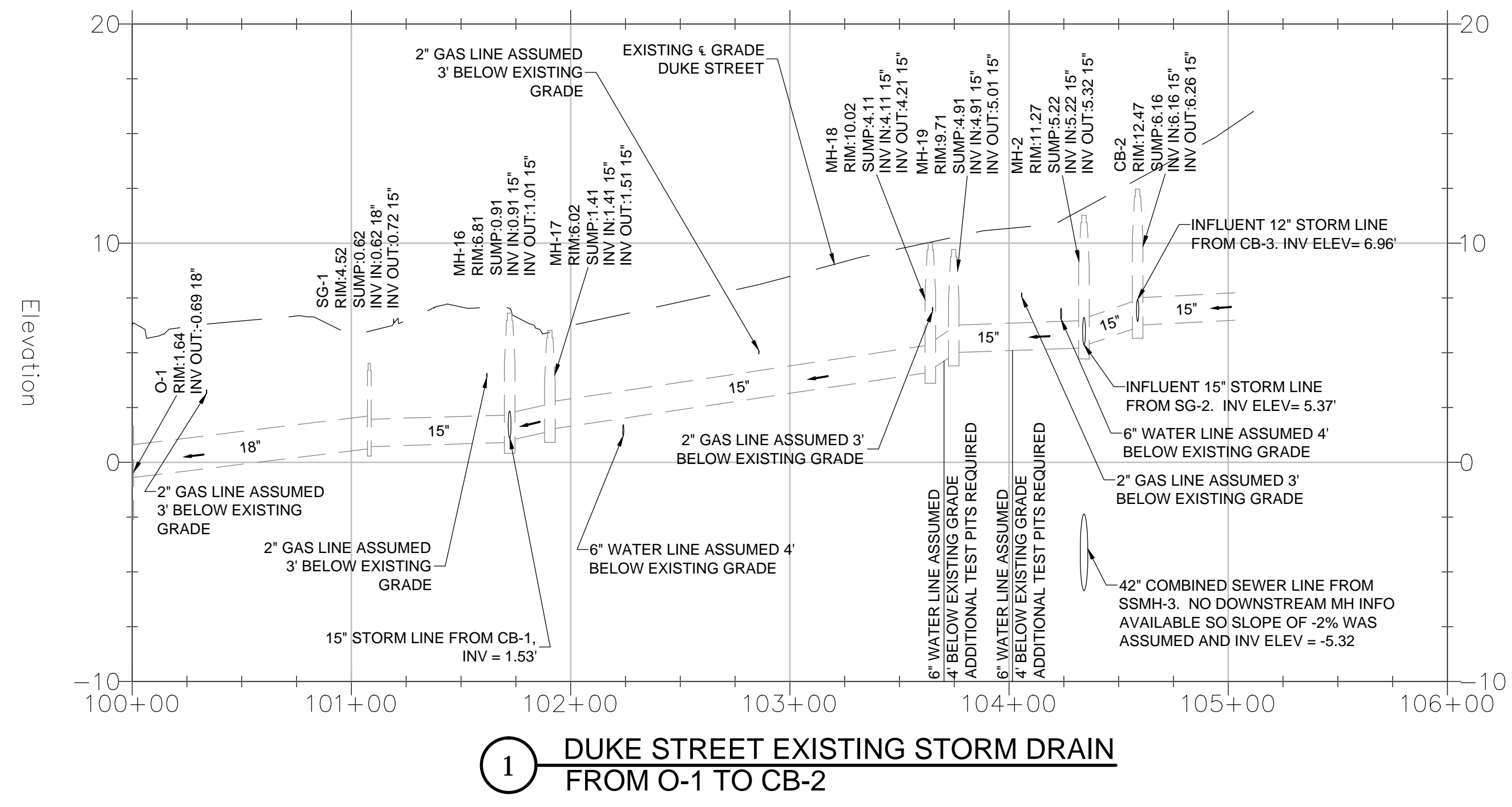
ROUGH GRADING AND STORM DRAIN PLAN

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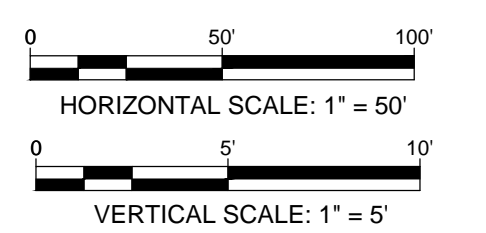
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| INITIALS | COMMENTS |
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Scale: Project No. Sheet 13 of 19

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NOTE:
WE RECOMMEND A THOROUGH INSPECTION OF EXISTING STORM DRAIN SYSTEM TO ENSURE THE INTEGRITY OF THE STORM DRAIN PIPES AND STRUCTURES



WATERFRONT FLOOD MITIGATION PROJECT 15% CONCEPT DESIGN SUBMISSION EXISTING STORM DRAIN PROFILES

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| REVISIONS | INITIALS | COMMENTS |
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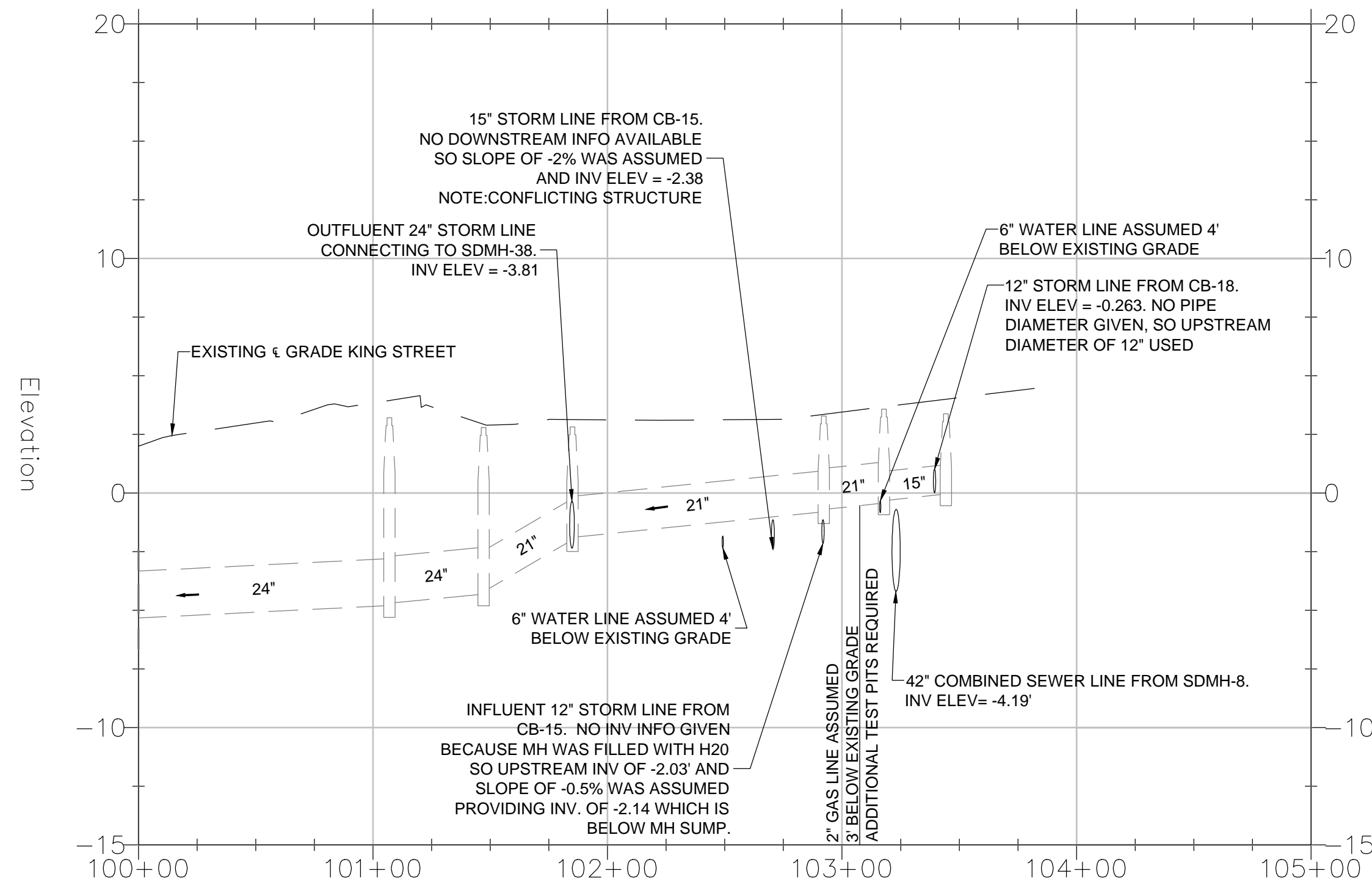
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Project No. _____

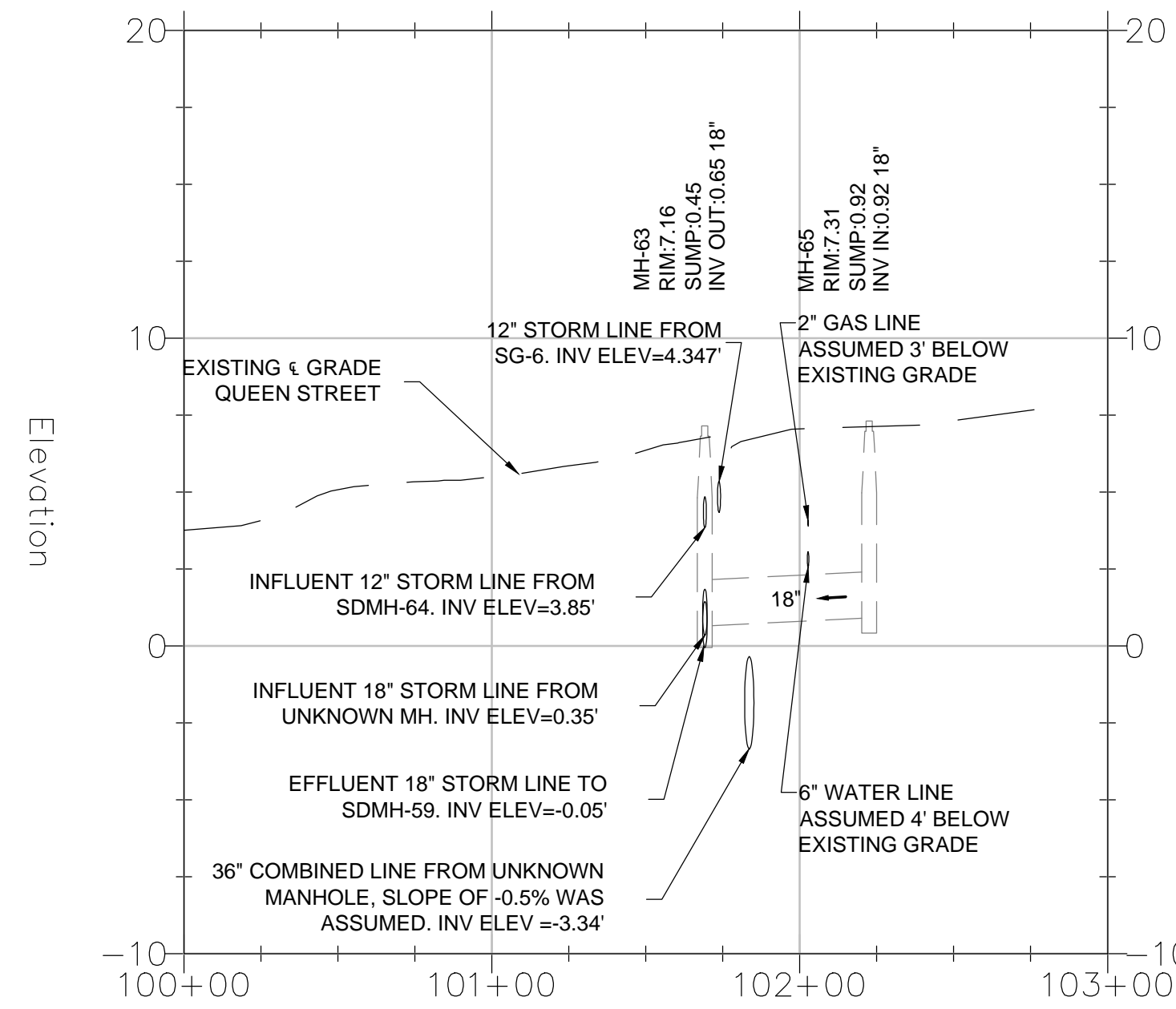
Scale: _____

Sheet 14 of 19

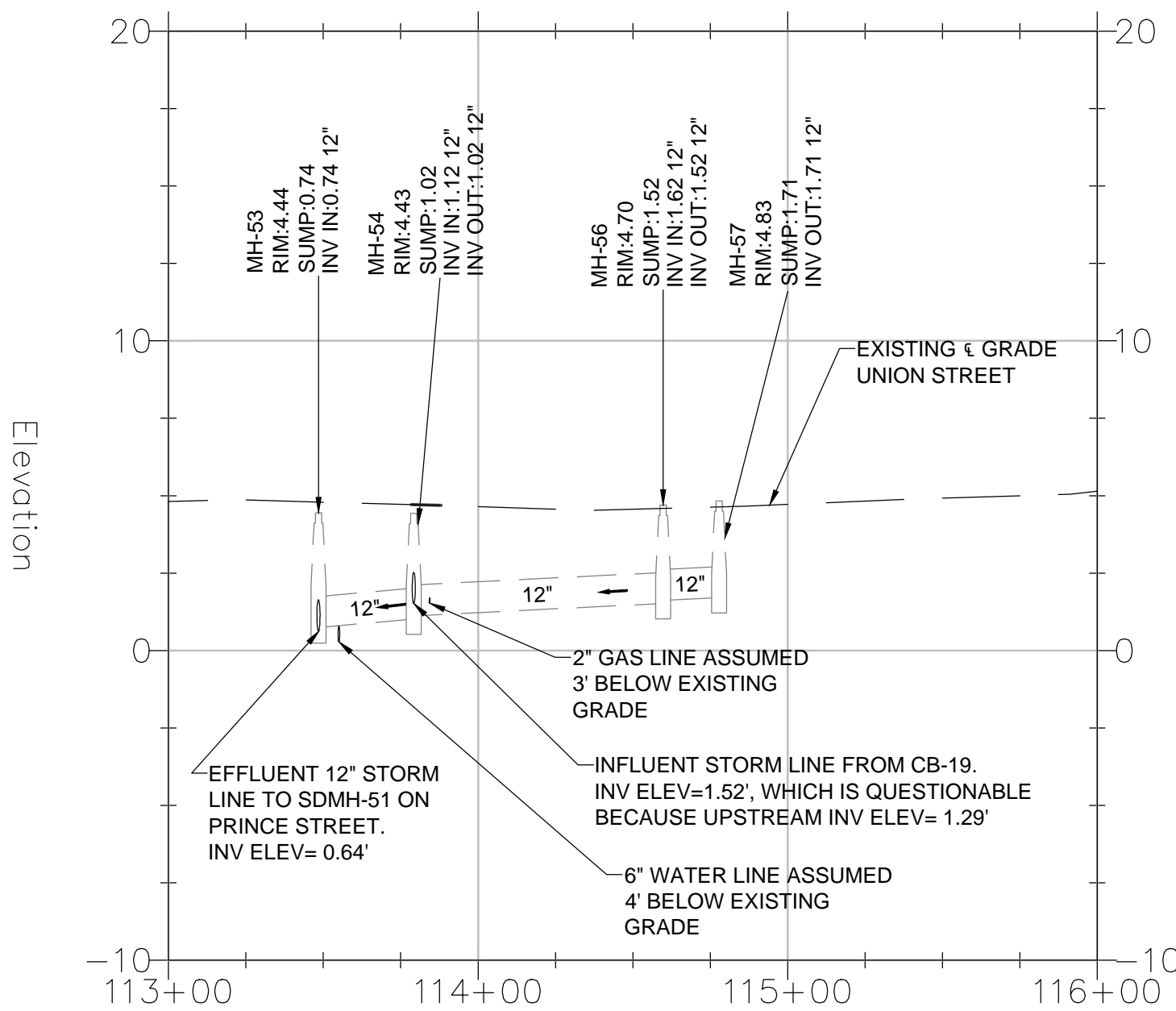
Q:\Projects\ENG\City of Alexandria\Waterfront Small Area Plan Engineering Implementation\05_Dwgs\C-Sheet\C-202 EXISTING GRADE SIDE STREETS.dwg Plotted: 7/31/2014 4:19 PM by Chen, Alan



1 KING STREET EXISTING STORM DRAIN
FROM MH-45 TO MH50 1" = 50' HOR, 1" = 5' VERT



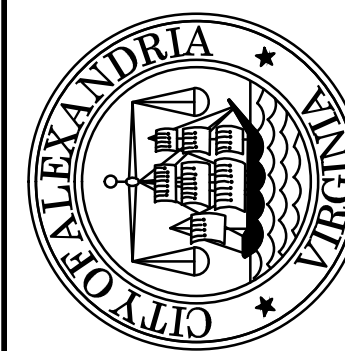
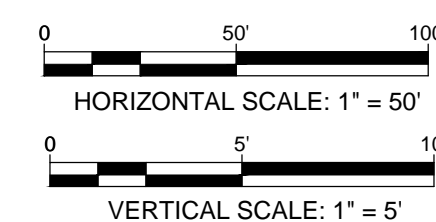
2 QUEEN STREET EXISTING STORM DRAIN
FROM O-5 TO MH-53 1" = 50' HOR, 1" = 5' VERT



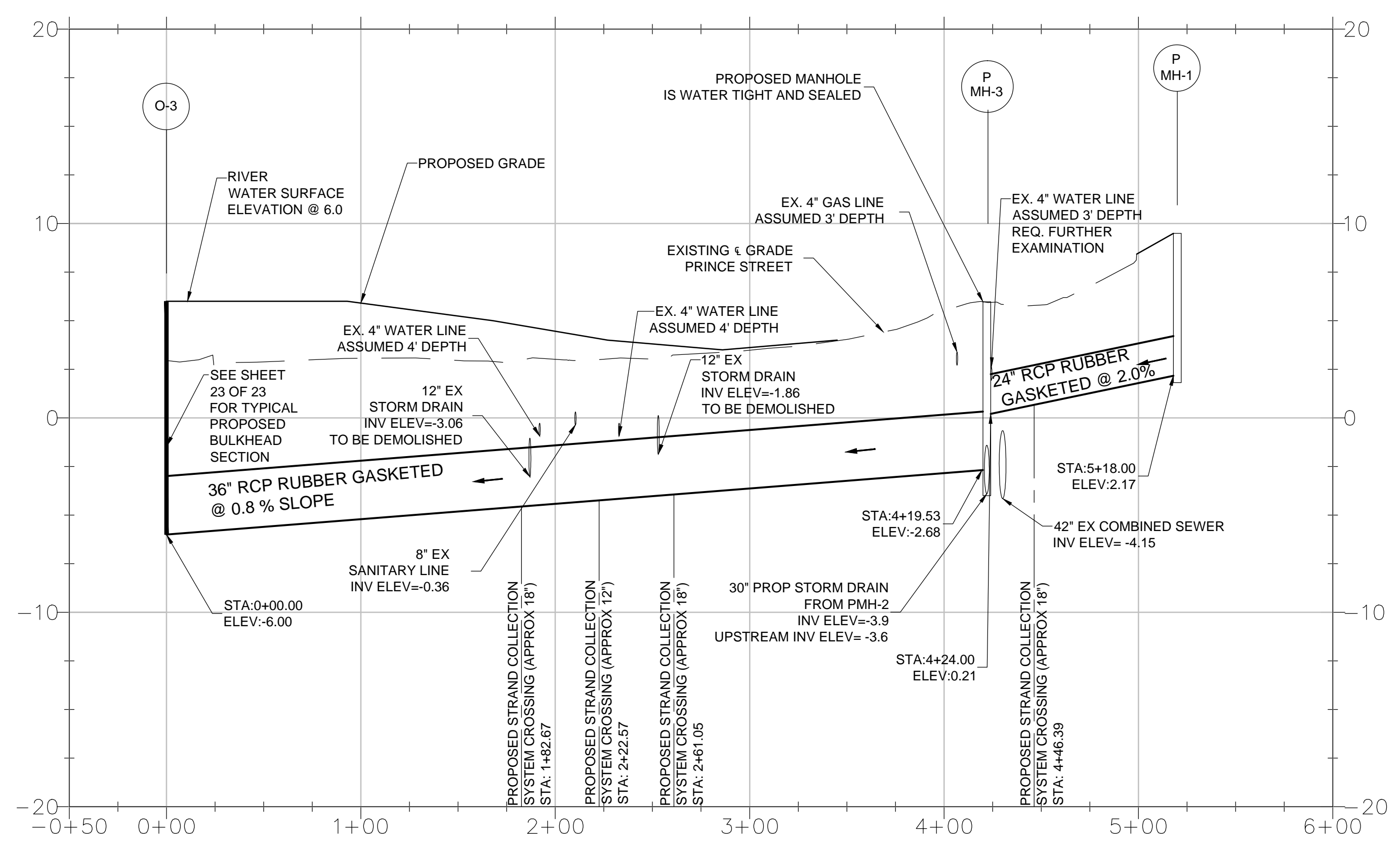
3 UNION STREET - PRINCE STREET EXISTING STORM DRAIN
FROM MH-53 TO MH-57 1" = 50' HOR, 1" = 5' VERT

NOTE:
WE RECOMMEND A THOROUGH INSPECTION OF EXISTING STORM DRAIN SYSTEM
TO ENSURE THE INTEGRITY OF THE STORM DRAIN PIPES AND STRUCTURES

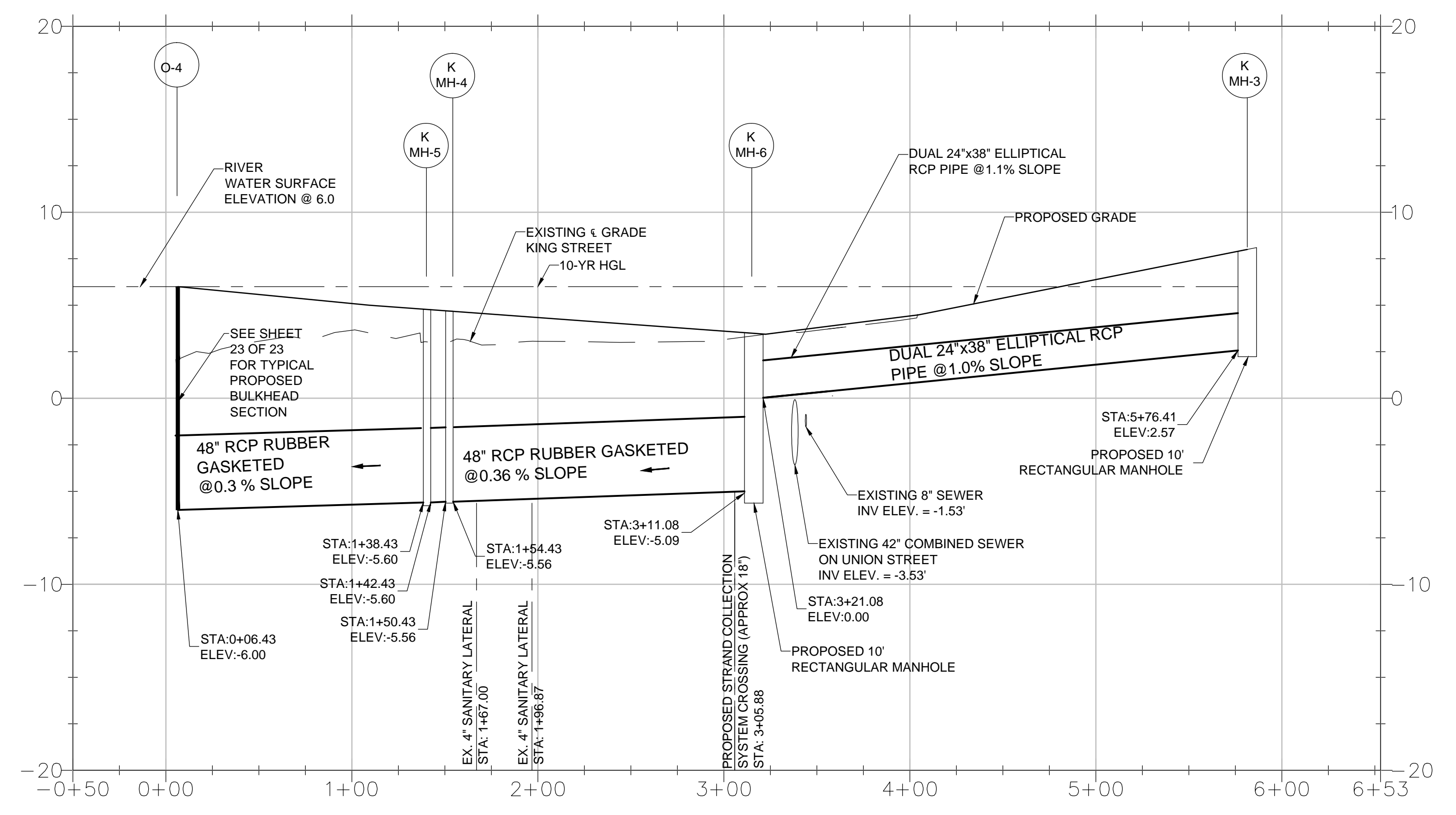
ABBREVIATIONS
CB- CATCH BASIN
CI- CAST IRON
ELEV- ELEVATION
INV- INVERT
MH- MANHOLE
O-6- OUTFALL
SDMH- STORM DRAIN
MANHOLE
SG- SURFACE GRATE
SSMH- SANITARY SEWER
MANHOLE



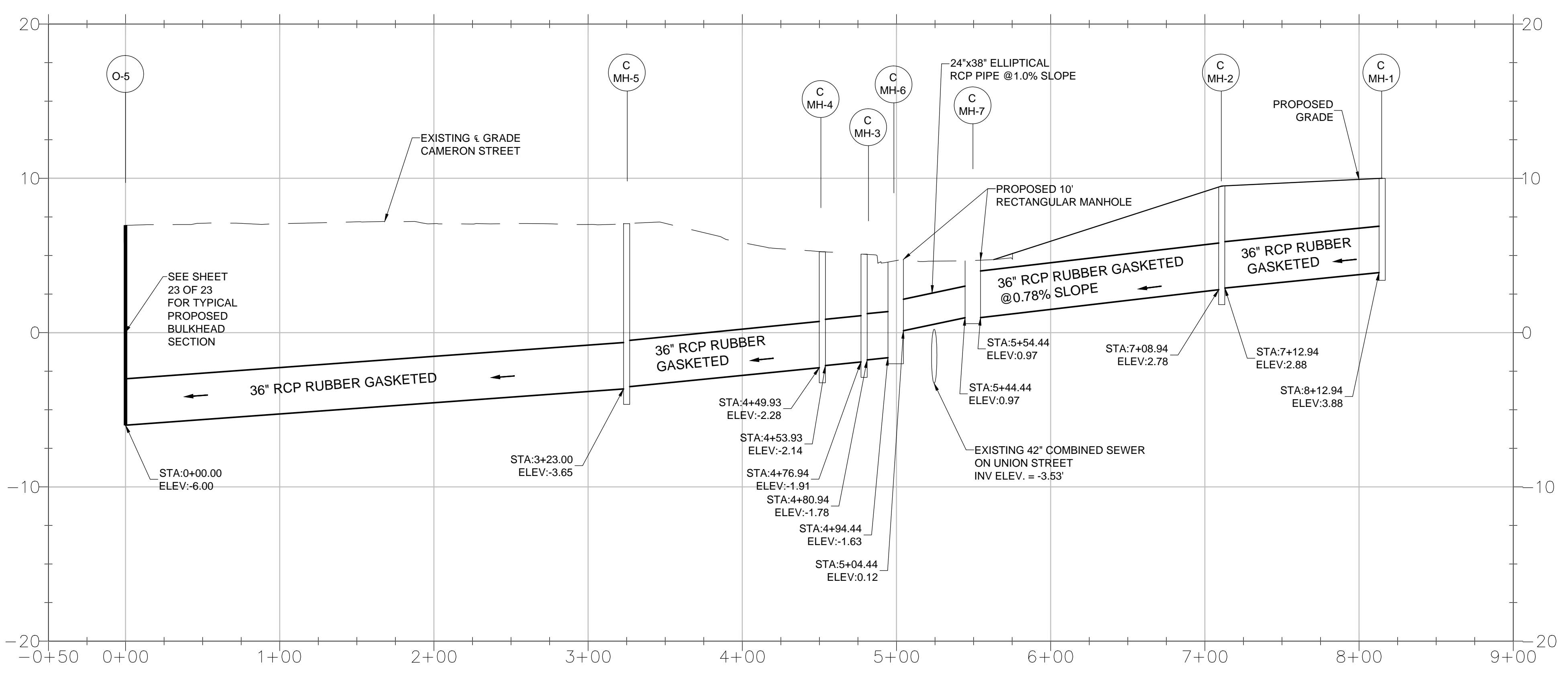
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1 PRINCE STREET BY-PASS STORM DRAIN
1" = 50' HOR. 1" = 5' VERT

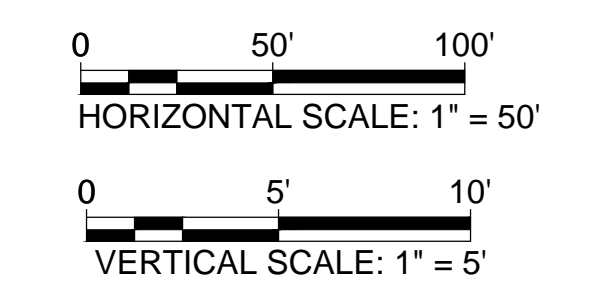


2 KING STREET BY-PASS STORM DRAIN
1" = 50' HOR. 1" = 5' VERT



3 CAMERON STREET BY-PASS STORM DRAIN
1" = 50' HOR. 1" = 5' VERT

NOTE:
BEFORE THE CONSTRUCTION OF THE PROPOSED STORM DRAIN SYSTEM, WE RECOMMEND A THOROUGH INSPECTION OF EXISTING STORM DRAIN SYSTEM TO ENSURE THE INTEGRITY OF THE STORM DRAIN PIPES AND STRUCTURES

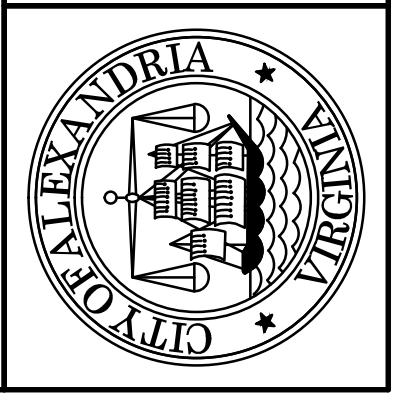


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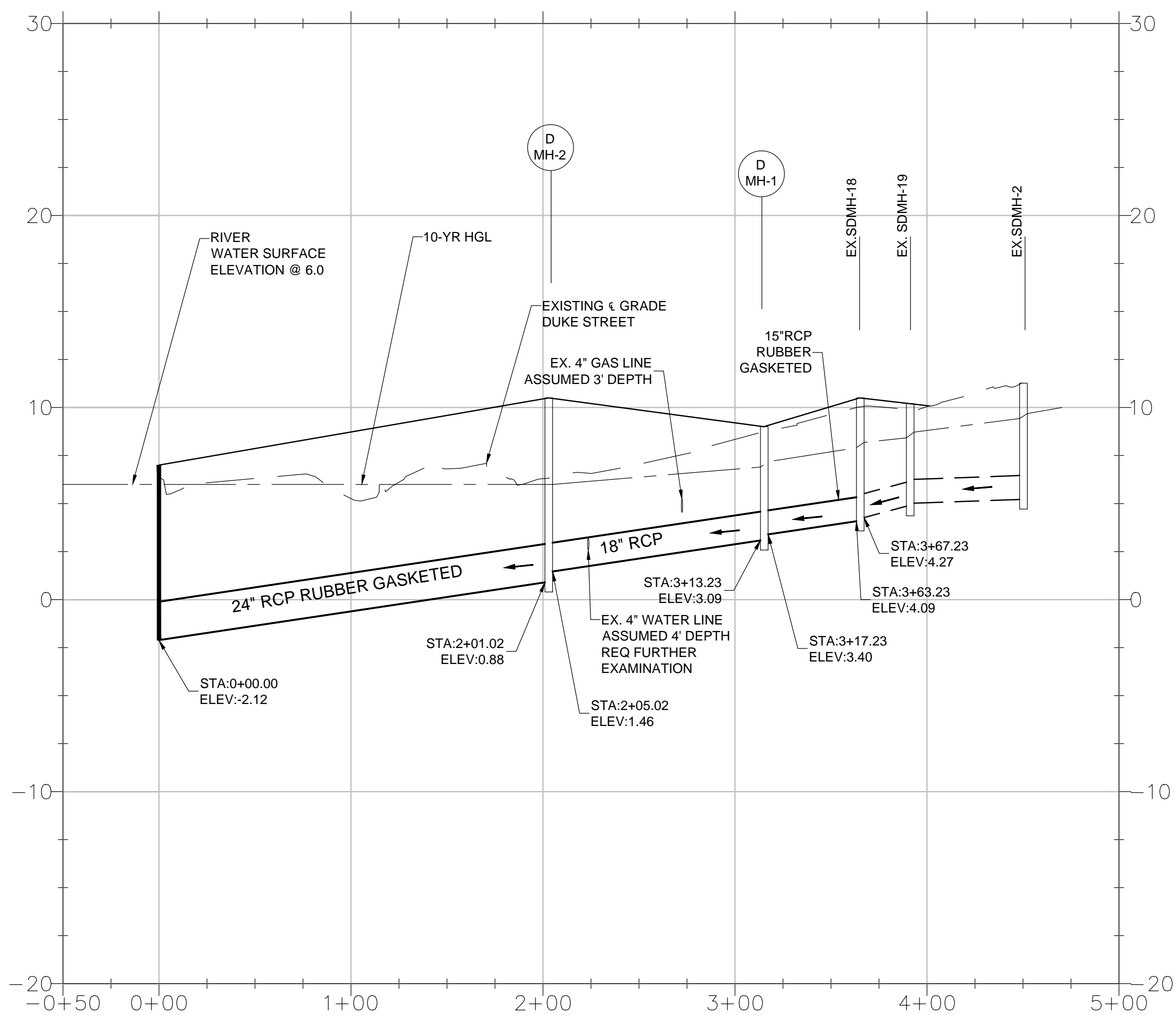
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 Project No. _____
 Scale: _____
 Sheet 16 of 19

PROPOSED STORM DRAIN PROFILES

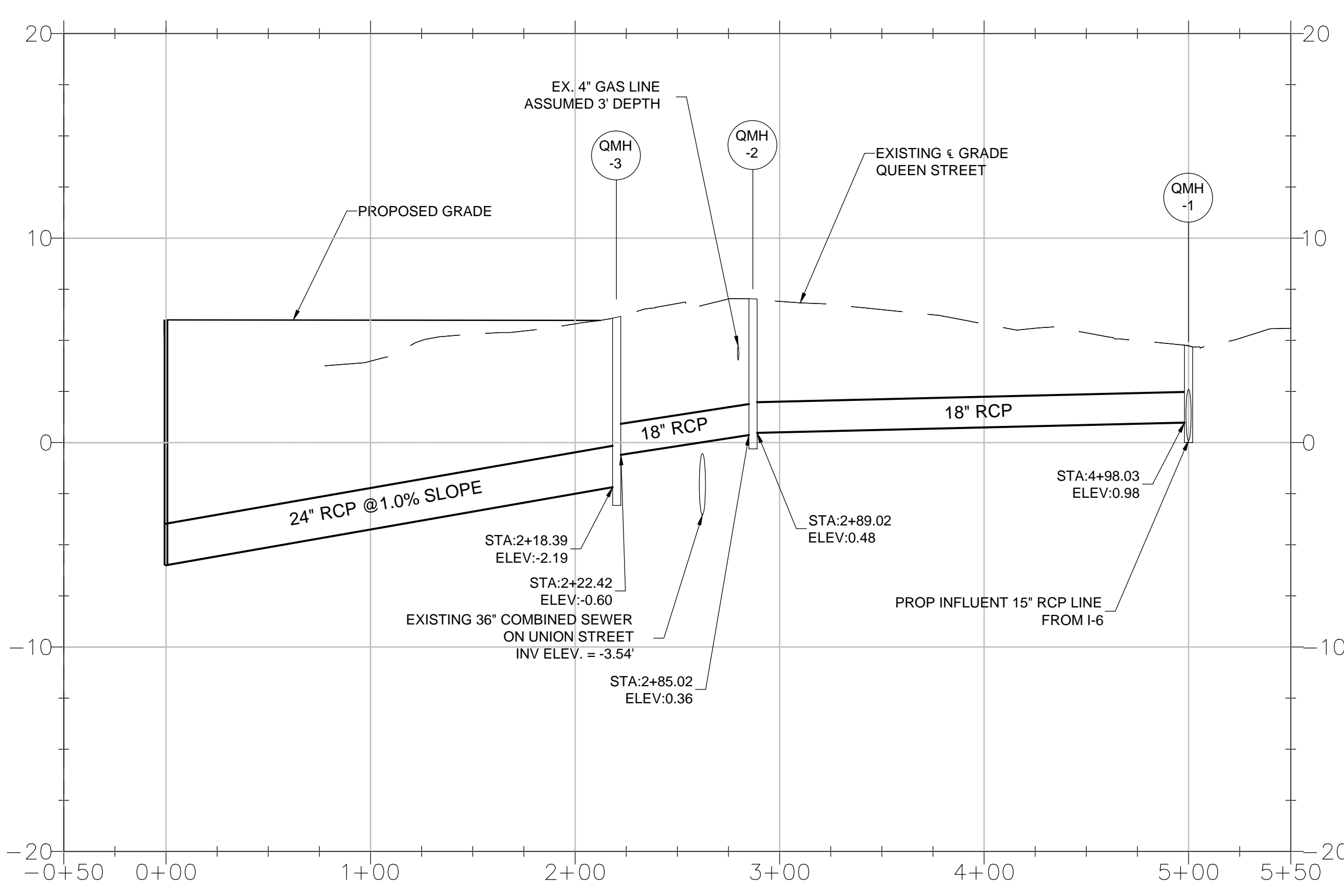
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1 DUKE STREET BY-PASS STORM DRAIN
1" = 50' HOR. 1" = 5' VERT



2 QUEEN STREET BY-PASS STORM DRAIN
1" = 50' HOR. 1" = 5' VERT

STORM DRAIN DESIGN COMPUTATIONS FOR CAMERON ST PUMP STATION

| From Structure | To Structure | Drainage Area Acres | Runoff Coeff. C | CA In. Acres | Accum. Area Acres | Accum. CA | Inlet Time Min | Rainfall Intensity In./hr. | Runoff Q cfs | Invert Elevations | | Length ft. | Slope ft./ft. | Dia. In. | Type | Manning's n | Capacity cfs | Velocity fps |
|----------------|--------------|---------------------|-----------------|--------------|-------------------|-----------|----------------|----------------------------|--------------|-------------------|-----------|------------|---------------|----------|------|-------------|--------------|--------------|
| | | | | | | | | | | Upper End | Lower End | | | | | | | |
| CB-1 | MH-17 | 0.11 | 0.75 | 0.083 | 0.11 | 0.08 | 5.00 | 9.00 | 0.74 | 0.84 | 0.47 | 41.2 | 0.90% | 12 | RCP | 0.013 | 3.37 | 4.30 |
| CB-2 | CB-3 | 0.09 | 0.75 | 0.068 | 0.09 | 0.07 | 5.00 | 9.00 | 0.61 | 1.14 | 1.10 | 12.5 | 0.32% | 12 | RCP | 0.013 | 2.01 | 2.56 |
| CB-3 | MH-16 | 0.15 | 0.75 | 0.113 | 0.24 | 0.18 | 5.00 | 9.00 | 1.62 | 1.10 | 1.04 | 19.4 | 0.31% | 12 | RCP | 0.013 | 1.98 | 2.52 |
| MH-17 | MH-16 | 0.00 | 0.75 | 0.000 | 0.11 | 0.08 | 5.00 | 9.00 | 0.74 | 1.10 | 1.04 | 19.4 | 0.31% | 12 | RCP | 0.013 | 1.98 | 2.52 |
| CB-4 | MH-16 | 0.18 | 0.75 | 0.135 | 0.18 | 0.18 | 5.00 | 9.00 | 1.62 | 1.15 | 1.10 | 15.0 | 0.33% | 15 | RCP | 0.013 | 3.73 | 3.04 |
| MH-16 | MH-15 | 0.00 | 0.75 | 0.000 | 0.53 | 0.44 | 5.00 | 9.00 | 3.98 | 1.04 | 0.01 | 187.8 | 0.55% | 15 | RCP | 0.013 | 4.79 | 3.90 |
| MH-15 | MH-14 | 0.00 | 0.75 | 0.000 | 0.53 | 0.44 | 5.00 | 9.00 | 3.98 | 0.07 | 0.00 | 12.5 | 0.56% | 15 | RCP | 0.013 | 4.83 | 3.93 |
| CB-5 | MH-14 | 0.10 | 0.75 | 0.075 | 0.10 | 0.08 | 5.00 | 9.00 | 0.68 | -2.35 | -2.92 | 27.0 | 2.11% | 12 | RCP | 0.013 | 5.17 | 6.59 |
| MH-14 | MH-13 | 0.00 | 0.75 | 0.000 | 0.63 | 0.52 | 5.00 | 9.00 | 4.66 | -3.02 | -3.82 | 80.1 | 1.00% | 15 | RCP | 0.013 | 6.45 | 5.26 |
| MH-13 | MH-12 | 0.00 | 0.75 | 0.000 | 0.63 | 0.52 | 5.00 | 9.00 | 4.66 | -3.92 | -4.45 | 178.0 | 0.30% | 18 | RCP | 0.013 | 5.73 | 3.24 |
| I-3 | MH-12 | 1.11 | 0.75 | 0.833 | 1.11 | 0.83 | 5.00 | 9.00 | 7.49 | -4.30 | -4.45 | 14.8 | 1.01% | 18 | RCP | 0.013 | 10.57 | 5.99 |
| MH-12 | TR-2 | 0.00 | 0.75 | 0.000 | 1.74 | 1.35 | 5.00 | 9.00 | 12.15 | -4.55 | -4.80 | 66.9 | 0.37% | 24 | RCP | 0.013 | 13.83 | 4.40 |
| TR-2 | PS | 0.00 | 0.75 | 0.000 | 1.74 | 1.35 | 5.00 | 9.00 | 12.15 | -4.90 | -5.00 | 24.1 | 0.42% | 24 | RCP | 0.013 | 14.58 | 4.64 |

STORM DRAIN DESIGN COMPUTATIONS FOR STRAND ST PUMP STATION

| From Structure | To Structure | Drainage Area Acres | Runoff Coeff. C | CA In. Acres | Accum. Area Acres | Accum. CA | Inlet Time Min | Rainfall Intensity In./hr. | Runoff Q cfs | Invert Elevations | | Length ft. | Slope ft./ft. | Dia. In. | Type | Manning's n | Capacity cfs | Velocity fps |
|----------------|--------------|---------------------|-----------------|--------------|-------------------|-----------|----------------|----------------------------|--------------|-------------------|-----------|------------|---------------|----------|------|-------------|--------------|--------------|
| | | | | | | | | | | Upper End | Lower End | | | | | | | |
| CB-17 | CB-16 | 0.14 | 0.75 | 0.105 | 0.14 | 0.11 | 5.00 | 9.00 | 0.95 | 1.62 | 1.45 | 17.2 | 0.99% | 12 | RCP | 0.013 | 3.54 | 4.51 |
| CB-16 | MH-11 | 0.21 | 0.75 | 0.158 | 0.35 | 0.26 | 5.00 | 9.00 | 2.36 | 1.35 | 0.97 | 38.7 | 0.98% | 12 | RCP | 0.013 | 3.53 | 4.50 |
| CB-18 | MH-11 | 0.34 | 0.75 | 0.255 | 0.34 | 0.26 | 5.00 | 9.00 | 2.30 | -0.51 | -3.26 | 25.6 | 10.74% | 12 | RCP | 0.013 | 11.67 | 14.87 |
| MH-11 | MH-10 | 0.00 | 0.75 | 0.000 | 0.69 | 0.52 | 5.00 | 9.00 | 4.66 | 0.46 | -2.10 | 174.0 | 1.47% | 15 | RCP | 0.013 | 7.83 | 6.39 |
| CB-8 | MH-10 | 1.05 | 0.75 | 0.788 | 1.05 | 0.79 | 5.00 | 9.00 | 7.09 | -1.41 | -1.80 | 39.2 | 0.99% | 18 | RCP | 0.013 | 10.47 | 5.93 |
| CB-6 | MH-10 | 0.31 | 0.75 | 0.233 | 0.31 | 0.23 | 5.00 | 9.00 | 2.09 | -1.63 | -1.80 | 16.7 | 1.02% | 12 | RCP | 0.013 | 3.59 | 4.58 |
| MH-10 | MH-9 | 0.00 | 0.75 | 0.000 | 2.05 | 1.54 | 5.00 | 9.00 | 13.84 | -3.41 | -3.75 | 34.5 | 0.99% | 30 | RCP | 0.013 | 40.71 | 8.30 |
| CB-7 | MH-9 | 0.13 | 0.75 | 0.098 | 0.13 | 1.64 | 5.00 | 9.00 | 14.72 | -4.73 | -4.89 | 15.7 | 1.02% | 24 | RCP | 0.013 | 22.83 | 7.27 |
| CB-9 | MH-8 | 1.15 | 0.75 | 0.863 | 1.28 | 0.86 | 5.00 | 9.00 | 34.48 | -3.90 | -4.13 | 18.2 | 1.26% | 30 | RCP | 0.013 | 46.10 | 9.40 |
| MH-9 | MH-8 | 0.00 | 0.75 | 0.000 | 2.18 | 3.17 | 5.00 | 9.00 | 33.15 | -4.23 | -4.33 | 33.2 | 0.30% | 36 | RCP | 0.013 | 36.63 | 5.18 |
| MH-8 | I-1 | 0.00 | 0.75 | 0.000 | 3.46 | 4.04 | 5.00 | 9.00 | 36.32 | -4.33 | -4.40 | 23.0 | 0.30% | 36 | RCP | 0.013 | 36.79 | 5.21 |
| I-1 | TR-1 | 0.94 | 0.75 | 0.705 | 4.40 | 4.74 | 5.00 | 9.00 | 42.66 | -4.76 | -4.97 | 81.8 | 0.26% | 42 | RCP | 0.013 | 50.97 | 5.30 |
| CB-10 | CB-11 | 0.14 | 0.75 | 0.105 | 0.14 | 0.11 | 5.00 | 9.00 | 0.95 | 0.48 | 0.28 | 20.1 | 1.00% | 12 | RCP | 0.013 | 3.55 | 4.53 |
| CB-11 | I-5 | 0.11 | 0.75 | 0.083 | 0.25 | 0.19 | 5.00 | 9.00 | 1.69 | 0.18 | -0.20 | 37.9 | 1.00% | 12 | RCP | 0.013 | 3.57 | 4.54 |
| I-5 | MH-5 | 0.19 | 0.75 | 0.143 | 0.44 | 0.33 | 5.00 | 9.00 | 2.97 | -0.30 | -0.80 | 50.0 | 1.00% | 24 | RCP | 0.013 | 22.62 | 7.20 |
| CB-13 | CB-12 | 0.11 | 0.75 | 0.083 | 0.11 | 0.08 | 5.00 | 9.00 | 0.55 | 0.55 | 0.50 | 17.6 | 0.28% | 12 | RCP | 0.013 | 1.90 | 2.42 |
| CB-12 | MH-7 | 0.14 | 0.75 | 0.105 | 0.25 | 0.19 | 5.00 | 9.00 | 1.69 | 0.49 | 0.47 | 5.1 | 0.39% | 12 | RCP | 0.013 | 2.23 | 2.84 |
| MH-7 | MH-6 | 0.00 | 0.75 | 0.000 | 0.25 | 0.19 | 5.00 | 9.00 | 1.69 | 0.13 | 0.00 | 43.2 | 0.30% | 18 | RCP | 0.013 | 5.76 | 3.26 |
| CB-14 | MH-6 | 0.63 | 0.75 | 0.473 | 0.63 | 0.47 | 5.00 | 9.00 | 4.25 | -0.13 | -0.34 | 20.8 | 1.01% | 18 | RCP | 0.013 | 10.55 | 5.97 |
| MH-6 | MH-5 | 0.00 | 0.75 | 0.000 | 1.32 | 0.99 | 5.00 | 9.00 | 8.91 | -0.74 | -0.82 | 25.6 | 0.31% | 24 | RCP | 0.013 | 12.66 | 4.03 |
| CB-15 | MH-5 | 0.09 | 0.75 | 0.068 | 0.09 | 0.07 | 5.00 | 9.00 | 0.61 | -0.58 | -0.66 | 7.8 | 1.03% | 18 | RCP | 0.013 | 10.63 | 6.02 |
| MH-5 | MH-3 | 0.00 | 0.75 | 0.000 | 1.41 | 1.06 | 5.00 | 9.00 | 9.52 | -3.60 | -6.03 | 107.0 | 2.27% | 24 | RCP | 0.013 | 34.08 | 10.85 |
| MH-3 | MH-2 | 0.00 | 0.75 | 0.000 | 1.50 | 1.13 | 5.00 | 9.00 | 10.13 | -6.13 | -6.78 | 67.2 | 0.97% | 30 | RCP | 0.013 | 40.33 | 8.22 |
| I-6 | MH-2 | 2.27 | 0.75 | 1.703 | 2.27 | 1.70 | 5.00 | 9.00 | 15.32 | -6.62 | -6.78 | 15.9 | 1.01% | 24 | RCP | 0.013 | 22.69 | 7.23 |
| MH-2 | MH-1 | 0.00 | 0.75 | 0.000 | 3.77 | 2.83 | 5.00 | 9.00 | 25.45 | -6.90 | -8.09 | 242.8 | 0.49% | 36 | RCP | 0.013 | 46.69 | 6.61 |
| MH-1 | TR-1 | 0.00 | 0.75 | 0.000 | 3.77 | 2.83 | 5.00 | 9.00 | 25.45 | -4.89 | -4.97 | 25.5 | 0.31% | 36 | RCP | 0.013 | 37.39 | 5.29 |
| TR-1 | PS | 0.00 | 0.75 | 0.000 | 8.17 | 7.57 | 5.00 | 9.00 | 68.11 | -4.97 | -5.00 | 5.2 | 0.58% | 42 | RCP | 0.013 | 76.71 | 7.98 |

STORM DRAIN DESIGN COMPUTATIONS FOR DUKE ST BYPASS LINE

| From Structure | To Structure | Drainage Area Acres | Runoff Coeff. C | CA In. Acres | Accum. Area Acres | Accum. CA | Inlet Time Min | Rainfall Intensity In./hr. | Runoff Q cfs | Invert Elevations | | Length ft. | Slope ft./ft. | Dia. In. | Type | Manning's n | Capacity cfs | Velocity fps |
|----------------|--------------|---------------------|-----------------|--------------|-------------------|-----------|----------------|----------------------------|--------------|-------------------|-----------|------------|---------------|----------|------|-------------|--------------|--------------|
| | | | | | | | | | | Upper End | Lower End | | | | | | | |
| DMH-1 | DMH-2 | 1.75 | 0.75 | 1.313 | 1.75 | 1.31 | 5.00 | 9.00 | 11.81 | 3.09 | 1.46 | 112.9 | 1.44% | 18 | RCP | 0.013 | 12.62 | 7.14 |
| DMH-2 | O-4 | 0.29 | 0.75 | 0.218 | 2.04 | 1.53 | 5.00 | 9.00 | 13.77 | 0.88 | -2.12 | 199.9 | 1.50% | 24 | RCP | 0.013 | 27.71 | 8.82 |

STORM DRAIN DESIGN COMPUTATIONS FOR PRINCE ST BYPASS LINE

| From Structure | To Structure | Drainage Area Acres | Runoff Coeff. C | CA In. Acres | Accum. Area Acres | Accum. CA | Inlet Time Min | Rainfall Intensity In./hr. | Runoff Q cfs | Invert Elevations | | Length ft. | Slope ft./ft. | Dia. In. | Type | Manning's n | Capacity cfs | Velocity fps |
|----------------|--------------|---------------------|-----------------|--------------|-------------------|-----------|----------------|----------------------------|--------------|-------------------|-----------|------------|---------------|----------|------|-------------|--------------|--------------|
| | | | | | | | | | | Upper End | Lower End | | | | | | | |
| PMH-2 | PMH-3 | 3.79 | 0.75 | 2.843 | 3.79 | 2.84 | 5.00 | 9.00 | 25.58 | -3.60 | -3.90 | 27.9 | 1.08% | 30 | RCP | 0.013 | 42.56 | 8.67 |
| PMH-1 | PMH-3 | 2.77 | 0.75 | 2.078 | 2.77 | 2.08 | 5.00 | 9.00 | 18.70 | 2.17 | 0.21 | 97.8 | 2.00% | 24 | RCP | 0.013 | 32.02 | 10.20 |
| PMH-3 | O-3 | 0.00 | 0.75 | 0.000 | 6.56 | 4.92 | 5.00 | 9.00 | 44.28 | -2.68 | -6.00 | 421.0 | 0.79% | 36 | RCP | 0.013 | 59.23 | 8.38 |

STORM DRAIN DESIGN COMPUTATIONS FOR KING ST BYPASS LINE

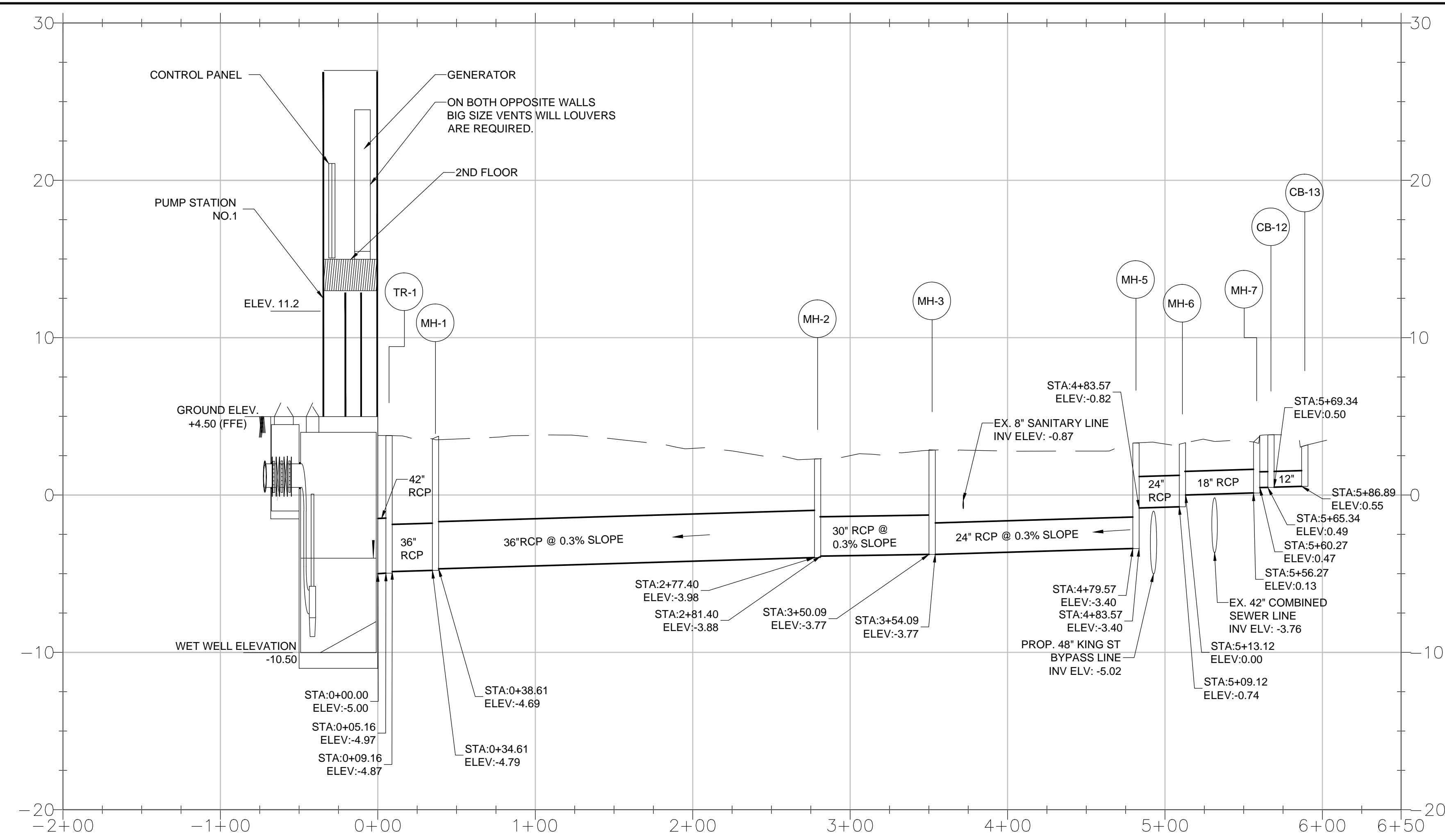
| From Structure | To Structure | Drainage Area Acres | Runoff Coeff. C | CA In. Acres | Accum. Area Acres | Accum. CA | Inlet Time Min | Rainfall Intensity In./hr. | Runoff Q cfs | Invert Elevations | | Length ft. | Slope ft./ft. | Dia. In. | Type | Manning's n | Capacity cfs | Velocity fps |
|----------------|--------------|---------------------|-----------------|--------------|-------------------|-----------|----------------|----------------------------|--------------|-------------------|-----------|------------|---------------|----------|------|-------------|--------------|--------------|
| | | | | | | | | | | Upper End | Lower End | | | | | | | |
| KMH-3 | KMH-6 | 11.10 | 0.75 | 8.325 | 7.97 | 8.33 | 5.00 | 9.00 | 74.93 | 2.57 | 0.00 | 258.4 | 0.99% | 2x30" | RCP | 0.013 | 82.04 | 8.36 |
| KMH-6 | KMH-4 | 0.00 | 0.75 | 0.000 | 11.10 | 8.33 | 5.00 | 9.00 | 74.93 | -5.00 | -5.57 | 156.7 | 0.36% | 48 | RCP | 0.013 | 86.65 | 6.90 |
| KMH-4 | KMH-5 | 0.00 | 0.75 | 0.000 | 11.10 | 8.33 | 5.00 | 9.00 | 74.93 | -5.56 | -5.60 | 8.0 | 0.50% | 48 | RCP | 0.013 | 101.57 | 8.09 |
| KMH-5 | O-4 | 0.00 | 0.75 | 0.000 | 11.10 | 8.33 | 5.00 | 9.00 | 74.93 | -5.60 | -6.00 | 132.0 | 0.30% | 48 | RCP | 0.013 | 79.07 | 6.30 |

NOTE: 36" RCP PIPE FROM KMH-7 TO KMH-6 SUBSTITUTED WITH DUAL 24"x38" ELLIPTICAL RCP PIPE, WHICH ARE INDIVIDUALLY EQUIVALENT TO A ROUND 30" PIPE.

STORM DRAIN DESIGN COMPUTATIONS FOR CAMERON ST BYPASS LINE

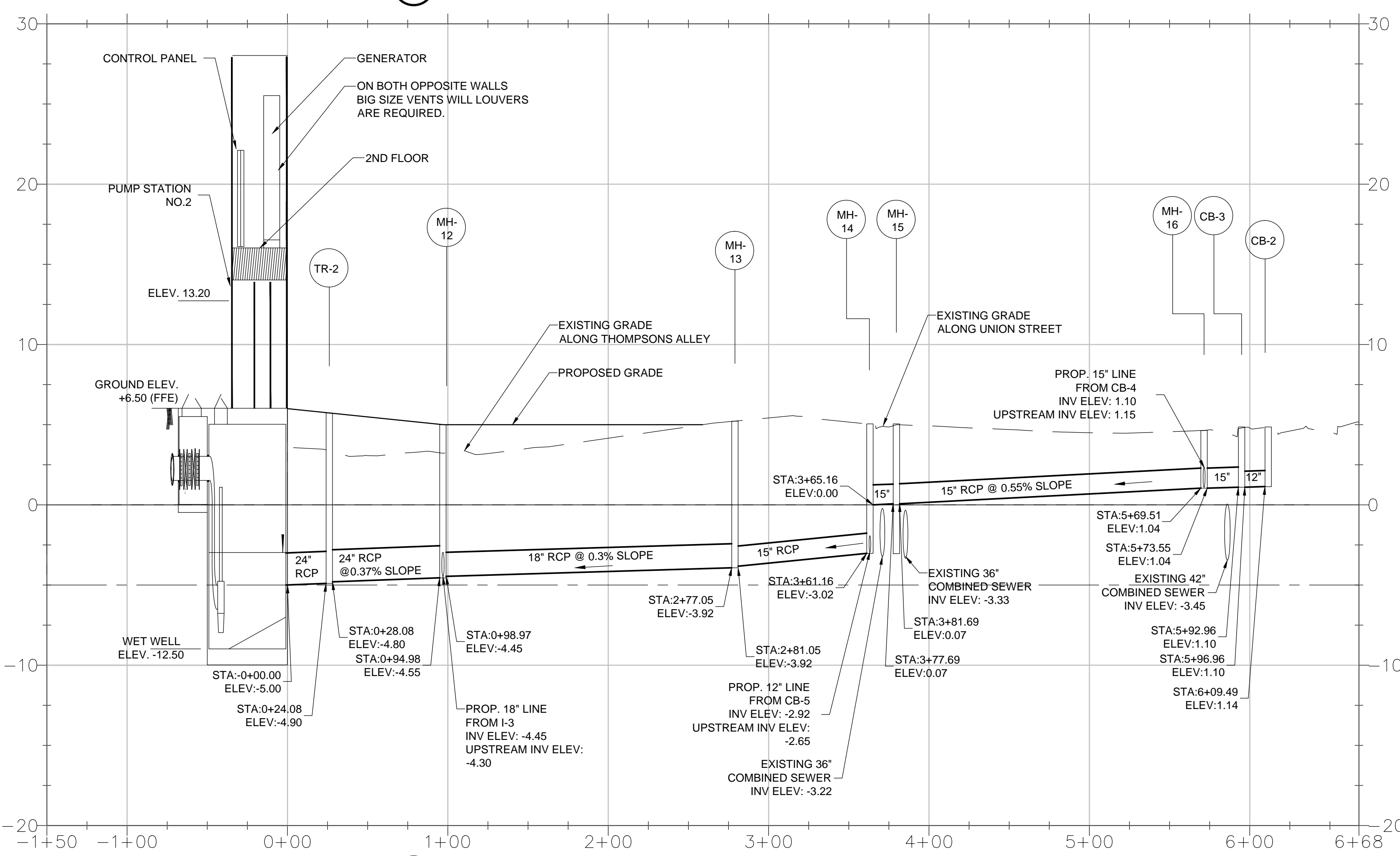
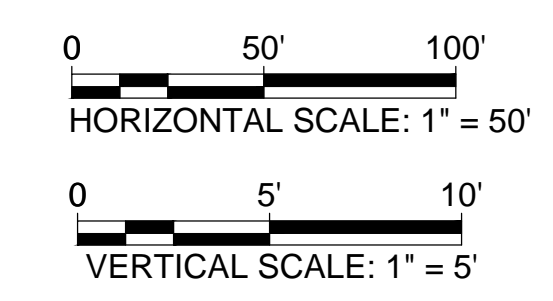
| From Structure | To Structure | Drainage Area Acres | Runoff Coeff. C | CA In. Acres | Accum. Area Acres | Accum. CA | Inlet Time Min | Rainfall Intensity In./hr. | Runoff Q cfs | Invert Elevations | | Length ft. | Slope ft./ft. | Dia. In. | Type | Manning's n | Capacity cfs | Velocity fps |
|----------------|--------------|---------------------|-----------------|--------------|-------------------|-----------|----------------|----------------------------|--------------|-------------------|-----------|------------|---------------|----------|------|-------------|--------------|--------------|
| | | | | | | | | | | Upper End | Lower End | | | | | | | |
| CMH-1 | CMH-2 | 7.97 | 0.75 | 5.978 | 7.97 | 5.98 | 5.00 | 9.00 | 53.80 | 3.88 | 2.88 | 100.0 | 0.70% | 36 | RCP | 0.013 | 55.80 | 7.90 |
| CHM-2 | CMH-7 | 0.00 | 0.75 | 0.000 | 7.97 | 5.98 | 5.00 | 9.00 | 53.80 | 2.78 | 0.97 | 232.4 | 0.78% | 36 | RCP | 0.013 | 58.86 | 8.33 |
| CHM-7 | CMH-6 | 0.00 | 0.75 | 0.000 | 7.97 | 5.98 | 5.00 | 9.00 | 53.80 | 0.97 | 0.12 | 40.0 | 2.00% | 30 | RCP | 0.013 | 58.00 | 11.82 |
| CHM-6 | CMH-3 | 0.00 | 0.75 | 0.000 | 7.97 | 5.98 | 5.00 | 9.00 | 53.80 | -1.63 | -1 | | | | | | | |

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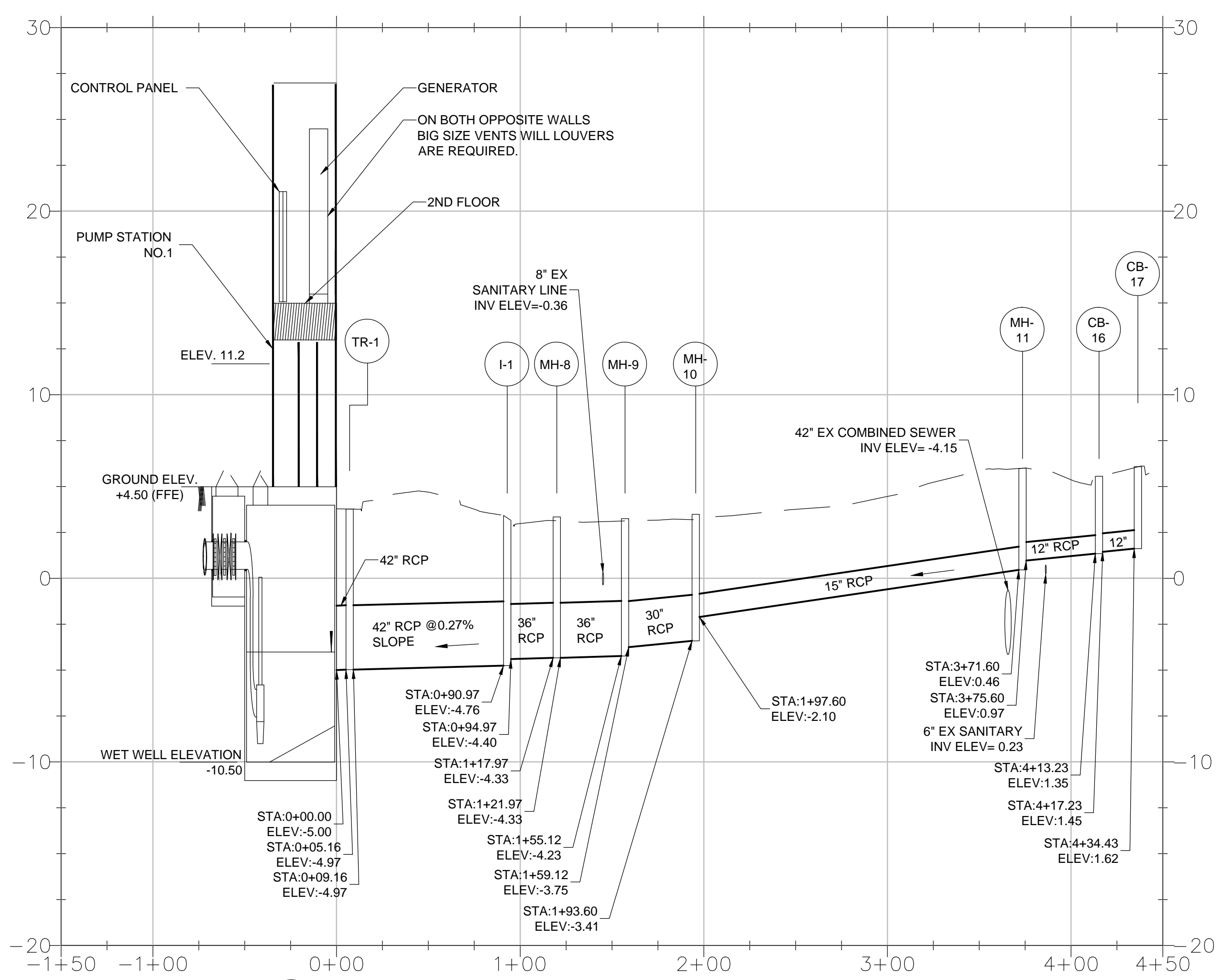


1 EXISTING STORM DRAIN FROM KING STREET DIVERTED TO PUMP STATION -1
1" = 50' HOR. 1" = 5' VERT

NOTE:
BEFORE THE CONSTRUCTION OF THE PROPOSED STORM DRAIN SYSTEM, WE RECOMMEND
A THOROUGH INSPECTION OF EXISTING STORM DRAIN SYSTEM TO ENSURE THE INTEGRITY
OF THE STORM DRAIN PIPES AND STRUCTURES



2 PROPOSED STORM DRAIN FROM CAMERON STREET TO PUMP STATION-2
1" = 50' HOR. 1" = 5' VERT



3 PROPOSED STORM DRAIN FROM PRINCE ST TO PUMP STATION-1
1" = 50' HOR. 1" = 5' VERT

WATERFRONT FLOOD MITIGATION PROJECT 15% CONCEPT DESIGN SUBMISSION

REVISIONS
INITIALS COMMENTS

Date: _____

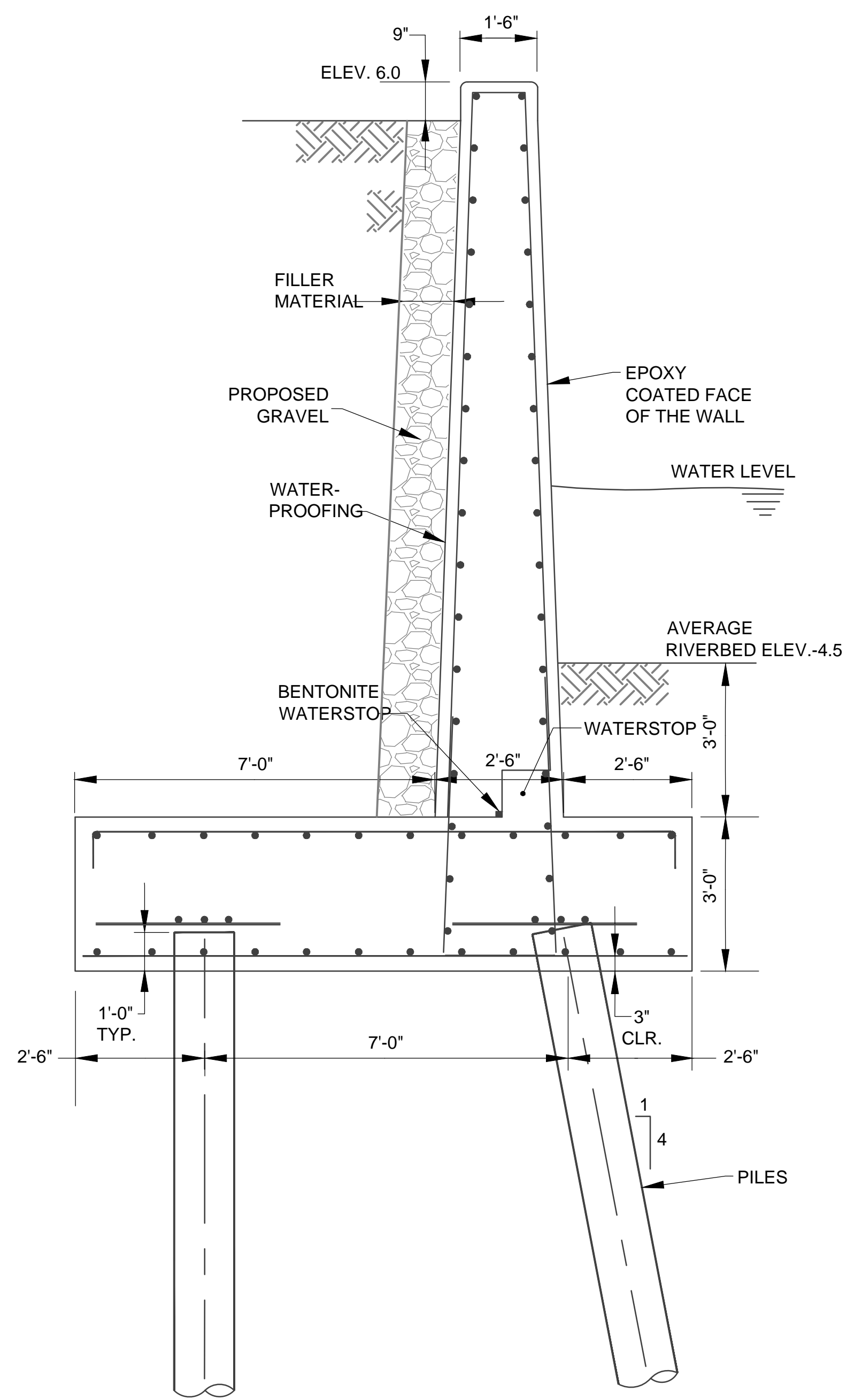
URS
12420 MILESTONE CENTER DRIVE, SUITE 150
GERMANTOWN, MD 20876

Scale: _____ Project No. _____ Sheet 18 of 19

PROPOSED STORM DRAIN PROFILES

CITY OF ALEXANDRIA, VIRGINIA
Department of Project Implementation
301 King St, Room 4-100
Alexandria, Virginia 22314

Q:\Projects\ENG\City of Alexandria\Waterfront Small Area Plan Engineering Implementation\05_Dwgs\C-Sheet\C-205 TYPICAL BULKHEAD SECTION AND NOTES.dwg Plotted: 7/31/2014 4:20 PM by Chen, Alan



1 PROPOSED ALTERNATIVE BULKHEAD SECTION
SCALE: 1/2" = 1'-0"

NOTE:
PROPOSED BULKHEAD IS CURRENTLY PLANNED TO BE DESIGNWED WITH SHEET PILES AND TIEBACKS.

GENERAL NOTES:

CODES

1. INTERNATIONAL BUILDING CODE (IBC), 2009
2. AMERICAN CONCRETE INSTITUTE (ACI), "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318-08).
3. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) "STANDARD SPECIFICATION FOR HIGHWAY BRIDGES 17TH EDITION DATED 2002"

DESIGN LOADS

1. DEAD LOADS
COMPONENTS AND EQUIPMENT - ACTUAL WEIGHT
2. LIVE LOADS
AASHTO HS-20 TRUCK LOADING
3. EARTH PRESSURE DESIGN PARAMETERS

EARTH PRESSURE CALCULATED BASED ON COULOMB THEORY.
ANGLE OF INTERNAL FRICTION:
33 DEGREES - FOR EXCELLENT SOIL
30 DEGREES - FOR GOOD AND POOR SOILS
FOR RETAINING WALLS, PASSIVE EARTH PRESSURE FROM TOP OF FOOTING TO BOTTOM OF FOOTING WAS UTILIZED IN THE DESIGN

FOUNDATION

1. 12" or 14"Ø CONCRETE PILES, EVERY 6'-0" ALONG THE WALL.

FORMWORK

1. FORMWORK SHALL BE DESIGNED IN ACCORDANCE WITH ACI 347 "GUIDE TO FORMWORK FOR CONCRETE."

CONCRETE

1. CONCRETE SHALL BE DETAILED AND CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE SPECIFICATION SECTION.
2. CONCRETE FACE OF THE WALL ALONG WATER WILL BE COATED WITH EPOXY.
3. REINFORCING STEEL SHALL BE DETAILED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AMERICAN CONCRETE INSTITUTE, (ACI 315-04) "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES," AND (ACI SP-66) "ACI DETAILING MANUAL 2004."
4. MATERIALS
CONCRETE - STRENGTHS LISTED SHALL BE THE MINIMUM COMPRESSIVE STRENGTHS TO BE ACHIEVED AT 28 DAYS.
ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI.
NORMAL WEIGHT CONCRETE SHALL WEIGH NOT MORE THAN 150 POUNDS/CUBIC FOOT (PCF)
REINFORCING STEEL - AMERICAN INSTITUTE FOR TESTING AND MATERIALS (ASTM) SPECIFICATION A615, DEFORMED, GRADE 60.
ALL REINFORCING STEEL SHALL BE EPOXY COATED STEEL.
5. ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 3/4 INCH UNLESS OTHERWISE NOTED.
6. MINIMUM REINFORCING COVER SHALL BE AS FOLLOWS, UNLESS NOTED OTHERWISE ON THE DRAWINGS:
CONCRETE EXPOSED TO EARTH & WEATHER 2"
CONCRETE CAST PERMANENTLY AGAINST EARTH 3"
CONCRETE PERMANENTLY EXPOSED TO WATER 3"
7. HOOKS FOR REINFORCING NOT SHOWN ON THESE DRAWINGS SHALL BE DETAILED AS ACI STANDARD HOOKS.
8. THE WALL WILL HAVE CONTROL JOINTS EVERY 25 FEET AND EXPANSION JOINTS EVERY 90 FEET. ALL THE JOINT SHALL HAVE WATERSTOP IN THEM.

