Floodplain Technical Memorandum

ArDOT JOB NO. CA0602

I-30 (From I-530/I-440 to I-40) and
I-40 (From Hwy. 365/MacArthur Dr. to Hwy. 67)

Pulaski County, Arkansas

October 2017

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FIGURES

ATTACHMENTS

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1.0 INTRODUCTION

Approved by Arkansas voters, the Arkansas Department of Transportation (ArDOT) is implementing an accelerated State Highway Construction and Improvement Program named the Connecting Arkansas Program (CAP).

A major component of the CAP is to implement a project to improve a portion of Interstate 30 (I-30) from Interstate 530 (I-530) and Interstate 440 (I-440) to Interstate 40 (I-40), including the Arkansas River Bridge, and a portion of I-40 from Highway (Hwy.) 365 (MacArthur Drive [Dr.]) to Hwy. 67. This project is CA0602: I-530 - Hwy. 67 (Widening & Reconst.) (I-30 & I-40), commonly known as the 30 Crossing project. **Figure 1** illustrates the proposed 7.3-mile project limits.

1.1 Existing Facility

I-30 is one of the critical links of the Central Arkansas Freeway System. It connects communities within the Central Arkansas Region and serves local, regional and national travelers with varied destinations and trip purposes.

The I-30 corridor generally consists of three main lanes in each direction with parallel one-way discontinuous frontage roads on each side of the interstate. In the northern portion of the project limits, the I-40 corridor consists of three to four main lanes in each direction with parallel one-way frontage roads on each side of the interstate between the I-30/I-40 interchange and North Hills Boulevard (Blvd.). Within the 7.3-mile corridor, four system interchanges are located:

- I-30 with I-530 and I-440
- I-30 with I-630
- I-30 with I-40
- I-40 with Highways 67/167

1.2 Proposed Alternatives

1.2.1 No-Action Alternative

The No-Action Alternative represents the case in which the proposed project is not constructed, but could include future projects identified through the long range planning process for maintaining a state of good repair as funding becomes available.

1.2.2 Action Alternatives

Two different main lane configurations are under consideration. Both would include the replacement of the Arkansas River Bridge.

- Eight-Lane General Purpose (GP) Alternative would provide four main lanes in each direction with no Collector Distributor (C/D) lanes.

- Six-Lane with C/D Lanes Alternative would reconstruct the existing six-lane (three in each direction) roadway while adding two decision lanes on each side that ultimately feed into a C/D system located at the Arkansas River Bridge.

FIGURE 1: LOCATION MAP

The current Hwy. 10 (Cantrell Rd.) interchange provides direct access to the downtown business district of Little Rock. Its proximity to the Arkansas River Bridge and the I-30 interchange with I-630 creates a unique level of complexity. In order to balance various project goals, two interchange concepts are being considered for replacement of this interchange:

- An elevated Single Point Urban Interchange (SPUI) constructed in the same location as the current interchange;
- A Split Diamond Interchange (SDI) constructed south of the existing interchange at 4th and 9th Streets.

Combining the two main lane configurations with the two Hwy. 10 (Cantrell Rd.) interchange concepts results in the four Action Alternatives as follows:

Alternative 1A: 8-Lane GP with SPUI Alternative
Alternative 1B: 8-Lane GP with SDI Alternative
Alternative 2A: 6-Lane with C/D Lanes with SPUI Alternative
Alternative 2B: 6-Lane with C/D Lanes with SDI Alternative

For detailed information on the Action Alternatives, refer to the **30 Crossing Environmental Assessment** (EA) for the proposed project.

2.0 REGULATORY BACKGROUND

The following regulatory requirements listed below apply to the floodplains located within the 30 Crossing project area.

- **Executive Order (EO) 11988, Floodplain Management (1977)** directs federal agencies to "provide leadership and take action to reduce the risk of flood loss, to minimize the impacts of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains." This EO was authorized to assist in furthering the National Environmental Policy Act (NEPA), the National Flood Insurance Act of 1968 (amended), and the Flood Disaster Protection Act of 1973.
- **23 Code of Federal Regulations (CFR), Part 650 – Highways, Chapter I – Federal Highway Administration, U.S. Department of Transportation, Part 650 – Bridges, Structures, and Hydraulics,** prescribes the policies and procedures that the FHWA is directed to implement in the "location and hydraulic design of highway encroachments on floodplains."
- **44 CFR Part 1 – Emergency Management and Assistance, Chapter I – FEMA,** contains the basic policies and procedures of the Federal Emergency Management Agency (FEMA) to regulate floodplain management and to analyze, identify, and map floodplains for flood insurance purposes.

3.0 METHODOLOGY

Floodplains are the areas that are inundated during a storm of given magnitude. A 100-year floodplain is the regulatory floodplain associated with a 100-year design storm frequency, or base flood. Floodplains are designated on mapping used by the FEMA flood insurance program. The floodplain associated with the base flood is designated Zone A, AE, or AH. The FEMA designated flood zones are shown on the FEMA Floodplain maps in **Attachment A** for the project area. The project area intersects the 100-year floodplain at Fourche Creek, Arkansas River, and the Dark Hollow Basin.

Changes in the floodplain, such as adding fill material, constructing buildings or bridges, or constricting the channel, can cause a rise in the water surface elevation. This increase in the water surface elevation can subsequently impact properties not previously affected and are consequently regulated by FEMA. Floodplain impacts are measured by the change in the water surface elevation or Base Flood Elevation (BFE).

The floodway is a portion of the floodplain and stream channel reserved for the passage of flood waters while providing for suitable use of the adjacent land. It must be kept free of encroachment in order to carry the base flood without increasing the water surface more than a designated height. Hydraulic modeling is used to generate the floodway limits, which are site specific to each stream channel. Delineating a floodway requires an analysis of the effects of eliminating areas of flow in the overbanks on computed water surface elevations. Within the project area, the Arkansas River and Fourche Creek have designated floodways.

Detailed HEC-RAS flood models have been developed for Fourche Creek and for the Arkansas River. Flood elevations in those locations are therefore listed at Zone AE, meaning BFE's are determined. The Arkansas River HEC-RAS model was modified to include the proposed I-30 bridge. This evaluation is presented in a separate report, the I-30 Arkansas River Bridge Replacement Bridge Hydraulics Report.

The Fourche Creek floodway is considered Zone AE, meaning that BFE's have been determined by hydraulic modeling. The analysis presented herein for Fourche Creek is volumetric only. Fill volumes were calculated between the ground surface elevation, and the BFE at the locations of encroachment (elevation 256.5 NAVD).

Dark Hollow is considered Zone AH, meaning BFE's were developed to reflect 1-3 feet of ponding. Surveys performed for this project allowed the exact limits of the 100-year floodplain to be determined and represented as the 252-foot contour for the purposes of estimating fill and compensation volumes. Fill and compensation volume calculations were performed using these floodplain limits rather than the estimated limits shown on the Flood Insurance Rate Maps (FIRM), included as **Attachment A**. The analysis presented herein for Dark Hollow is volumetric only. For both Action Alternatives, permanent fill volumes were calculated between the ground surface elevation, and the BFE for Dark Hollow (252). Any permanent excavation occurring as a result of the project between those elevations was deducted from the fill volume.

The vertical datum used to identify elevations in this memo is North American Vertical Datum (NAVD) 1988. The horizontal datum used to identify the location of the project and floodplains is North American Datum (NAD) 83, GRS80 spheroid.

4.0 EXISTING CONDITIONS

Fourche Creek begins at the foot of Brush Mountain, near Ferndale, approximately 20 miles northwest of the southern end of the proposed project. Fourche Creek flows southeast through the southern end of the project area to join with the Arkansas River, 5 miles southeast of the project area. The FEMA designated floodway of Fourche Creek passes through the I-30, I-530, and I-440 interchange (**Figure 1**). The channel of Fourche Creek meanders through the interchange, crossing I-440 at several locations.

The Dark Hollow Basin, a ponding/flood detention area, is located along the I-40 corridor in the northern portion of the project area, from the I-30/I-40 interchange to the I-40/US 67 interchange (**Figure 2**). There is no FEMA designated floodway for the Dark Hollow Basin. The Dark Hollow Basin is drained by two major drainage channels, referred to in the *North Little Rock, Dark Hollow Limited Re-Evaluation Report (USACE, 2002)* as the Pike Diversion Ditch (PD1) and Dark Hollow Channel (DH 2/3). Pike Diversion Ditch originates near the I-30/I-40 interchange, where it is identified on FIRM Map 05119C0344G as Fairman Ditch Tributary 1. Downstream of I-30, PD1, which is shown on USGS Quad maps as the Fairman Ditch, continues east for approximately 4700 feet before turning south. Dark Hollow Channel (DH3) originates on the east side of the North Hills interchange, passes under I-40, and drains south and east under the Union Pacific Railroad (UPRR). Dark Hollow Channel is shown on USGS Quad maps as Ditch Six. South of the UPRR crossing, Dark Hollow Channel joins with a channel originating to the east called Dixie Addition (DA). South of the point of confluence of DH3 and DA, Dark Hollow Channel is designated DH2. PD1 drains through the Dark Hollow Basin, passing under the UPRR, and unites near Sam Evans Drive with DH2, forming DH3, which continues along Range Line Avenue for about 1500 feet. At this point the channel enters the Redwood Tunnel, an arch-shaped culvert running underground along North Redwood Street for approximately 2,700 feet, where it discharges into the Arkansas River. The Redwood Tunnel was identified in the *North Little Rock, Dark Hollow Limited Re-Evaluation Report (USACE, 2012)* as undersized with respect to the flow it carries.

In an effort to evaluate alternatives to alleviate flooding in the Dark Hollow Basin, the *North Little Rock, Dark Hollow Limited Re-Evaluation Report (USACE, 2012)* analyzed conveyance and storage improvements using HEC-HMS and HEC-RAS. The *North Little Rock Dark Hollow Limited Re-Evaluation Report (USACE, 2011)* recommended conveyance improvements focused on the existing channels and the Redwood Tunnel, as well as storage improvements located in the Dark Hollow floodplain.

The existing conditions water surface elevations from the hydraulic model in the *North Little Rock, Dark Hollow Limited Re-Evaluation Report (USACE, 2012)* agrees with the BFE of 252 shown on the FIRM maps for the Dark Hollow Basin. The elevation 252 contour was therefore considered to be the limit of the base flood for the purpose of calculating potential floodplain impacts from the project in the Dark Hollow Basin.

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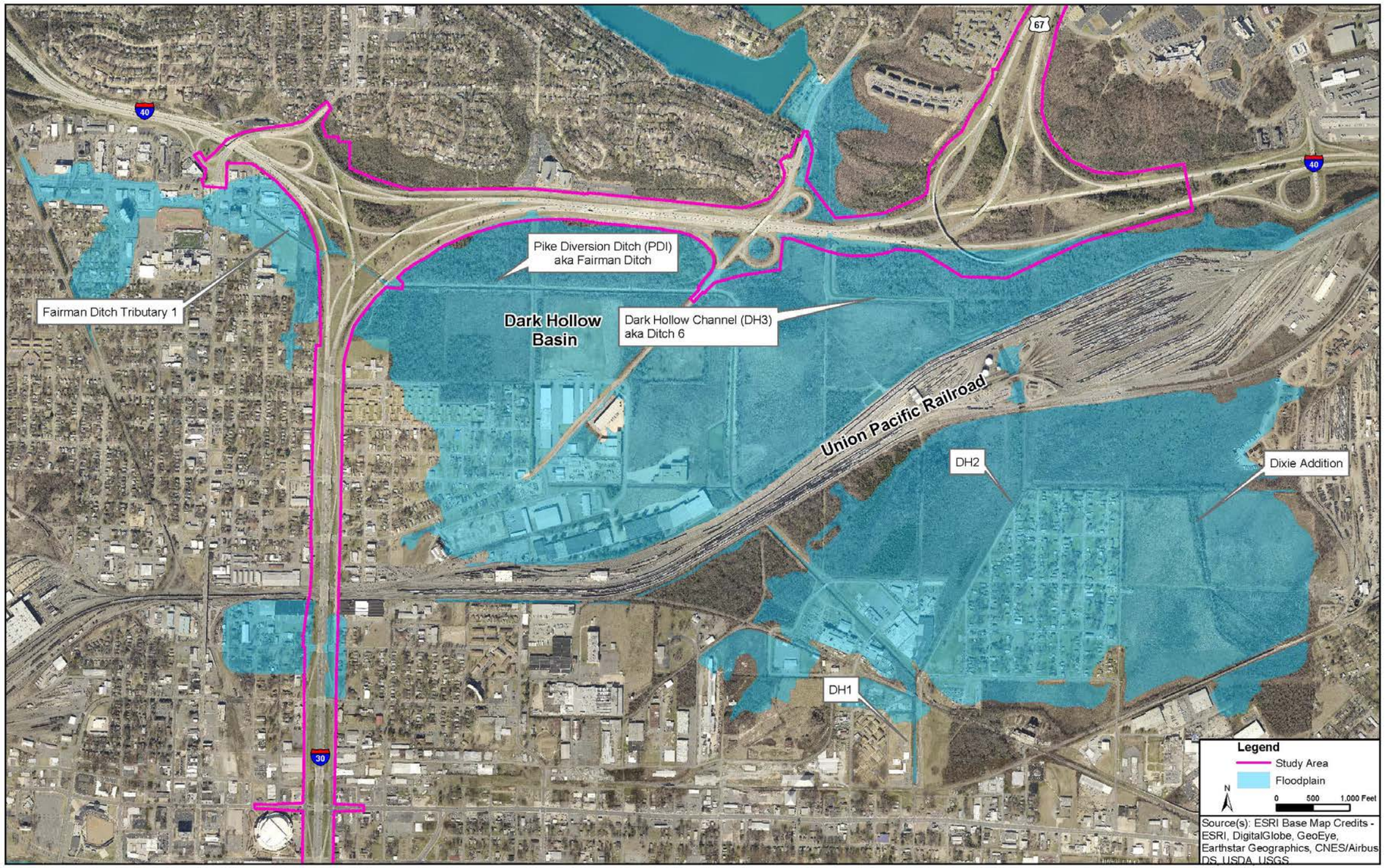
FIGURE 2: DARK HOLLOW FLOODPLAIN



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5.0 IMPACTS AND MITIGATION

5.1 No-Action Alternative

The No-Action Alternative would have no effect on floodplains.

5.2 Proposed Action Alternatives

The proposed Action Alternatives would raise and widen I-30, which has the potential for placing fill in floodplains at Fourche Creek and Dark Hollow. The estimated impacts from the Action Alternatives on floodplains are given in Sections 6.2.1 and 6.2.2.

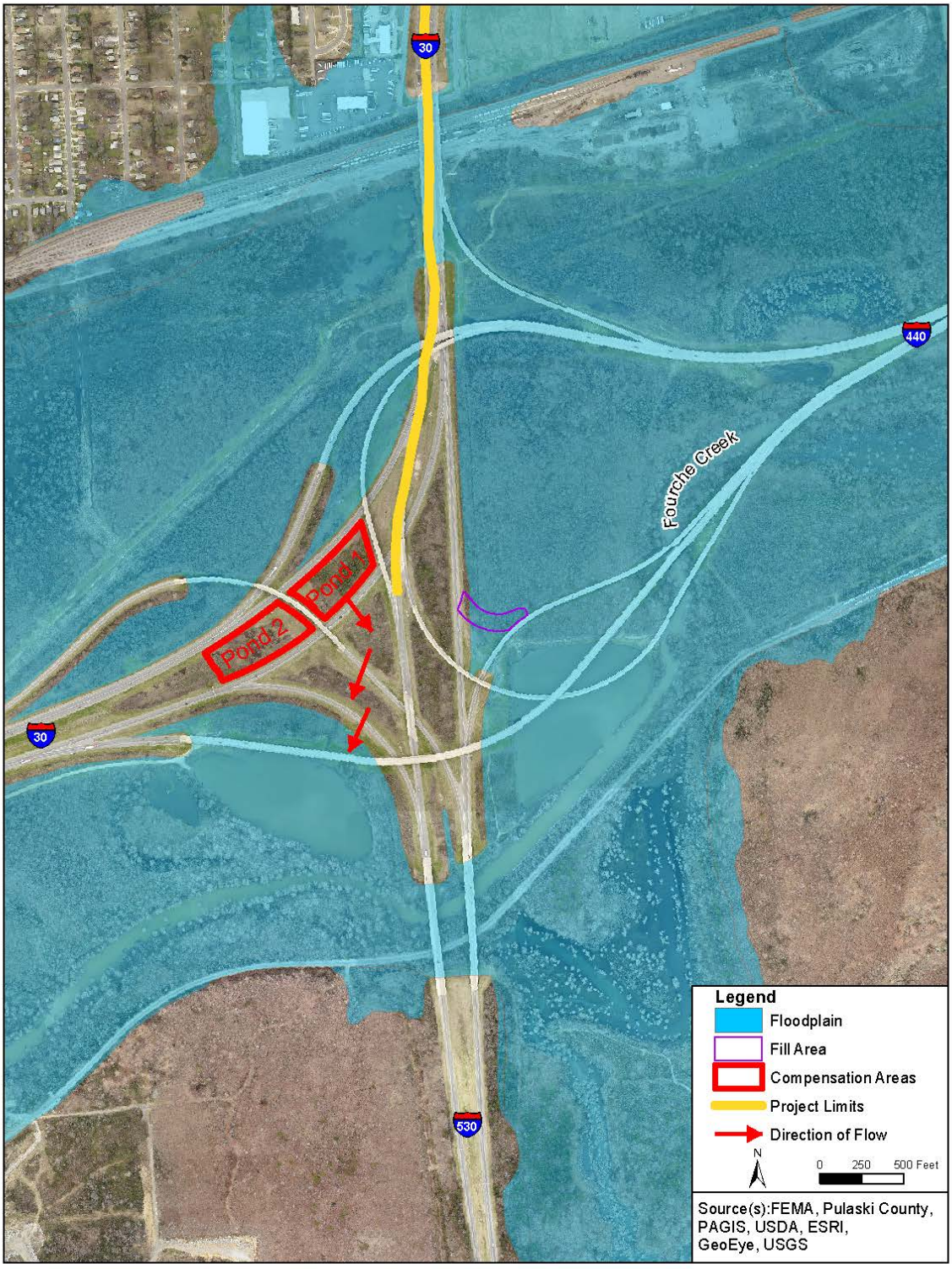
5.2.1 Fourche Creek

The conceptual maintenance of traffic plan developed for this project requires that fill would have to be temporarily placed within the floodway associated with Fourche Creek to construct a temporary ramp from I-440 westbound to I-30 northbound. The fill would be located north of the channel of Fourche Creek, immediately on the downstream (east) side of I-530. Consequently, while this area provides storage of flood waters, it is in an ineffective flow area. The temporary fill would be removed following construction, but volume compensation is being proposed to account for the possibility of a flooding event occurring during construction. For both the 8-Lane G P and 6-Lane with C/D Alternatives, the temporary fill volume is approximately 11.2 Acre-feet (Ac-ft), calculated between the existing ground surface and the BFE of 256.5 **(Figure 3)**. In addition to this temporary fill, the proposed bridge over the Fourche Creek floodplains would be wider than the existing bridge, resulting in approximately 0.1 Ac-ft of additional permanent fill due to bridge piers.

The proposed compensating areas (Ponds 1 and 2) are located west of I-530, in the median of I-30. Ponds 1 and 2 would be connected, under the elevated I-530 northbound to I-30 westbound ramp, during flood events. The compensation areas would be connected to Fourche Creek under I-30 to the south so that they would fill as flood waters rise in Fourche Creek. The exact method of making this connection would be the responsibility of the Design Builder. The proposed compensating volume is 11.93 Ac-ft. This compensation addresses an anticipated temporary condition; however, the compensation is permanent and can be used to offset other floodplain impacts in Fourche Creek with either this or other projects.

The floodplain impacts to Fourche Creek and the conceptual mitigation plan were discussed with the City of Little Rock at a meeting on January 11, 2017 (**Attachment D**). The City of Little Rock requested that the Design Builder provide a “no-rise” certification for the Fourche Creek crossing and approved the conceptual mitigation plan.

FIGURE 3: TEMPORARY FLOODPLAIN FILL AND COMPENSATING STORAGE AREAS IN I-30/I-530/I-440 INTERCHANGE



5.2.2 Dark Hollow

It is not possible to widen the roadway and avoid placing additional fill in the Dark Hollow floodplain. Encroachment is minimized with both Action Alternatives by bridging the floodplains wherever feasible.

In Dark Hollow, approximately 18.01 Ac-ft of permanent fill would be placed below elevation 252 with the 8-Lane GP Alternative, and 17.43 Ac-ft of permanent fill would result from the 6-lane with C/D Alternative **(Figures 4 and 5**).

Mitigation in the form of compensatory storage would be created to replace the storage lost in the Dark Hollow floodplain due to permanent roadway fill. In the I-30/I-40 interchange, three areas were identified as contiguous and hydraulically connected to the Fairman Ditch, which passes through the interchange from west to east. These flood storage areas are shown on **Figure 6**. As flood surface elevations rise in Fairman Ditch, flood waters would spill out of the channel and fill the contiguous flood storage areas. The areas would be graded to allow flood waters to drain to the Fairman Ditch (**Attachment B**). The exact method of making this connection would be the responsibility of the Design Builder. The volume able to be created in these three areas is 11.57 Ac-ft, 3.67 Ac-ft, and 10.85 Ac-ft, for a total of 26.09 Ac-ft. This is an excess of 8.08 Ac-ft over the worst case amount of fill that would result from any of the Action Alternatives in the Dark Hollow floodplain.

The floodplain impacts to Dark Hollow and the conceptual mitigation plan were discussed with the City of North Little Rock at a meeting on October 11, 2016 (**Attachment D**). The City of North Little Rock approved the conceptual mitigation plan.

FIGURE 4: PERMANENT FLOODPLAIN FILL AREAS IN DARK HOLLOW (I-30/I-40 INTERCHANGE)

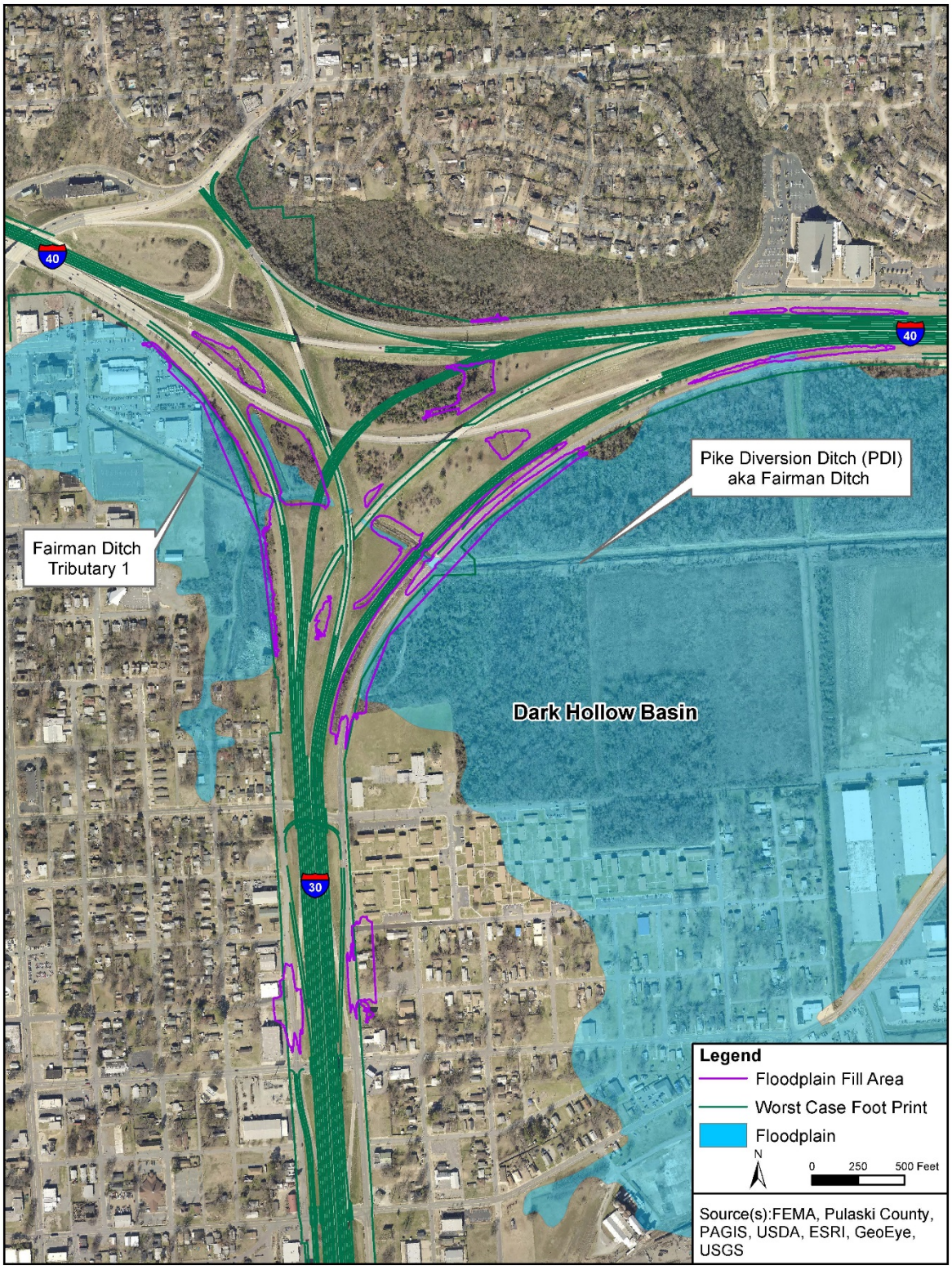


FIGURE 5: PERMANENT FLOODPLAIN FILL AREAS IN DARK HOLLOW AREA (NORTH HILLS INTERCHANGE)

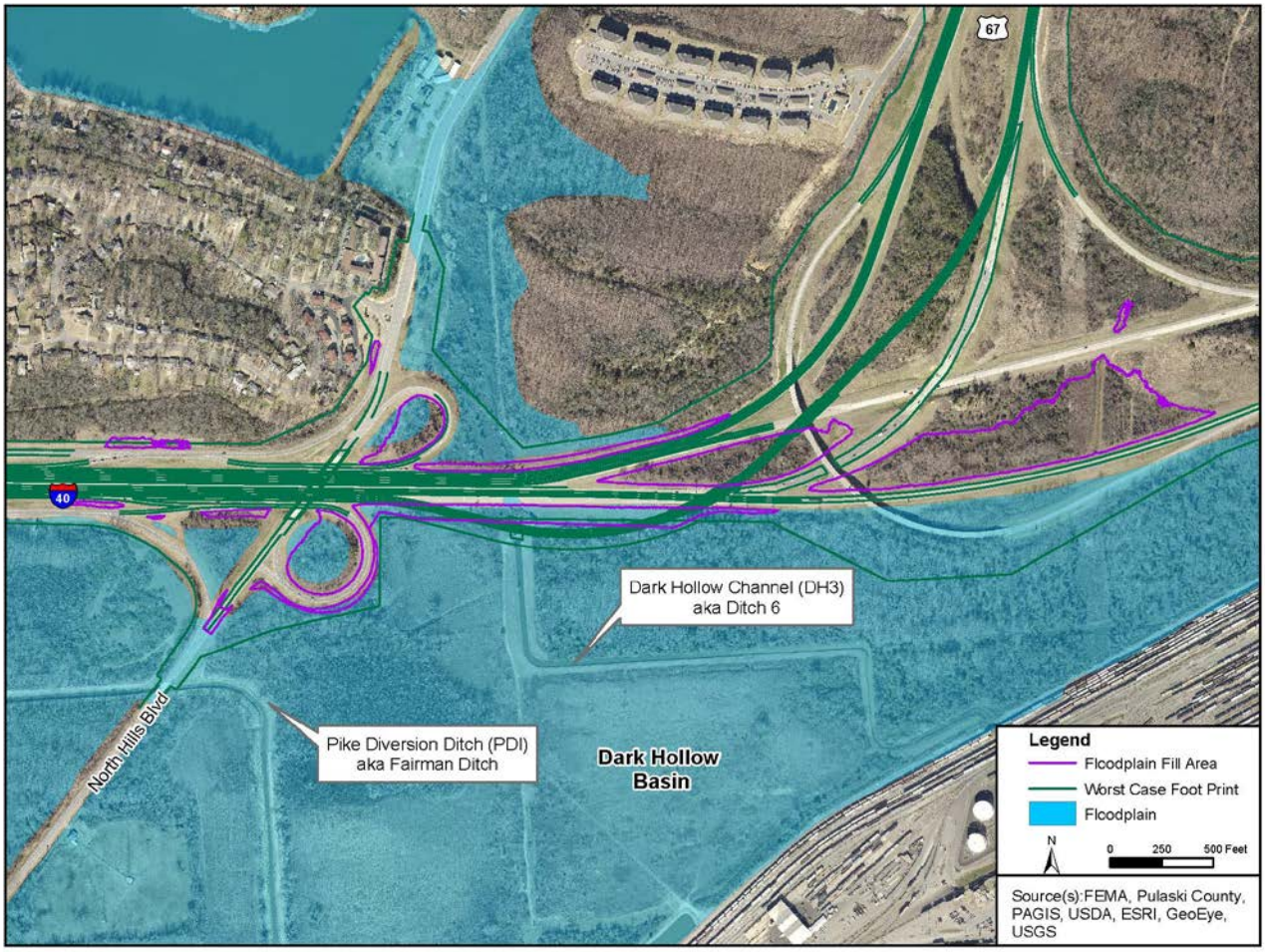
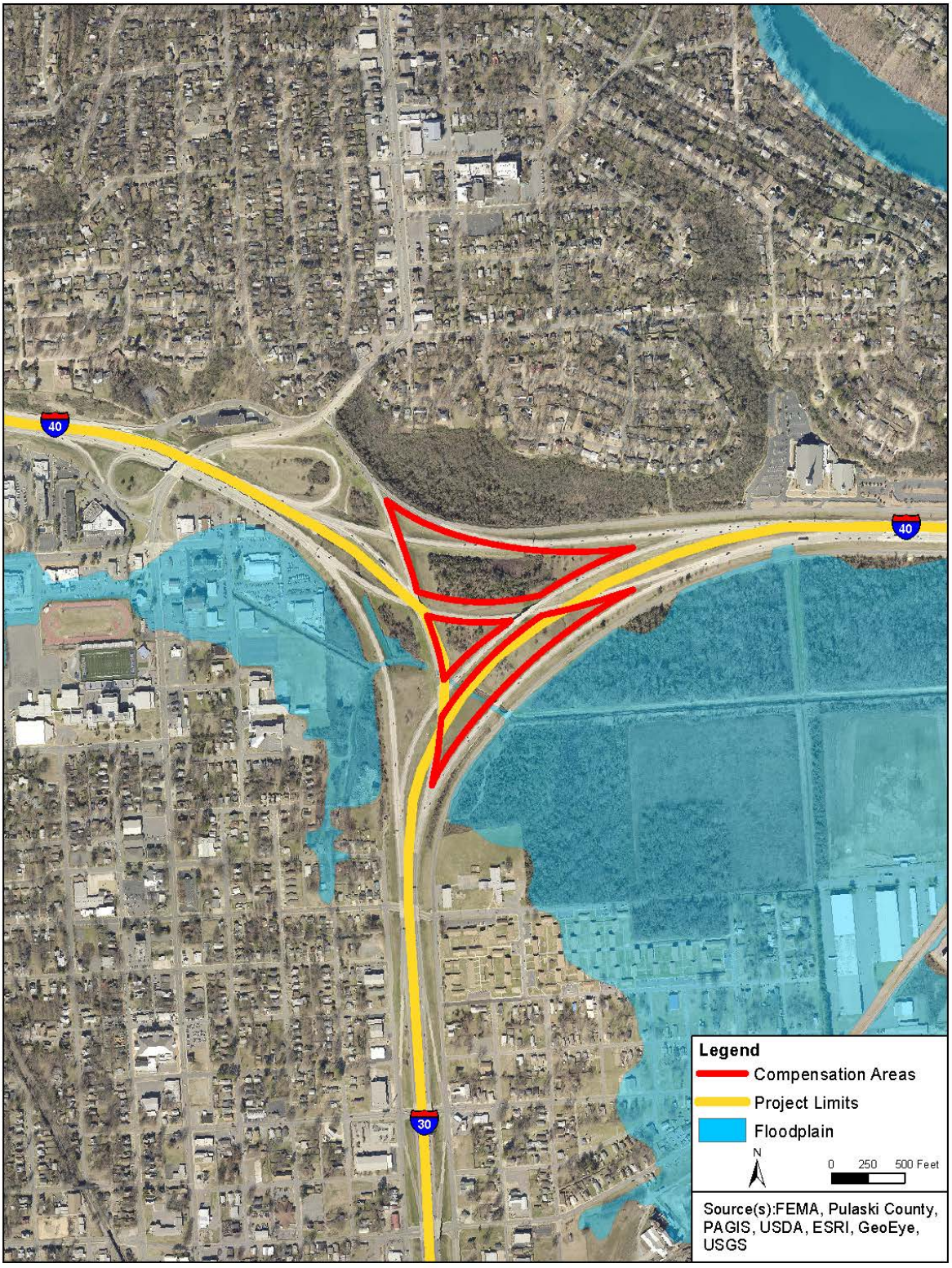


FIGURE 6: FLOODPLAIN COMPENSATION AREAS FOR DARK HOLLOW BASIN



6.0 SUMMARY AND CONCLUSIONS

The proposed 30 Crossing Action Alternatives are expected to involve encroachment into the 100-year floodplains of Fourche Creek, the Arkansas River, and Dark Hollow. These encroachments are unavoidable and, as a result of minimization and mitigation measures, would not result in an increase in floodplain elevations or loss of floodplain storage.

7.0 REFERENCES

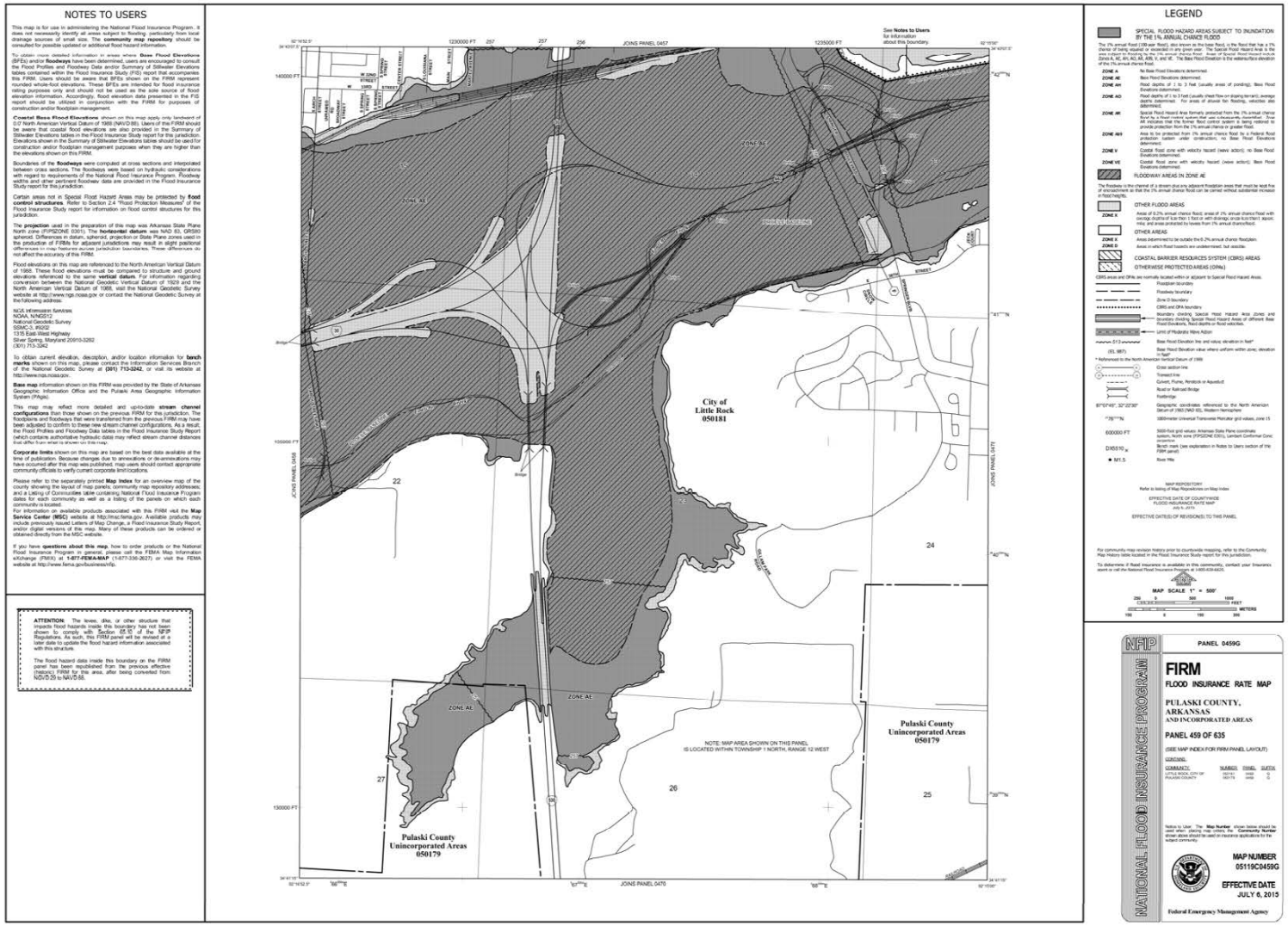
Federal Emergency Management Agency (FEMA). Flood Insurance Study Pulaski County, Arkansas, and Incorporated Areas Volume 1 of 3. July 2015.

Federal Emergency Management Agency (FEMA). Flood Insurance Study Pulaski County, Arkansas, and Incorporated Areas Volume 2 of 3. July 2015.

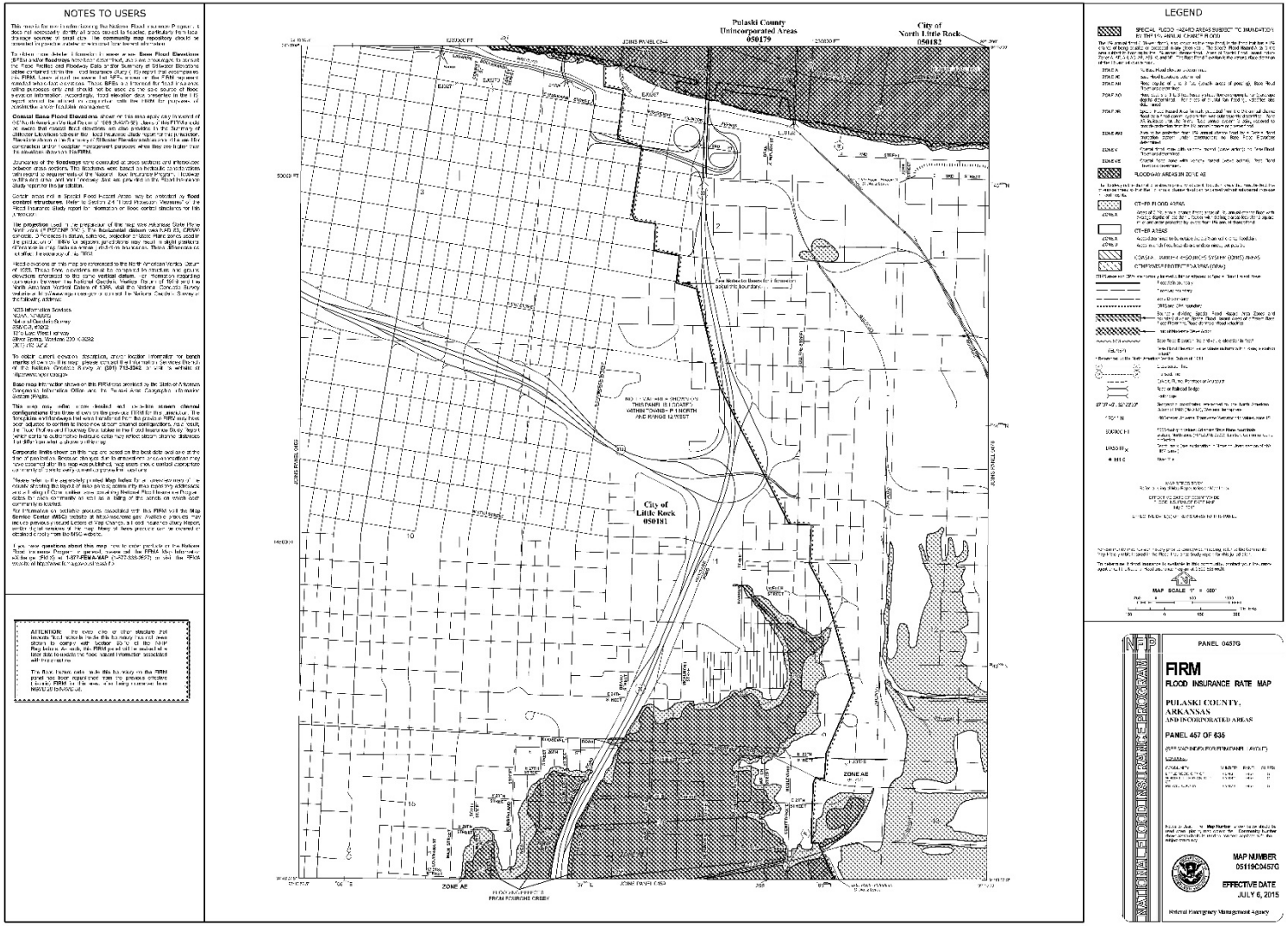
U.S. Army Corps of Engineers. North Little Rock, Dark Hollow Limited Re-Evaluation Report. Appendix A: Hydrology and Hydraulics Report. April 2002 (Updated April 2006).

Attachment A: Flood Insurance Rate Maps

Attachment A-1 FIRM Map 459

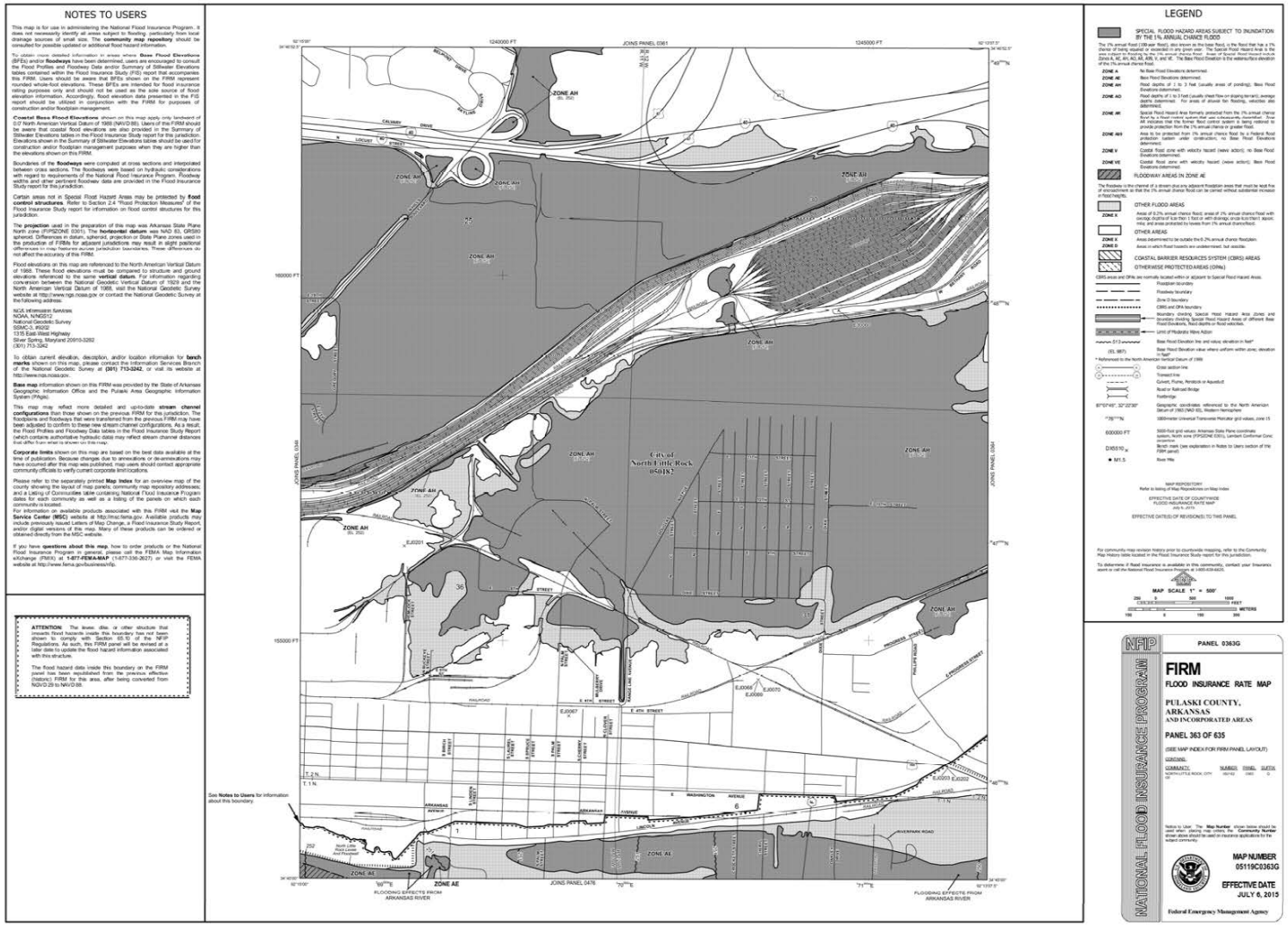


Attachment A-2 FIRM Map 457



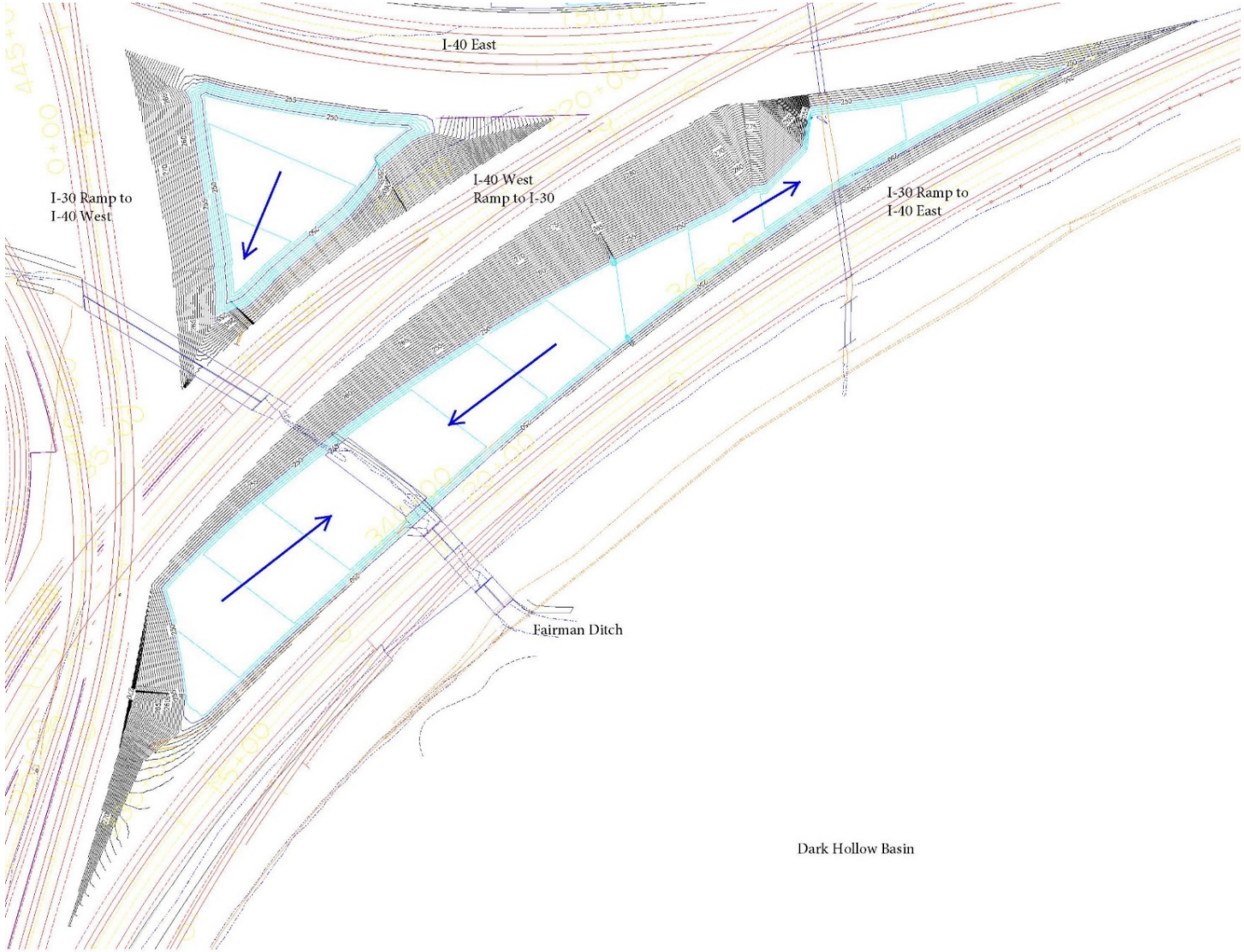
Attachment A-3 Firm Map 334

Attachment A-4 Firm Map 363

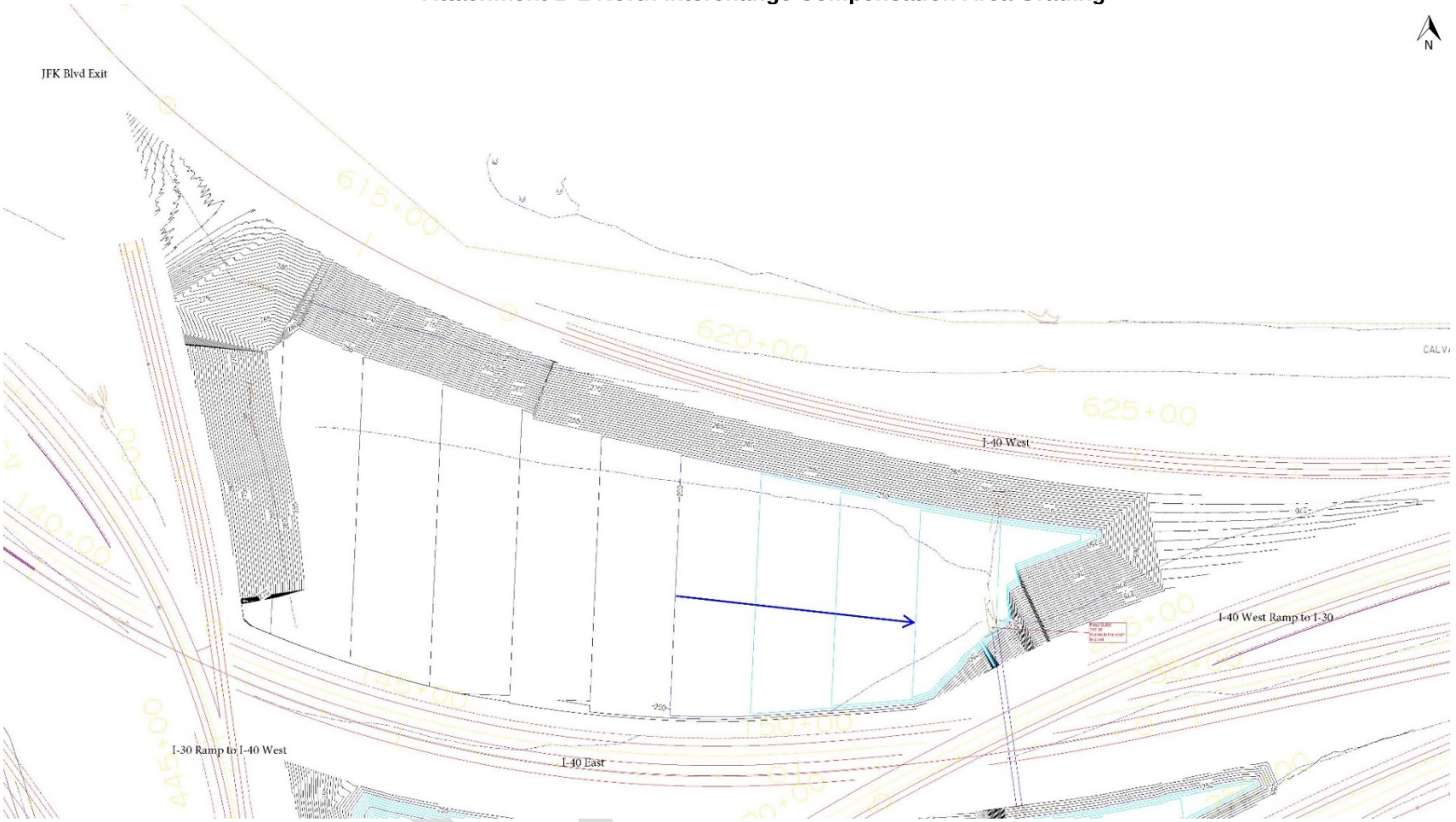


Attachment B: Grading Plan for Floodplain Compensation Areas

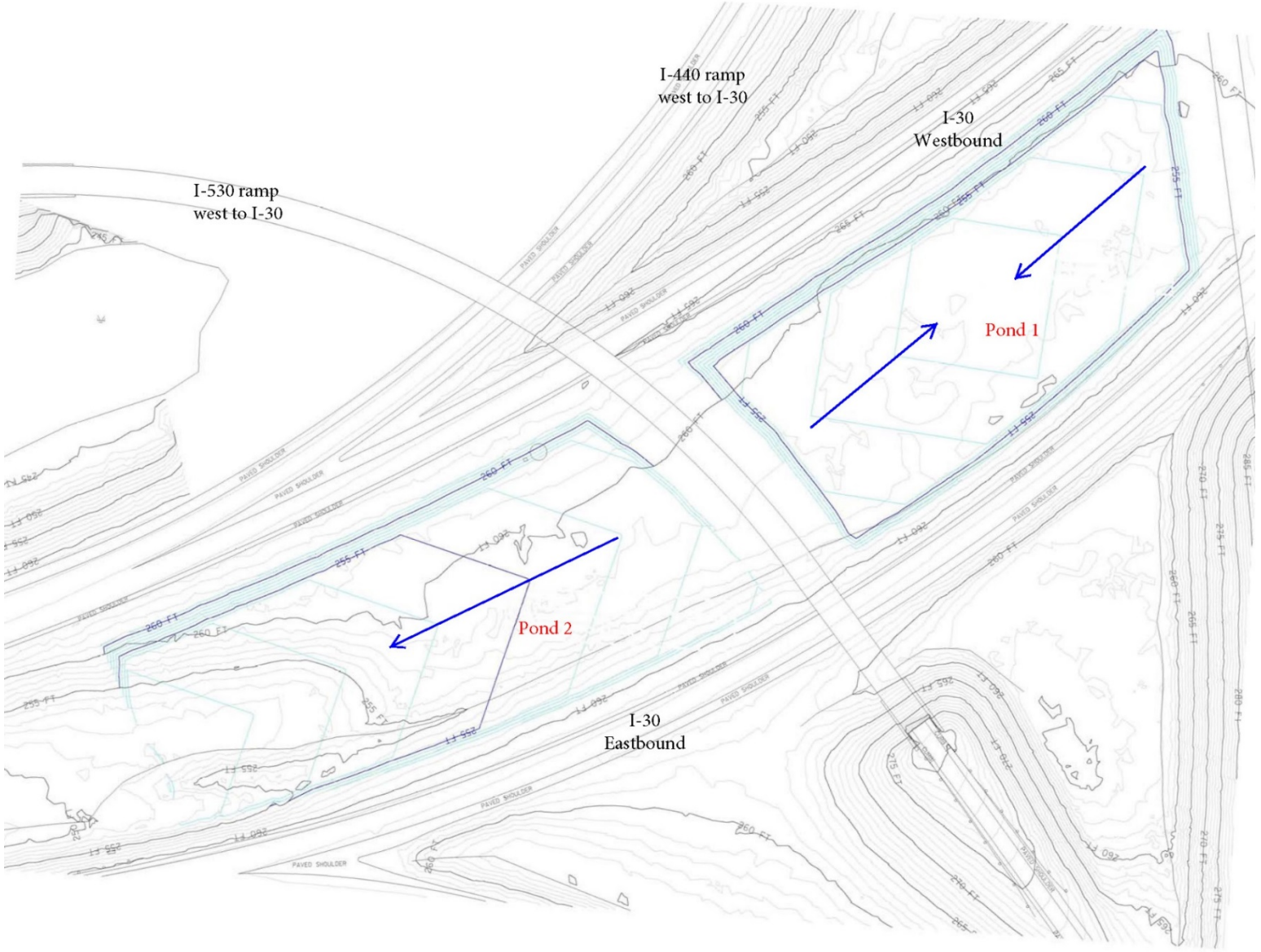
Attachment B-1 North Interchange Compensation Area Grading



Attachment B-2 North Interchange Compensation Area Grading



Attachment B-3 South Interchange Compensation Area Grading



Attachment C: Volume Calculations

TECHNICAL MEMORANDUM

Revised Floodplain Compensating Storage Volumes at Southern Terminus of Project due to Temporary Detour for Reconstruction of I-440 WB to I-30 EB Ramp

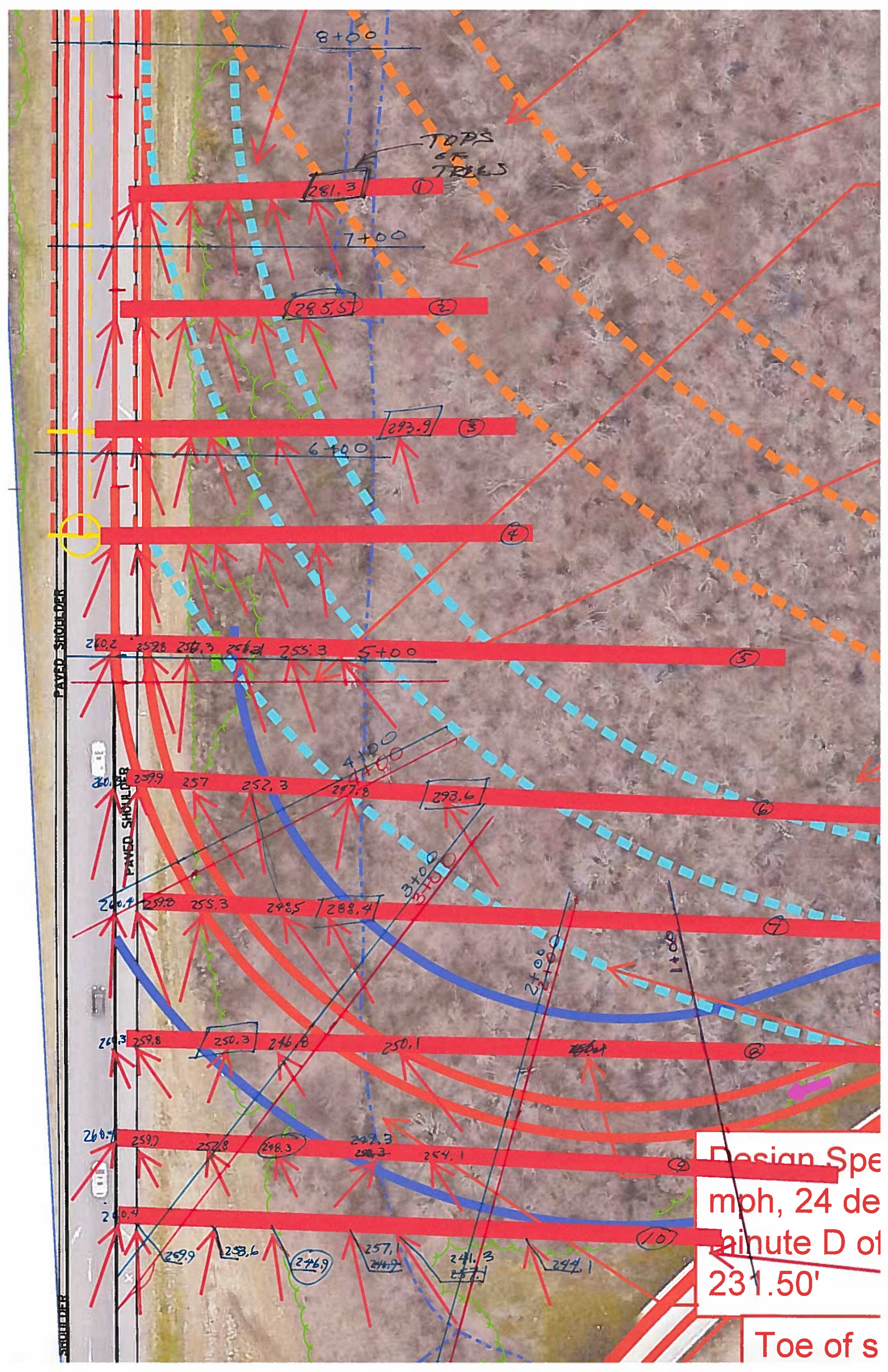
PREPARED FOR:	AHTD
COPY TO:	GarverUSA
PREPARED BY:	CH2M –Tim Walsh TBW
DATE:	August 12, 2016
PROJECT NUMBER:	657528
APPROVED BY:	CH2M--Mark Callahan MSC

In order to reconstruct portions of the I-440 WB to I-30 EB ramp but maintain this movement, a temporary detour is necessary. This detour is to be constructed by partially widening certain causeway bridge structures plus constructing an earthern berm portion. Previously, an estimate of the fill volumes between normal ground and the floodplain elevation of 256.5 were prepared. However, that estimate was based upon an assumption that the natural ground elevation was at elevation 236. This assumed elevation was based upon limited survey information. Google Earth files were utilized to obtain natural ground elevation estimates. However, it was apparent that the elevations within the treelines were the actual tops of trees and not representative of the actual ground. The assumed existing ground elevation at the creek (236) was obtained from an unobscured area. It was recognized that the resulting compensating storage volume estimate based upon the natural ground elevation of 236 was very conservative.

Mr. John Cantabery (Garver) suggested that utilizing county LIDAR data through PAGIS may give more realistic elevations. A revised estimate of the required compensating storage volume was prepared using this LIDAR information.

This revised estimate was based upon preparing cross sections at 100 foot intervals along the proposed detour alignment and calculating volumes by average end area method. Worksheets and calculations are attached.

Based upon this revised and more detailed engineering analysis, it was computed that the compensating storage volume for the earthen embankment of this temporary detour ramp is 18,069 cys or 11.2 acre-feet.


8+00
TOPS OF TREES
281.3
1
7+00
285.5
2
293.9
3
6+00
4
PAVED SHOULDER
260.2
259.8
256.3
255.3
5+00
5
4+00
4+00
260.1
259.9
257
252.3
297.8
293.6
6
3+00
3+00
240.1
259.8
255.3
248.5
288.4
7
2+00
2+00
1+00
263
259.8
250.3
246.8
250.1
8
260.7
259.2
252.8
248.3
249.3
254.1
9
240.4
259.9
253.6
246.9
257.1
241.3
244.1
10
Design Spe
mph, 24 de
minute D of
231.50'
Toe of s

In the pdf file, line 1 is on top. Work way from top to bottom
The points below match up with the arrows. Work your way
from left to right.

LINE	EOL	EOS	E/W	MID	TOE	WOODS
1	260.5	260.1	252.2	251	249.7	281.3

LINE	EOL	EOS	E/W	MID	TOE	WOODS
2	260.4	260	256.8	252.5	247.1	285.5

LINE	EOL	EOS	E/W	MID	TOE	WOODS
3	260.4	259.9	254.2	250.6	247.9	293.9

LINE	EOL	EOS	E/W	MID	TOE	WOODS
4	260.4	259.9	256	255.6	252.2	289.7

LINE	EOL	EOS	E/W	MID	TOE	WOODS
5	260.2	259.8	256.3	256.1	255.3	293.1

LINE	EOL	EOS	E/W	MID	TOE	WOODS
6	260.3	259.9	257	252.3	247.8	293.6

LINE	EOL	EOS	MID	E/W	TOE	WOODS
7	260.4	259.8	255.3	1	248.5	288.4

LINE	EOL	EOS	MID	E/W	TOE	WOODS
8	260.3	259.8	250.3	1	246.8	250.1

LINE	EOL	EOS	MID	TOE	E/W	STREAM	WOODS
9	260.4	259.9	252.8	248.3	1	249.3	254.1

LINE	EOL	EOS	MID	TOE	E/W	WOODS	STREAM	WOODS
10	260.4	259.9	253.6	246.9	1	257.1	241.3	244.1

POINTS REPRESENT

EOL	Edge of Lane
EOS	Edge of Shoulder
MID	Mid Point of Slope
TOE	Toe of Slope
E/W	Edge of Woods
WOODS	In Woods

NOTES:

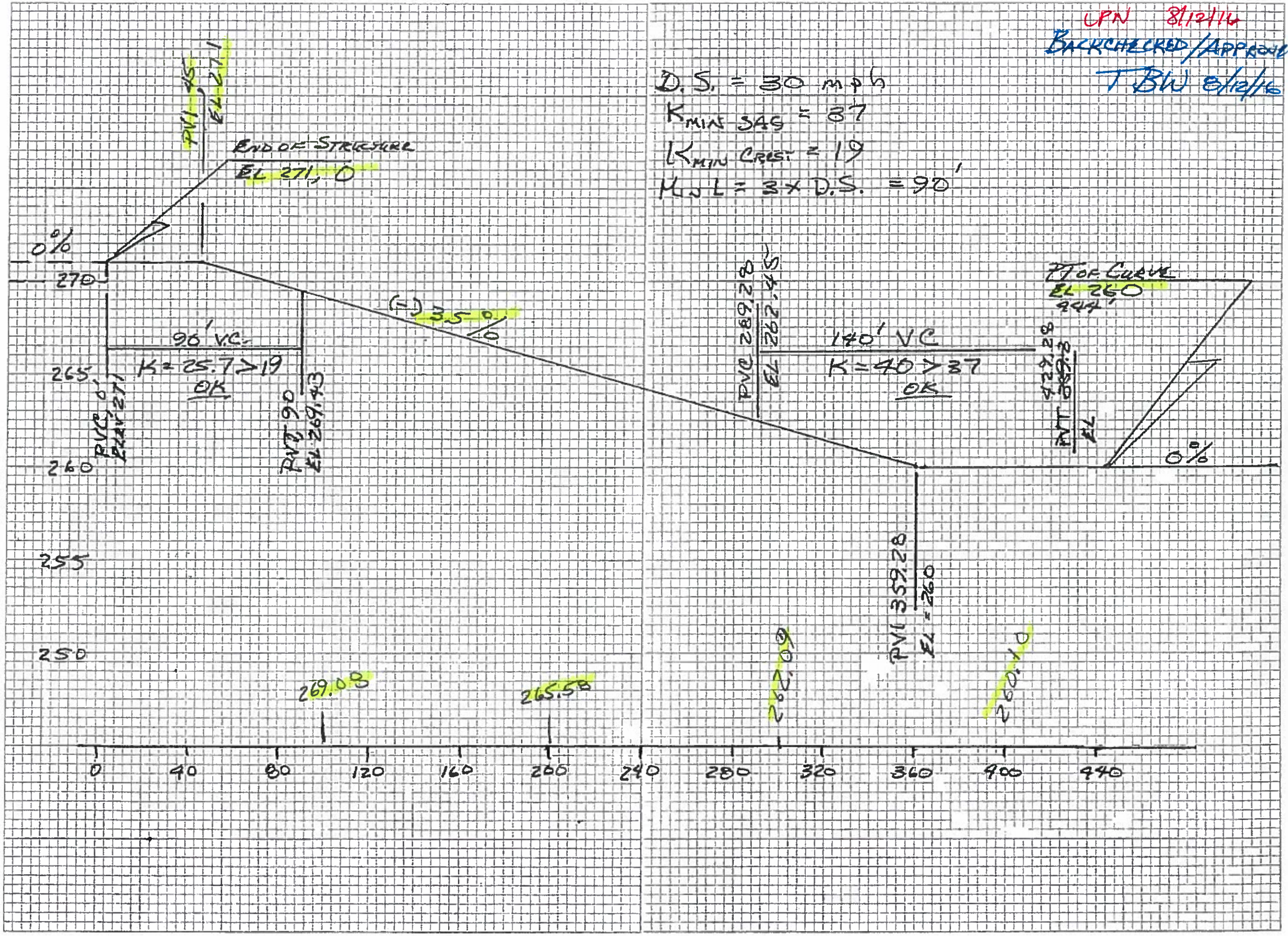
1 Same point as point to the left. For example in line 7, one arrow represents the MID point and E/W point with an elevation of 255.3

CH2MHILL SUBJECT PROFILE I-440 DETOUR RAMP BY JSW SHEET NO. 1 of 1 DATE 7/21/16 PROJECT NO.

CH2MHILL SUBJECT BY SHEET NO. of DATE PROJECT NO.

LPN 8/12/16
BACKCHECKED/APPROVED
TBW 8/12/16

D.S. = 30 mph
$K_{MIN\ SAG} = 37$
$K_{MIN\ CREST} = 19$
$L_{MIN} = 3 \times D.S. = 90'$



ILL SUBJECT _____ BY _____ HILL SUBJECT _____ HILL SUBJECT _____ BY _____

_____ SHEET NO. ____ of ____ DATE _____ _____ _____ SHEET NO. ____ of ____ DATE _____

_____ PROJECT NO. _____ _____ _____ PROJECT NO. LPN 8/12/16

STA 0+00 END OF BRIDGE

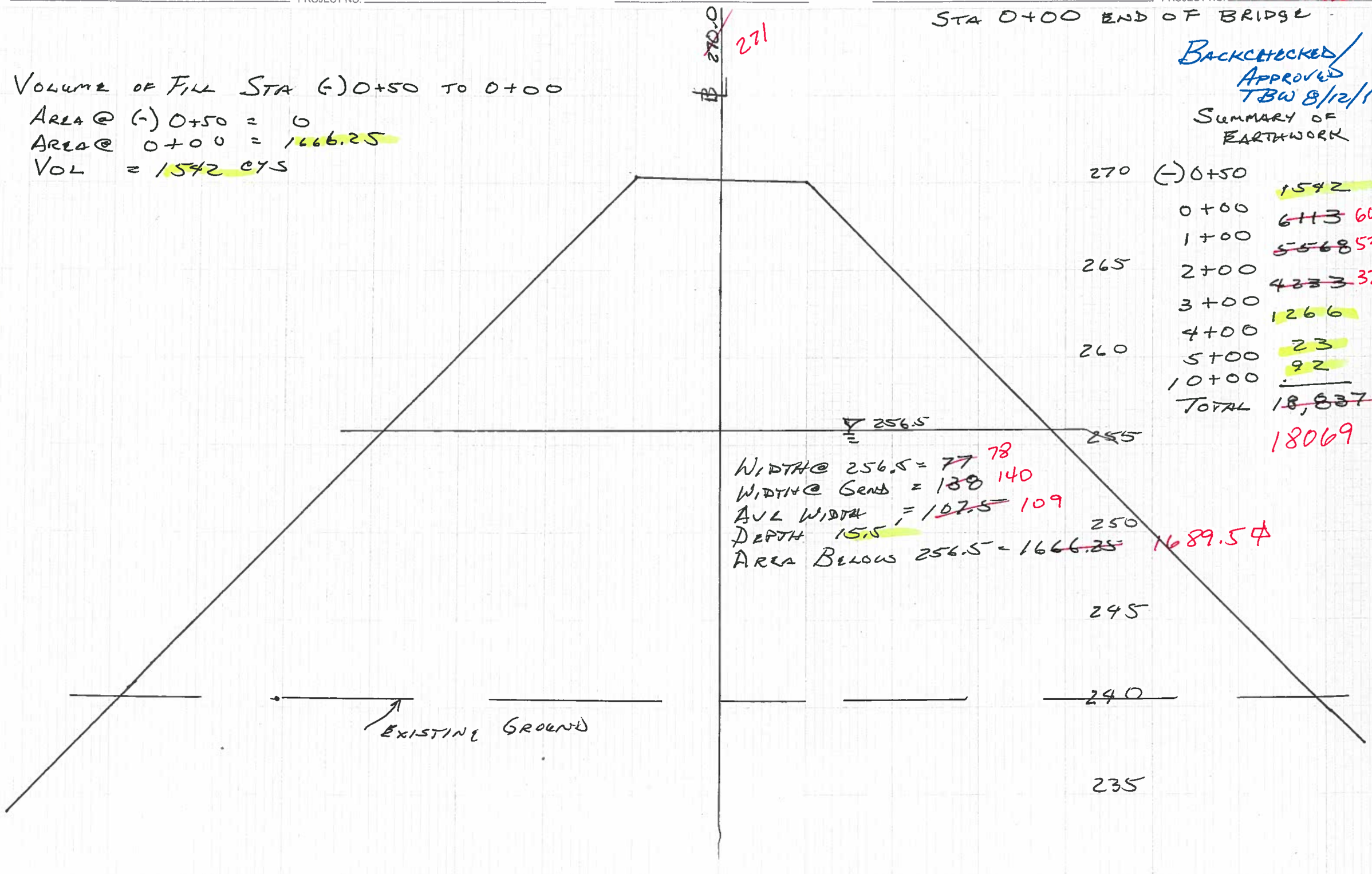
BACKCHECKED / APPROVED TBW 8/12/16

VOLUME OF FILL STA (-)0+50 TO 0+00

AREA @ (-) 0+50 = 0

AREA @ 0+00 = 1666.25

VOL = 1542 CYS



WIDTH @ 256.5 = ~~77~~ 78

WIDTH @ GRND = 138 140

AVE WIDTH = ~~107.5~~ 109

DEPTH 15.5

AREA BELOW 256.5 - ~~1666.25~~ 1689.5 ✓

SUMMARY OF EARTHWORK

270	(-)0+50	1542
	0+00	~~613~~ 6026
	1+00	~~5568~~ 5396
265	2+00	~~4333~~ 3724
	3+00	1266
	4+00	23
260	5+00	92
	10+00	_____
	TOTAL	~~18,837~~
		18069

ILL SUBJECT _____ BY _____ HILL
SHEET NO. ____ of ____ DATE _____
PROJECT NO. _____

SUBJECT _____ HILL
SUBJECT _____
BY _____
SHEET NO. ____ of ____ DATE _____
PROJECT NO. _____

LDN 8/12/16
BACKCHECKED/
APPROVED TBW
8/12/16

VOLUME OF FILL STA 0+00 TO 1+00

AREA @ 0+00 = ~~1666.25~~ 1689
AREA @ 1+00 = ~~1635~~ 1565
VOLUME = ~~6,113~~ CYS 6026 CY

STA 1+00

269.08

270
265
260
256.5
255
250
245
240
235

FLOOD AREA

WIDTH @ 256.5 = ~~78~~ 70
WIDTH @ 241 = ~~136~~ 132
AVE WIDTH = ~~108.5~~ 101
DEPTH ≈ 15.5'
AREA BELOW 256.5 = ~~1635 sf~~
15654

EXISTING GROUND

ILL SUBJECT _____ BY _____ HILL

SHEET NO. ____ of ____ DATE _____

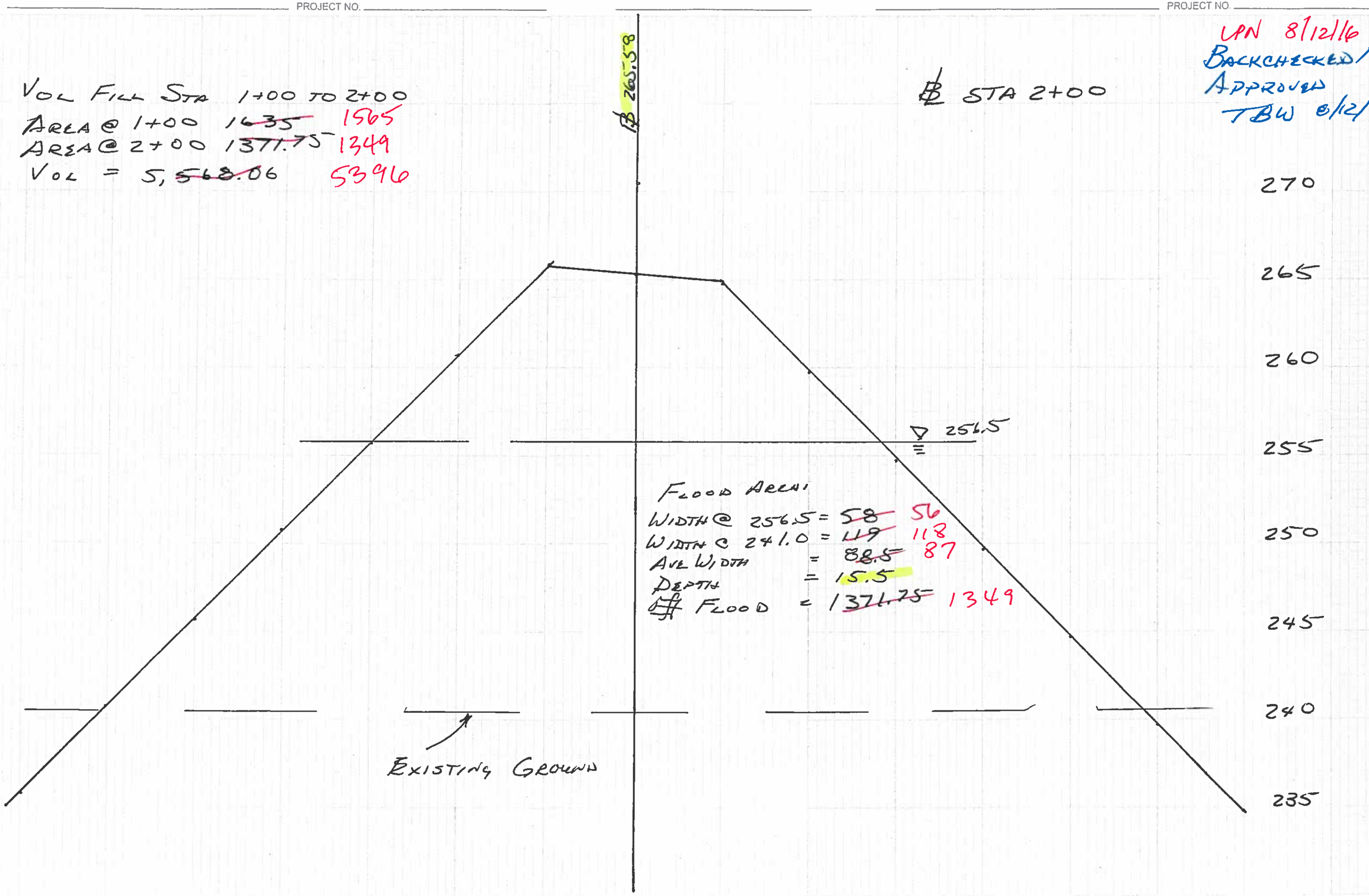
PROJECT NO. _____

VOL FILL STA 1+00 TO 2+00

AREA @ 1+00 ~~1635~~ 1565

AREA @ 2+00 ~~1371.75~~ 1349

VOL = 5, ~~568.06~~ 5396



FLOOD AREA:

WIDTH @ 256.5 = ~~58~~ 56

WIDTH @ 241.0 = ~~119~~ 118

AVE WIDTH = ~~88.5~~ 87

DEPTH = 15.5

FLOOD = ~~1371.75~~ 1349

UPN 8/12/16

BACKCHECKED / APPROVED TBW 8/12/16

ILL SUBJECT _____ BY _____ HILL SUBJECT _____ HILL SUBJECT _____ BY _____

_____ SHEET NO. ___ of ___ DATE _____ _____ _____ SHEET NO. ___ of ___ DATE _____

_____ PROJECT NO. _____ _____ _____ PROJECT NO. _____

LPN 8/12/16
BACHECKED/
APPROVED
JBW 8/12/16

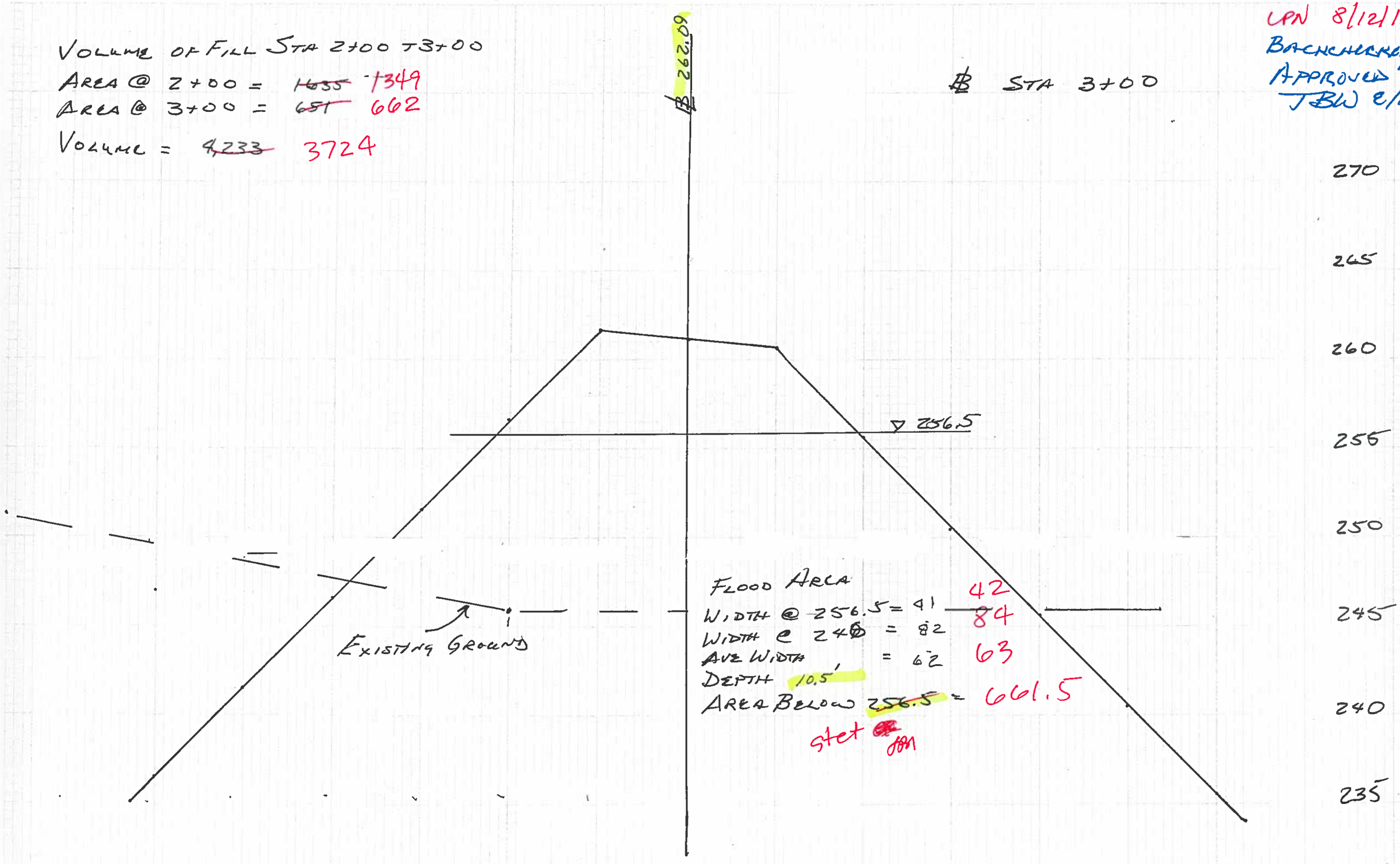
VOLUME OF FILL STA 2+00 TO 3+00

AREA @ 2+00 = ~~1655~~ 1349

AREA @ 3+00 = ~~651~~ 662

VOLUME = ~~4,233~~ 3724

℄ STA 3+00



FLOOD AREA

WIDTH @ 256.5 = 41 ~~42~~

WIDTH @ 240 = 82 84

AVE WIDTH = 62 63

DEPTH 10.5'

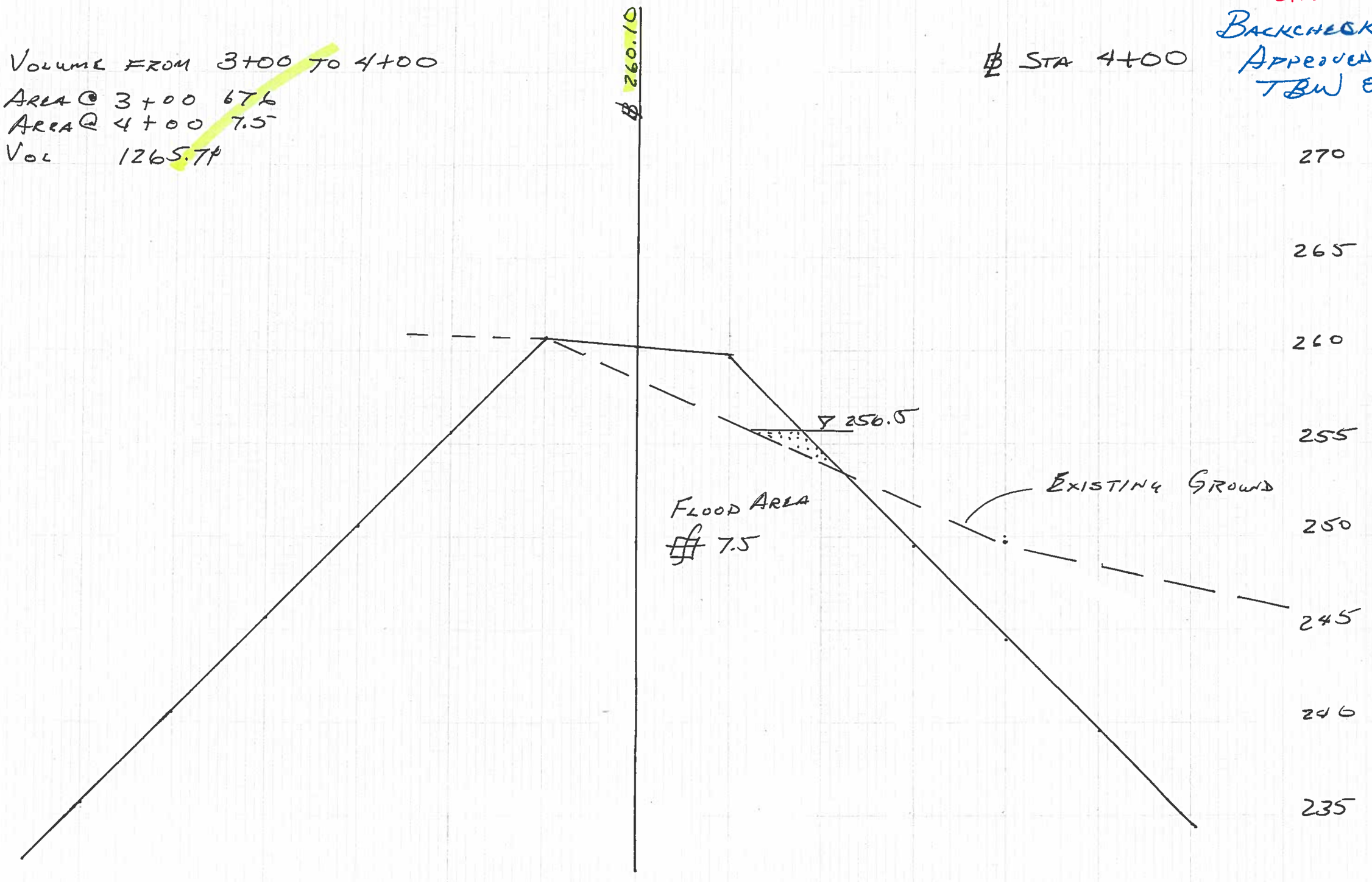
AREA BELOW ~~256.5~~ = 661.5

stet ~~CE~~ JBW

LPN 8/12/16
BACKCHECKED/
APPROVED
TBW 8/12/16

VOLUME FROM 3+00 TO 4+00
AREA @ 3+00 6.76
AREA @ 4+00 7.5
VOL 1265.7P

℄ STA 4+00



ILL SUBJECT _____ BY _____ HILL

SHEET NO. ____ of ____ DATE _____

PROJECT NO. _____

SUBJECT _____ HILL

SUBJECT _____ BY _____

SHEET NO. ____ of ____ DATE _____

PROJECT NO. _____

UPN 8/12/16
BACKCHECKED/APP
TBW 8/12/16

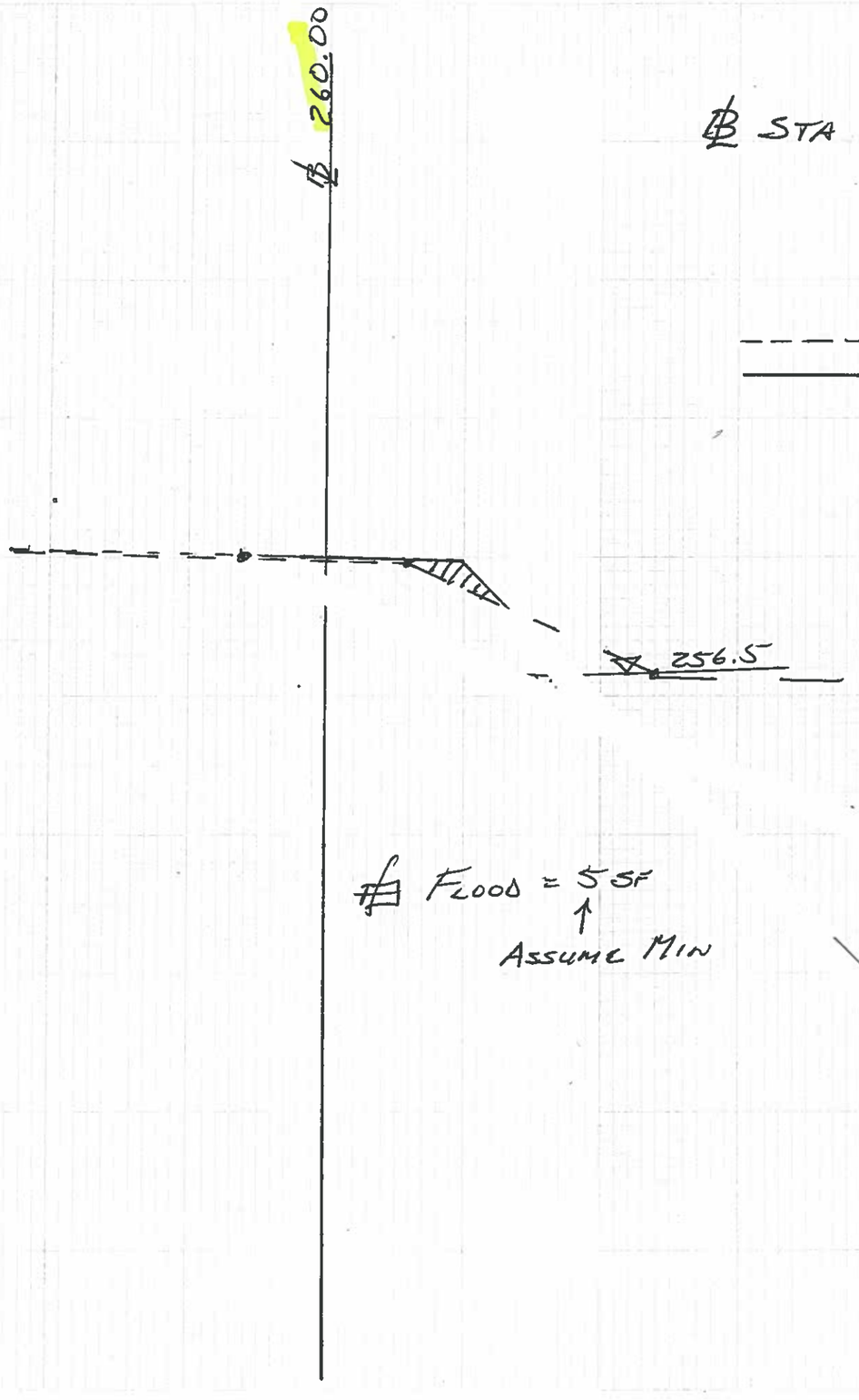
Volume 4+00 TO 5+00

Vol 23 CYS

Vol 5+00 TO 10+00

Vol = 92 CYS

℄ STA 5+00, 6+00, 7+00, 8+00, 9+00



FLOOD = 5 SF
↑
ASSUME MIN

Triangle Volume Report

Report Created: 8/31/2016
Time: 9:09am

Mode: Selected Shapes
Input Grid Factor: 1.000000

Original Surface: **sCA0602_SOUTH_INTCHNG**
Description: DTM_GROUND
Preference: Default
Type: Existing
Design Surface: **Surface_Elevation_256_5**
Description: Surface elevation of 256.5
Preference: Default
Type: Design
Cut Factor: 1.0000
Fill Factor: 1.0000

Cut:	304255.70 cu ft
Fill:	0.00 cu ft
Net:	304255.70 cu ft
Cut:	11268.73 cu yd
Fill:	0.00 cu yd
Net:	11268.73 cu yd

East Pond
Existing storage below elevation 256.5

Existing surface is set to Original Surface and elevation 256.5 is set to the Design Surface.
The Fill would indicate the amount of fill below elevation 256.5.
The grading limits were used as a boundary.

A fill of 0 shows no existing storage in this area.

Triangle Volume Report

Report Created: 8/31/2016
Time: 9:16am

Mode: Selected Shapes
Input Grid Factor: 1.000000

Original Surface: **sCA0602_SOUTH_INTCHNG**
Description: DTM_GROUND
Preference: Default
Type: Existing
Design Surface: **Surface_Elevation_256_5**
Description: Surface elevation of 256.5
Preference: Default
Type: Design
Cut Factor: 1.0000
Fill Factor: 1.0000

Cut:	281177.57 cu ft
Fill:	98410.22 cu ft
Net:	182767.35 cu ft
Cut:	10413.98 cu yd
Fill:	3644.82 cu yd
Net:	6769.16 cu yd

West Pond
Existing storage below elevation 256.5

Existing surface is set to Original Surface and elevation 256.5 is set to the Design Surface.
The Fill would indicate the amount of fill below elevation 256.5.
The grading limits were used as a boundary.

98,410.22 cf / 43,560 sf/Ac-ft
= **2.26 Ac-ft of existing storage in this area**

Triangle Volume Report

Report Created: 8/6/2016
Time: 2:32pm

Mode: Selected Shapes
Input Grid Factor: 1.000000

Original Surface: **Proposed_SouthCompArea_1**
Description: South Comp Area Pond
Preference: Finished Surface
Type: Design
Design Surface: **Surface_Elevation_256_5**
Description: Surface elevation of 256.5
Preference: Default
Type: Design
Cut Factor: 1.0000
Fill Factor: 1.0000

Cut:	0.00 cu ft
Fill:	369878.40 cu ft
Net:	-369878.40 cu ft
Cut:	0.00 cu yd
Fill:	13699.20 cu yd
Net:	-13699.20 cu yd

South Comp Area
East Pond

Comparison of the new grading against elevation 256.5. Contour 256.5 was used as a boundary.

Total storage from new grading 369,878.40 cf / 43,560 sf/Ac-ft = 8.49 Ac-ft total storage

Triangle Volume Report

Report Created: 8/31/2016
Time: 8:56am

Mode: Selected Shapes
Input Grid Factor: 1.000000

Original Surface: **Proposed_SouthCompArea2**
Description:
Preference: Default
Type: Design
Design Surface: **Surface_Elevation_256_5**
Description: Surface elevation of 256.5
Preference: Default
Type: Design
Cut Factor: 1.0000
Fill Factor: 1.0000

Cut:	0.00 cu ft
Fill:	249455.66 cu ft
Net:	-249455.66 cu ft

Cut:	0.00 cu yd
Fill:	9239.10 cu yd
Net:	-9239.10 cu yd

South Comp Area
West Pond

Comparison of the new grading against elevation 256.5
Contour 256.5 was used as a boundary.

Total storage from new grading
249,455.66 cf / 43,560 sf/Ac-ft
= 5.73 Ac-ft total storage

Total storage available from new grading
East Pond = 8.49 Ac-ft
West Pond = 5.73 Ac-ft
TOTAL = 14.22 Ac-ft

Need to calculate the existing storage available below elevation 256.5 in both areas.

West Pond
See Triangle Volume Report for InRoads Printout
2.26 Ac-ft of existing storage

East Pond
All new grading is below elevation 256.5. Therefore, all storage available is new storage.
0 Ac-ft existing storage

NEW AVAILABLE STORAGE
14.22 Ac-ft from new grading
- 2.26 Ac-ft from existing storage

= 11.96 Ac-ft of new storage

8 Lane Option — Surface to Surface Comparisons

3/15/2016

	Fill from Existing to				Fill from	Fill Elev 248.6 to	Fill Elev 249.6 to	Fill Elev 252 to	Proposed Fill Below 252*	
Area	Elev 248.6	Elev 249.6	Elev 252	Proposed (A)	252 to Water Table	Proposed (E)	Proposed (F)	Proposed (B)	(D)	Ac-ft
8-1	2,470		9,595	0	7,125	0	0	0	0	
8-2	254		2,153	12,805	1,899	12,805		8,288	4,263	2.64
8-3	4,927		17,265	93,720	12,338	91,360		76,994	11,799	7.31
8-4	120		2,635	0	2,515	0		0	0	0.00
8-5	5		167	0	17,260	0		0	0	0.00
8-6	0		118	652	118	999		551	101	0.06
8-7	0		761	5,303	761	4,501		2,588	2,715	1.68
8-8		0	287	0	287		0	0	0	0.00
8-9		26	188	0	162		25	0	0	0.00
8-10		3,186	7,920	2,066	4,734		2,339	1,905	161	0.10
8-11		5,407	13,958	627	8,551		1,088	98	529	0.33
8-12		89	20,617	0	20,528		742	0	0	0.00
8-13		0	52,856	0	52,856		0	0	0	0.00
8-14		0	110	0	110		0	0	0	0.00
8-15 A		11,980	24,807	767	12,827		829	161	606	0.38
8-15 B		65	518	20	453		120	0	20	0.01
8-15 C		88	716	273	628		453	62	123	0.08
8-15 D		0	16	0	16		42	0	0	0.00
8-16		6,475	14,369	7,302	7,894		7,988	5,605	1,697	1.05
8-17		0	96	516	96		760	438	78	0.05
8-18	0		438	117	438	616		84	438	0.27
8-19	196		1,161	0	965	0		0	0	0.00
8-20	7,503		27,918	19,021	20,415	17,119		8,949	2,569	1.59
8-21	0		92	292	92	520		223	69	0.04
8-22	2,964		6,807	10,826	3,843	9,493		6,458	1,404	0.87
8-23	0		103	4,787	103	5,855		4,684	103	0.06
8-24	0		1,462	322	1,462	633		285	37	0.02
8-25	0		0	0	0	0		0	0	0.00
Totals			207,133	159,416				117,373	26,712	16.56

10 Lane Option

	Surface to Surface Comparisons									
	Fill from Existing to				Fill from	Fill Elev 248.6 to	Fill Elev 249.6 to	Fill Elev 252 to	Proposed Fill Below 252*	
Area	Elev 248.6	Elev 249.6	Elev 252	Proposed (A)	252 to Water Table	Proposed (E)	Proposed (F)	Proposed (B)	(D)	Ac-ft
10-1	2,470		9,595	0	7,125	0	0	0	0	
10-2	254		2,153	10,350	1,899	11,691		8,288	1,808	1.12
10-3	4,927		17,265	91,790	12,338	88,330		75,860	11,003	6.82
10-4	120		2,635	314	2,515	448		193	1	0.00
10-5	5		167	0	162	0		0	0	0.00
10-6	0		95	966	95	1,194		871	95	0.06
10-7	0		761	5,303	761	6,491		4,542	761	0.47
10-8		0	287	0	287		0	0	0	0.00
10-9		26	188	5	162		25	1	4	0.00
10-10		0	7,920	2,235	7,920		2,563	2,011	224	0.14
10-11		2,273	5,758	5,703	3,485		4,854	1,835	1,595	0.99
10-12		89	20,617	344	20,528		742	132	123	0.08
10-13		0	52,856	0	52,856		0	0	0	0.00
10-14		0	110	0	110		0	0	0	0.00
10-15 A		11,980	24,807	36,085	12,827		28,748	20,804	3,301	2.05
10-15 B		65	518	20	453		136	0	20	0.01
10-15 C		88	716	389	628		490	189	112	0.07
10-15 D		0	16	0	16		19	0	0	0.00
10-16		265	14,369	9,371	14,104		10,462	7,929	1,177	0.73
10-17		0	96	707	96		1,086	611	96	0.06
10-18	0		233	989	233	2,781		789	233	0.14
10-19	196		1,161	0	965	0		0	0	0.00
10-20	4,697		12,773	24,205	8,076	22,853		12,374	7,134	4.42
10-21	0		92	493	92	590		459	34	0.02
10-22	2,964		6,807	7,142	3,843	6,143		3,922	256	0.16
10-23	0		103	5,908	103	6,976		5,805	103	0.06
10-24	0		1,462	322	1,462	633		285	37	0.02
10-25	0		0	0	0	0		0	0	0.00
Totals			183,560	202,641				146,900	28,117	17.43

Triangle Volume Report

Report Created: 9/12/2016
Time: 9:33am

Mode: Selected Shapes
Input Grid Factor: 1.000000

Original Surface: **1019_2022_247 Bottom**
Description:
Preference: Finished Surface
Type: Design
Design Surface: **Suface_Elevation_252**
Description: Merged prop surface north of the river
Preference: Finished Surface
Type: Design
Cut Factor: 1.0000
Fill Factor: 1.0000

Cut:	0.01 cu ft
Fill:	472789.31 cu ft
Net:	-472789.30 cu ft
Cut:	0.00 cu yd
Fill:	17510.72 cu yd
Net:	-17510.71 cu yd

Southeast pond, non-detention area.
Comparison of the pond surface to an elevation of 252.
472,789.31 cf
10.85 Ac-ft

Triangle Volume Report

Report Created: 9/12/2016
Time: 9:46am

Mode: Selected Shapes
Input Grid Factor: 1.000000

Original Surface: **Proposed_1021_247_SlopedBottom**
Description:
Preference: Frame
Type: Design
Design Surface: **Suface_Elevation_252**
Description: Merged prop surface north of the river
Preference: Finished Surface
Type: Design
Cut Factor: 1.0000
Fill Factor: 1.0000

Cut:	0.00 cu ft
Fill:	159968.25 cu ft
Net:	-159968.25 cu ft

Cut:	0.00 cu yd
Fill:	5924.75 cu yd
Net:	-5924.75 cu yd

Middle Pond Detention Area
Comparison of the pond surface to an elevation of 252
159,968 cf
3.67 Ac-ft

Triangle Volume Report

Report Created: 9/12/2016
Time: 9:50am

Mode: Selected Shapes
Input Grid Factor: 1.000000

Original Surface: **Proposed_104_247_SlopedBottom**
Description:
Preference: Default
Type: Design
Design Surface: **Suface_Elevation_252**
Description: Merged prop surface north of the river
Preference: Finished Surface
Type: Design
Cut Factor: 1.0000
Fill Factor: 1.0000

Cut:	0.00 cu ft
Fill:	503948.61 cu ft
Net:	-503948.61 cu ft

Cut:	0.00 cu yd
Fill:	18664.76 cu yd
Net:	-18664.76 cu yd

North Pond Detention Area
Comparison of the pond surface to an elevation of 252
503,949 cf
11.57 Ac-ft

Attachment D: Meeting Notes

MEETING SUMMARY

I-30 Crossing

CA0602

City of North Little Rock Floodplains Coordination Meeting/

October 11th

ATTENDEES:	Chris Wilbourn, Mark Callahan, Adam Wierciak, Bryon Russell
COPY TO:	Jennifer Halstead, Earl Mott
PREPARED BY:	Bryon Russell
DATE:	October 11, 2016 3:00 PM CST
PROJECT:	CA0602

Objectives

Discuss floodplain impacts on Dark Hollow

Summary

The team reviewed the US Army Corps of Engineers HECRAS model for Dark Hollow, potential impacts of the project on floodplains associated with Dark Hollow, and the conceptual mitigation plan for Dark Hollow. Chris Wilbourn responded that the City of North Little Rock has no issues with the conceptual mitigation plan.

We discussed the storm sewer modeling effort underway for the system discharging to the Fairman Ditch. Adam Wierciak and Bryon Russell presented information on drainage area mapping west of I-30 in North Little Rock, obtained from recent field work. A 60-inch pipe outfall was discovered along North Poplar Street which appeared to discharge southwest toward the North Little Rock Boys and Girls Club ball field. Chris Wilbourn indicated this outfall likely connects to the Pike Avenue tunnel, which discharges to the Arkansas River through a pump station. Consequently, it was decided that the drainage area to the 60-inch pipe outfall could be deleted from the drainage area contributing to the I-30 frontage road storm sewer system.

Chris Wilbourn reported that flooding is common in the area of West 13th Street and North Magnolia Street, but he believes this is due to pipe clogging rather than capacity issues.

Chris Wilbourn asked if the project team was aware of a new residential development going in the northeast quadrant of the I-40/North Hills interchange. He believes this development may have floodplain impacts. The project team is only responsible for floodplain impacts related to the I-30 project.

Action Items

Provide the City with the US Army Corps of Engineers model for Dark Hollow.

MEETING SUMMARY

I-30 Crossing

CA0602

City of Little Rock Floodplains Coordination Meeting/ January 11th

ATTENDEES:	Keli Wylie, Nathan Charles, Vince Floriani, Mark Callahan, John Cantabery, Adam Wierciak, Bryon Russell
COPY TO:	Jennifer Halstead, Earl Mott
PREPARED BY:	Bryon Russell
DATE:	January 11, 2017 10:00 am CST
PROJECT:	CA0602

Objectives

Discuss floodplain impacts on Fourche Creek

Summary

As a follow-up to the November meeting, Adam Wierciak and Bryon Russell had reviewed the floodplain information that had been provided by the City of Little Rock. A review of the models verified that I-30 is located in the "bathtub" area of Fourche Creek. The bathtub area is not included in the hydraulic models. There is a gap in the hydraulic models between the Hwy 365 (Springer Boulevard) crossing and the University Avenue crossing. Consequently, Nathan Charles stated that no hydraulic modeling of the I-30 improvements will be required. The City of Little Rock will require a volumetric analysis of the floodplain impacts only.

The project team has developed conceptual plans for a temporary maintenance of traffic ramp between I-440 westbound and I-30 northbound, as well as for a new I-30 bridge over the Fourche Creek floodplain and the UPRR Railroad. The floodplain fill for the temporary ramp has been estimated at 11.2 Ac-ft. The amount of permanent additional fill due to the piers for the proposed bridge over the Fourche Creek floodplain is estimated at 0.1 Ac-ft. Two potential floodplain compensation areas in the I-30/I-530/I-440 interchange have been identified. These compensation areas are capable of providing 11.9 Ac-ft of compensating floodplain storage.

The amount of temporary and permanent floodplain fill needed to construct the project will be determined by the Design-Builder. The Design-Builder will be responsible for developing a floodplain compensation plan and securing approval of the plan from the City of Little Rock and Pulaski County. Should the Design-Builder elect to construct the project as shown in the concept plans, the City has indicated they will accept the plan.

Action Items

Provide the City with these meeting notes for review.

MEETING SUMMARY

I-30 Crossing

CA0602

AHTD and City of North Little Rock Maintenance Coordination Meeting/ February 27, 2017

ATTENDEES: Mark Headley, Johnathon Mormon, Chris Wilbourn, Mark Callahan, John Cantabery, Bryon Russell

COPY TO: Ben Browning, Keli Wylie, Earl Mott

PREPARED BY: Bryon Russell

DATE: February 27, 2017 3:00 PM CST

PROJECT: CA0602

Objectives

The purpose of the meeting was to discuss maintenance responsibilities for the conceptual storm sewer serving the west I-30 frontage road and outfalling to the Fairman Ditch.

Summary

An overview of the conceptual storm sewer outfall to Fairman Ditch was provided. It was emphasized that this is only a concept, prepared for the purpose of ensuring that a solution could be found that complies with all project design criteria, and that the Design-Build team will have the flexibility to change the design, as long as they comply with the RFP criteria. The concept was developed after looking at many alternatives over several months.

The west frontage road storm sewer system serves a large offsite area of NLR and drains north to the Fairman Ditch. The system contains inlets accepting offsite runoff that are very low in relation to the 25 year tailwater of Fairman Ditch. In order to prevent surcharging of these inlets, the design concept involves a pond and pump system at the Fairman Ditch outfall.

AHTD suggested that, for ease of maintenance, pond slopes should be no steeper than 4:1 and the pond bottom should normally be dry. In order to accomplish this, the pond bottom should be graded toward a deeper wet well, which would then be pumped to the adjacent Fairman Ditch. The pond bottom should be seeded with water tolerant grasses. These criteria will be included in the RFP.

The pond and pump will be within ATHD right of way, but AHTD does not normally maintain pump stations, while the City of NLR maintains four. Due to their familiarity with pump stations, it was suggested that the City maintain the Fairman Ditch pond and pump station. Chris Wilbourn will discuss with the mayor. The City would want the pump to be float-activated, with diesel backup power available.

The design concept also involves diverting the portion of the west frontage road drainage area south of the Union Pacific Railroad that currently drains north to Fairman Ditch, south to the Arkansas River. Modifications to the existing pump station at Cypress Street, maintained by the City of NLR, will possibly be required, both because of impacts from the bridge construction, and because of the increase in flow. The RFP will contain language advising of the need for these modifications.

Action Items

Chris Wilbourn will discuss maintenance of the pond and pump station with the mayor of North Little Rock.