

DRAINAGE DESIGN DOCUMENTATION

☒ PRELIMINARY

STATE PROJECT NO.: FD52 0093 0042 000-001

☐ ADVANCE

FEDERAL PROJECT NO.: STPM 5138(056)

☐ FINAL

COUNTY: Oldham

ITEM NO.: 5-441.00

MARS NO.: 79216 01 D

ROAD NAME: Louisville-Cincinnati Road

REVIEW STATUS

ROUTE NO.: US 42

DISTRICT: 5

STATION TO STATION: 100+00.00 TO 151+07.15

CO DRAINAGE:

DESIGNED BY: Hall-Harmon Engineers, Inc.

BRIDGES:

☐ BRIDGE

☒ INLET SPACING

☒ BOX CULVERT

☒ STORM SEWER

☐ ARCH CULVERT

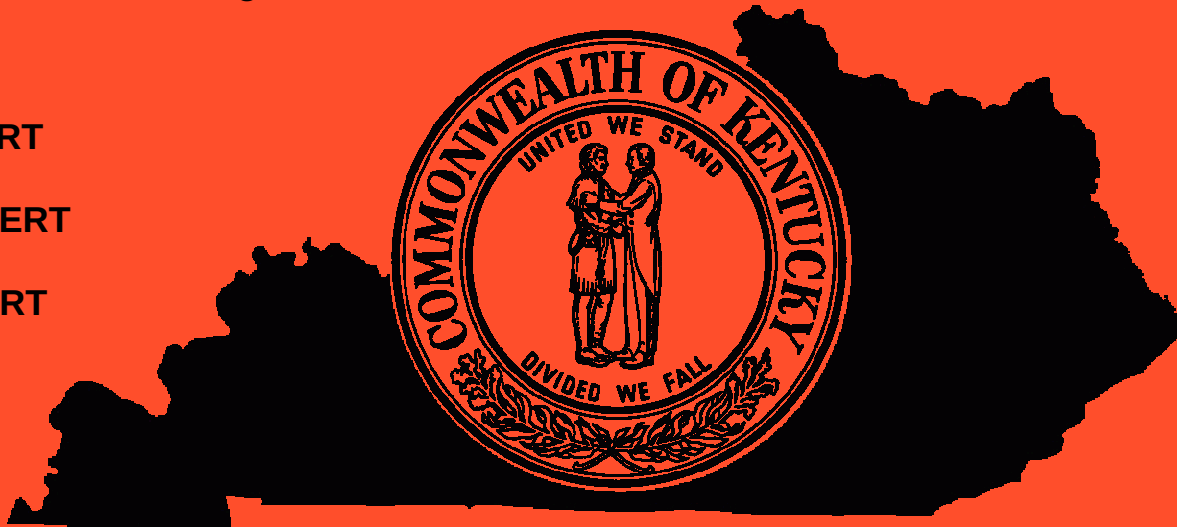
☒ CHANNEL CHANGE

☒ PIPE CULVERT

☐ DRY STRUCTURE

☐ OTHER

☒ CHANNEL LINING

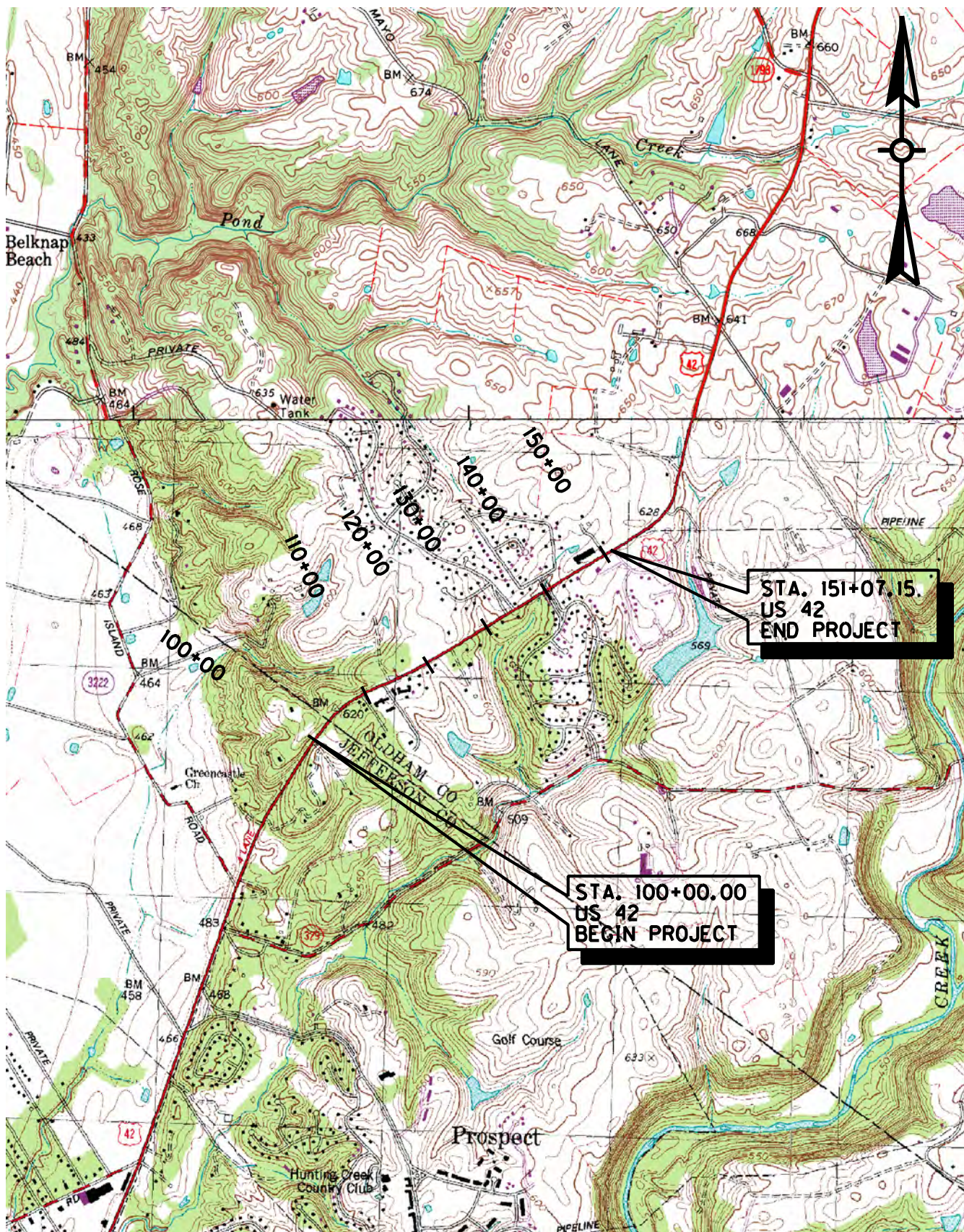


KENTUCKY TRANSPORTATION CABINET
DIVISION OF HIGHWAY DESIGN

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Road Name: Louisville - Cincinnati		Designer: Hall-Harmon Engineers, Inc.	
UPN: FD52 093 0042 000-001		FPN: STPM 5138(056)	
Section	Description		
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	Bridge and Culvert Summary – Form TC 61- 504		
	Project Location Map – USGS Topographic Quadrangle Map		
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	Team Meeting Minutes – February 6, 2009		
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	Drainage Design Summary – Form TC 61-100 for DBIs and Headwall		
	Computer Output		

Section 1 – Drainage Summary

Kentucky Transportation Cabinet Division of Highway Design 8-10		BRIDGE AND CULVERT SUMMARY			TC 61-504 Folder 1 of 1	
County: Oldham			Route: US 42		Item No. 5-441.00	
Road Name: Louisville - Cincinnati					Section: 1	
UPN: FD52 093 0042 000-001			FPN: STPM 5138(056)			
Type of Work: Reconstruct US 42 from Jefferson/Oldham County Line to Ridgemoor Drive						
Designer: Hall-Harmon Engineers, Inc.				Central Office Reviewer: Ron Matar		
Termini: 100+00 to 151+07.15						
Bridges: 0		Box Culverts: 2		Pipe Culverts: 0		
Arch Culverts: 0		Entrance Pipes: 4		Box Inlets: 61		
Channel Changes: 1		Other: S&F Headwall - 1, Manholes -3 , Junction box -1				
Station	Structure No.	Structure Description	Drawing No.	Remarks	Page No.	
RT 105+52		15" entrance pipe			86	
LT 113+80		18" entrance pipe			93	
LT 122+65		15" entrance pipe			100	
129+83.43		3' x 3' RCBC Extensioin		with deflections	107	
LT 49+15		15" entrance pipe		River Bluff Rd East	119	
139+20		4' x 4' RCBC Extension		For more information see SS	126	
				No. 4 and Water Related Impacts		
LT 111+00		Storm Sewer No. 1 Outfall		Includes:	136	
				DBI Right 111+00.	146	
RT 121+14		Storm Sewer No. 2 Outfall		Includes:	156	
				Headwall Left 121+14.	166	
RT 129+67		Storm Sewer No. 3 Right Outfall			178	
LT 130+00		Storm Sewer No. 3 Left Outfall		Includes:	187	
				DBI Left 133+00,	195	
				DBI Left 49+69 River Bluff.	202	
RT 138+34		Storm Sewer No. 4 Outfall		Includes:	211	
				DBI Left 136+50,	223	
				DBI Left 139+20,	230	
				Existing 4' X 4' RCBC 139+20,	n/a	
				Exist DBI Lt. 49+56.3 Hayfield Way,	237	
				DBI Left 50+50.17 Hayfield Way.	244	
		Pavement Inlet Spread Calcs			255	
		Channel Calculations			259	
		Other - Water Related Impacts			275	



CONTOUR INTERVAL = 10 FOOT



GRAPHIC SCALE
1" = 2000'

SHOWING A PORTION OF
ANCHORAGE, KY. AND OWEN, KY.
QUADRANGLE

US 42
PROJECT LOCATION MAP
OLDHAM COUNTY
ITEM NO. 5-441.00

Section 2 – Design Executive Summary

DESIGN EXECUTIVE SUMMARY

County: Oldham Item No.: 5-441.00
Federal Project No.: STPM 5138(056) UPN: FD52 093 0042 000-001
Mars No.: 79216 01 D UPN: _____

Project Description:

Reconstruct US 42 from Jefferson/Oldham County Line to Ridgewood Drive (approximately 1.0 mile).

Roadway Classification:

☐ Local ☐ Collector ☒ Arterial ☐ Interstate ☐ Rural ☒ Urban

ADT(current) 18,200 ADT(2032) 39,200 DHV(2029) 3,810

Posted Speed Limit: ☒ 45 mph (rural) ☐ 35 mph (Urban) ☐ Other Specify N/A

Design speed selected by the Project Team 35 mph (urban) See Design Criteria Notes.

☒ Concurrence in noted Typical Exceptions to be obtained from Director of Design.

DESIGN CRITERIA	EXISTING	TYPICAL	PROJECT TEAM RECOMMENDATION
Number of Lanes	3-2	2	3
Pavement Width	Taper from 4 lanes to 2-11' lanes	2-12' lanes	2-12' lanes + 14' turn lane
Shoulder Width, Slope	0'-2'	2' curb & gutter	2' curb & gutter
Bridge Width	N/A	N/A	N/A
Minimum Radius ($e_{max} = 4.0\%$)	1000'	371' (2004 Green Book)	1000'
Maximum Grade	5.09%	8% (rolling)	5.09%
Minimum Sight Distance	256'	250'	264'
Border Area (urban)	N/A	10'	See typical section
Multi-use Path	None	10'	10'

Design Criteria Notes:

Design speed chosen to match expected operating speed.

DESIGN EXECUTIVE SUMMARY

Access Control By permit
Environmental Action Categorical Exclusion Level I Approval Date March 17, 2010
Existing Pavement Depths 9" asphalt

Attachments: (1) Map showing project location.
(2) Typical sections, including any bridges on 8-1/2" x 11".
(3) Cost comparison table of alternates vs. Highway Plan.

Discussions: (1) Alternatives considered including Preferred and No Build.
(2) Design Exception Required.
(3) If Preferred alternative cost is 15% or more above Highway Plan cost.
(4) Maintenance of Traffic Notes.
(5) Avoidance Alternatives to Water-Related Impacts.
(6) Consideration for bicycle and pedestrian facilities.
(7) Purpose and Need Statement.

Submitted By: [Signature]
Project Engineer, check one: (Dept. of Highway ☐ or Consultant ☒

12-27-2010
Date

Recommended By: [Signature]
Project Manager

1-6-2011
Date

Recommended By: [Signature]
Location Engineer

1/10/11
Date

Recommended By: [Signature]
T.E.B.M for Location

1/10/11
Date

Comments:

Section 106 process: received No Adverse Effect determination from SHPO 5-21-09

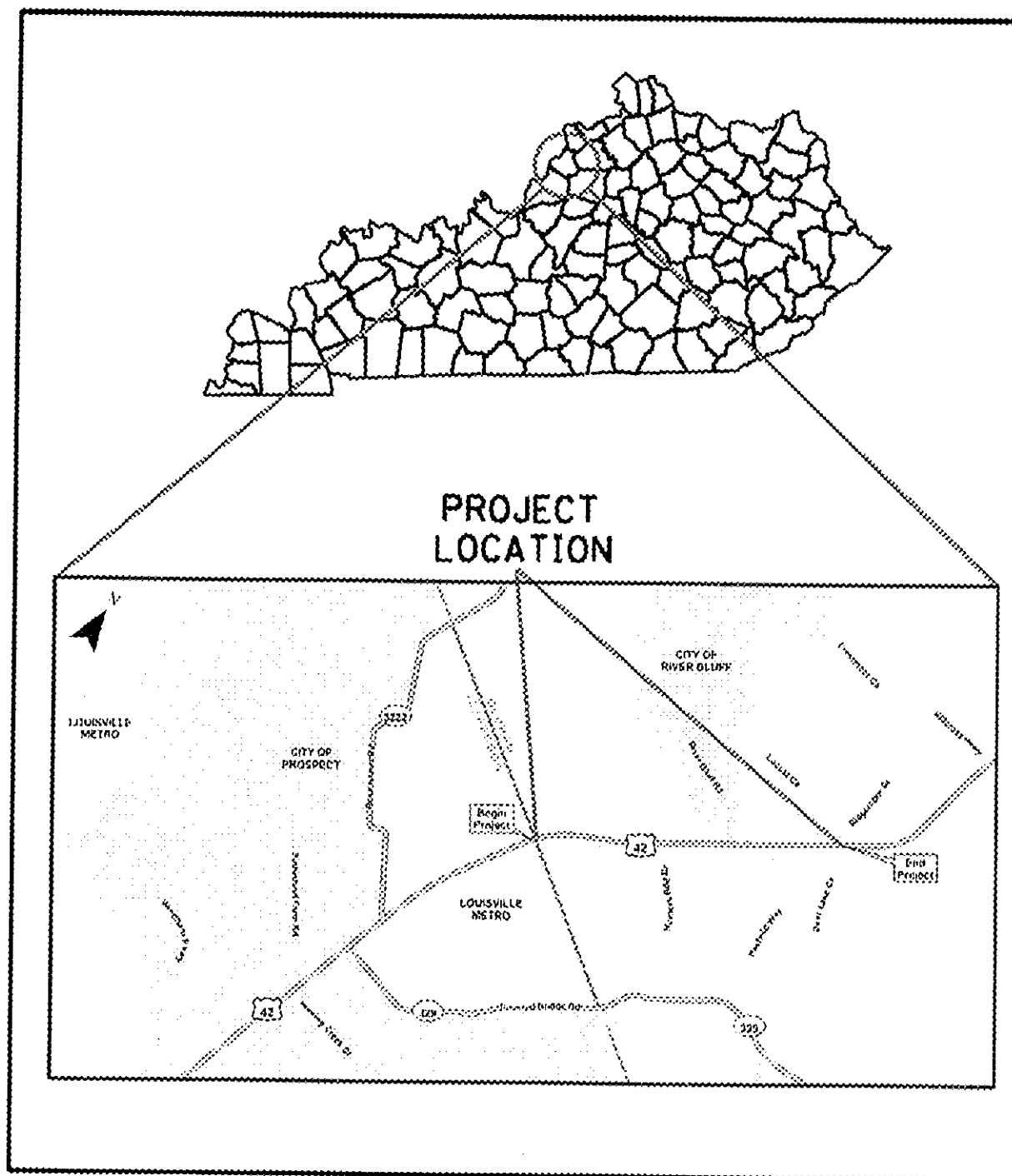
GEOMETRIC APPROVAL GRANTED BY:

[Signature]
Director, Division of Highway Design

1/10/11
Date

DESIGN EXECUTIVE SUMMARY

TC 61-9E
REV. 02/05



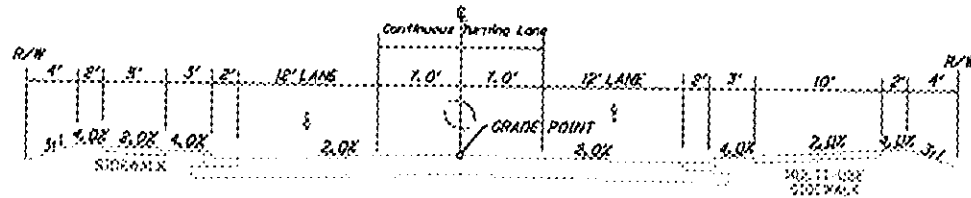
ATTACHMENT 1
PROJECT LOCATION MAP
US 42
ITEM NO. 5-441.00
OLDHAM COUNTY, KENTUCKY

DESIGN EXECUTIVE SUMMARY

TYPICAL SECTIONS

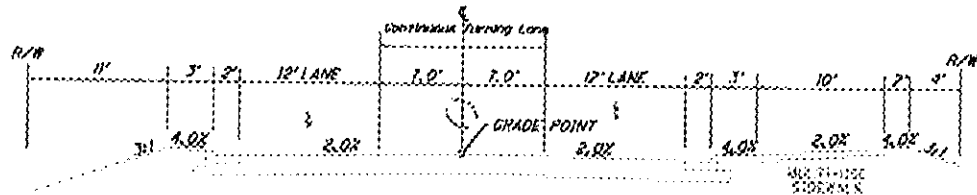
US 42

3-LANE URBAN - SIDEWALK



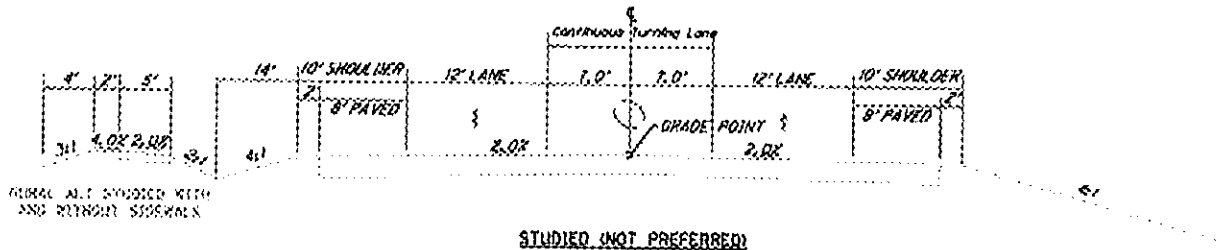
PREFERRED (RIVER BLUFF RD. TO END)

3-LANE URBAN - NO SIDEWALK



PREFERRED (BEGINNING TO RIVER BLUFF RD)

3-LANE RURAL



STUDIED (NOT PREFERRED)

ATTACHMENT 2 US 42 TYPICAL SECTIONS

ITEM NO. 5-441.00
OLDHAM COUNTY, KENTUCKY

DESIGN EXECUTIVE SUMMARY

ATTACHMENT 3

COST COMPARISON TABLE

(Item No. 5-441.00)

		2010 Highway Plan	Current Estimate (Preferred Alternate)	Difference
OLDHAM	D	\$180,000	\$707,000 *	\$527,000
	R	\$2,205,000	\$2,712,000	\$507,000
	U	\$811,000	\$685,000	-\$126,000
	C	\$3,600,000	\$3,183,000	-\$417,000

* Total Design Cost (Phase 1 and Phase 2).

ALTERNATIVE COST ESTIMATES

Alternate	Description	Right of Way	Utilities	Construction	Total
Alt 1*	3 lane urban with sidewalk and multiuse path	\$2,712,000	\$685,000	\$3,183,000	\$6,580,000
Alt 2	3 lane rural	\$9,500,000	\$775,000	\$2,956,000	\$13,231,000

* Preferred

**DESIGN EXECUTIVE SUMMARY
DISCUSSION ITEMS**

Attachments:

- a. SHPO No Adverse Effect Determination (05-21-2009)
- b. Communicating All Promises Notes (March 2010)
- c. KIPDA Project Description - ID # 952 (October 7, 2010)

Discussion:

1. Alternatives considered including Preferred and No Build.
2. Design Exception Required
3. If Preferred Alternate Cost is 15% or more above Highway Plan cost.
4. Maintenance of Traffic Notes.
5. Avoidance Alternatives to Water-Related Impacts.
6. Consideration for bicycle and pedestrian facilities.
7. Purpose and Need Statement.

DESIGN EXECUTIVE SUMMARY

(PAGE 7 of 15)



STEVEN L. BESHEAR
GOVERNOR

TOURISM, ARTS AND HERITAGE CABINET KENTUCKY HERITAGE COUNCIL

MARCHETA SPARROW
SECRETARY

THE STATE HISTORIC PRESERVATION OFFICE
300 WASHINGTON STREET
FRANKFORT, KENTUCKY 40601
PHONE (502) 564-7005
FAX (502) 564-6820
www.heritage.ky.gov

MARK DENNEN
EXECUTIVE DIRECTOR AND
STATE HISTORIC PRESERVATION OFFICER

May 21, 2009

Mr. Gregory Rawlings
Environmental Specialist, Kentucky Division Office
Federal Highway Administration
330 West Broadway
Frankfort, KY 40601

Re: De Minimis application to National Register-Eligible Sites 1, 2, 3 (OL-503-505) and 9 (OL-511), A Cultural Resource Survey of the Reconstruction of US 42 from the Jefferson/Oldham County Line to Ridgemoor Drive in Oldham County, Kentucky (Item No. S-441)

Dear Mr. Rawlings:

The State Historic Preservation Office received, on May 11, 2009, your letter regarding the above-referenced project as well as a letter dated April 15, 2009 from KYTC-DEA. This office originally commented on this undertaking in a letter dated February 12, 2009 in which we determined that Sites 1, 2, 3 and 9 (OL-503, OL-504, OL-505 and OL-511) were eligible for listing in the National Register of Historic Places (NRHP). This office also requested that an additional site be documented, resulting in the consultant's identification of Site 11, the Kinchloe/Embry/Grafton House (JF-1836). While we were not asked to make a determination of eligibility for this property, we have been contacted by River Fields, Inc., a non-profit organization interested in becoming a consulting party on this project, who suggest that JF-1836 is associated with individuals of substantial regional significance. Within the historic context of this report, the consultant identified a twentieth-century trend when "...significant citizens of Louisville during the era [1920s] were attracted to the agrarian lifestyle in Oldham County (LV-6)." These individuals are said to have frequently adapted existing Oldham County farmland to suit bloodstock operations. Since the Embry brothers were natives of Louisville and leaders in regional Agriculture, owning their own livestock company and acting as President of Stockyard Associations in multiple states, we believe that this property could be eligible for listing in the National Register of Historic Places under Criteria B for its associations with these individuals and as a reflection of the aforementioned, notable trend.

A letter from your office, dated May 7, 2009, indicates that Alternative 1 - Minimization will result in minor taking from the National Register boundaries of Sites 1, 2, 3, and 9. Alternative 2 will have an Adverse Effect on these sites, and Alternative 3 is no longer being considered. Alternative 1 - Minimization will take 0.003 acres of permanent right of way from Site 9 and will include the construction of a retention wall along a portion of the property facing Highway 42. Alternative 1 also requires a taking of approximately six to seven feet of land from Sites 1, 2, and 3 along the roadway. Therefore, we concur with your office that this taking will not

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Discussion Item - Attachment A

DESIGN EXECUTIVE SUMMARY

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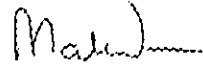
US 42 Widening, Oldham County (Item No. 5-441)

impact the property in a way that will substantially diminish its ability to convey its significance nor will it severely detract from the characteristics which make it eligible for listing. Therefore, we concur that this undertaking will have **No Adverse Effect** upon these historic properties and agree with your recommendation that the **De Minimis** rule be applied to Sites 1, 2, 3, and 9.

In closing, we would like to point out that while this taking is considered to be minor from a historic/cultural resource perspective, River Fields Inc. has indicated that they hold a conservation easement on these properties. We acknowledge that information pertaining to the enforcement of this conservation easement could weigh differently on the review of alternatives selected by this undertaking. Should any additional information change or impact the scope of work for the project or its alternatives, please contact our office so that we may determine if additional documentation is needed.

If you have any questions about these comments, feel free to contact Danae Peckler of my staff at (502) 564-7005, extension 127.

Sincerely,



Mark Dennen
Executive Director and
State Historic Preservation Officer

Cc: David Waldner,  Amanda Abner, KYTC-DEA

DAP:dap

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Discussion Item -- Attachment A

DESIGN EXECUTIVE SUMMARY

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SYP8161
22 MAR 2010

KENTUCKY TRANSPORTATION CABINET
COMMUNICATING ALL PROMISES (CAP)

Page: 1

<u>Item No.</u>	5 - 441	<u>Project Mgr.</u>	TALA QUINIO
<u>CAP #</u>	<u>Date of Promise</u>	<u>Promise made to:</u>	<u>County</u> OLDHAM <u>Route</u> US-42
1	03-MAR-10	Environmental	<u>Location of Promise</u> project
<u>CAP Description</u>			
1. COORDINATION WITH USFWS PRIOR TO CONSTRUCTION FOR IMPACTING 1.76 ACRES OF IB SUMMER HABITAT			
2. COMPLETION OF ARCHAEOLOGICAL PHASE I WORK AT PARCELS 15, 20, AND 21 AFTER ROE OR FEE SIMPLE PURCHASE			
3. POTENTIAL FOR CORPS OF ENGINEERS PERMIT AT CULVERT CROSSING NEAR HAYFIELD WAY			

Page 1

Discussion Item -- Attachment B

DESIGN EXECUTIVE SUMMARY

(PAGE 10 of 15)



Project Description:

New interchange and connector road from KY 1447 to US 42 with interchange on F71 near Jefferson/Oldham County border.

Project Purpose:

Provide access to F71 between I-265 and Crestwood to alleviate congestion on KY 22, US 42, and KY 1084.

Contact Agency: KYTC

State ID #:

County/Counties: Jefferson, Oldham

Regional Priority: ☒

Project Cost: \$22,021,416

Included in AQ Analysis / Regionally Significant: ☒

Estimated Open to Public Year: 2012

Supports ITS Architecture: ☐

Introduced to the Plan: 12/2004

CMP Candidate: ☒

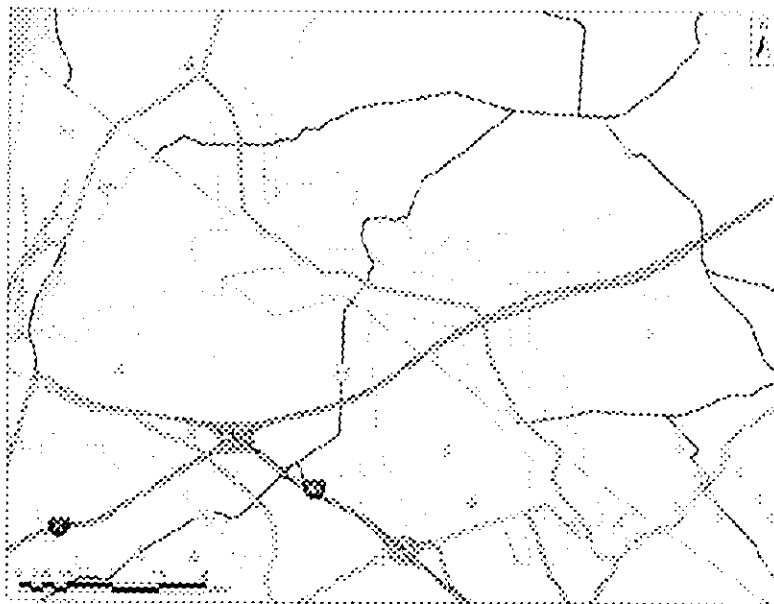
1/4 Mile Bike/Ped Priority Corridor: ☒

Title VI Area: ☐

1/4 Mile Freight Corridor: ☒

Boys' Facility:

Pedestrian Facility:



1. ALTERNATIVES CONSIDERED

Project Description

The proposed project consists of the improvement of US 42 in Oldham County, Kentucky from the Jefferson County / Oldham County line to Ridgemoor Drive, a distance of approximately 1.0 mile (see Location Map, Attachment No. 1). The proposed facility is planned to include the following elements:

- Widening (reconstruction) of US 42 to three lanes from the Jefferson County / Oldham County line to Ridgemoor Drive.
- Incorporate sidewalk and/or Multipurpose Path on one or both sides.

Design Criteria

US 42 is an urban arterial highway in rolling terrain. Two alternates were studied:

- Rural Alternate -- 45 mph design speed based on the existing posted speed limit and the existing typical section.
- Urban Alternate -- 35 mph design speed based on the existing roadway profile matching more closely a 35 MPH design speed than a higher design speed, the functional classification, the cost savings of the reduced impact associated with utilizing as much of the existing roadway profile as possible and based upon the voiced preference of the local officials asking that the road, through this congested area, be signed 35 MPH.

Access to adjacent properties will be by permit. The typical three lane section has a 14' flush center turn lane, separating 2-12' thru lanes with 10' shoulders (8' paved) for rural and standard curb and gutter for urban. With the urban alternate, a 5' sidewalk on the north side from River Bluff Road to Ridgemoor Drive and a 10' multiuse path on the south side throughout the entire project will be incorporated.

Traffic projections indicate 4 thru lanes and a turn lane will be necessary to accommodate future traffic volumes. Capacity analysis shows that a 3 lane alternate operates at LOS D through 2022 and fails in 2026. The design team decided instead to only study alternates that utilized 2 thru lanes and a center turn lane. This reduced number of thru lanes was selected because of the reduced cost and reduced footprint the smaller roadway would have. The 2 thru lane footprint will reduce the construction cost, reduce the right of way impact, and reduce the environmental impact. Additionally, in KIPDA's Horizon 2030: The Metropolitan Transportation Plan for the Louisville (KY-IN) Planning Area (October 7, 2010) project #952 (See Attachment C) would construct a new connector between US 42 north of this project and I-71. This connector would drastically reduce the traffic volumes that have been projected for this project along US 42. Therefore, this project only considered 3 lane alternatives.

Alternate 1 - Urban

Alternate 1 - Urban widens on both sides of the existing centerline for the entire length of project. Incorporated into this alternate will be a 5' sidewalk on the north side from River Bluff Road to Ridgemoor Drive and a 10' multiuse path on the south side throughout the entire project. The inside lanes of the existing 4-lane section at the beginning of the project will be tapered out to the proposed center turn lane using a 45:1 taper. Attempts were made to fit a vertical grade to this alternate that would meet 45 mph design standards. Doing so would require an 8' fill at the sag curve prior to River Bluff and 2' cut through the crest curve at River Bluff. The changes for the 45 MPH design speed will increase cost by \$400,000, complicate traffic control, increase property damage to the Vet office property and the historical site at River Bluff. Therefore, the vertical grade for this alternate was selected to meet roadway design standards for 35 mph.

Alternate 2 - Rural

Alternate 2 - Rural widens to both sides of the existing centerline for the entire length of the project also. No sidewalks are incorporated into this design. The inside lanes of the existing 4-lane section at the beginning of the project will be tapered out to the proposed center turn lane using a 45:1 taper. The vertical grade is improved in this alternate to meet roadway design standards for 45 mph.

A unique feature of this 3 lane rural alternate is that it could be modified in the future to a 5 lane urban section with little to no need for additional right of way. This would allow the roadway to be expanded to meet expected future traffic volumes. Though minimal right of way would be required in the future, the right of way impact associated with the current 3 lane rural alternate involves a large right of way impact including a possible 7 relocations.

Other Alternatives Eliminated From Further Study

Alternate 3 is a rural 3-lane section with a sidewalk on the North side from River Bluff Road to Ridgemoor Drive. Alternate 3A and 3B are the same section as Alternate 3 except have some modifications along the existing frontage road. Alternate 3A has a retaining wall at the edge of the existing frontage road and Alternate 3B has a retaining wall 2' outside of the ditch line in this vicinity and relocates the frontage road. These alternatives were eliminated from further study due to the right-of-way impacts and the increased costs.

No Build Alternate

No Build Alternate - A portion of the existing roadway vertical alignment does not meet the current AASHTO design standards for the current traffic volumes and posted speed limit. Also, due to an increase in commuters to and from Louisville and the development along the project corridor, the traffic volumes are expected to double in the next 20 years. The no build would result in this substandard roadway remaining, and would not accommodate the expected traffic. The accident data for the last 3 years shows that there are between 10 and 14 rear end crashes between Hunters Ridge and Ridgemoor Drive each year. The existing profile along this stretch of US 42 contains vertical geometric deficiencies for the posted speed of 45 MPH and has a

critical crash rate factor greater than 1.0 (which indicates statistically, a higher rate than roads of similar functional classification).

Historic Site Impact

The Belknap Farm Fruit Stand (Site 9, Parcel 36) is a one-story, five bay, hipped roof, Colonial Revival brick building which is sited on a lot in the northwest quadrant of the intersection of River Bluff Road and US 42. According to local sources, the structure served as a fruit stand for the Belknap Farm owned by William B. Belknap who was an economist and stock breeder. Local sources indicate that the stand was used from the 1930s until circa 1950. It was determined to be eligible for the National Register.

Also identified as being eligible for the National Register, is the Wallace Property. Henry F. Wallace was a noted journalist, civil rights activist and conservationist. This property is located along the north side of US 42 for approximately 1200 ft. beginning 1000 ft. from the county line (Sites 1, 2, & 3).

Preferred Alternative

To avoid an adverse effect to Historic Site 9, design adjustments have been incorporated to Alternative 1. The proposed grade near the River Bluff intersection was lowered to improve sight distance. The proposed grade of the sag vertical curve to the west of River Bluff Road was raised slightly to improve sight distance. The proposed sag vertical curve at Hayfield Road was lowered to match the existing grade. The proposed 5' sidewalk on the north side of US 42 and along the Site 9 property was pulled back to be located just behind the back of the proposed curb. In addition to this, a short retaining wall is proposed on the north side of the sidewalk to keep the disturb limits from encroaching onto the Site 9 property. Also, the northbound side of River Bluff Road was moved to the east and the entrance to Site 9 extended to keep the disturb limits from encroaching onto Site 9. After incorporating the above practical solutions, no permanent right-of-way will be acquired from the property. Included on the construction plans will be a commitment that says no harm to the landscaping or the structure will occur and the fence will be rebuilt as shown. Because of this redesign effort, the State Historic Preservation Officer (SHPO) issued a No Adverse Effect determination for Alternative 1 (see attached SHPO letter). Temporary use of an eligible property is acceptable under the *de minimis* rule of Section 4(f), as long as the ground and any other existing items (ex. fence, etc.) are restored to their original state, and the SHPO concurs that there will be No Adverse Effect; which is the case for Site 9.

Alternate 1 received a No Adverse Effect determination for minor grading that will be constructed on the Wallace Property (Sites 1, 2, & 3), which is located along the middle of the project on the north side of US 42. SHPO has also determined that the *de minimis* rule shall apply to Sites 1, 2, & 3 (see attached SHPO letter).

At the October 2009 Project Team meeting, it was determined that Alternate 1 is the preferred alternative. Alternate 1 is the preferred alternate because of the following reasons:

- **Cost** – The preferred alternate (Alternate 1) was less than half the cost of the other alternate, with an estimated total cost difference of \$6,651,000.
- **R/W Impacts** – The preferred alternate required significantly less total right of way and did not require any relocations.
- **Utility Impacts** – Due to the smaller foot print of the Preferred alternate, the impacts to the utilities were decreased (by \$90,000).
- **Environmental Sensitivity** – Though a Category Exclusion is anticipated, the reduced foot print of the preferred alternate will have less environmental impact on the lands surrounding the project (see attached Communicating All Promises Note) including the treed areas that are summer habitat for Indiana bats. Likewise, the impact to the blue line stream and other waterways will be reduced compared to the other alternates.

2. DESIGN EXCEPTION REQUIRED

US 42, inside the projects limits, is functionally classified as an Urban Principal Arterial; however the existing roadway has a rural typical section and is signed with a 45 MPH speed limit. Since the preferred alternate has an urban typical section the design speed was selected to be 35 MPH. Therefore, a design exception is required for the reduced design speed.

3. PREFERRED ALTERNATE COST

The overall cost of the preferred alternate is **not** greater than 15% above the Highway Plan cost. The overall cost of the preferred alternate is 7% greater than the Highway Plan cost.

- Design* is 25% greater (+\$527,000) than the 2010 Highway Plan.
- R/W is 23% greater (+\$507,000) than the 2010 Highway Plan.
- Utility is less (-\$126,000) than the 2010 Highway Plan.
- Construction is less (-\$417,000) than the 2010 Highway Plan.

* Total Design Cost (Phase 1 and Phase 2).

4. MAINTENANCE OF TRAFFIC NOTES

General Notes

- Ingress and Egress to all businesses and residents will be maintained.
- Contractor shall not work on both sides of the road simultaneously within the same area.
- At night and during periods of construction inactivity, place drums 2 feet from the traveled way.
- Contractor shall maintain a smooth transition from existing pavement to proposed paving operation.
- Contractor shall be responsible for all temporary drainage.

Project Phasing

Traffic will be maintained on the existing roadway and widened where required. The majority of the proposed grade allows for salvaging the existing pavement; overlaying and widening.

There are locations where reconstruction (i.e. Full Depth Pavement) is required due to undercutting of the existing road or the raising of the existing grade.

In those cases, traffic is to be maintained on the existing road and shifted to new construction on the left or right of the proposed centerline (some temporary widening of existing road may be required).

5. AVOIDANCE ALTERNATIVES TO WATER RELATED IMPACTS**Blue Line Stream Impact**

The existing alignment crosses one blue line stream (a tributary of the Harrods Creek) as identified on the ANCHORAGE, KY quad map. The head water of this blue line stream begins to the north of the office building on the left at the end of the project. It crosses US 42 at an approximate 55° skew thru an existing 4' x 5' culvert at the Hayfield Way/US 42 intersection. The stream leaves the project limits behind the residences on the south side of US 42. All of the build alternatives will require widening of the existing 4' x 5' box culvert structure to accommodate the proposed three lane roadway section because the stream crosses US 42, therefore there is not an avoidance alternative. At this time there appears to be no adverse impacts to this blue line stream. In order to protect the waterway, typical erosion control and sediment control measures will be utilized to minimize erosion within the project limits. These measures will include silt fence, ditch checks, silt traps, temporary ditches, seeding and protecting and inlet protection.

6. CONSIDERATION FOR BICYCLE AND PEDESTRIAN FACILITIES

Bicycle and pedestrian facilities were discussed for the improvements to US 42. Bicycle facilities will be provided in the preferred alternative by means of the 10' multipurpose path on the south side of US 42 throughout the entire project length. Five foot wide sidewalks are planned in all of the alternatives, except Alternate 2 (Rural), on the north side of the project from River Bluff Road to Ridgemoor drive.

7. PURPOSE AND NEED STATEMENT

The purpose and need of the project is to improve traffic flow, minimize congestion and address safety issues on US 42 between the Jefferson County/Oldham County line and Ridgemoor Drive.

Section 3 – Meeting Reports and Correspondence

Meeting Minutes
Louisville – Cincinnati (US 42)
Jefferson County Item No. 5-972.00
Oldham County Item No. 5-441.00

A meeting to discuss both US 42 roadway improvement projects was held at 1:30 p.m. on Wednesday, October 24, 2007 at the KYTC District 5 Office; the following persons were in attendance:

Name	Representing	Telephone	Email
KYTC REPRESENTATIVES			
Tala Quinio	KYTC Project Manager	502-367-6411	Tala.Quinio@ky.gov
John Callihan	KYTC	502-376-6411	JohnE.Callihan@ky.gov
Jeff Schaefer	KYTC	502-367-6411	Jeff.Schaefer@ky.gov
Matt Bullock	KYTC	502-367-6411	Matt.bullock@ky.gov
Brian Meade	KYTC	502-367-6411	Brian.Meade@ky.gov
DESIGN CONSULTANTS			
Albert Zimmerman	Qk4	502-585-2222	azimmerman@qk4.com
Mike Hudson	Qk4	502-585-2222	mHUDSON@qk4.com
Diane Zimmerman	JJG	502-228-0393	dzimmerman@jjg.com
Larry Harmon	HHE	859-269-3150	larry.harmon@hhenet.com
Brian Knapp	HHE	859-269-3150	bknapp@hhenet.com

Jefferson County Item No. 5-972.00

Items discussed were as follows:

1. A revised manuscript drawing of the Alternate 1 alignment, with comments addressed from the 9-27-97-design team meeting, was presented. Alternate 1 is a 5-lane urban section that follows the existing alignment, with a raised median used wherever access control would not be changed from existing conditions. The result is a small length of raised median on each end of the project with a flush median throughout the most of the project.
2. A manuscript drawing of Alternate 2 alignment was presented. Alternate 2 is the same typical section and median configuration as Alternate 1, but the alignment was shifted 12' to the east (away from the commercial side). The median configuration will be revised to match Alternate 1's median locations.
3. A manuscript drawing of Alternate 1 with U-turns was presented. This alternate included widening the median to 30' in the areas of Timber Ridge Road and River Road to accommodate for U-turn maneuvers. In between these two intersections is a continuous raised median with only one opening located at Fox Harbor Road. A U-turn was not proposed at Fox Harbor Road because widening to the necessary 30' median would cause unnecessary impacts on the adjoining property. Furthermore, it

would more closely resemble a continuous 30' median from Timber Ridge Road to River Road, which is unnecessary.

4. The design team decided that it was not reasonable to design US 42 for the 2030 traffic volume. It is anticipated that would require a 7-lane section and excessively long turn lanes. Instead, the design will do the best it can to improve traffic and safety with reasonable disturbances utilizing a 5-lane urban section.
5. The realignment of River Road approach with the use of a small traffic island (as shown on Alt 1) was selected over a traditional 90° intersection. The sidewalk will be extended from US 42, along the south side of River Road, to the intersection of Sedgewicke Drive. No sidewalk will be constructed on US 42 north of River Road.
6. Dual left turns from River Road onto US 42 would improve the level of service of the intersection, but space is limited due to the location of the shopping center, so do not include them in the design.
7. Verify that Parcel 34 has full access in Alt 1.
8. Any new entrance onto US 42 will be by KYTC permit, KYTC will decide if a median cut will be allowed to achieve full access.
9. River Road ties to US 42 at a large skew. To effectively realign River Road, it would have to flare to the north and then turn back to the south to tie to US 42 at a right angle. This option was not considered due to impacts to the adjoining property (including the shopping center), and the necessity to realign a long portion of River Road.
10. The design team has reviewed the possible consideration of roundabouts at River Road and Timber Ridge Road and identified right of way and geometric concerns. Qk4 is to develop a schematic of a roundabout for the 3-legged intersection at River Road with its current alignment.
11. All 3 alternates and a roundabout schematic shall be presented at the Public Officials Meeting that may be scheduled in November.
12. The consultant shall prepare a list of the each Alternate's Pros and Cons to be discussed at the Public Officials Meeting.

Oldham County Item No. 5-441.00

Items discussed were as follows:

1. The existing profile of US 42 and the vertical geometry, including equivalent design speed, was presented and discussed.

2. Meeting Minutes from the October 18th, 2007 Public Officials meeting were discussed.
3. The design team decided that it was not reasonable to design US 42 for the 2030 traffic volume. It is anticipated that would require a 5-lane section. Instead, the design will do the best it can to improve traffic and safety with reasonable disturbances utilizing a 3-lane section.
4. A 3-lane urban typical section with a design speed of 35 mph and a 3 lane rural typical section with a design speed of 45 mph will be studied as the two alternates.
5. The possibility of adding sidewalk to the rural section is to be considered.
6. The typical sections shall include two 12' travel lanes and a 14' continuous left turn lane. Bike lanes will not be striped on either alternate.
7. The Public Meeting will be scheduled for sometime in January 2008.
8. Typical Section displays, for the Public Meeting, will show probable/variable utility relocation areas.
9. Exhibits, for the Public Meeting, will show the edge of pavements, lane lines, curb and gutter, sidewalk, ditches and shoulders as appropriate for each alternate. Disturb limits and proposed right of way will not be shown.

These meeting minutes represents our understanding of items discussed during the meeting. All participants are requested to review these minutes and advise if they are not in concurrence and necessary corrections or clarifications shall be revised accordingly.

Meeting Minutes
Louisville – Cincinnati (US 42)
Oldham County Item No. 5-441.00
Jefferson County Item No. 5-972.00

A meeting to discuss both US 42 roadway improvement projects was held at 1:30 p.m. on Thursday, May 29, 2008 at the KYTC District 5 Office; the following persons were in attendance:

Name	Representing	Telephone	Email
KYTC REPRESENTATIVES			
Tala Quinio	KYTC Project Manager	502-367-6411	Tala.Quinio@ky.gov
John Callihan	KYTC	502-376-6411	JohnE.Callihan@ky.gov
Robert Farley	KYTC Central Office Design	502-564-3280	Bob.Farley@ky.gov
Andrea Clifford	KYTC	502-367-6411	Andrea.clifford@ky.gov
Glenda Luster	KYTC D5	502-367-6411	Glenda.luster@ky.gov
Jennifer McCleve	KYTC D5	502-367-6411	Jennifer.McCleve@ky.gov
DESIGN CONSULTANTS			
Albert Zimmerman	QK4	502-585-2222	azimmerman@qk4.com
Michael Hudson	QK4	502-585-2222	mHUDSON@qk4.com
Larry Harmon	HHE	859-269-3150	larry.harmon@hhenet.com
Brian Knapp	HHE	859-269-3150	bknapp@hhenet.com
Diane Zimmerman	JJG	502-228-0393	diane.zimmerman@jjg.com

Oldham County Item No. 5-441.00

Items discussed were as follows:

1. The results of the questionnaires from the April 1st Public Meeting were summarized and discussed. The results of the 35 returned questionnaires included the following:

When asked to rank the importance of the following 3 project issues by priority, the results were:

Top Priority: Access to and from US 42 subdivisions safely,
Middle Priority: Travel thru Project Limits more quickly and safely,
Lowest Priority: Pedestrian Facilities (sidewalks, etc.).

When asked to rank the preference of the following 3 roadway typical sections by priority, the results were:

Top Priority: Rural with sidewalks,
Middle Priority: Urban (curb & gutter) with sidewalks,
Lowest Priority: Rural without sidewalks.

2. The consultants shall provide drawings showing the existing utilities to the District so that the District can prepare a Utility Relocation Estimate on the recommended alternate.
3. The consultants shall compute Right of Way areas on each alternate so the District can prepare Right of Way Estimates.
4. Inquire with the District Environmentalist if there are any Historic, Hazmat or environmental issues on the project. Specifically inquire if the house on the corner of US 42 and River Bluff Road is considered historic.
5. All proposed alternates shall be designed to have the proper sight distance throughout the project. This can allow the existing traffic signal at the River Bluff Road intersection to be removed.
6. The urban alternate shall have a 35 MPH design speed and the rural alternates shall have a 45 MPH design speed.
7. The three alternates that are to be advanced to show disturb limits and proposed Right of Way are:
 - a. Rural 3 lane template without sidewalk
 - b. Rural 3 lane template with sidewalk on the north side from River Bluff Road to Ridgemoor Drive.
 - c. Urban 3 lane template with sidewalk on the north side from River Bluff Road to Ridgemoor Drive and a multiuse path on the south side throughout the entire project.
8. Associated with the rural alternates, the consultant shall study a sub-alternate for US 42 in the area of the frontage road (off of Hayfield Way) to determine if the frontage road can be avoided. Possible design solutions to consider include the use of a retaining wall between US 42 and the frontage road.
9. Since the proposed sidewalk on the rural section is separated from the roadway by the ditch, the sidewalk will need to be ADA compliant.
10. The consultant is to prepare manuscripts as discussed above for a Design Team meeting in July.
11. The alternates will be presented at a 2nd Public Meeting, which will be held in August or September 2008.

Jefferson County Item No. 5-972.00

Items discussed were as follows:

1. Roundabouts will not be considered for use on this project. The District will send a letter to the city officials to inform them of this decision.
2. The consultants are to prepare a Contract Modification to study two additional alternates. These alternates are to create "Minimum Cost/Minimum Impact" Solutions to satisfy the "Purpose and Need" of the project.
3. These "Minimum Cost/Minimum Impact" Solution alternates shall consist of adding a fifth lane to the existing roadway by Alternate #1) widening on both sides of the existing road or Alternate #2) widening only on the south side. Four 11' lanes with a 12' continuous turn lane will be studied. These alternates may include design features (such as shoulder width, ditch width, etc.) that may not meet current design standards; therefore design exceptions may be necessary.
4. Sidewalks, bike paths and/or multiuse paths will not be considered in the "Minimum Cost/Minimum Impact" Solution alternates.
5. The consultants shall develop cost estimates for the 5-lane alternate, U-Turn alternate and the "Minimum Cost/Minimum Impact" Solution alternates.

These meeting minutes represents our understanding of items discussed during the meeting. All participants are requested to review these minutes and advise if they are not in concurrence and necessary corrections or clarifications shall be revised accordingly.

Meeting Minutes **Louisville – Cincinnati (US 42)** **Oldham County Item No. 5-441.00**

A meeting to discuss the US 42 roadway improvement project was held at 1:30 p.m. on Friday, February 6, 2009 at the KYTC District 5 Office; the following persons were in attendance:

Name	Representing	Telephone	Email
KYTC REPRESENTATIVES			
Tala Quinio	KYTC Project Manager	502-367-6411	Tala.Quinio@ky.gov
Robert Craig Ashby	KYTC C. O. Design – Drainage	502-564-3280	Robert.Ashby@ky.gov
Robert Farley	KYTC Central Office Design	502-564-3280	Bob.Farley@ky.gov
Jeff Schaefer	KYTC D5 Environmental	502-210-5438	Jeff.Schaefer@ky.gov
Brian Meade	KYTC	502-367-6411	Brian.Meade@ky.gov
Ron Barber	KYTC D5 Utilities	502-210-5463	Ronald.Barber@ky.gov
Ron Geveden	KYTC Right of Way	502-210-5465	Ron.geveden@ky.gov
Dan O’dea	KYTC D5 - Signals	502-210-5400	Dan.O’dea@ky.gov
DESIGN CONSULTANTS			
Albert Zimmerman	QK4	502-992-2942	azimmerman@qk4.com
Michael Hudson	QK4	502-992-2989	mHUDSON@qk4.com
Tom Springer	QK4	502-585-2222	tspringer@qk4.com
Larry Harmon	HHE	859-269-3150	larry.harmon@hhenet.com
Brian Knapp	HHE	859-269-3150	bknapp@hhenet.com

Oldham County Item No. 5-441.00

The following items were discussed:

1. The consultant presented the five alternates that were developed and/or revised as a result of the comments taken at the 1st Public Meeting. The alternates were as follows:
 - Alt 1 - urban 3 lane w/ sidewalk & multiuse path, 35 MPH design Speed - sidewalk on the north side from River Bluff Road to Ridgemoor Drive and a multiuse path on the south side throughout the entire project.
 - Alt 2 - rural 3 lane, 45 MPH design Speed
 - Alt 3 - rural 3 lane w/ sidewalk, 45 MPH design Speed - sidewalk on the north side from River Bluff Road to Ridgemoor Drive
 - Alt 3A – Alt 3 with retaining wall @ edge of existing frontage road, 45 MPH design Speed
 - Alt 3B – Alt 3 with retaining wall 2' outside of ditch line and relocate frontage road, 45 MPH design Speed.

2. The consultant presented the cost estimates for the alternates. The Right of Way and Utility costs were prepared by the KYTC and the consultant prepared the construction costs. The costs are summarized as follows:

Alternate	Description	Right of Way	Utilities	Construction	Total
Alt 1	3 lane urban with sidewalk and multiuse path	\$2,712,000	\$685,000	\$2,662,351	\$6,059,351
Alt 2	3 lane rural	\$9,500,000	\$775,000	\$2,955,593	\$13,230,593
Alt 3	3 lane rural with sidewalk	\$11,363,000	\$800,000	\$2,990,590	\$15,153,590
Alt 3A	Alt 3 w/ retaining wall to protect exist frontage rd.	\$9,807,000	\$980,000	\$3,458,281	\$14,245,281
Alt 3B	Alt 3 with retaining wall and relocated frontage rd.	\$11,363,000	\$985,000	\$3,500,946	\$15,848,946

3. After reviewing the cost summary above, the design team decided to eliminate alternates 3, 3A and 3B. The consultants will modify the typical Urban section (Alt 1) and the typical Rural section (Alt 2), by utilizing minimum lane, shoulder and/or ditch widths to reduce proposed right of way.
4. SHPO is reviewing the Cultural Resources report, which recommended that no sites are eligible. KYTC anticipates SHPO's response sometime in February (submitted January 7, 2009). - There is a possibility that Sites 8, 9 and/or 10 (Parcels 36, 35 and 57 respectively) could be found eligible for the National Register by the SHPO. The boundary of any Site could be the footprint of the house, the entire property or somewhere in between. If it is found eligible and a "No Adverse Effect" determination is made then no further work is necessary. If an "Adverse Effect" determination is made, an Avoidance Alternative will need to be developed. If avoidance is not prudent then the minimization alternative must be selected. Temporary use on an eligible property is acceptable under Section 4(f), as long as the ground and any other existing items (ex. fence, etc.) is restored to their original state and the SHPO concurs that there will be no Adverse Effect.
5. The disturb limits for all current alternates impact the structure on Parcel 36 (Site 8) which may be found eligible for the National Register. If this property or any other property is determined to be eligible for the National Register, then the consultant will need to develop alternates that minimize the impact to, or avoid the existing structure and/or the parcel as a whole.

6. If the alternates need to be redesigned to avoid or to minimize the impact to any property identified in the Cultural Resources report, then the redesign may include: reduced lane widths, reduced shoulders and ditches, alignment shifts, eliminating the sidewalk or multiuse trail, reduced clear zone and use of retaining walls.
7. All proposed alternates provide the proper sight distance throughout the project. This improved sight distance reduces the need for the existing traffic signal at the River Bluff Road intersection.
8. KYTC had to defer the archeology on the Wallace Farm, Parcels 15, 20 & 21, because access to the site has been denied by the property owners.
9. After the results of Cultural Resources report are known and the consultant develops any additional Alternates, the Project Design Team will meet again to discuss the revised alternates and prepare for the 2nd Public Meeting.

These meeting minutes represents our understanding of items discussed during the meeting. All participants are requested to review these minutes and advise if they are not in concurrence and necessary corrections or clarifications shall be revised accordingly.

Meeting Minutes
Louisville – Cincinnati (US 42)
Oldham County Item No. 5-441.00
Jefferson County Item No. 5-972.00

A meeting to discuss both US 42 roadway improvement projects was held at 1:30 p.m. on Friday, October 23, 2009 at the KYTC District 5 Office; the following persons were in attendance:

Name	Representing	Telephone	Email
KYTC REPRESENTATIVES			
Tala Quinio	KYTC Project Manager	502-210-5473	Tala.Quinio@ky.gov
Brian Meade	KYTC	502-210-5411	Brian.Meade@ky.gov
Robert Farley	KYTC Central Office Design	502-564-3280	Bob.Farley@ky.gov
Cathy Cornish	KYTC Utilities	502-210-5476	Cathy.Cornish@ky.gov
Ron Geveden	KYTC D5 R/W	502-210-5465	Ron.Geveden@ky.gov
Tom Boykin	KYTC D5 R/W		Tom.Boykin@ky.gov
Jeff Schaefer	KYTC D5	502-210-5438	Jeff.Schaefer@ky.gov
Tony Harrod	KYTC D5	502-210-5400	Tharrod@ky.gov
Kevin J Bailey	KYTC D5	502-210-5423	Kevin.Bailey@ky.gov
DESIGN CONSULTANTS			
Albert Zimmerman	QK4	502-585-2222	azimmerman@qk4.com
Michael Hudson	QK4	502-585-2222	mHUDSON@qk4.com
Larry Harmon	HHE	859-269-3150	larry.harmon@hhenet.com
Brian Knapp	HHE	859-269-3150	bknapp@hhenet.com
Tom Springer	QK4	502-585-2222	Tspringer@qk4.com
Diane Zimmerman	JJG	502-228-0393	diane.zimmerman@jjg.com

Jefferson County Item No. 5-972.00

Items discussed were as follows:

1. A brief description of the Prospect Mobility Study was presented by Tom Springer. The top priority is a multi-use path from City Hall to Fox Harbor.
2. The purpose and need for the project is to reduce traffic congestion and improve safety. The KYTC Six-Year Plan description is to provide a center turn lane from Harrods Creek to River Road.

3. Previous Alternates 1, 2 and Alternate 1 with U-Turns were discussed. New Alternates 3 & 4 were also discussed. Alternates 1 & 3 were eliminated as viable options. Alternate 1 was an urban section that widens on both sides and Alternate 3 was a rural section that widens on both sides. Both alternates provided 2 lanes in each direction along with a center turn lane. It was decided to provide cost estimates for Alternates 2, 4 and Alternate 1 with U-Turn. The consultant will provide construct cost estimates and the department will provide right of way and utility costs for each of these three alternates.

Alternate 2 widens to the South providing 2-11' lanes in each direction along with a 12' center lane. It provides new curb and gutter and sidewalks on the North and new curb and gutter and a 10' multi-use trail in lieu of sidewalks on the South side.

Alternate 4 widens to the South providing 2-11' lanes in each direction along with a 12' center lane. It utilizes the existing ditching and curb and gutter on the North side. It provides new shoulders and ditches on the South side.

Alternate 1 with U-Turns widens on both the North and South sides and provides new curb and gutter and sidewalks on both sides. The median widens at the Timber Ridge Road and River Road intersections providing U-Turns at these two locations. This alternate provides a raised median that can be landscaped.

4. There may be a 60" water main located within the project limits. The consultant will try to obtain information regarding this water main.
5. A public officials meeting is scheduled for 1:00 pm on November 18, 2009. A public meeting is to be scheduled for December 1, 2009.
6. Check with MSD to determine the location and or future plans for utilities in this area.

Oldham County Item No. 5-441.00

Items discussed were as follows:

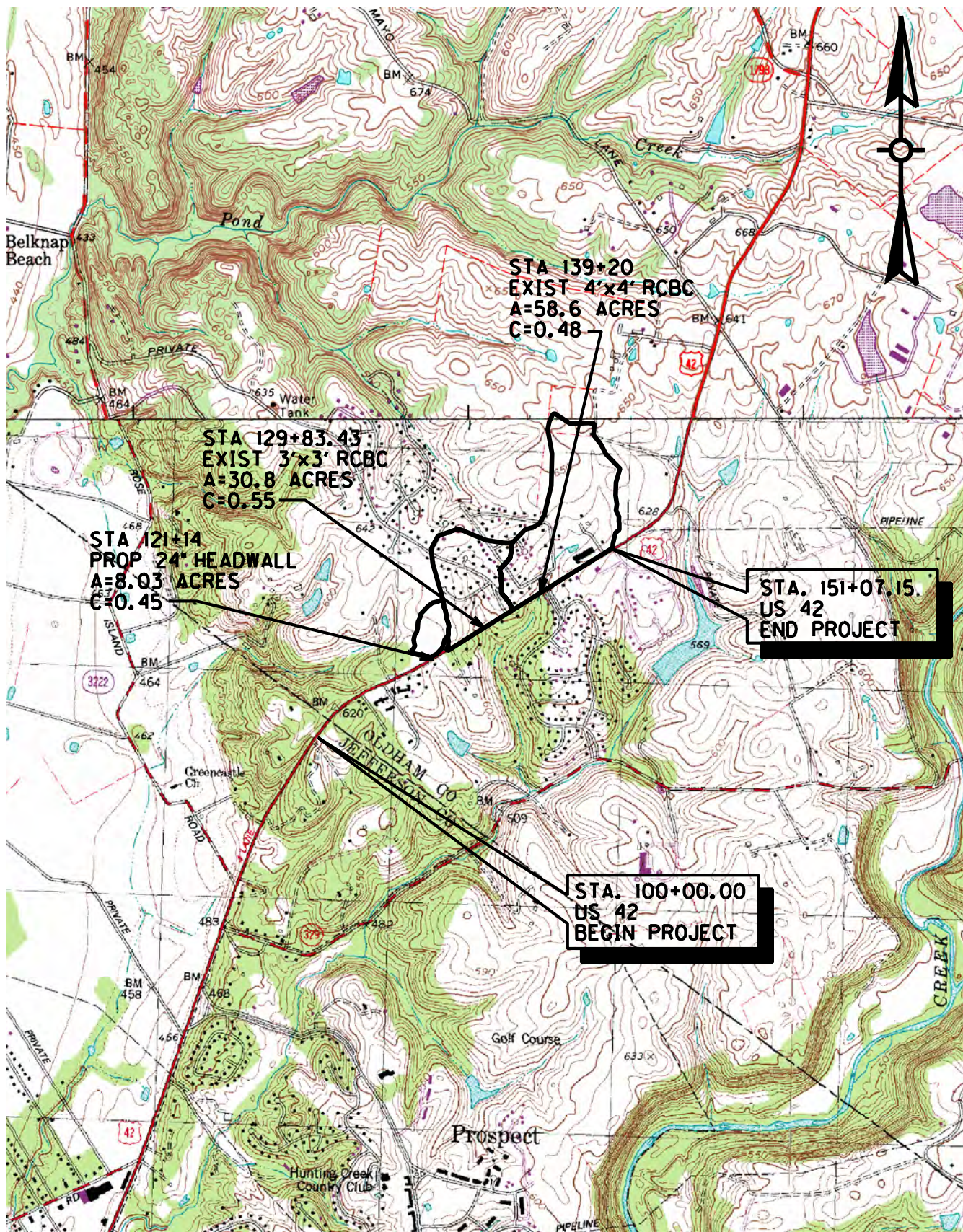
1. A brief project history was presented, noting the environmental study identified a historic site (Site 9) at the River Bluff Road intersection to avoid. The Wallace property at the beginning of the project along the north side of US 42 is also considered a historic resource.
2. Alternate 1 and 2 minimization alternates were discussed. Alternate 1 is an urban section that minimizes the impact to historic Site 9. Alternate 2 is a rural section that also

attempts to minimize the impact to the Site 9. It was determined that Alternate 1 has little or no impact on the site and therefore was selected as the preferred alternate. Also, Alternate 1 received a No Adverse Effect determination for the Wallace Property.

3. The department will check on the need for the signal at River Bluff Rd.
4. No additional public meetings or public officials meetings will be required in Phase I design.
5. Final Phase I plans and Design Executive Summary can now be completed and submitted.
6. The consultant will try to increase the sight distance for the vertical curve located at River Bluff Road to a 45 mph design speed. In addition, the River Bluff Road approach may be shifted to the west in order to minimize the impacts to Site 9 and to increase the sight distance.
7. The consultant will send updated plans including layout, typicals and R/W summary to District 5 Environmental Coordinator for development of the CE.
8. This meeting serves as the PL&G meeting.

Section 4 – Project Level Hydrology

USGS Quadrangle Map showing Large Drainage Areas



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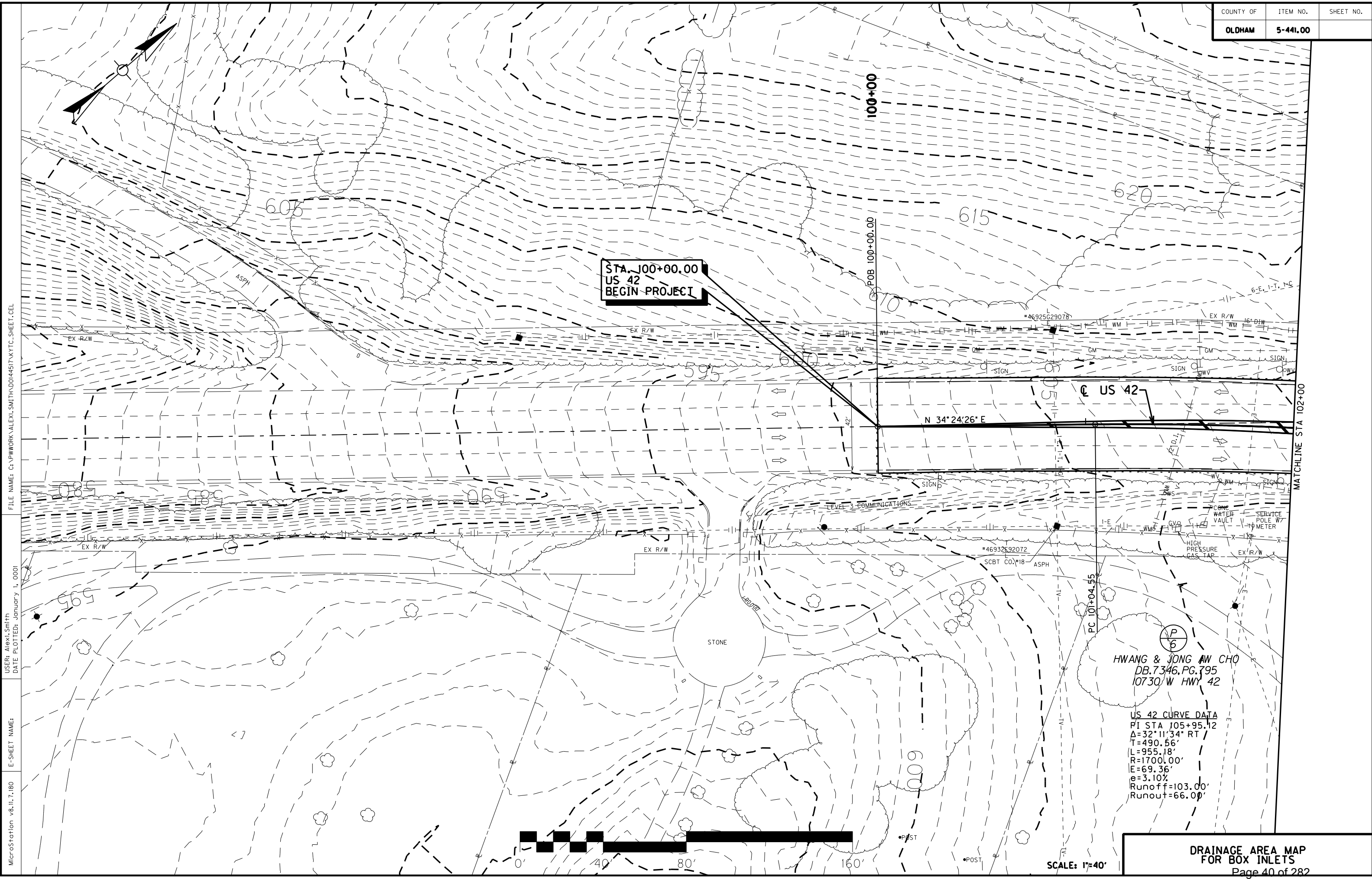


GRAPHIC SCALE
1" = 2000'

SHOWING A PORTION OF
ANCHORAGE, KY. AND OWEN, KY.
QUADRANGLE

US 42
DRAINAGE AREA MAP
OLDHAM COUNTY
ITEM NO. 5-441.00

Drainage Area Map for Box Inlets



COUNTY OF	ITEM NO.	SHEET NO.
OLDHAM	5-441.00	

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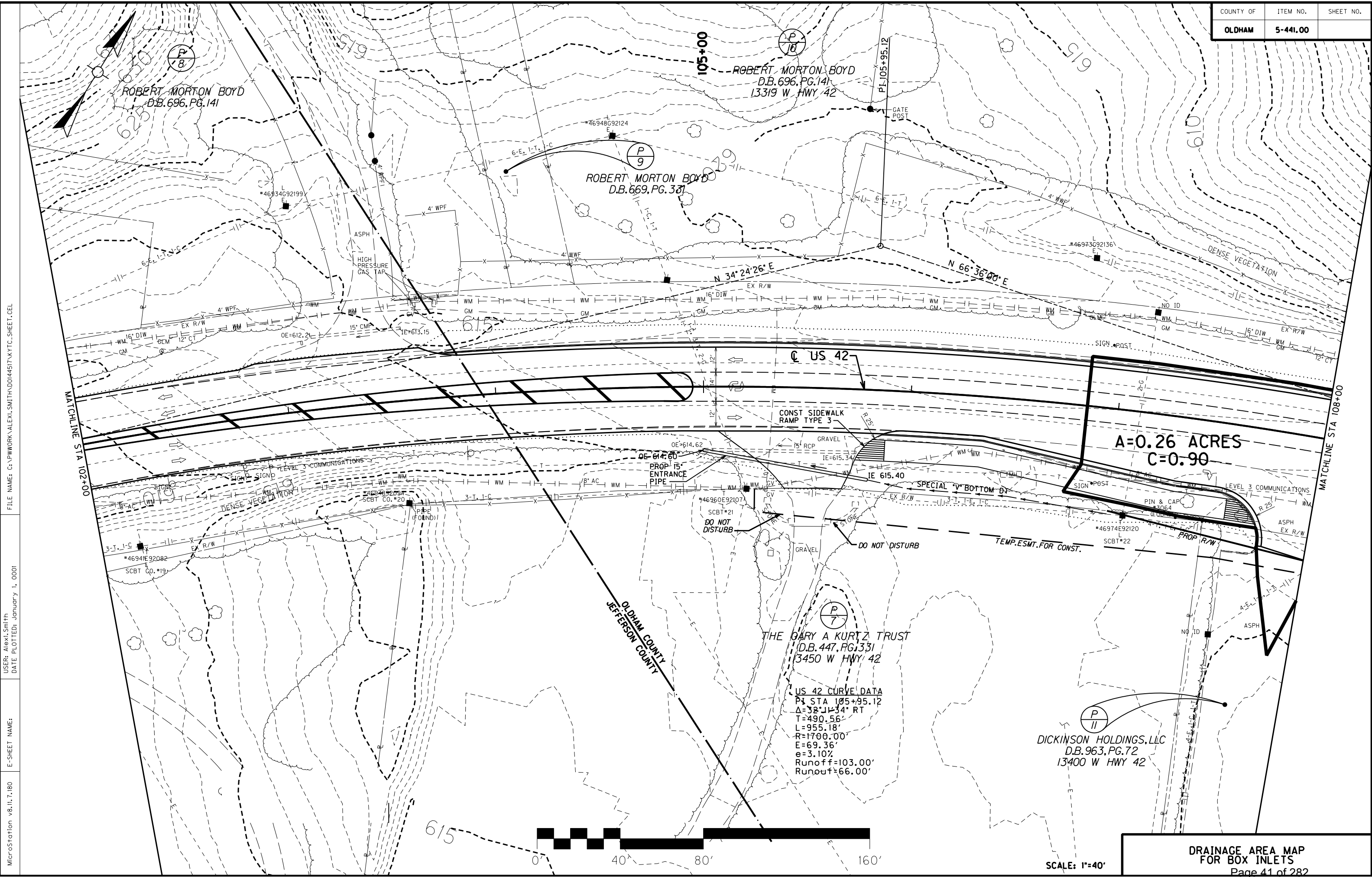
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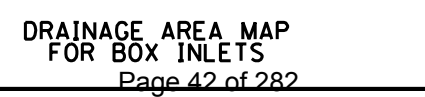
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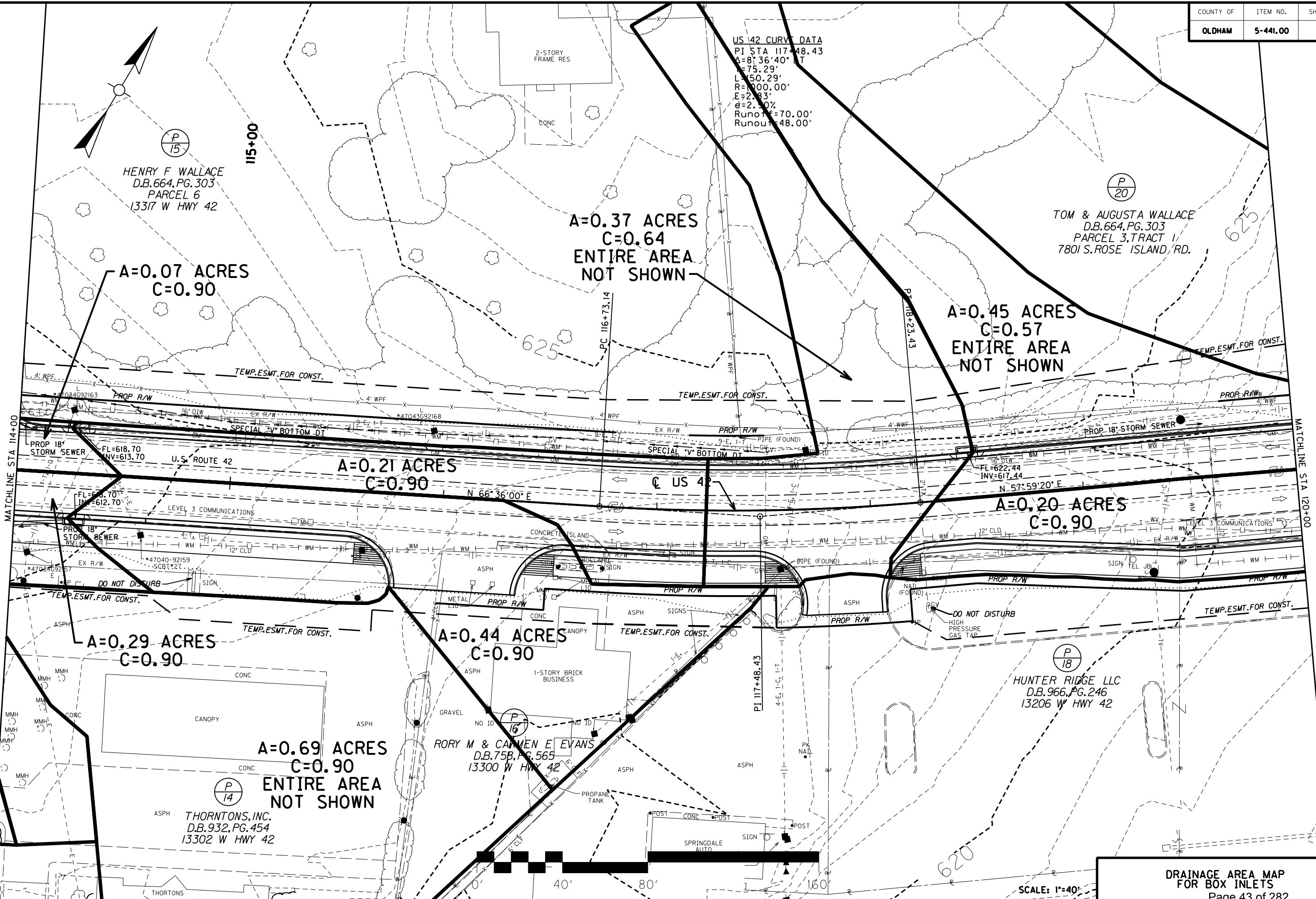
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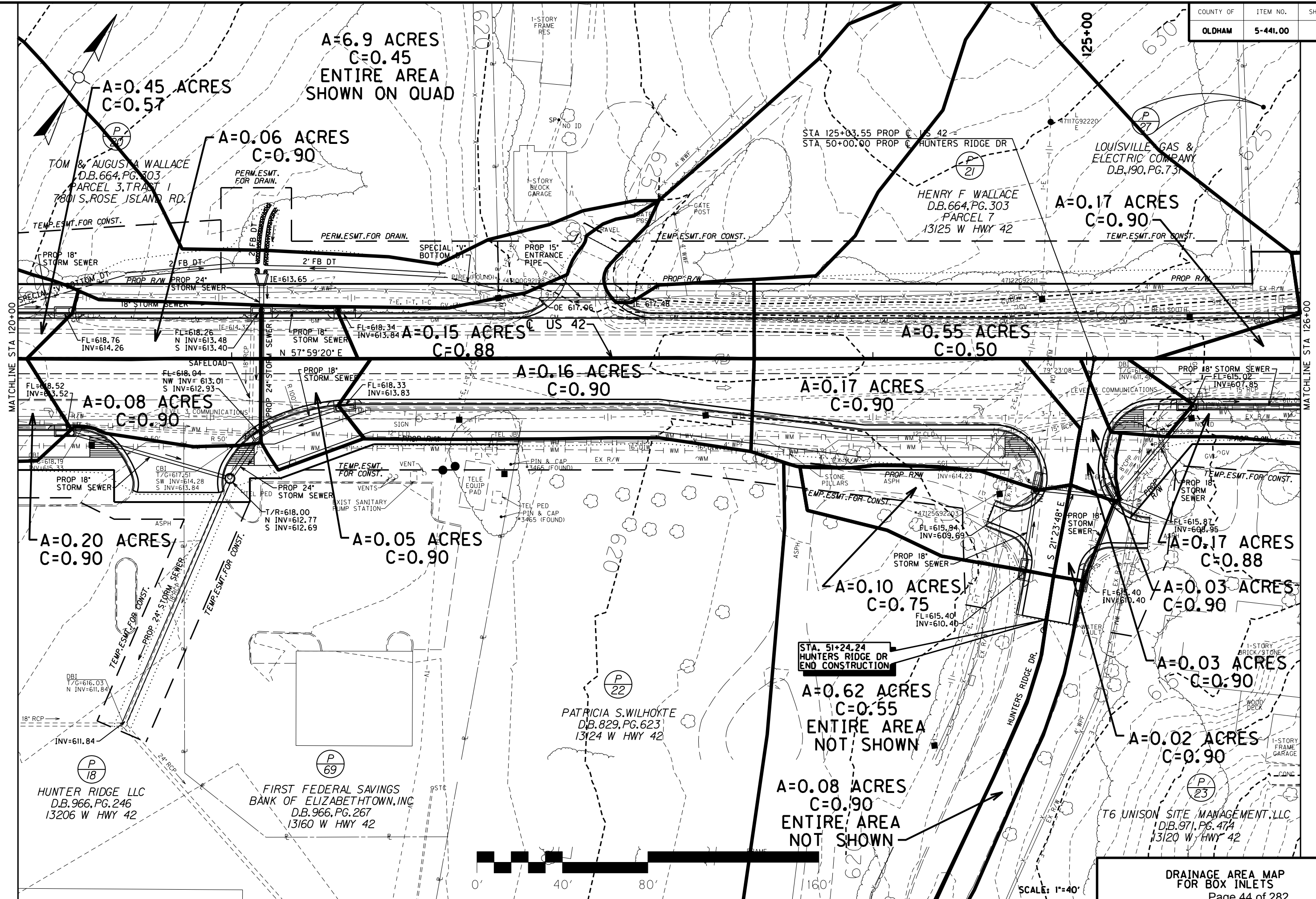
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D.B. 963, PG. 72
13400 W HWY 42



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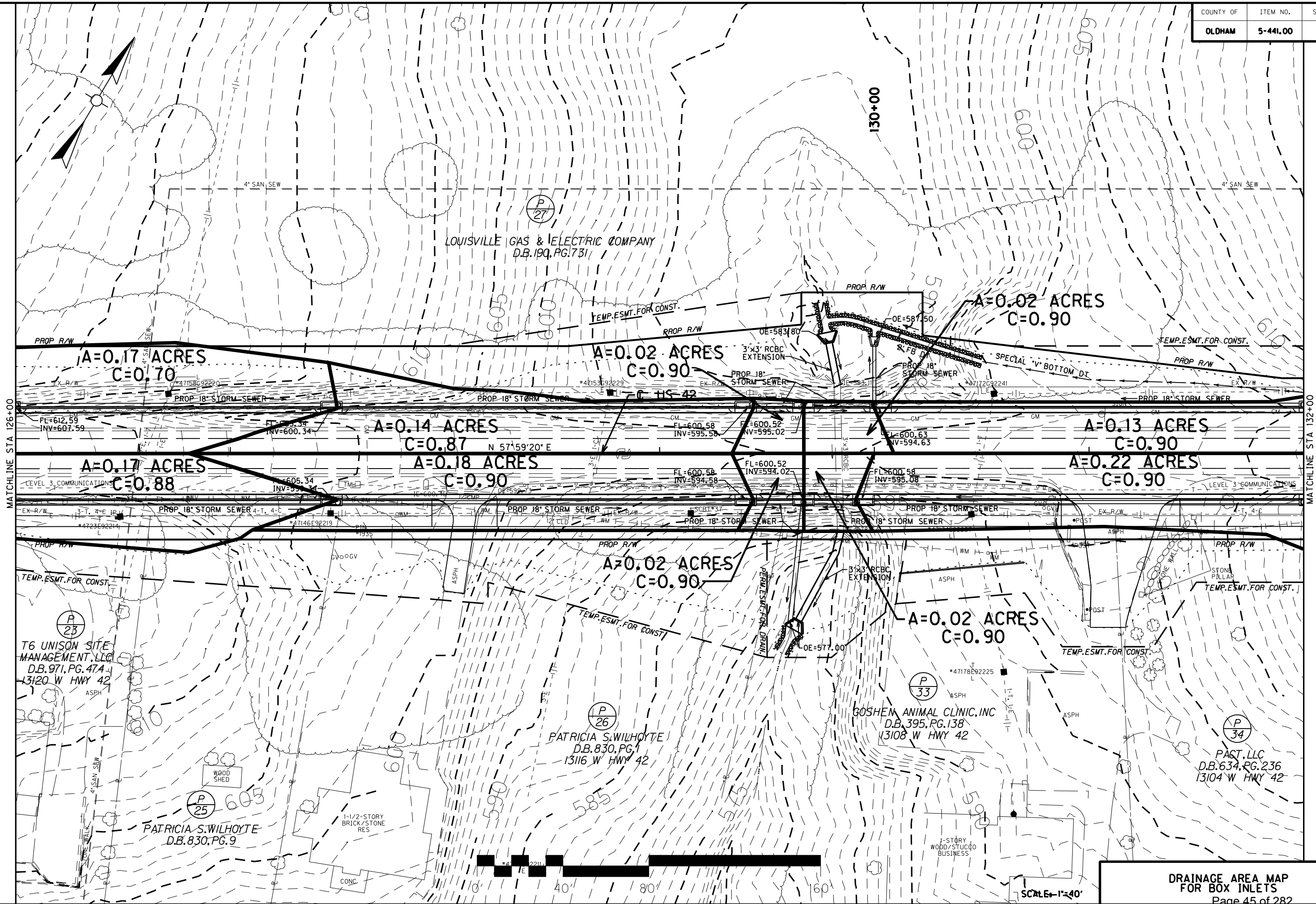
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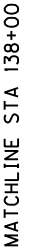
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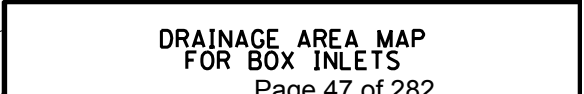
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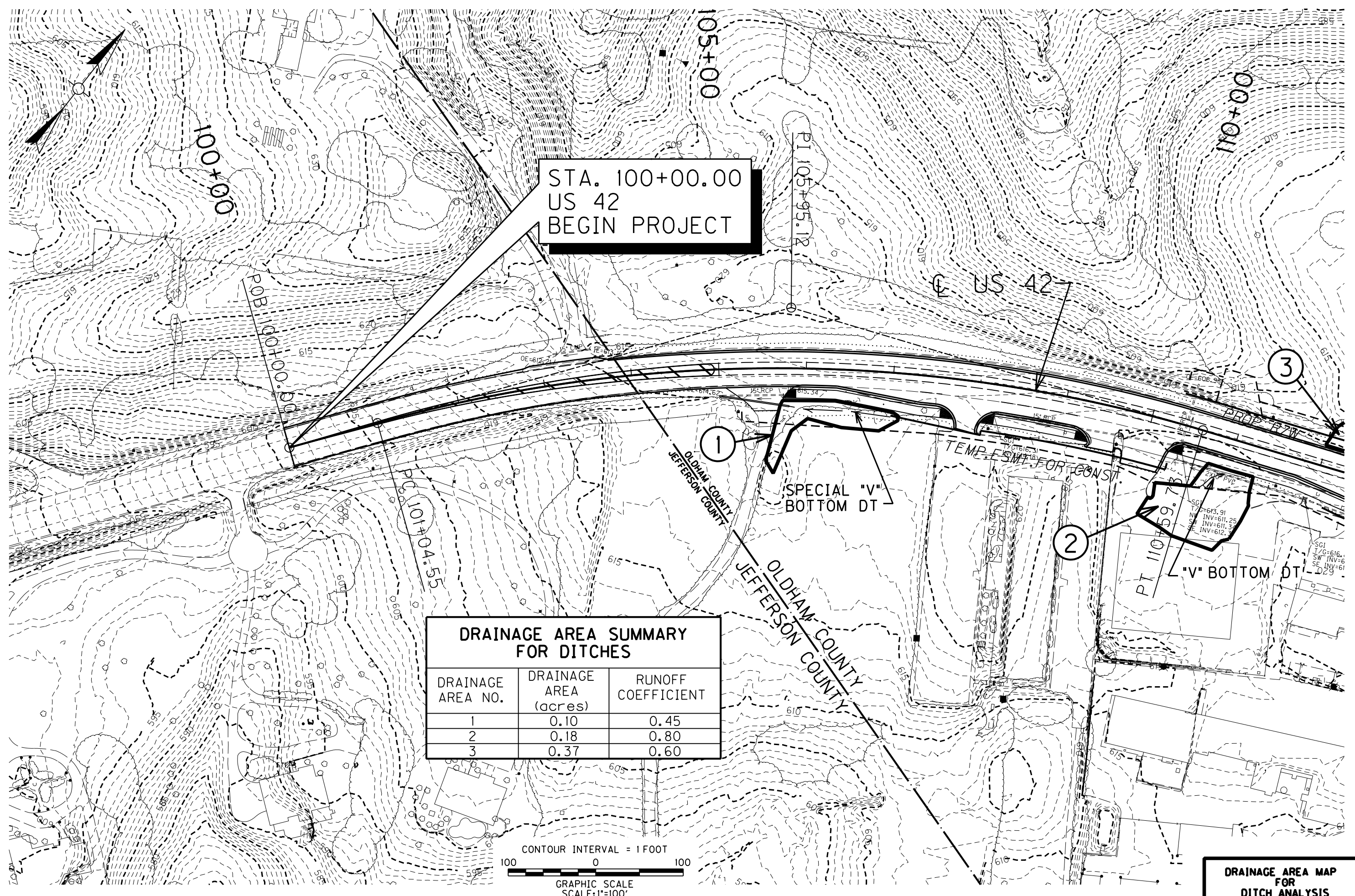
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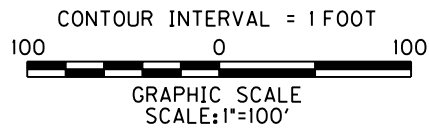


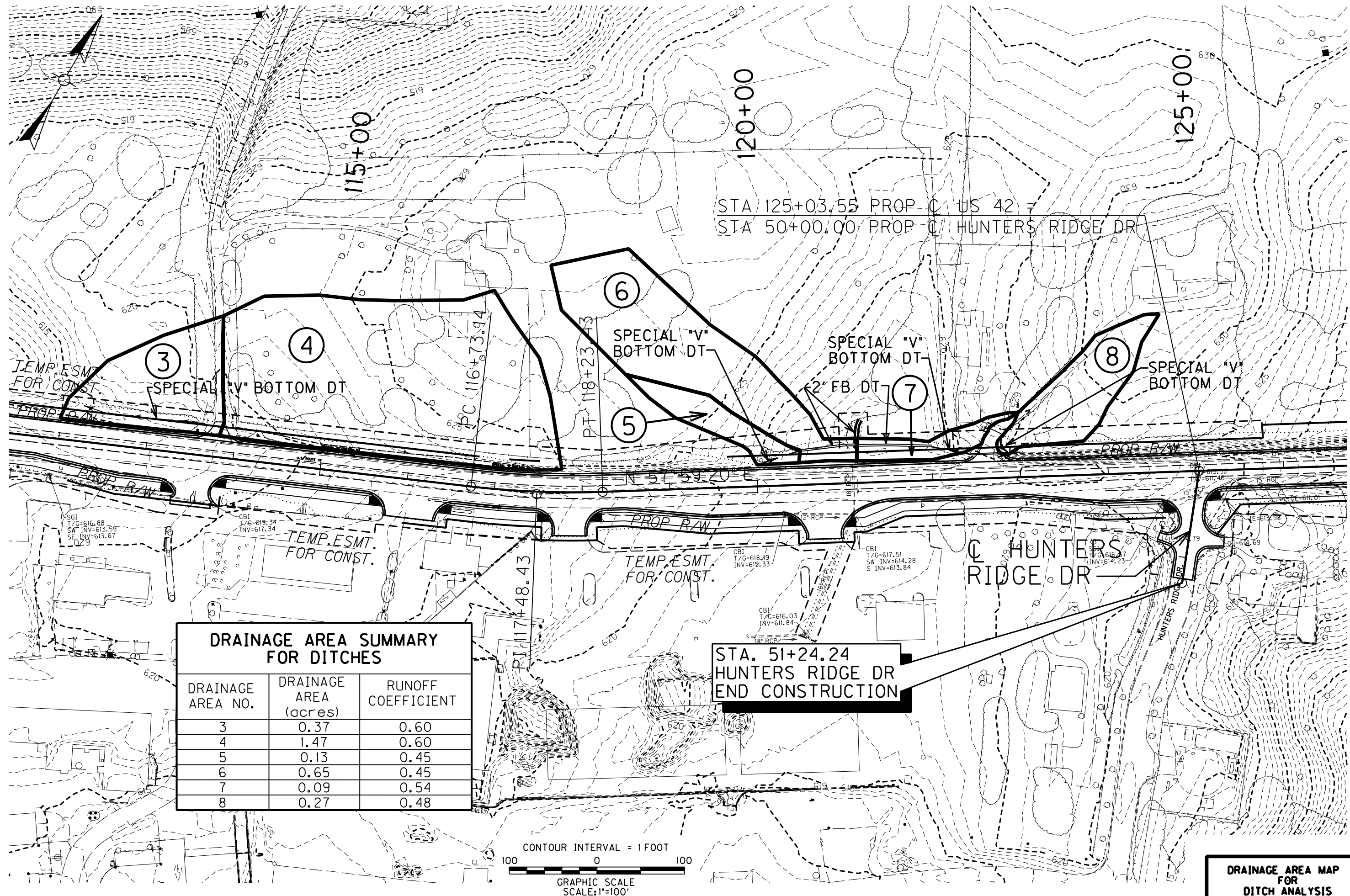


Drainage Area Map for Ditches

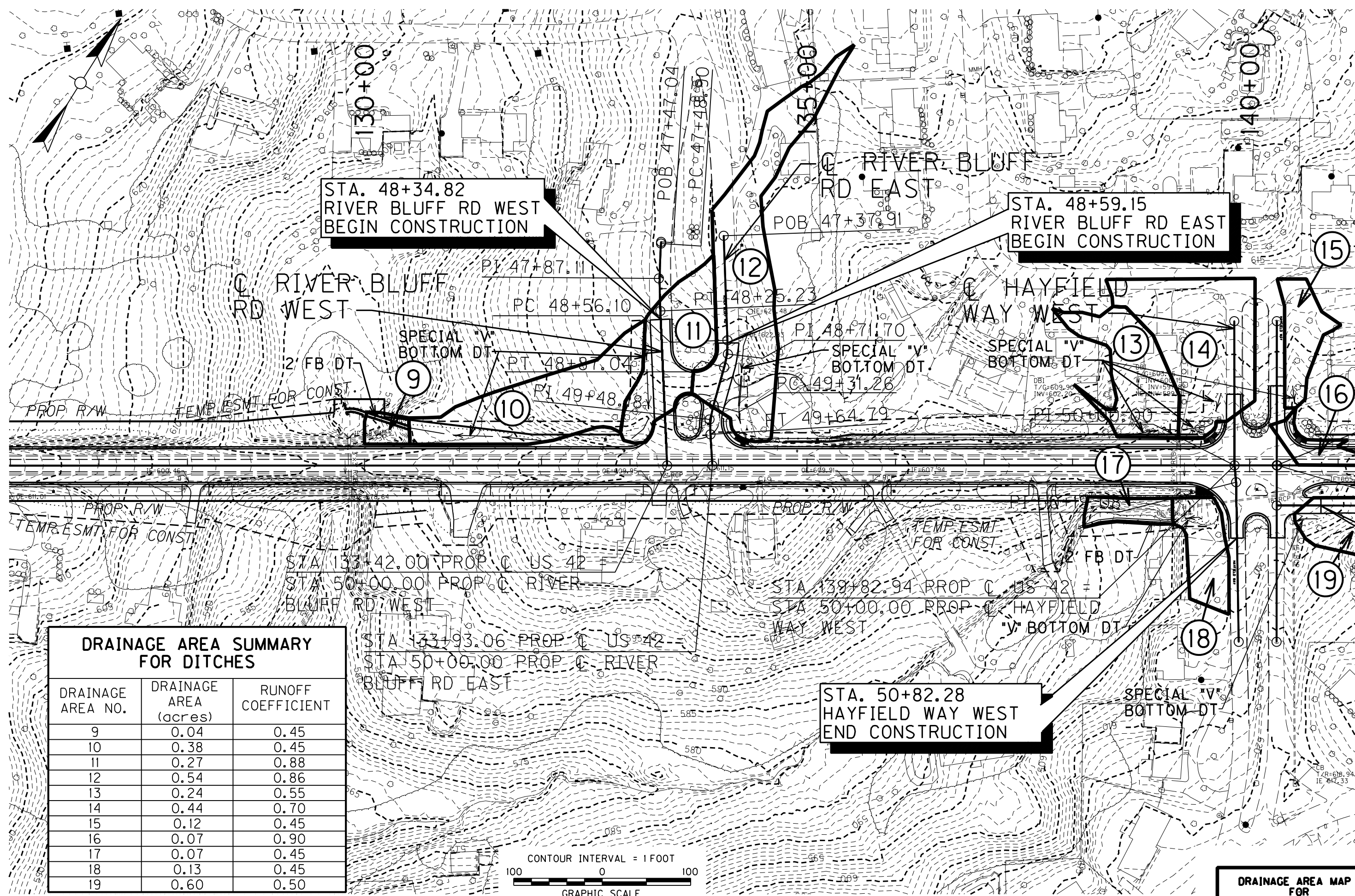


DRAINAGE AREA SUMMARY FOR DITCHES		
DRAINAGE AREA NO.	DRAINAGE AREA (acres)	RUNOFF COEFFICIENT
1	0.10	0.45
2	0.18	0.80
3	0.37	0.60



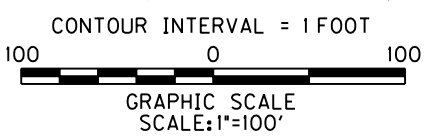


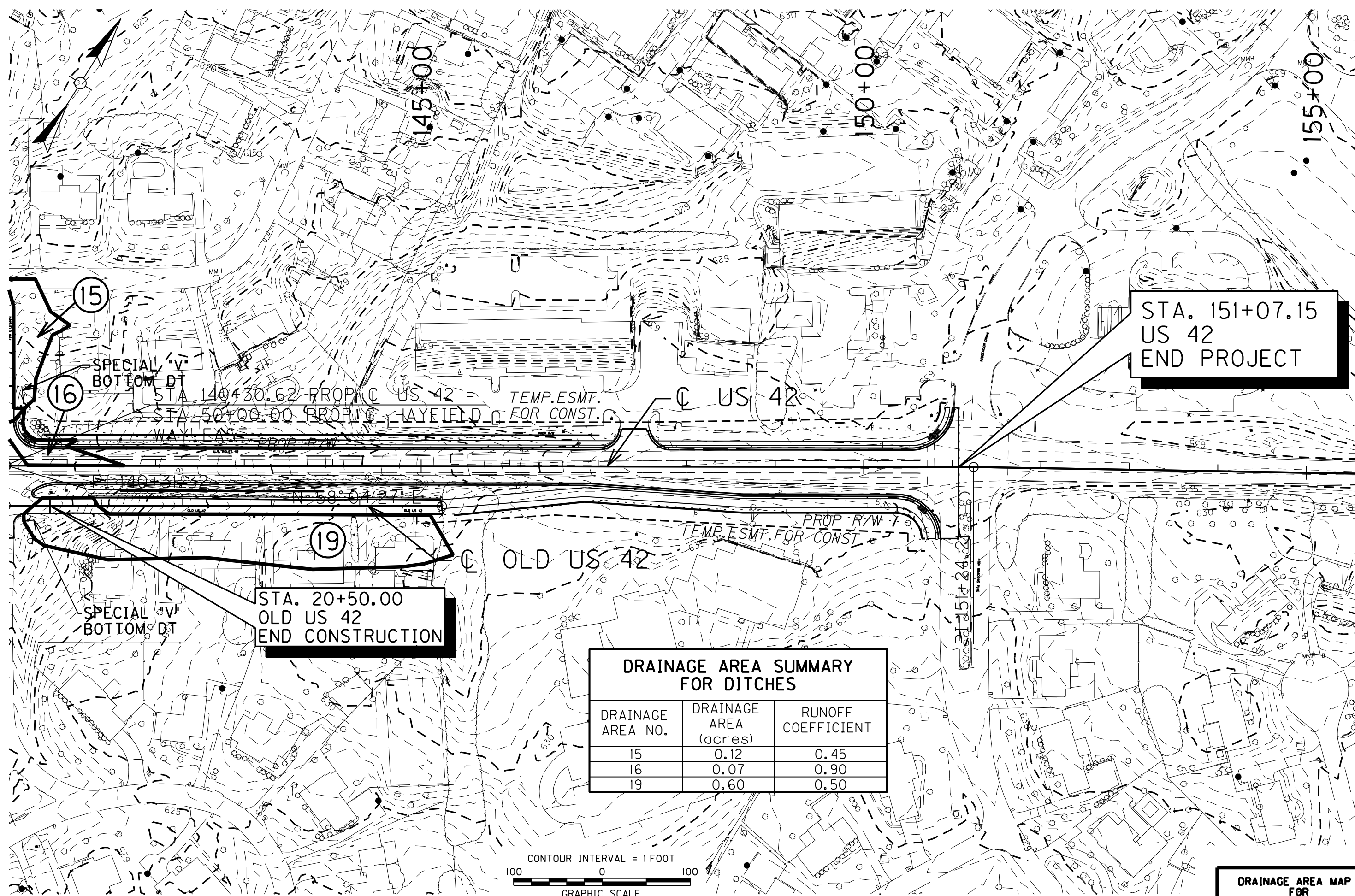
DRAINAGE AREA SUMMARY FOR DITCHES		
DRAINAGE AREA NO.	DRAINAGE AREA (acres)	RUNOFF COEFFICIENT
3	0.37	0.60
4	1.47	0.60
5	0.13	0.45
6	0.65	0.45
7	0.09	0.54
8	0.27	0.48



DRAINAGE AREA SUMMARY FOR DITCHES

DRAINAGE AREA NO.	DRAINAGE AREA (acres)	RUNOFF COEFFICIENT
9	0.04	0.45
10	0.38	0.45
11	0.27	0.88
12	0.54	0.86
13	0.24	0.55
14	0.44	0.70
15	0.12	0.45
16	0.07	0.90
17	0.07	0.45
18	0.13	0.45
19	0.60	0.50

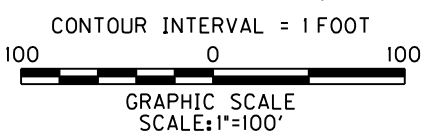




STA. 151+07.15
US 42
END PROJECT

STA. 20+50.00
OLD US 42
END CONSTRUCTION

DRAINAGE AREA SUMMARY FOR DITCHES		
DRAINAGE AREA NO.	DRAINAGE AREA (acres)	RUNOFF COEFFICIENT
15	0.12	0.45
16	0.07	0.90
19	0.60	0.50



Section 5 – Abbreviated Plans Set

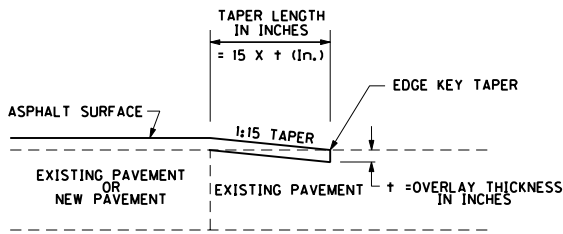
TYPICAL SECTIONS

US 42

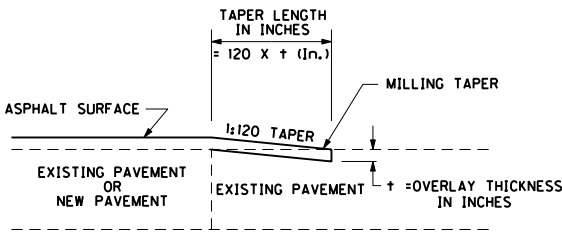
US 42 PROPOSED R/W

PROPOSED R/W WILL BE A MINIMUM OF 14' BEHIND THE FACE OF CURB. WHEN THERE IS A MULTI-USE PATH THE PROPOSED R/W WILL BE A MINIMUM OF 19' BEHIND THE FACE OF CURB.

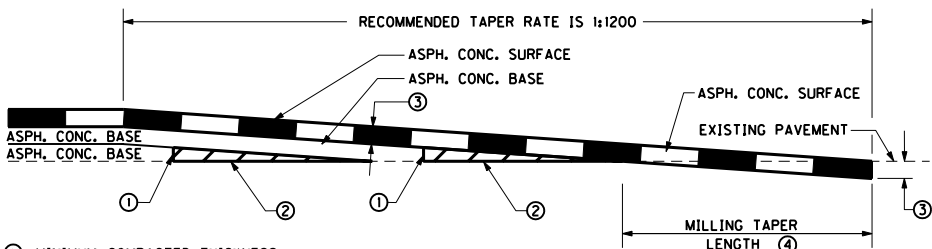
① SEE CROSS SECTIONS FOR SLOPES OUTSIDE THE LIMITS OF THE BERMS.



TAPER @ ENTRANCES
ENTRANCE



TAPERING OF OVERLAYS ON LOW SPEED FACILITIES (<45 MPH)
APPROACH

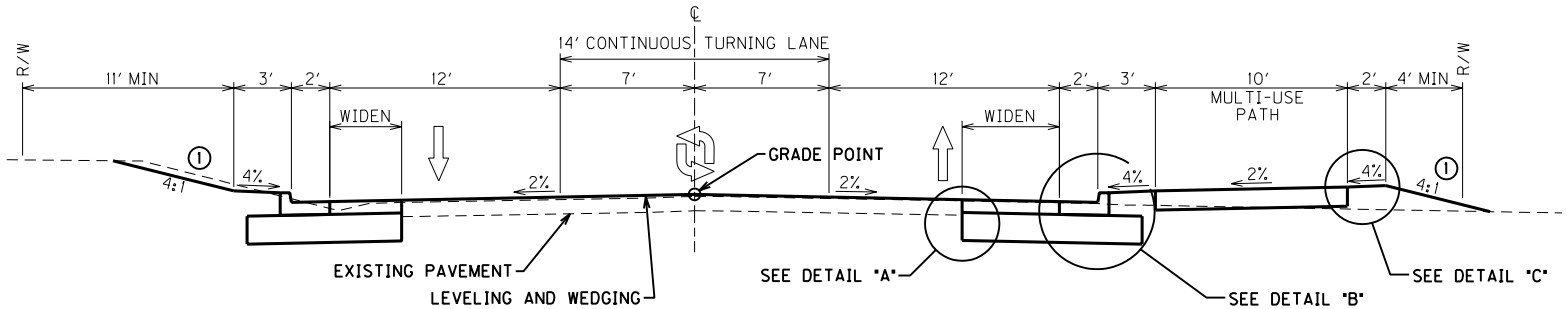


- ① MINIMUM COMPACTED THICKNESS
- ② ASPHALT MIXTURE FOR LEVELING AND WEDGING OR NEXT COURSE OF ASPHALT MIXTURE.
- ③ ASPHALT SURFACE THICKNESS (FULL DEPTH)
- ④ MILL EXISTING PAVEMENT TO RECEIVE ASPHALT SURFACE FULL DEPTH (EDGE KEY). TAPER LENGTH (ft) = $t \text{ (in)} \times \text{TAPER RATE} / 12$

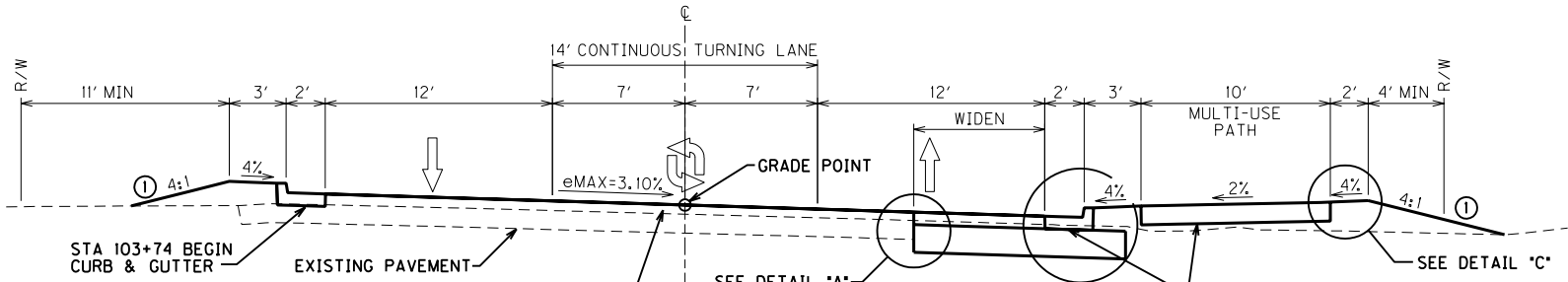
FOR A TAPER RATE OF 1:1200
TAPER LENGTH = 125 FEET WHEN $t = 1.25$ inches
TAPER LENGTH = 150 FEET WHEN $t = 1.50$ inches

TAPERING OF OVERLAYS ON HIGH SPEED FACILITIES
MAINLINE

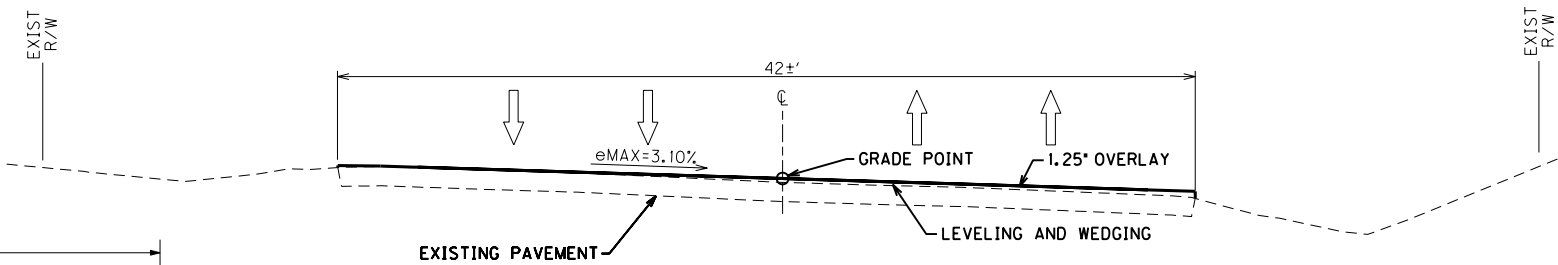
ASPHALT SURFACE OVERLAY TAPER DETAILS



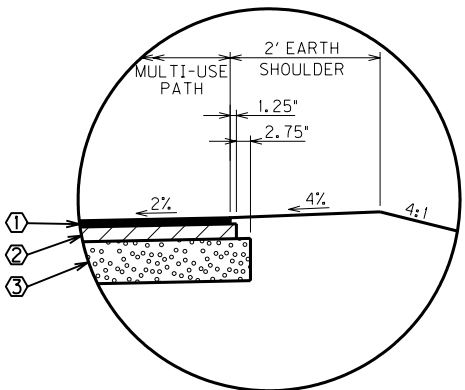
NORMAL SECTION WITH MULTI-USE PATH
STA 111+95 TO STA 115+78
STA 119+18 TO STA 134+33



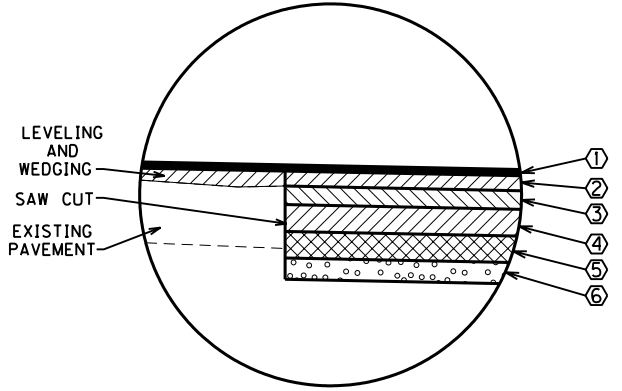
SUPERELEVATED SECTION WITH MULTI-USE PATH
STA 103+74 TO STA 111+95
STA 115+78 TO STA 119+18



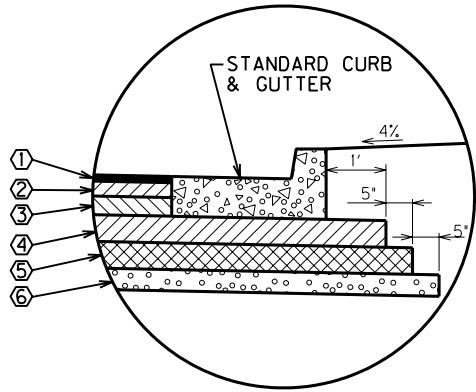
TYPICAL SECTION FOR OVERLAYING
STA 100+00 TO STA 103+74



DETAIL "C"



DETAIL "A"



DETAIL "B"

PAVEMENT DESIGN

TRAFFIC LANES

- | | |
|-----------------------------------|-------------|
| ① CL 3 ASPH SURFACE 0.38D PG64-22 | 1.25" DEPTH |
| ② CL 3 ASPH BASE 1.00D PG64-22 | 3.25" DEPTH |
| ③ CL 3 ASPH BASE 1.00D PG64-22 | 3.50" DEPTH |
| ④ CL 3 ASPH BASE 1.50D PG64-22 | 5.00" DEPTH |
| ⑤ DRAINAGE BLANKET-TYPE II-ASPH | 5.00" DEPTH |
| ⑥ DGA | 4.00" DEPTH |

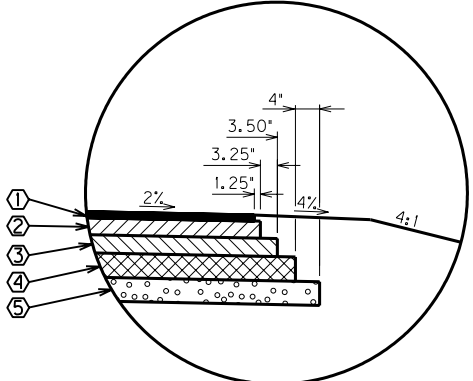
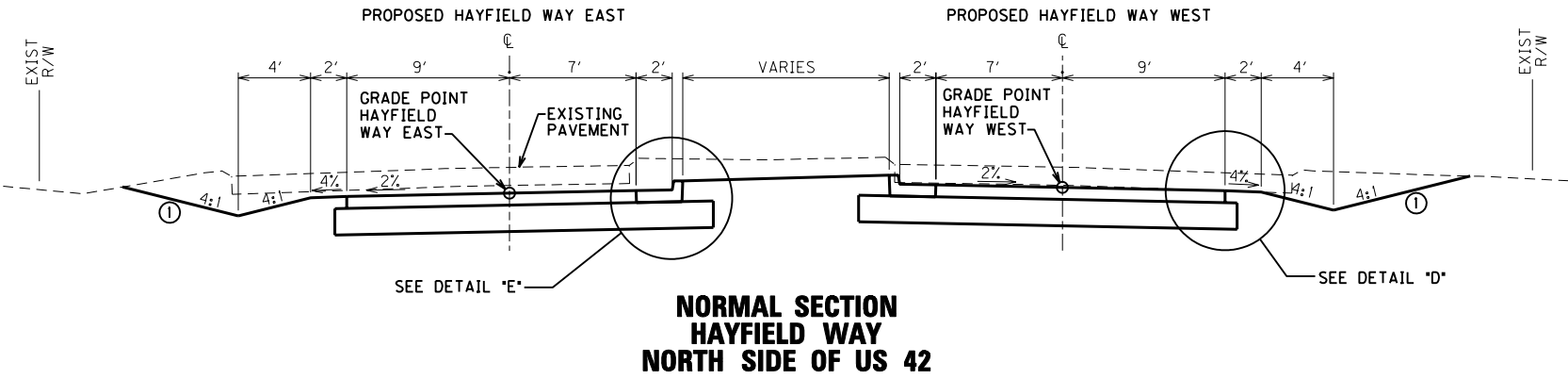
PAVEMENT DESIGN

MULTI-USE PATH

- | | |
|-----------------------------------|-------------|
| ① CL 2 ASPH SURFACE 0.38D PG64-22 | 1.25" DEPTH |
| ② CL 2 ASPH BASE 0.75D PG64-22 | 2.75" DEPTH |
| ③ DGA | 4.00" DEPTH |

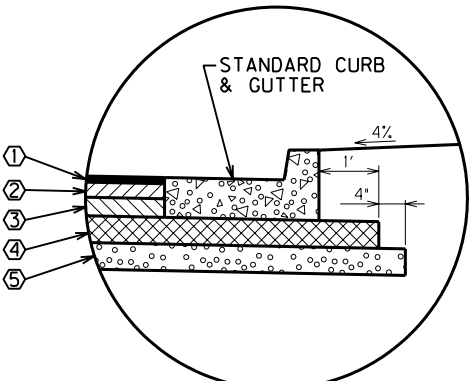
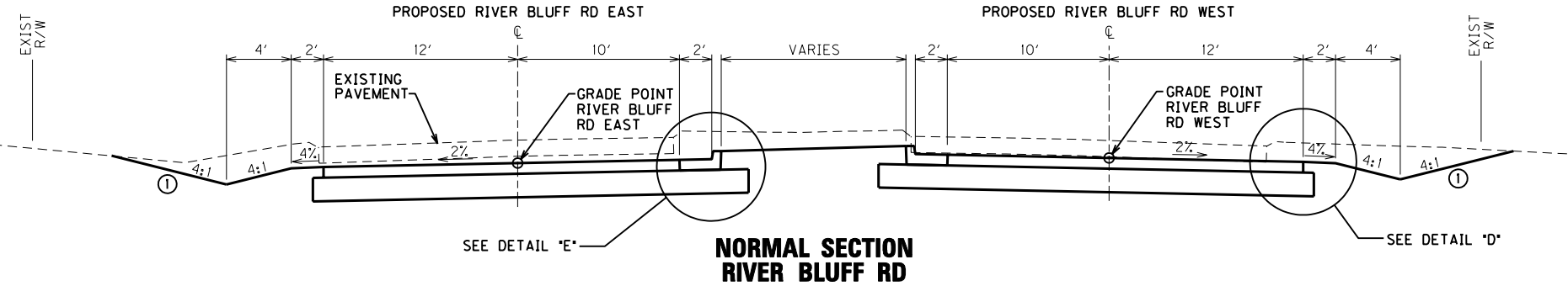
N. T. S.

TYPICAL SECTIONS APPROACH ROADS

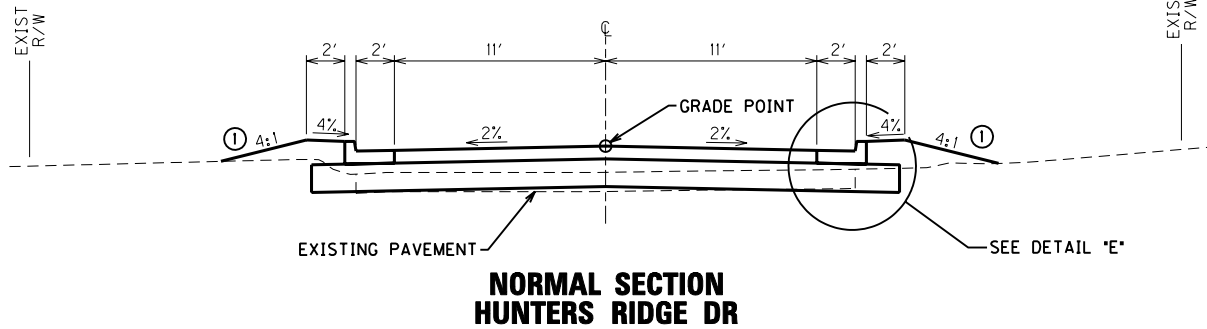


DETAIL "D"

① SEE CROSS SECTIONS FOR SLOPES OUTSIDE THE LIMITS OF THE BERMS.



DETAIL "E"

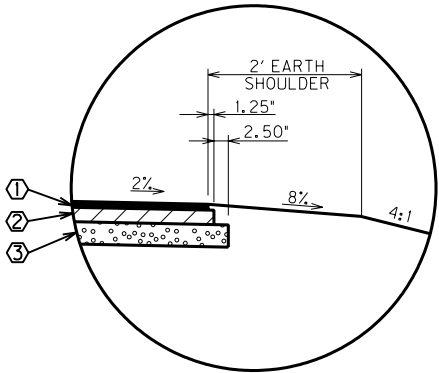


PAVEMENT DESIGN

- TRAFFIC LANES
- ① CL 2 ASPH SURFACE 0.38D PG64-22 1.25" DEPTH
 - ② CL 2 ASPH BASE 1.00D PG64-22 3.25" DEPTH
 - ③ CL 2 ASPH BASE 1.00D PG64-22 3.50" DEPTH
 - ④ DRAINAGE BLANKET-TYPE II-ASPH 4.00" DEPTH
 - ⑤ DGA 4.00" DEPTH

N. T. S.

TYPICAL SECTIONS APPROACH ROADS AND ENTRANCES



DETAIL "F"
RESIDENTIAL ASPHALT ENTRANCE

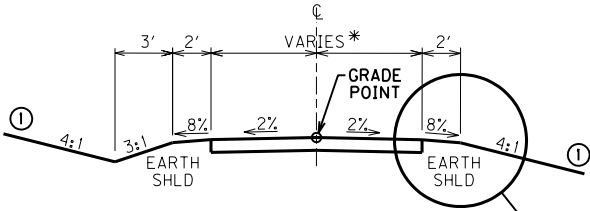
PAVEMENT DESIGN

TRAFFIC LANES

- | | |
|-----------------------------------|-------------|
| ① CL 2 ASPH SURFACE 0.38D PG64-22 | 1.25" DEPTH |
| ② CL 2 ASPH BASE 1.00D PG64-22 | 2.50" DEPTH |
| ③ DGA | 4.00" DEPTH |

SHOULDERS

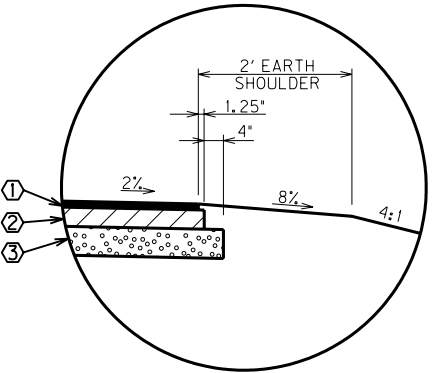
EARTH



ENTRANCE SECTION
(ASPHALT & CONCRETE)

* SEE PLANS FOR ENTRANCE WIDTHS

- | | |
|---------------|---------------------------------|
| STA 103+40 LT | STA 50+80 LT (HUNTERS RIDGE DR) |
| STA 105+52 RT | STA 50+87 RT (HUNTERS RIDGE DR) |
| STA 107+89 RT | STA 128+14 RT |
| STA 109+50 RT | STA 131+09 RT |
| STA 110+00 RT | STA 133+33 RT |
| STA 113+58 RT | STA 133+54 RT |
| STA 113+80 LT | STA 49+15 RT (RIVER BLUFF RD) |
| STA 116+07 RT | STA 135+80 RT |
| STA 117+86 RT | STA 137+63 RT |
| STA 120+75 RT | STA 147+41 LT |
| STA 122+65 LT | |



DETAIL "H"
COMMERCIAL ASPHALT ENTRANCE

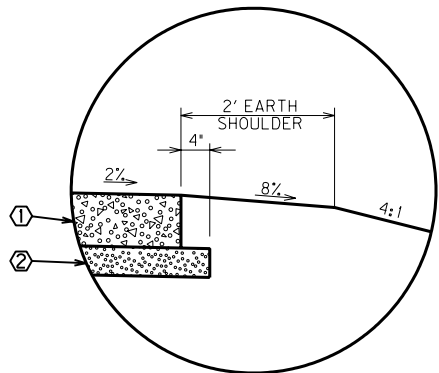
PAVEMENT DESIGN

TRAFFIC LANES

- | | |
|-----------------------------------|-------------|
| ① CL 2 ASPH SURFACE 0.38D PG64-22 | 1.25" DEPTH |
| ② CL 2 ASPH BASE 1.00D PG64-22 | 4.00" DEPTH |
| ③ DGA | 6.00" DEPTH |

SHOULDERS

EARTH



DETAIL "G"
RESIDENTIAL CONCRETE ENTRANCE

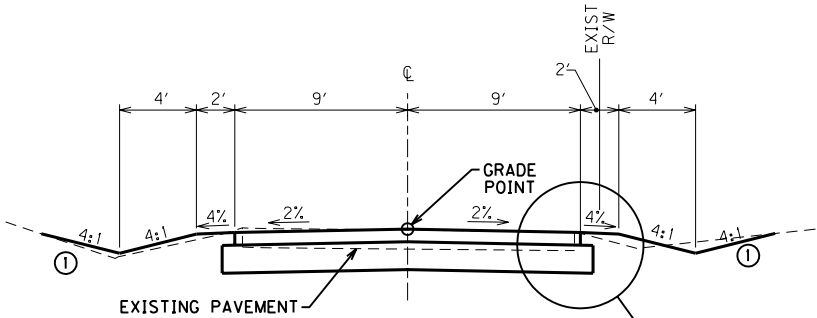
PAVEMENT DESIGN

TRAFFIC LANES

- | | |
|-------|-------------|
| ① JCP | 8.00" DEPTH |
| ② DGA | 4.00" DEPTH |

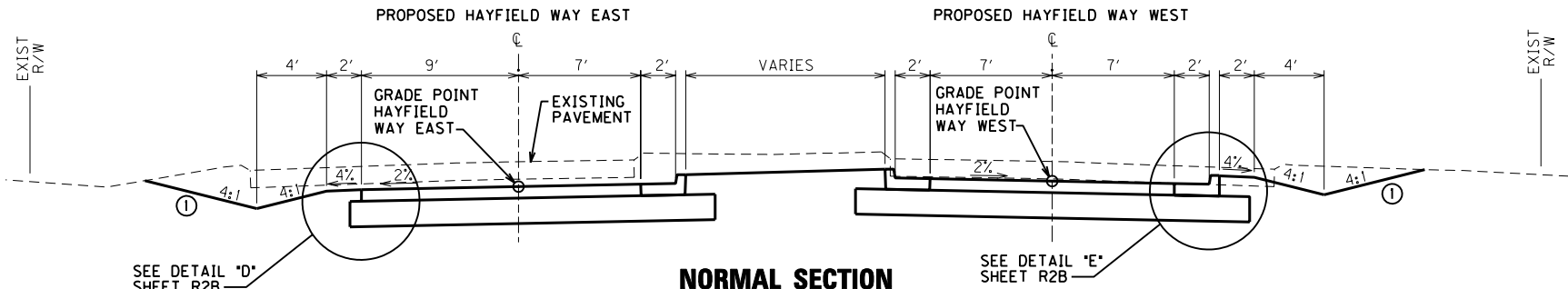
SHOULDERS

EARTH



NORMAL SECTION
OLD US 42
STA 20+09 TO STA 20+50

① SEE CROSS SECTIONS FOR SLOPES OUTSIDE THE LIMITS OF THE BERMS.



NORMAL SECTION
HAYFIELD WAY
SOUTH SIDE OF US 42

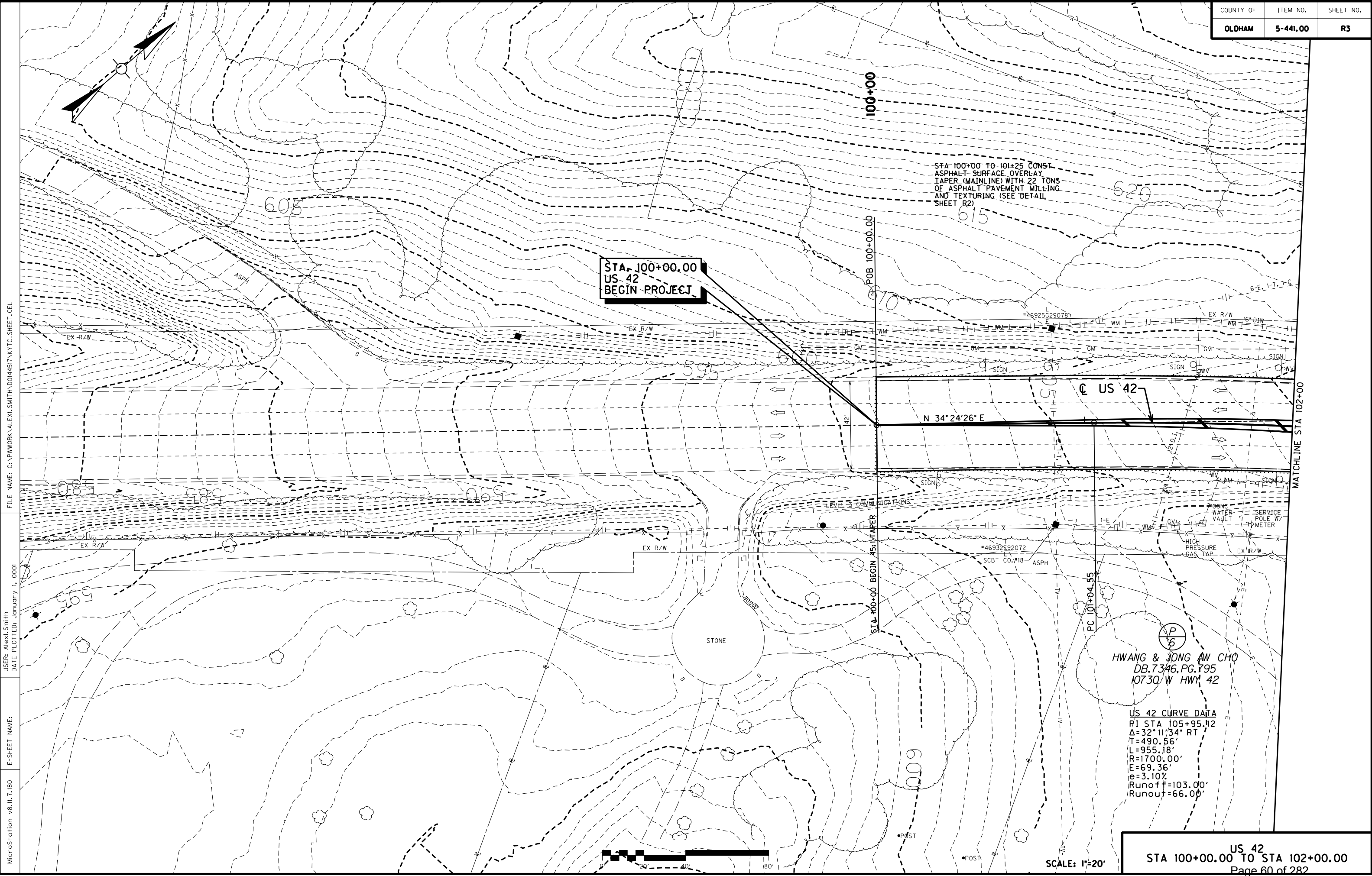
N. T. S.

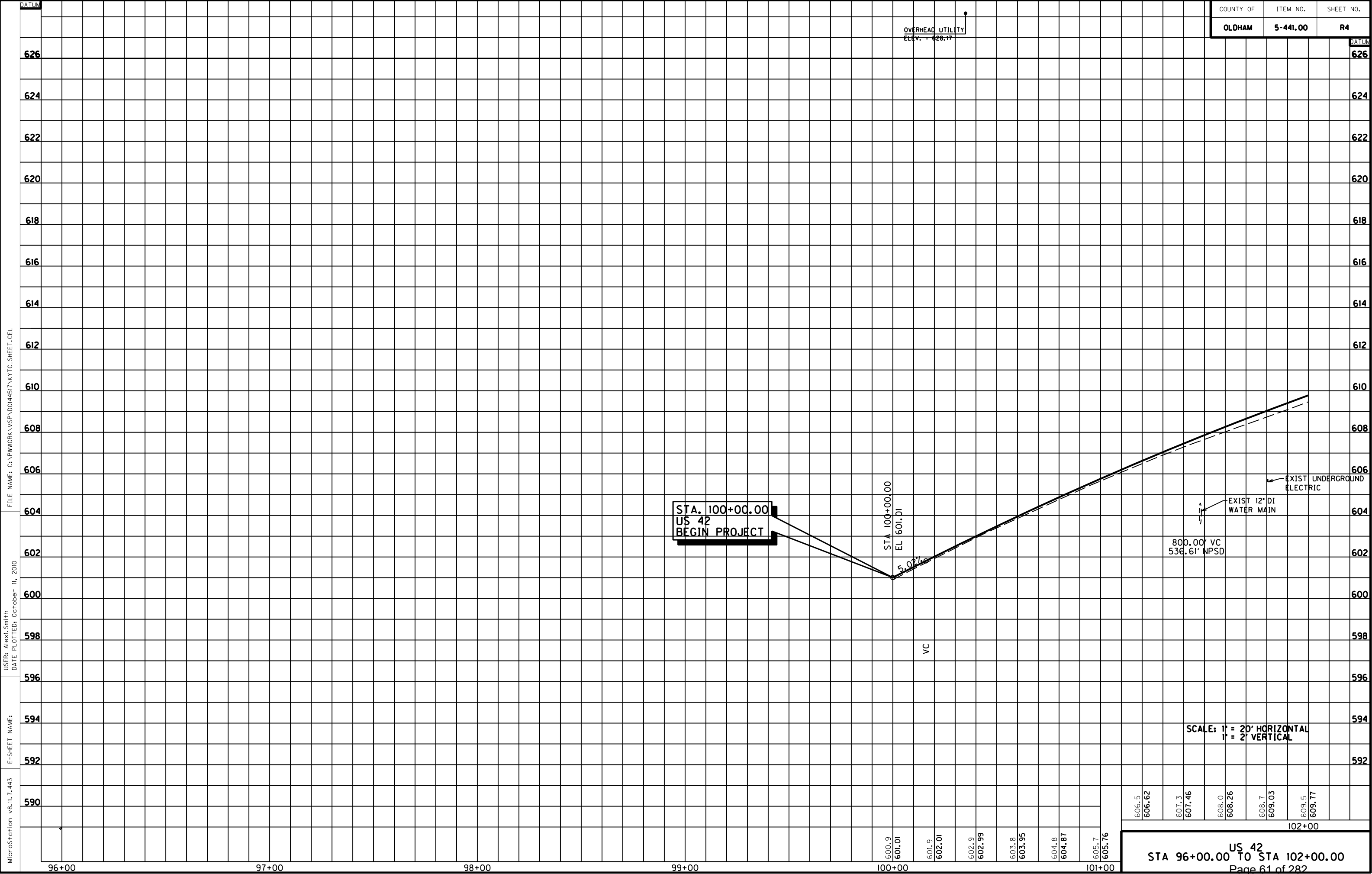
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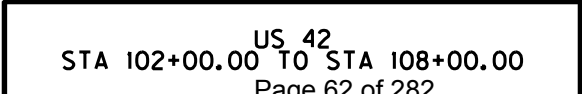
USER: Alexi Smith
DATE PLOTTED: January 1, 2001

E-SHEET NAME:

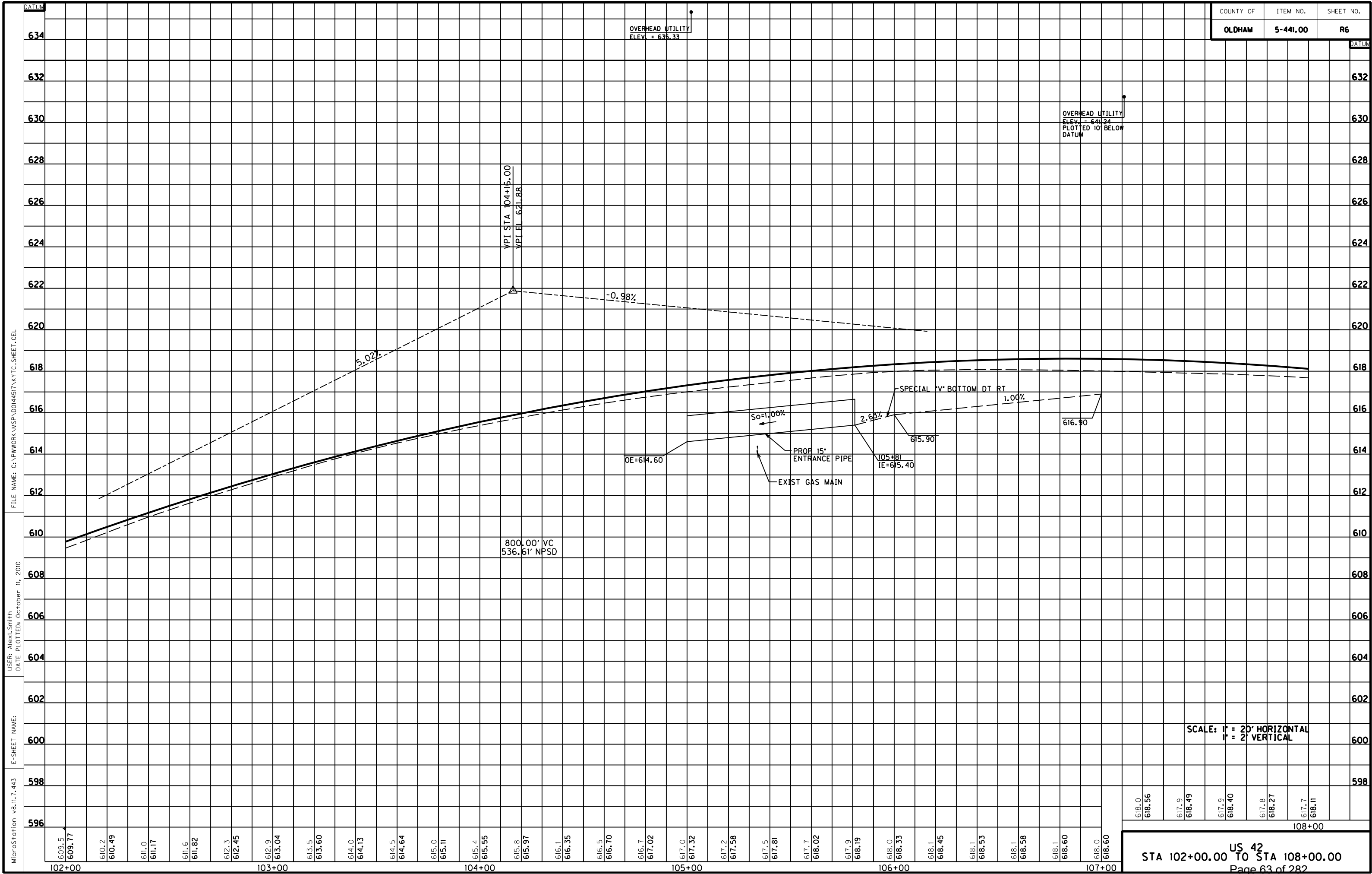
MicroStation v8.11.7.180







COUNTY OF	ITEM NO.	SHEET NO.
OLDHAM	5-441.00	R6



PAVED ENTRANCE CONSTRUCTION - LEFT								
STATION	WIDTH	TYPE	PIPE LENGTH AND SIZE	HEADWALLS	ASPH. SURF. (TONS)	ASPH. BASE (TONS)	CSB (TONS)	CONCRETE (SQ YD)
113+80	10'	ASPH	34 LF - 18"	NO HDWLS	--	--	--	35

DITCH CONSTRUCTION US 42 - LEFT				
STA. TO STA.	SIZE/TYPE	CHANNEL LINING		
		TYPE	DEPTH	QUANTITY
112+10-114+00	SPEC "V"	ECB	1'	138 SY
110+50	2' FB OUTLET	CLASS II	1'	5 TONS

STA 110+40 SAFeload
18" RCP, 5 CY

LT STA 108+00 TO 113+65
CONST 568 LF STANDARD
CURB AND GUTTER

LT STA 113+97 TO 114+00
CONST 3 LF STANDARD
CURB AND GUTTER

HENRY F WALLACE
D.B.664, PG.303
PARCEL 6
13317 W HWY 42

ROBERT MORTON BOYD
D.B.696, PG.141
13319 W HWY 42

ROBERT MORTON BOYD
D.B.696, PG.141
13319 W HWY 42

DICKINSON HOLDINGS, LLC
D.B.963, PG.72
13400 W HWY 42

SCHUTTE TRAINING CENTER
D.B.905, PG.424
13306 W HWY 42

COVERED BRIDGE INVESTMENTS, INC
D.B.764, PG.195
13304 W HWY 42

DITCH CONSTRUCTION US 42 - RIGHT				
STA. TO STA.	SIZE/TYPE	CHANNEL LINING		
		TYPE	DEPTH	QUANTITY
110+78-111+00	"V" BOT	TRM	1'	27 SY

PAVED ENTRANCE CONSTRUCTION - RIGHT								
STATION	WIDTH	TYPE	PIPE LENGTH AND SIZE	HEADWALLS	ASPH. SURF. (TONS)	ASPH. BASE (TONS)	CSB (TONS)	CONCRETE (SQ YD)
109+50	28'	ASPH	N/A	N/A	--	--	--	82
110+00	46'	ASPH	N/A	N/A	--	--	--	164
113+58	37'	ASPH	N/A	N/A	--	--	--	1137

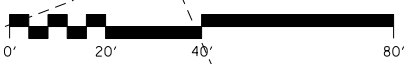
US 42 CURVE DATA
PI STA 105+95.12
Δ=32°11'34" RT
R=490.56'
L=955.18'
E=1700.00'
E=69.36'
e=5.10%
Runoff=103.00'
Runout=66.00'

RT STA 108+00 TO 109+36
CONST 155 LF STANDARD
CURB AND GUTTER

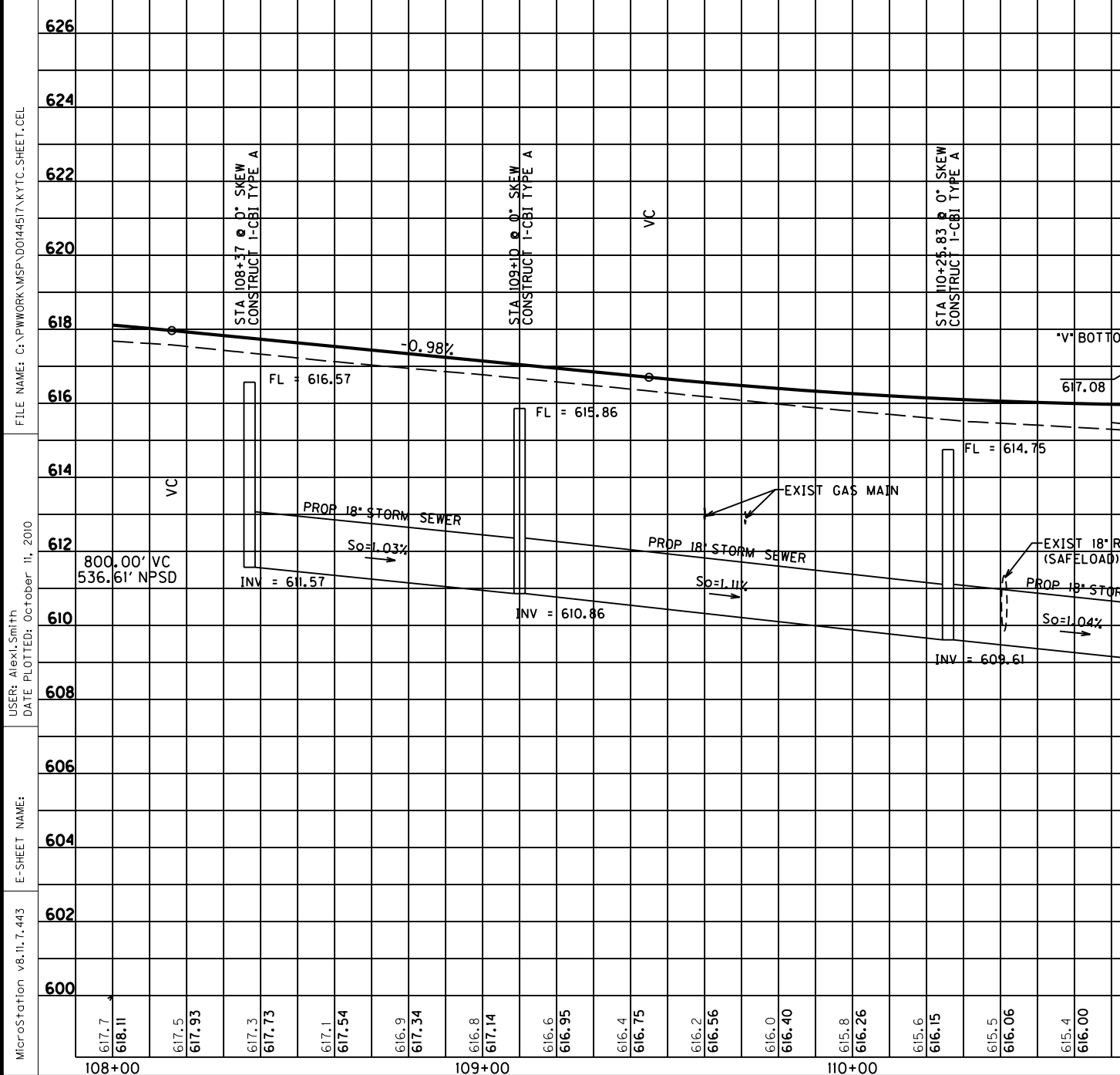
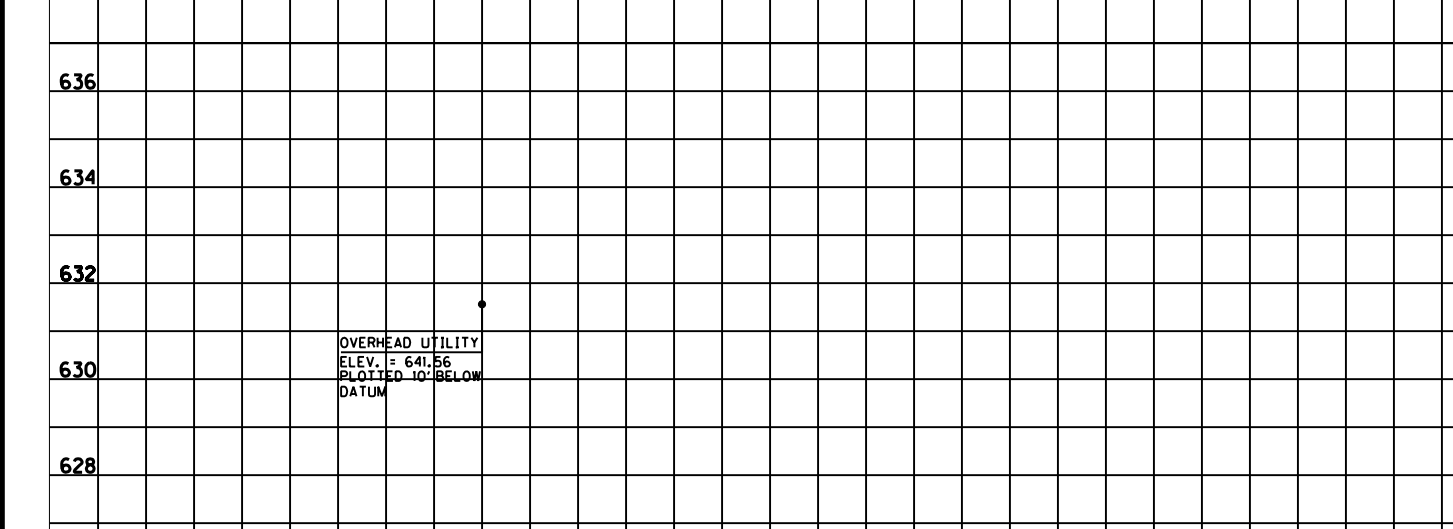
RT STA 109+65 TO 109+77
CONST 27 LF STANDARD
HEADER CURB

RT STA 110+19 TO 113+39
CONST 356 LF STANDARD
CURB AND GUTTER

RT STA 113+76 TO 114+00
CONST 44 LF STANDARD
CURB AND GUTTER



SCALE: 1"=20'



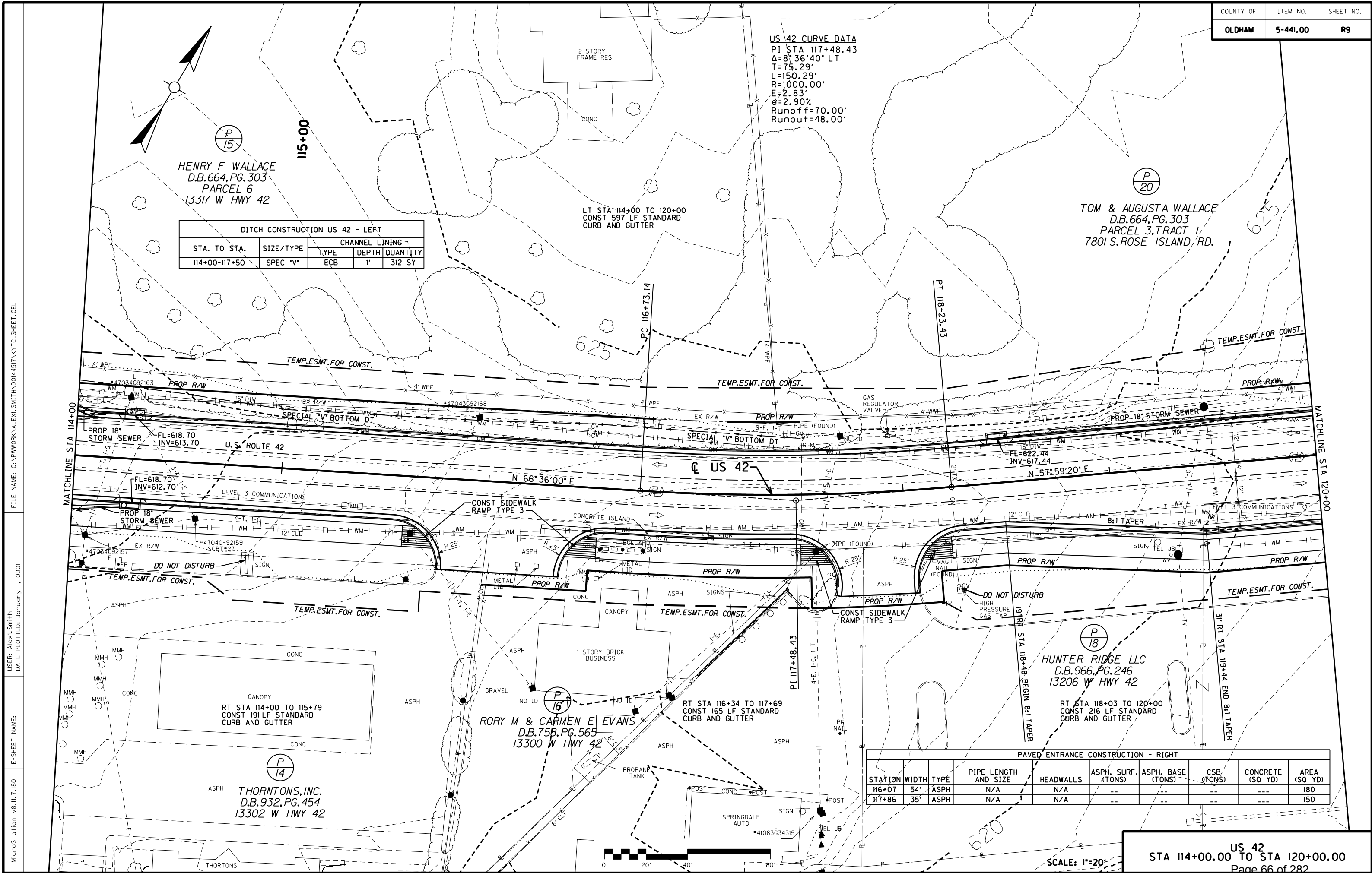
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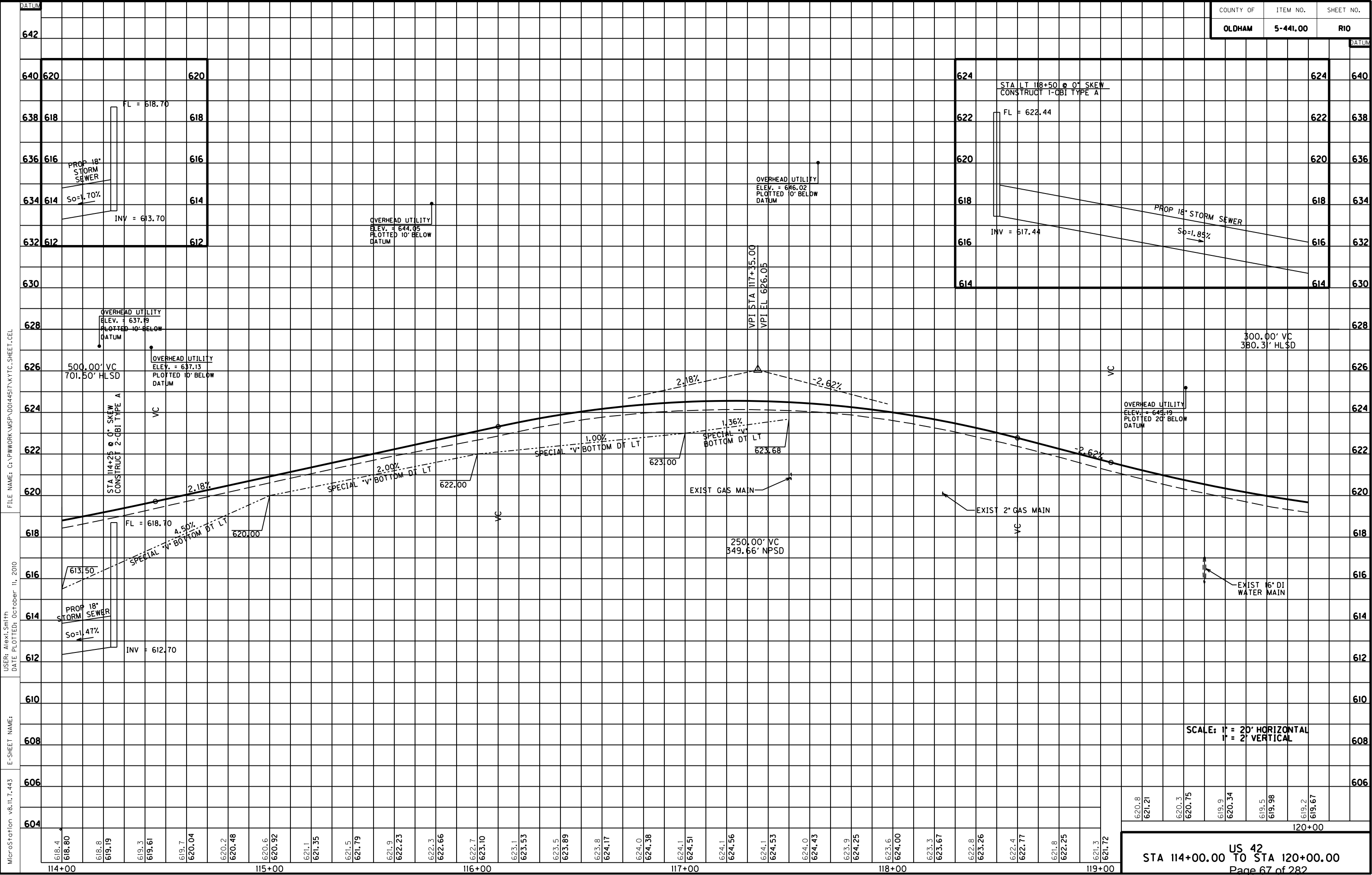
USER: Alexi Smith

DATE PLOTTED: January 1, 0001

MicroStation v8.11.7.180

E-SHEET NAME:





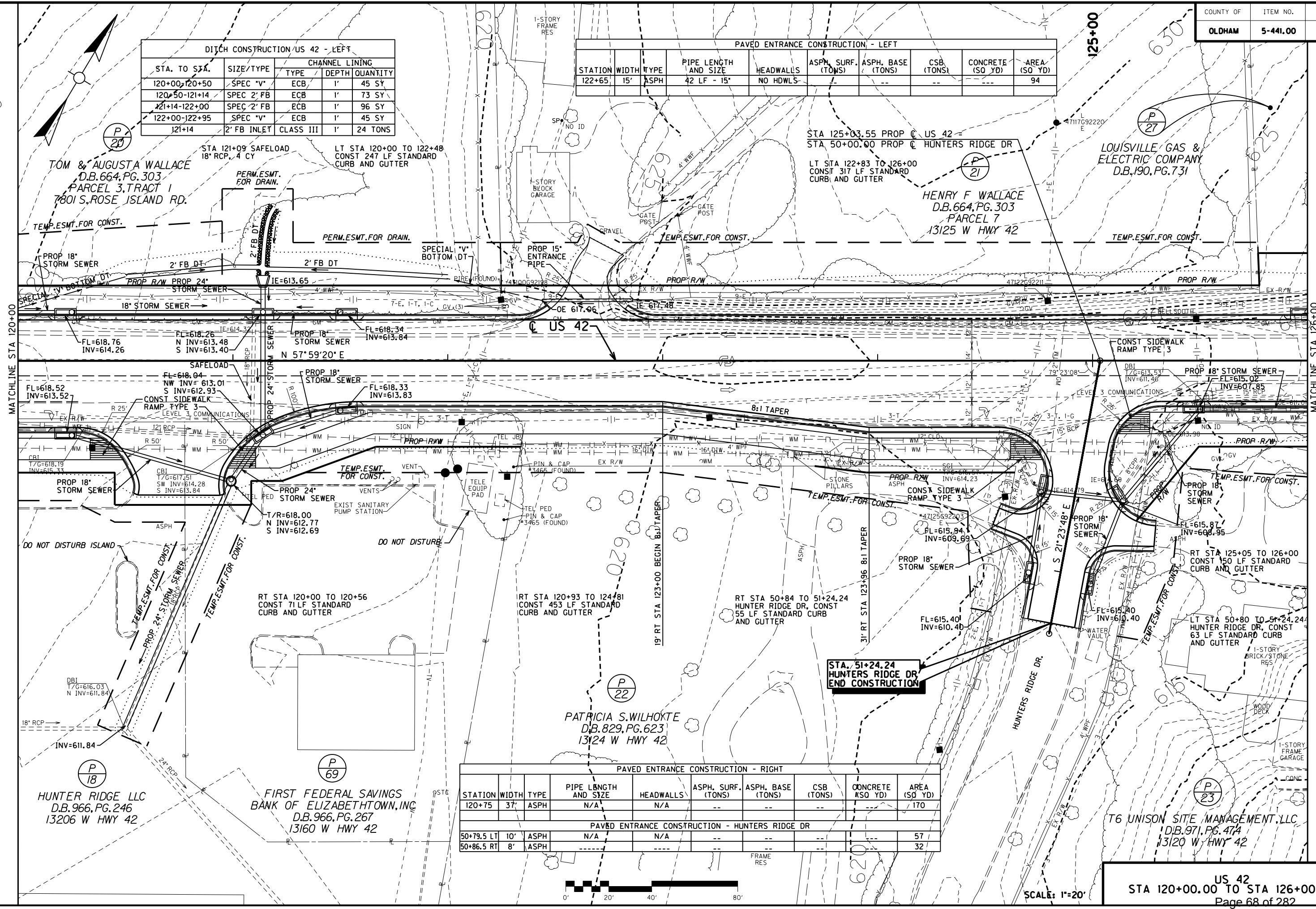
DITCH CONSTRUCTION / US 42 - LEFT				
STA. TO STA.	SIZE/TYPE	CHANNEL LINING		
		TYPE	DEPTH	QUANTITY
120+00-120+50	SPEC "V"	ECB	1'	45 SY
120+50-121+14	SPEC 2' FB	ECB	1'	73 SY
121+14-122+00	SPEC 2' FB	ECB	1'	96 SY
122+00-122+95	SPEC "V"	ECB	1'	45 SY
121+14	2' FB INLET	CLASS III	1'	24 TONS

PAVED ENTRANCE CONSTRUCTION - LEFT									
STATION	WIDTH	TYPE	PIPE LENGTH AND SIZE	HEADWALLS	ASPH. SURF. (TONS)	ASPH. BASE (TONS)	CSB (TONS)	CONCRETE (SQ YD)	AREA (SQ YD)
122+65	15'	ASPH	42 LF - 15"	NO HDWLS					94

PAVED ENTRANCE CONSTRUCTION - RIGHT									
STATION	WIDTH	TYPE	PIPE LENGTH AND SIZE	HEADWALLS	ASPH. SURF. (TONS)	ASPH. BASE (TONS)	CSB (TONS)	CONCRETE (SQ YD)	AREA (SQ YD)
120+75	37'	ASPH	N/A	N/A					170

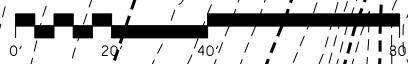
PAVED ENTRANCE CONSTRUCTION - HUNTERS RIDGE DR									
50+79.5 LT	10'	ASPH	N/A	N/A					57
50+86.5 RT	8'	ASPH	N/A	N/A					32

FILE NAME: G:\PWORK\ALEX.SMITH\044517\KTYC.SHEET.CEL
USER: Alex Smith
DATE PLOTTED: January 1, 0001
E-SHEET NAME: MicroStation v8.11.7.180



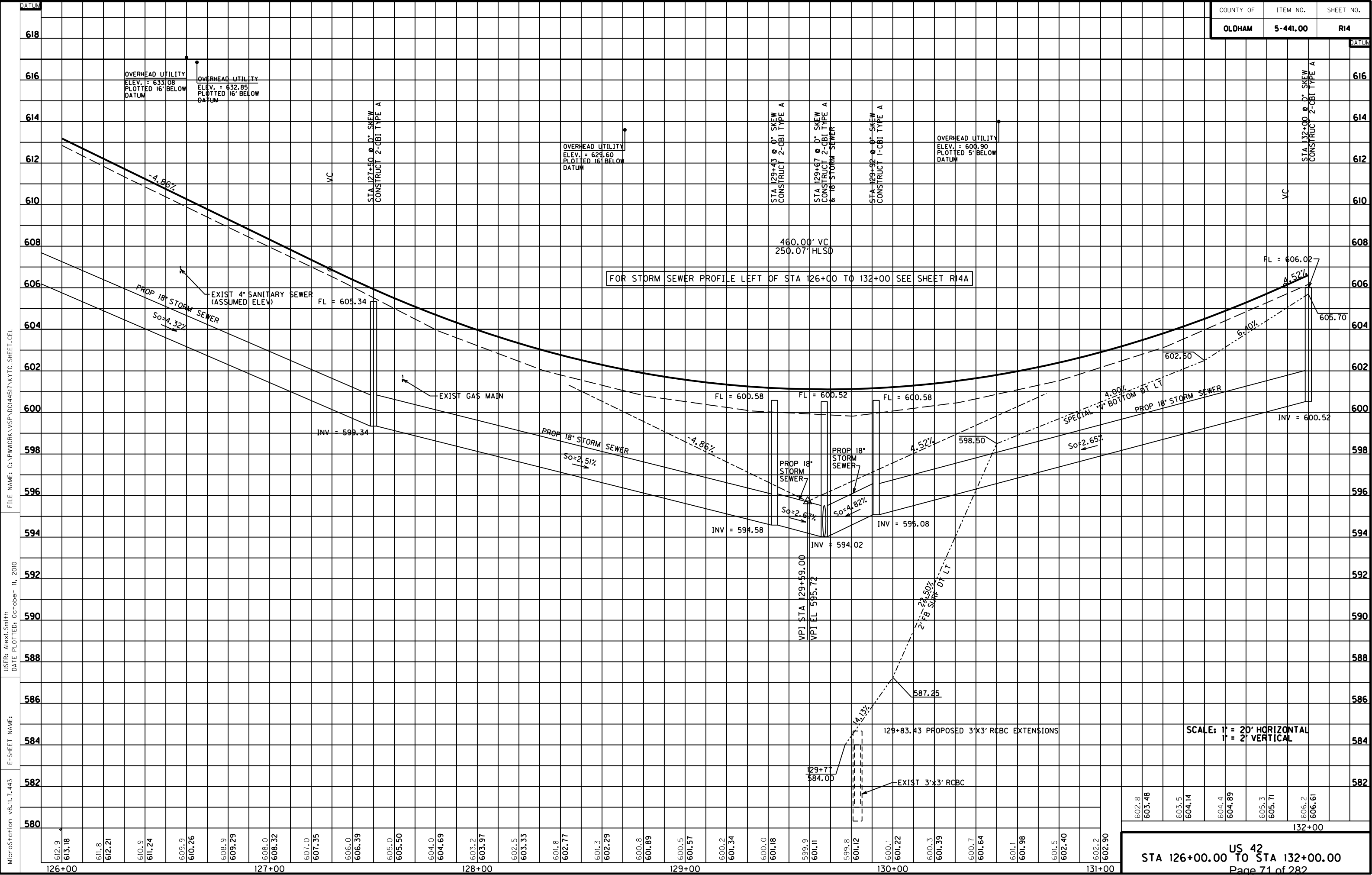
DITCH CONSTRUCTION US 42 - RIGHT				
STA. TO STA.	SIZE/TYPE	CHANNEL LINING		
		TYPE	DEPTH	QUANTITY
129+62	4' FB/OUTLET	CLASS III	2'	20 TONS

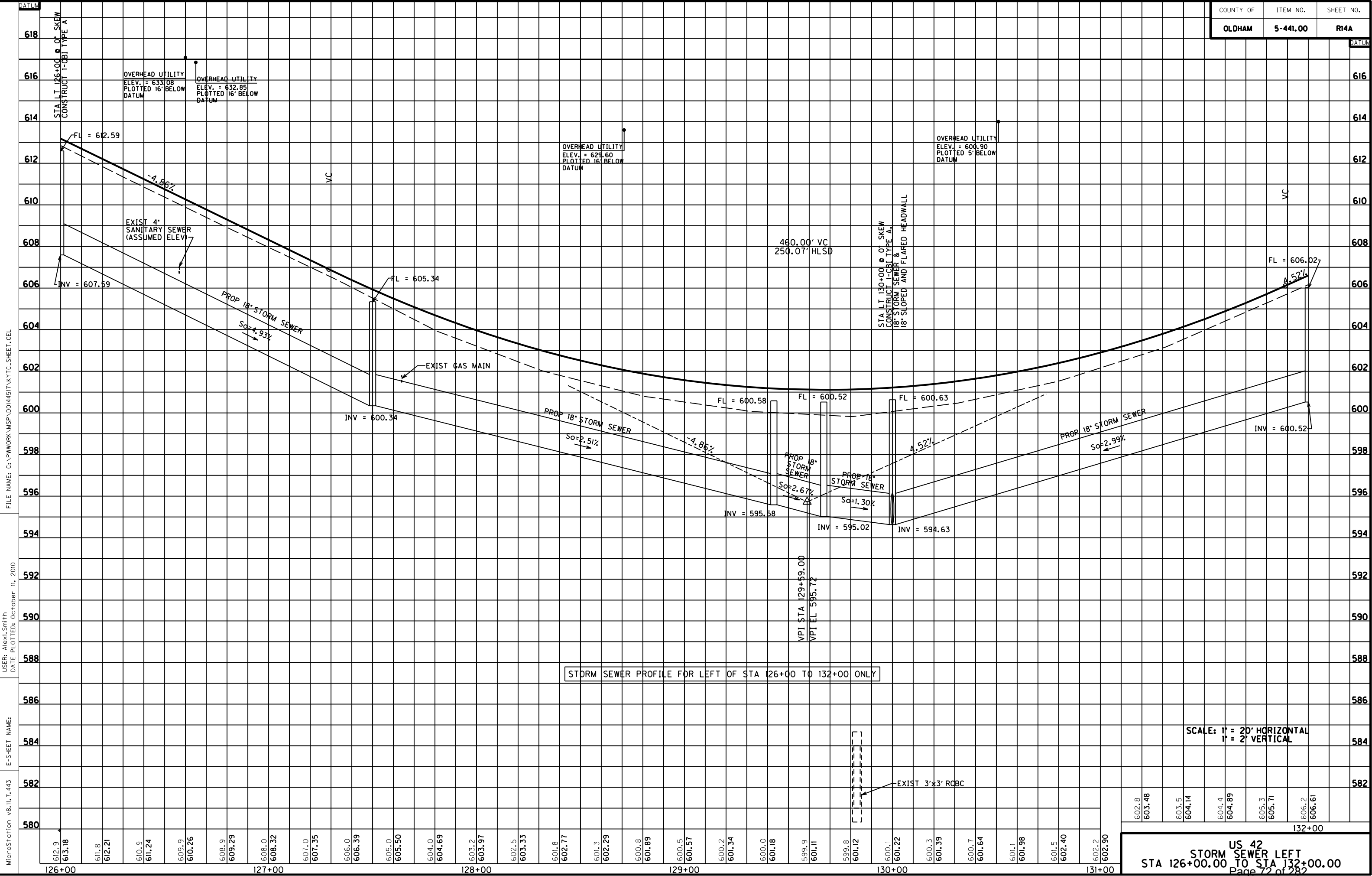
PAVED ENTRANCE CONSTRUCTION - RIGHT									
STATION	WIDTH	TYPE	PIPE LENGTH AND SIZE	HEADWALLS	ASPH. SURF. (TONS)	ASPH. BASE (TONS)	CSB (TONS)	CONCRETE (SQ YD)	ASPHALT AREA (SQ YD)
1128+14	10'	ASPH	N/A	N/A	-	-	-	51	35
1131+09	16'	ASPH	N/A	N/A	-	-	-	95	125



SCATE: 1-20'

US 42
STA 126+00.00 TO STA 132+00.00
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PAVED ENTRANCE CONSTRUCTION - RIVER BLUFF RD EAST - LEFT								
STATION	WIDTH	TYPE	PIPE LENGTH AND SIZE	HEADWALLS	ASPH. SURF (TONS)	ASPH. BASE (TONS)	CSB (TONS)	CONCRETE (SQ YD)
49+15	12'	ASPH	34 LF 15"	NO HDWLS	--	--	--	40

RIVER BLUFF RD
EAST CURVE DATA
PI 48+71.70
Δ = 17°43'31" RT
T = 15.59'
L = 30.94'
R = 100.00'
E = 1.21'

LT STA 134+03 TO 138+00
CONST 417 LF STANDARD
CURB AND GUTTER
LT STA 134+09 TO 138+00
CONST 216 SQ YD
SIDEWALK 4" CONCRETE

DITCH CONSTRUCTION RIVER BLUFF WEST RIGHT				
STA. TO STA.	SIZE/TYPE	TYPE	DEPTH	QUANTITY
48+35-48+50	SPEC 'V'	TRM	1'	14 SY
48+50-49+50	NORMAL	TRM	1'	89 SY
49+50-49+71	SPEC 'V'	TRM	1'	27 SY

DITCH CONSTRUCTION RIVER BLUFF EAST - LEFT				
STA. TO STA.	SIZE/TYPE	TYPE	DEPTH	QUANTITY
48+50-49+50	SPEC 'V'	TRM	1'	67 SY

PAVED ENTRANCE CONSTRUCTION RIGHT								
STATION	WIDTH	TYPE	PIPE LENGTH AND SIZE	HEADWALLS	ASPH. SURF (TONS)	ASPH. BASE (TONS)	CSB (TONS)	CONCRETE (SQ YD)
133+33	16'	ASPH	N/A	N/A	--	--	--	54
133+54	9'	ASPH	N/A	N/A	--	--	--	43
135+80	10'	ASPH	N/A	N/A	--	--	--	50
137+63	10'	CONC	N/A	N/A	--	--	--	137

RIVER BLUFF RD
WEST CURVE DATA
PI 47+87.11
Δ = 6°14'52" LT
T = 38.20'
L = 76.33'
R = 700.00'
E = 1.04'

STA. 48+34.82
RIVER BLUFF RD WEST
BEGIN CONSTRUCTION

M.KEVIN &
MARGARET M.BERTOLI
D.B.374,PG.36
3709 RIVER BLUFF RD

STA. 48+59.15
RIVER BLUFF RD EAST
BEGIN CONSTRUCTION

KENNETH & JUDY POTTINGER
D.B.641,PG.108
3714 LOCUST CIRCLE WEST

WILLIAM F. & JANE M. LANHAM
D.B.178,PG.276
3716 LOCUST CIRCLE WEST

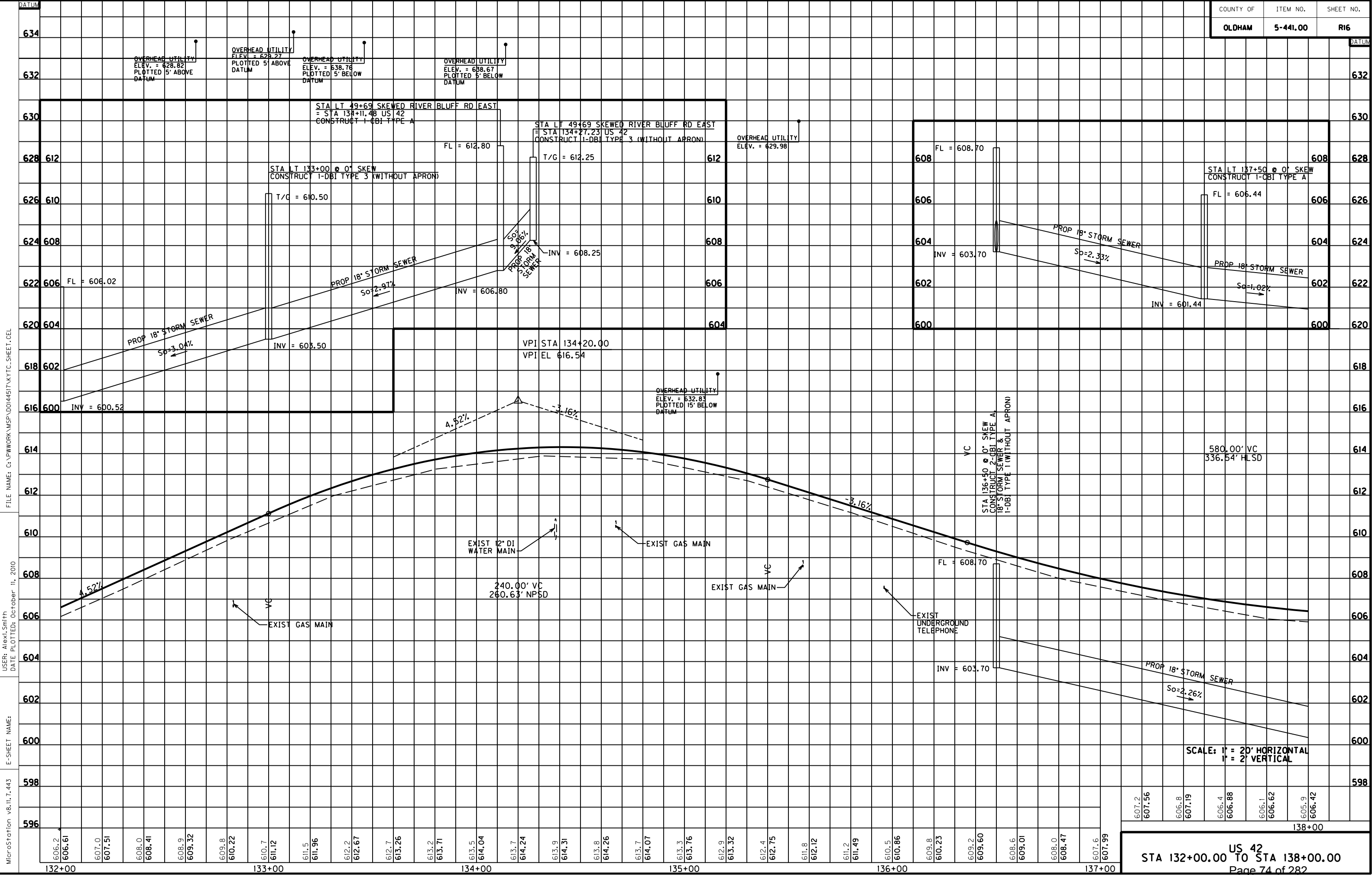
DIANA L. MCBRIDE
D.B.322,PG.185
3718 LOCUST CIRCLE WEST

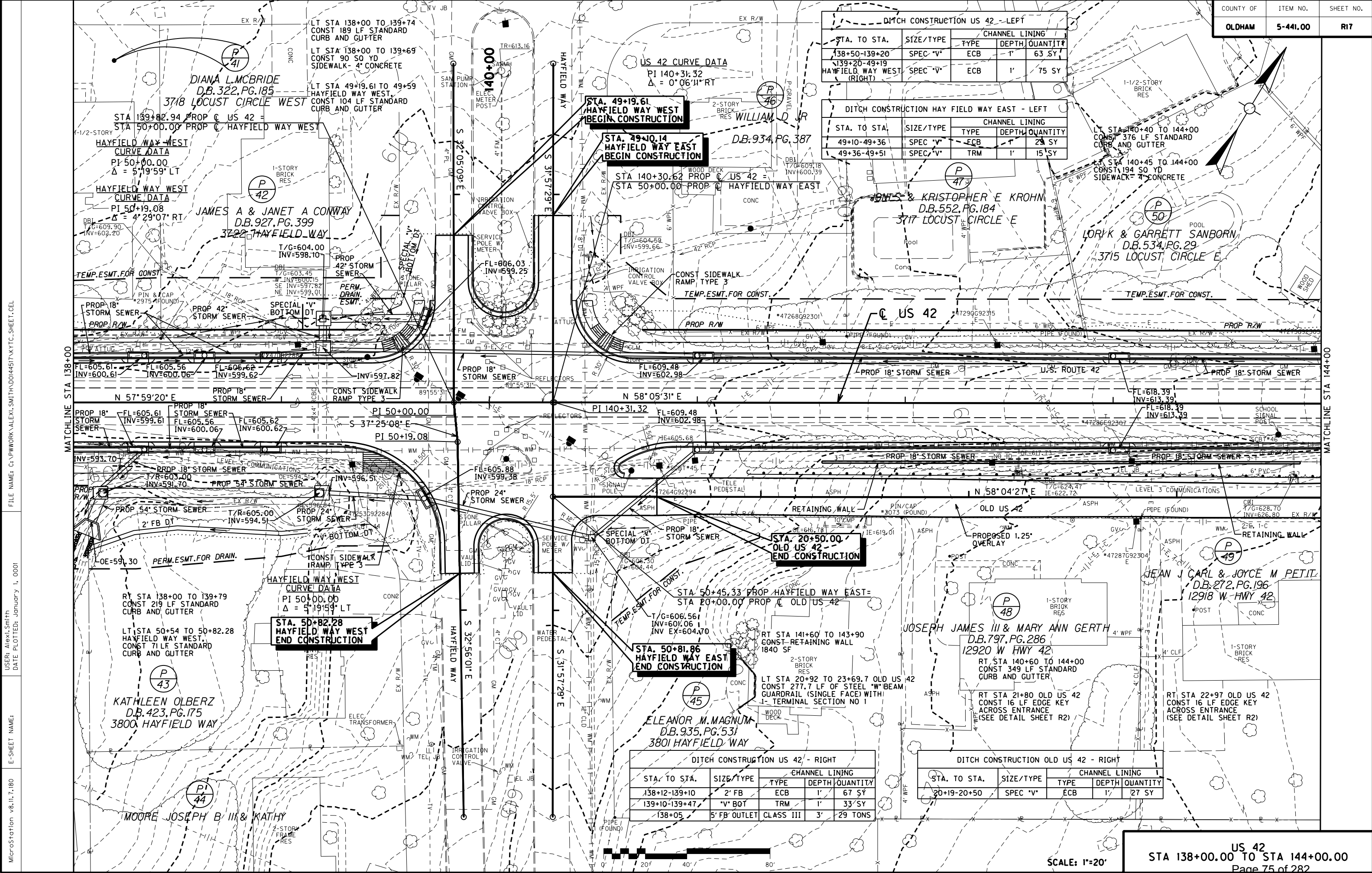
CARRIE JEAN HICKS
D.B.335,PG.38
13100 W HWY 42

RICHARD G & SHIRLEY A
WHONSEPLER
D.B.758,PG.336
13050 W HWY 42

US 42
STA 132+00.00 TO STA 138+00.00
Page 73 of 282

FILE NAME: G:\PWORK\ALEXI.SMITH\044517\KTYC.SHEET.CEL
USER: Alexi Smith
DATE PLOTTED: January 1, 2001
E-SHEET NAME: MicroStation v8.11.7.180

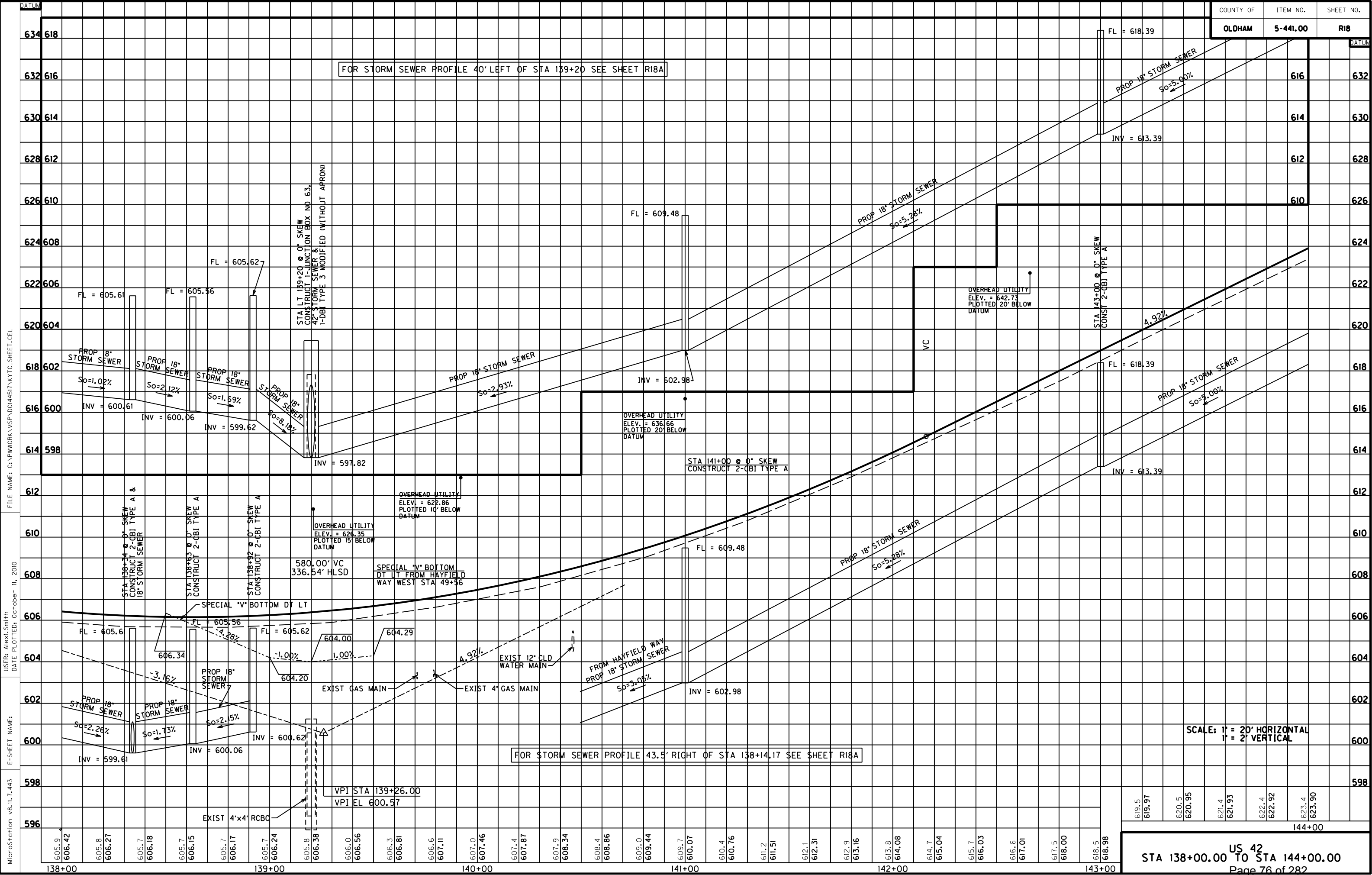


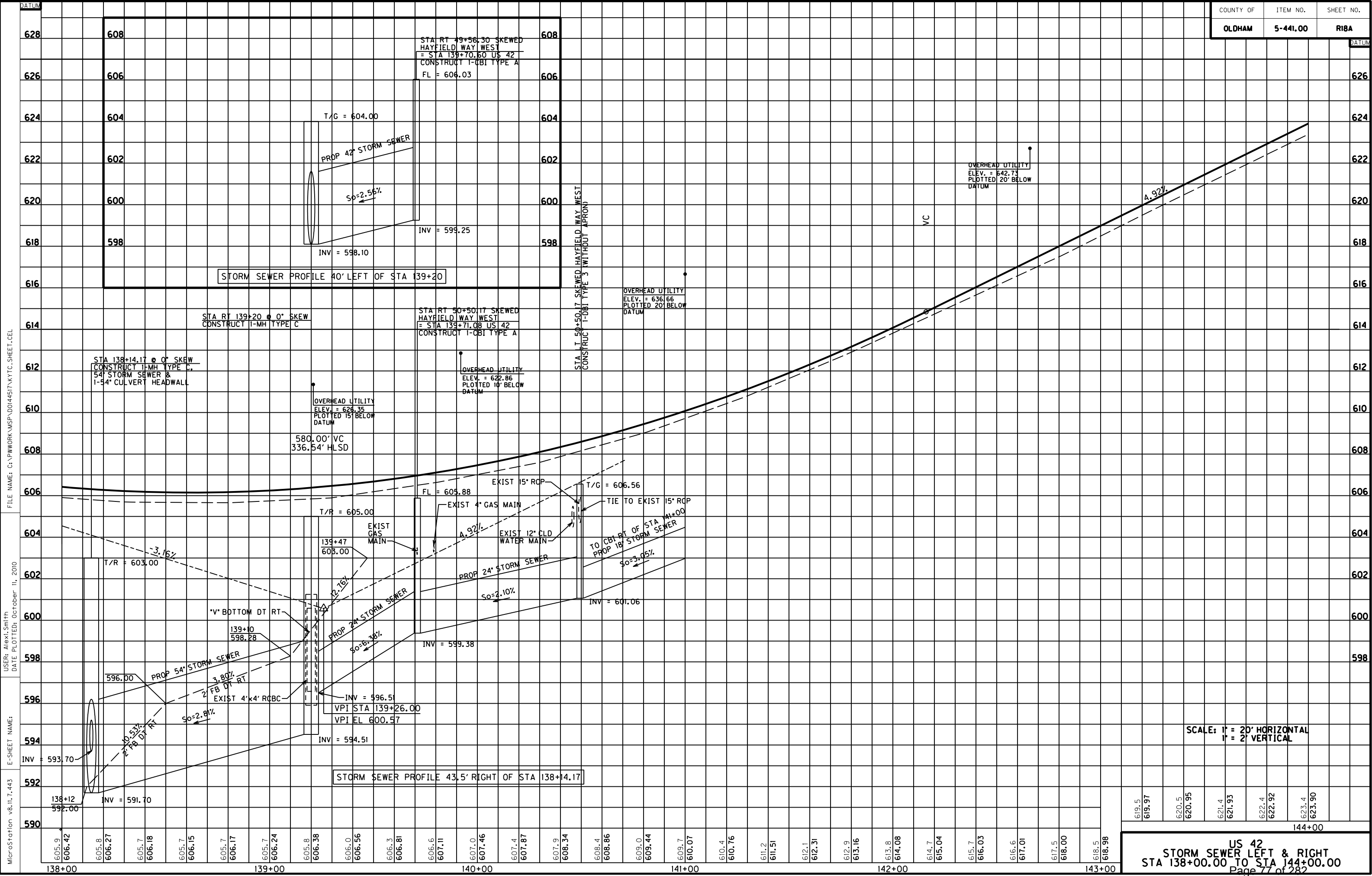


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USER: Alex Smith
DATE PLOTTED: January 1, 2001
MicroStation v8.11.7.180 E-SHEET NAME:

DITCH CONSTRUCTION US 42 - RIGHT				
STA. TO STA.	SIZE/TYPE	CHANNEL LINING	DEPTH	QUANTITY
138+12-139+10	2' FB	ECB	1'	67 SY
139+10-139+47	*V BOT	TRM	1'	33 SY
138+05	5' FB OUTLET	CLASS III	3'	29 TONS

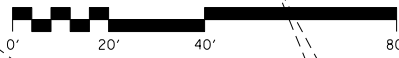
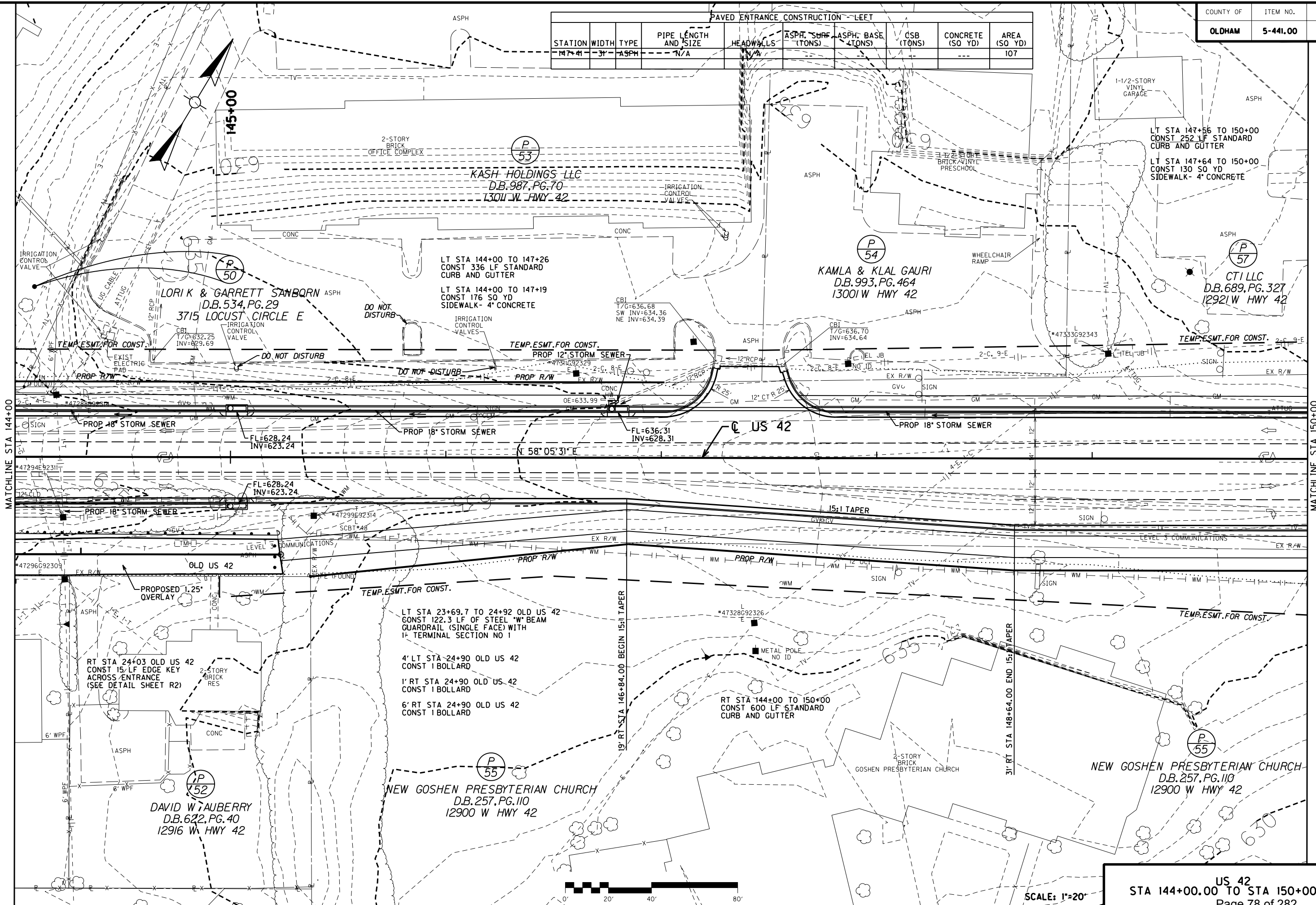
DITCH CONSTRUCTION OLD US 42 - RIGHT				
STA. TO STA.	SIZE/TYPE	CHANNEL LINING	DEPTH	QUANTITY
20+19-20+50	SPEC *V	ECB	1'	27 SY



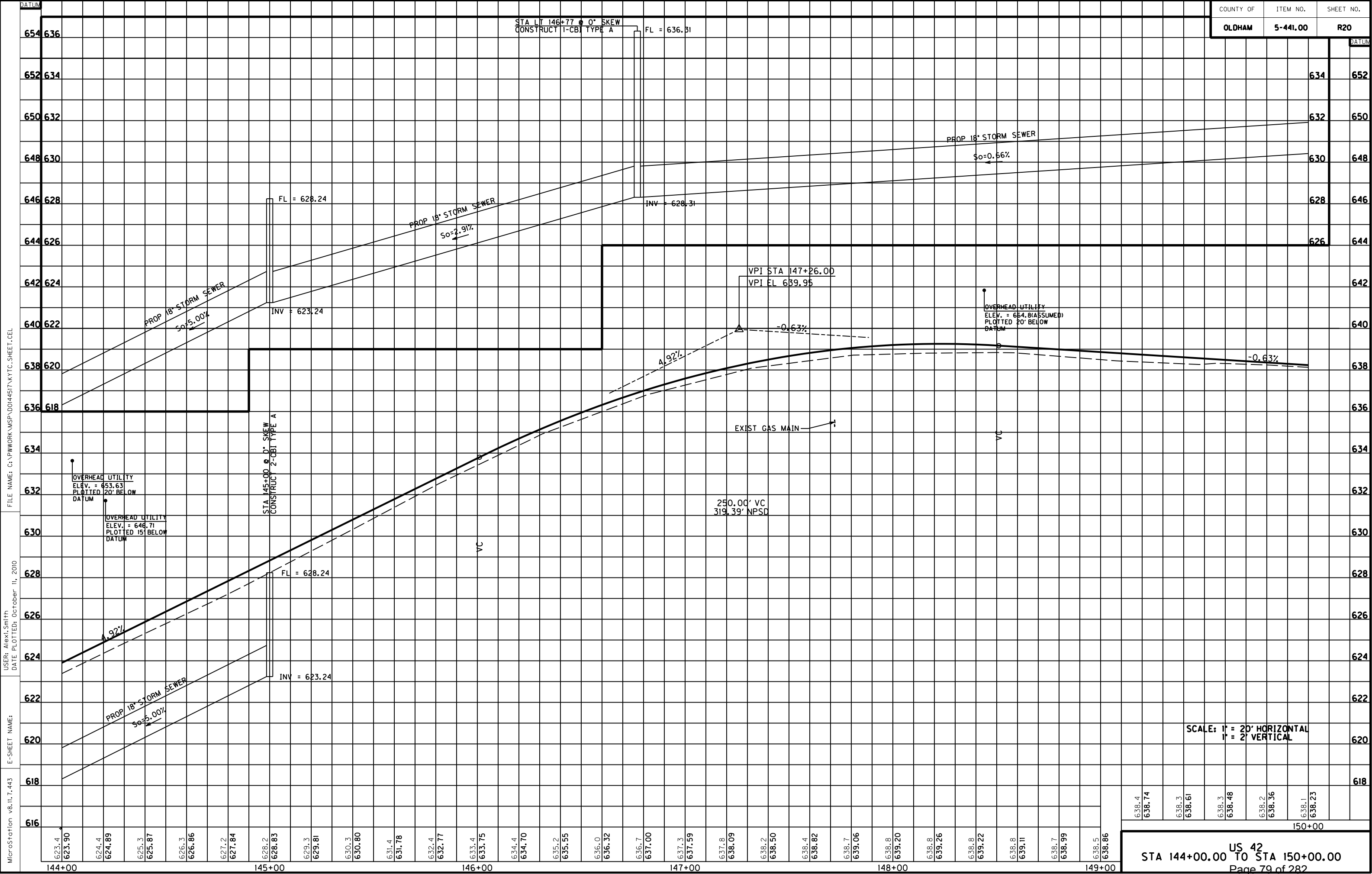


COUNTY OF	ITEM NO.	SHEET NO.
OLDHAM	5-441.00	R19

PAVED ENTRANCE CONSTRUCTION - LEFT								
STATION	WIDTH	TYPE	PIPE LENGTH AND SIZE	HEADWALLS	ASPH. SURF (TONS)	ASPH. BASE (TONS)	CSB (TONS)	CONCRETE (SQ YD)
147+41	3'	ASPH	N/A	N/A				107



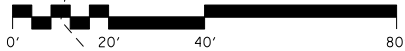
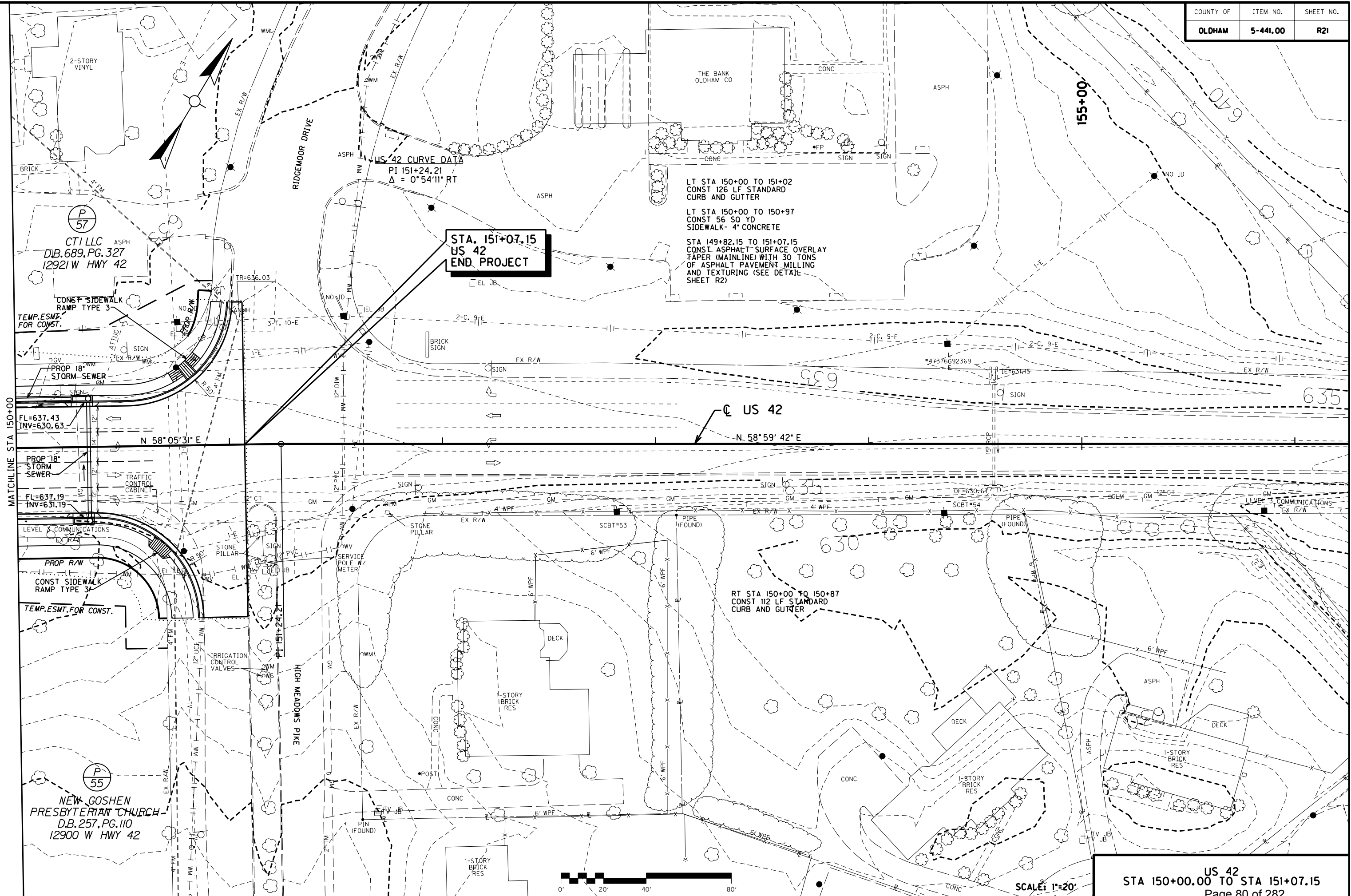
SCALE: 1"=20'



FILE NAME: C:\PWORK\ALEXI.SMITH\DO14517\K.YTC.SHEET.CEL

USER: Alexi Smith
DATE PLOTTED: January 1, 2001

MicroStation v8.11.7.180
E-SHEET NAME:



SCALE: 1"=20'

US 42
STA 150+00.00 TO STA 151+07.15
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ATUM

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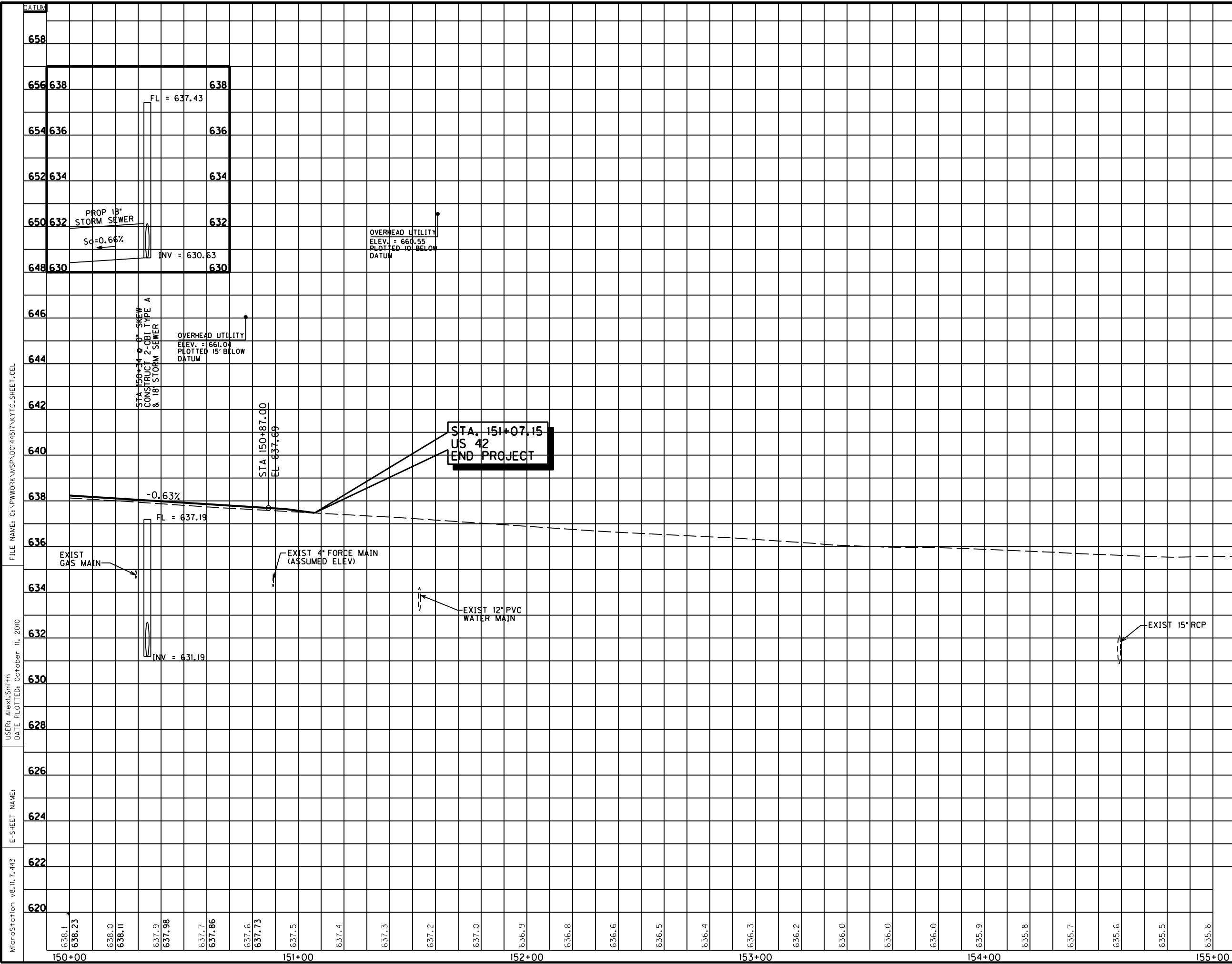
52	
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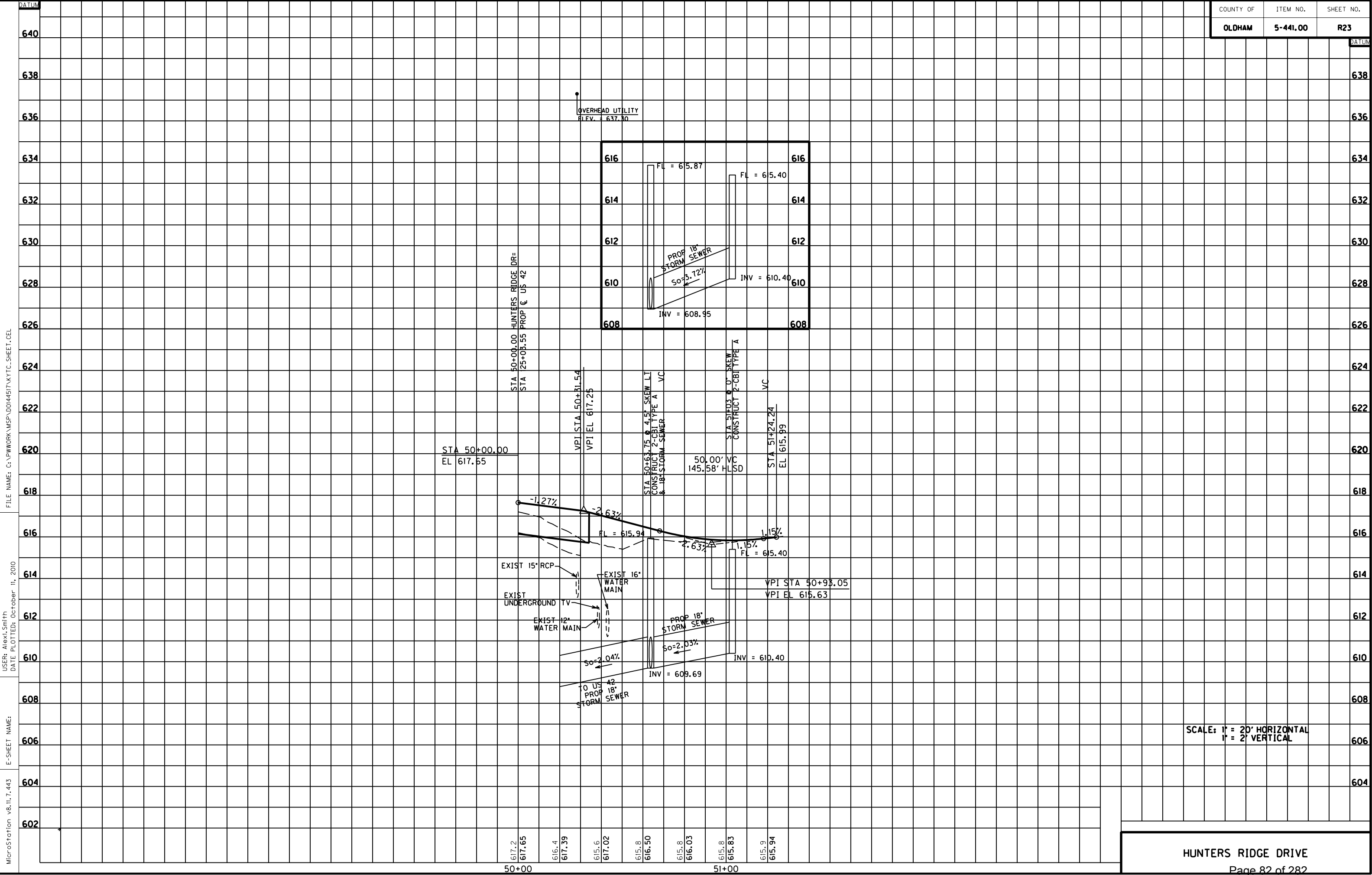
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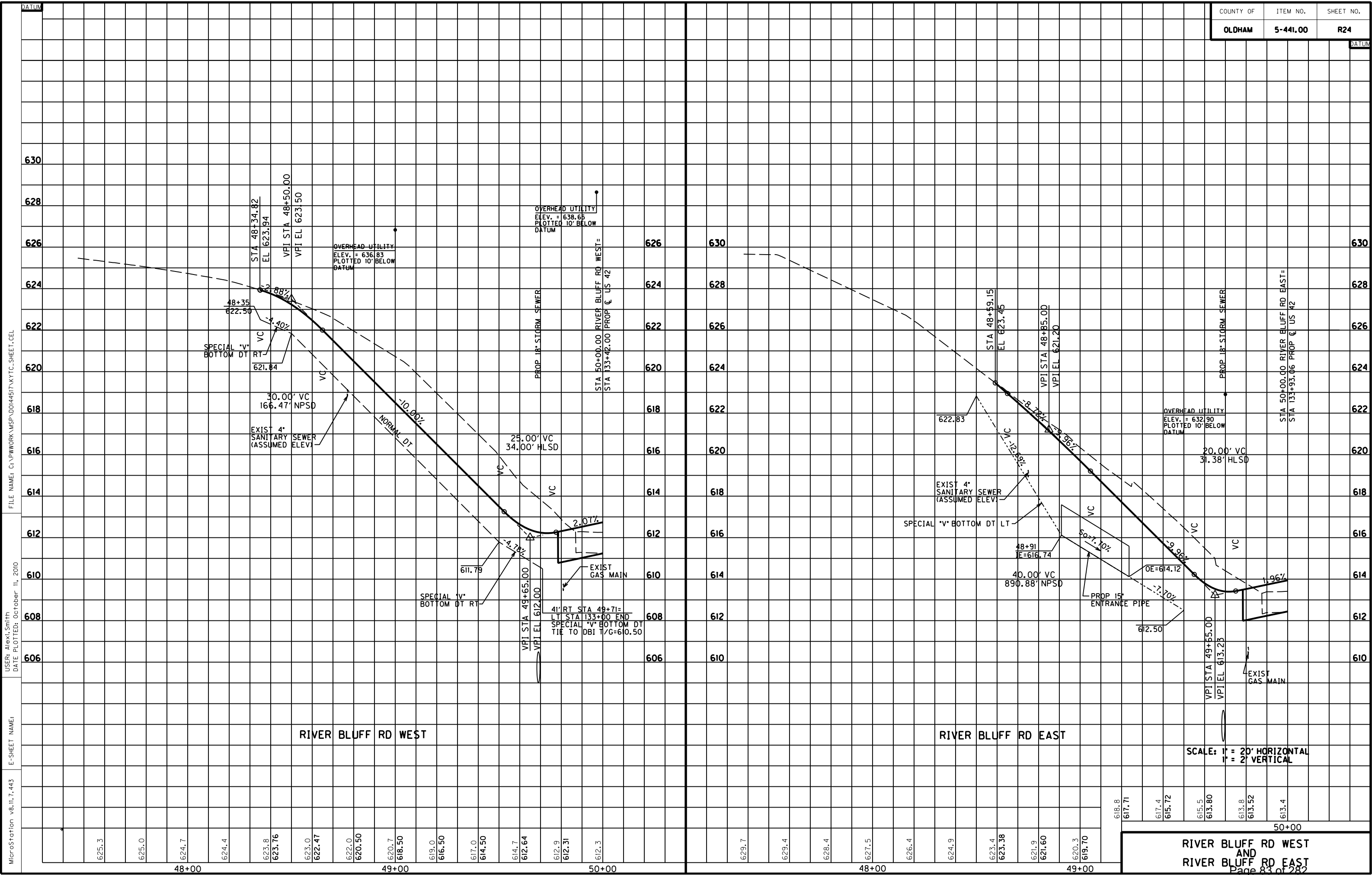
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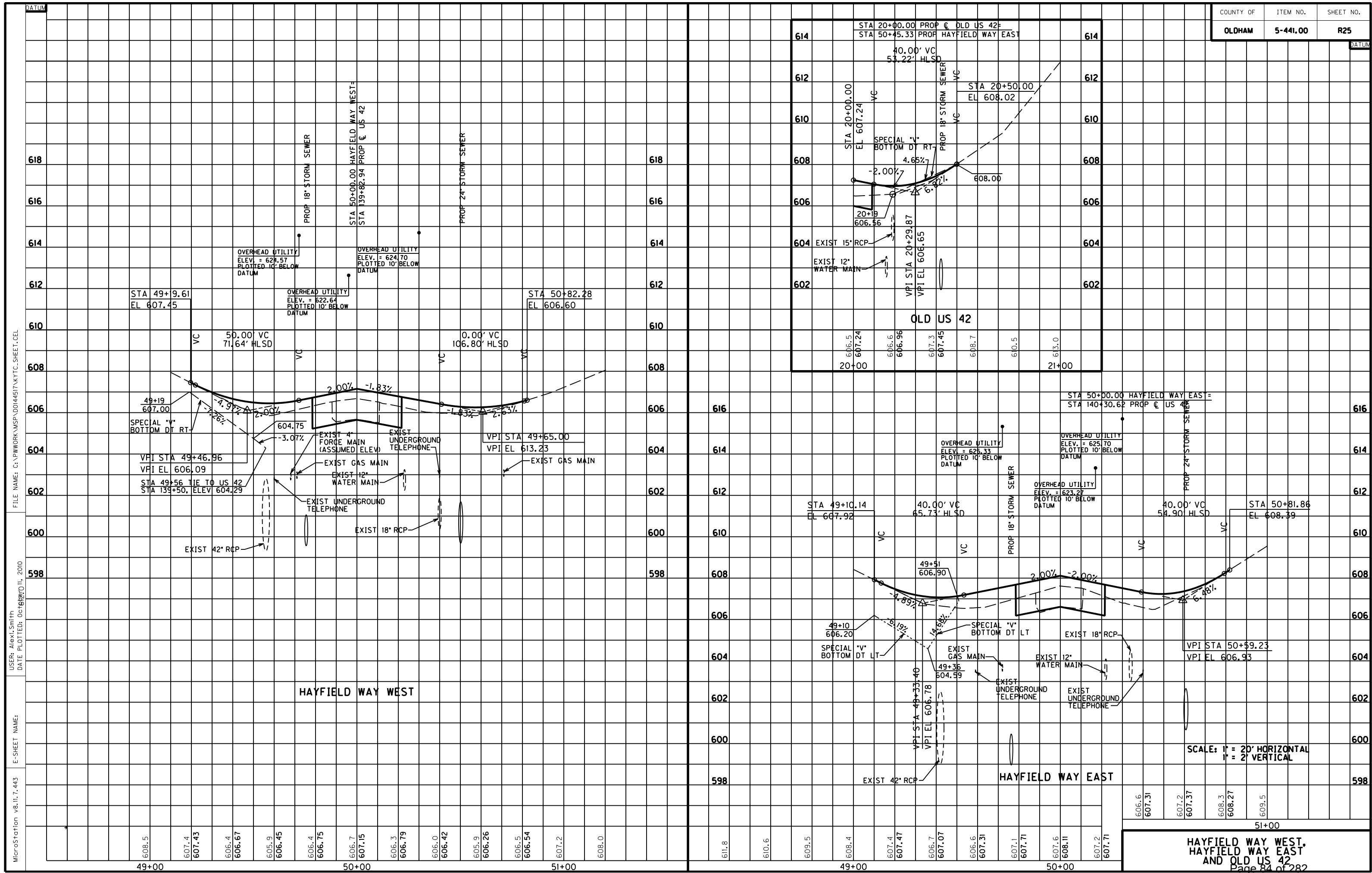
SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

US 42
STA 126+00.00 TO STA 132+000.00
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Section 6 – Bridges and Culverts

Entrance Pipe
US 42
Right 105+52

Kentucky Transportation Cabinet
Division of Highway Design
DRAINAGE DESIGN SUMMARY

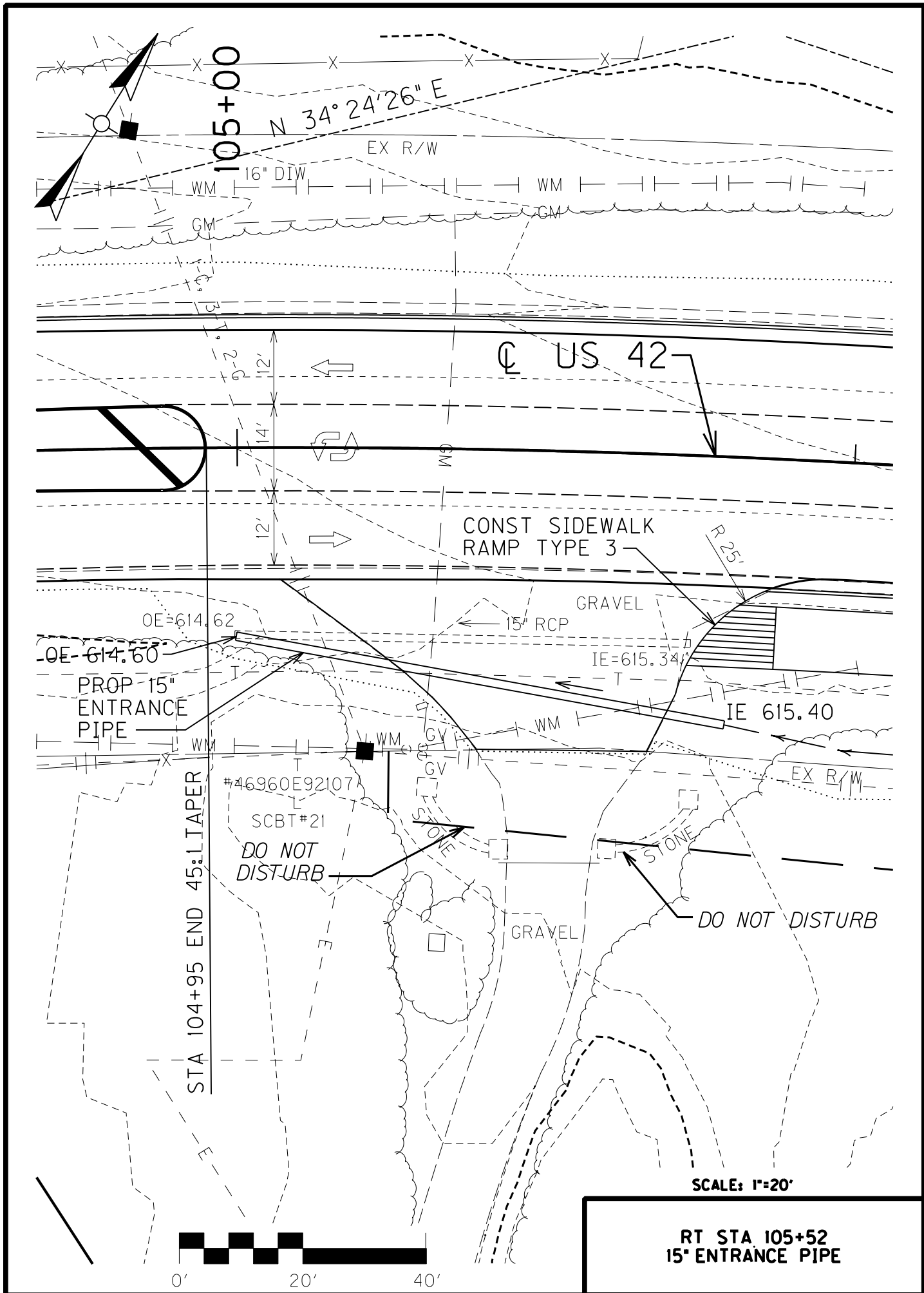
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County :	OLDHAM	Route :	US 42	Item # :	5-441.00
UPN :	FD52 093 0042 000-001	FPN :	STPM 5138(056)	Sta.:	105+52 RT
Latitude (dec deg):	38.36611111	Longitude (dec deg):	85.60027778		
EXISTING CONDITIONS					
Downstream Channel Data			Drainage Area:	Ac	Slope :
Stream Name or Description:			Natural drain.		
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Normal Pool El.		OHW Elev.		Bed Material:	D50 (mm)
Drift:		Abrasion Level:		pH:	
				Resistivity:	
FEMA Flood Zone:	No	Zone Type:		Flood Map No(s):	
Existing Bridge or Culvert			Drainage Area:	Ac	
Size, Length, Type & Material:			Skew:		
Lt. Abut./Inlet:			Rt. Abut./Outlet:		
Inlet El.:		Outlet El.:		Slope:	
				Top/Grate El.:	
Low Road El.:	618.2	Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Headwater Elev.					
Outlet Velocity (ft/s)					
PROPOSED CONDITIONS					
Downstream Channel Data			Drainage Area:	0.1	Ac
Stream Name or Description:			Roadway ditch		
Return Interval (years)	2	5	10	25	50
Discharge (cfs)			0.3		0.4
Flow Depth ; Tailwater (ft)			0.30		0.40
Proposed Bridge or Culvert			Drainage Area:	0.1	Ac
Size, Length, Type & Material:			15" entrance pipe - 80 lf		
Lt. Abut./Inlet:	n/a		Rt. Abut./Outlet:	n/a	
Inlet El.:	615.4	Outlet El.:	614.6	Slope:	1.00%
				Top/Grate El.:	
Low Road El.:	617.1	Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)				0.3	0.4
Headwater Elev.				615.75	615.80
Outlet Velocity (ft/s)				1.30	1.20
Flow Over Road (cfs)				0.00	0.00

Kentucky Transportation Cabinet
Division of Highway Design
Drainage Design Summary

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REMARKS and / or CONTROLS															
RECORD HIGHWATER DATA															
Source	1:					2:					3:				
Elevation															
Date															
Location															
PROPOSED CHANNEL LINING / STREAM DISTURBANCE															
Location	Class	Thickness	Depth	Length	Quantity	Quantity Below OHW (CY)									
Upstream															
Downstream															
Total Length of Stream Disturbance (ft):				n/a											
PROPOSED DIVERSION															
Flooding		Return Interval (yrs)			Discharge (cfs)			Elevation							
Design Storm															
Overtopping Storm															
Recommended Size and Type of Opening(s):															
PROPOSED BOX CULVERT OR SPECIAL WING WALLS															
Inlet/Lt. Abut. Skewed		☐		Outlet/Rt. Abut. Skewed		☐									
Location	1	2	3	4											
30 Degree															
Skewed															
Special															
SCOUR															
Analysis Method:				Flow Angle (deg):				D50 (mm)				D95 (mm)			
Contraction Scour (ft):				Local Abut. Scour (ft):				Total Abut. Scour (ft):				0.00			
Pier No.:															
Length (ft):															
Width (ft):															
* Type:															
Local Scour:															
Total Scour:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*	(1) Triangular Nose		(2) Square Nose		(3) Round Nose		(4) Circular Cylinder		(5) Group Cylinders						
Potential for Aggradation/Degradation/Movement:															
Other Factors Affecting Abut./Pier Location:															
Scour Mitigation Measures:															



SCALE: 1"=20'

RT STA 105+52
15" ENTRANCE PIPE

01-23-2012 19:34:07

HYPACK : KENTUCKY CULVERT DESIGN PROGRAM

US42 Oldham County ENTRANCE PIPE RIGHT 105+52

STATION	S	L	AHW	DQ	DTW	CQ	CTW
ft	ft/ft	ft	ft	cfs	ft	cfs	ft
105+ 52.0	0.01000	80.	2.00	0.	0.30	0.	0.40

- - - - -

CSP/CAP (CODE : 111) -- OUTLET CONTM 2ioVERNS
PROJECTING FROM FILL (NO HEADWALL)
USER SIZE SELECTION

OUTLET CONTROL			I.C.TEST					
#	PIPES	DIAM	HW	VO	YO	FROUDE	HWOC	V00C
		in	ft	f/s	ft		ft	f/s
DQ	1	15	0.35	1.3	0.18	0.55	0.34	1.4
CQ	1	15	0.40	1.2	0.27	0.40	0.38	1.7

KTdid: 9802

END OF RUN

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
 ENTRANCE PIPE RIGHT 105+52

Zone of Influence : louisville
 C-Factor : .45
 Area (acres) : .1

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 60 (ft)
 Overland Friction Factor : N = .4
 2-Year, 24-Hour Precipitation : P = 3.2 (in)
 Average Overland Slope : SO = .06 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 13 (ft)
 Manning's Roughness Coefficient : n = .035
 Bank Full Section Flow Area : AC = 8 (ft²)
 Channel Slope : SC = .06 (ft/ft)
 Wetted Perimeter : WP = 16.12 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.1775	8.4609	8.4276	0.0332	3.9445
Q 5	0.2384	7.5121	7.4789	0.0332	5.2972
Q 10	0.2777	7.0694	7.0361	0.0332	6.1715
Q 25	0.3292	6.6073	6.5740	0.0332	7.3146
Q 50	0.3656	6.3373	6.3041	0.0332	8.1236
Q 100	0.4031	6.0958	6.0625	0.0332	8.9572
Q 500	0.4941 (cfs)				

=====

KTdid: 9802

END OF RUN

 DITCHA : CHECK DEPTH OF FLOW AND DISCHARGE IN DITCHES & CHANNELS
 =====

PROJECT : ENTRANCE PIPE RIGHT 105+52

DEPTH CALCULATIONS :

Q = Discharge = .3 (cfs)
 B = Bottom Width = 0 (ft)
 Z = Average Side Slope (Z : 1) = 4
 S = Channel Slope = .005 (ft/ft)
 N = Manning's Roughness Coefficient = .035

CHANNEL HYDRAULICS :

DEPTH = 0.3000 (ft)
 AREA = 0.3600 (ft²)
 VELOCITY = 0.8306 (fps)
 HYDRAULIC RADIUS = 0.1455 (ft)
 WETTED PERIMETER = 2.4739 (ft)

DEPTH CALCULATIONS :

Q = Discharge = .4 (cfs)
 B = Bottom Width = 0 (ft)
 Z = Average Side Slope (Z : 1) = 4
 S = Channel Slope = .005 (ft/ft)
 N = Manning's Roughness Coefficient = .035

CHANNEL HYDRAULICS :

DEPTH = 0.3349 (ft)
 AREA = 0.4486 (ft²)
 VELOCITY = 0.8938 (fps)
 HYDRAULIC RADIUS = 0.1625 (ft)
 WETTED PERIMETER = 2.7617 (ft)

KTdid: 9802

END OF RUN

Entrance Pipe
US 42
Left 113+80

Kentucky Transportation Cabinet
Division of Highway Design
DRAINAGE DESIGN SUMMARY

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County :	OLDHAM	Route :	US 42	Item # :	5-441.00
UPN :	FD52 093 0042 000-001	FPN :	STPM 5138(056)	Sta.:	113+80 LT
Latitude (dec deg):	38.36611111	Longitude (dec deg):	85.60027778		
EXISTING CONDITIONS					
Downstream Channel Data			Drainage Area:	Ac	Slope :
Stream Name or Description:			Natural drain.		
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Normal Pool El.		OHW Elev.		Bed Material:	D50 (mm)
Drift:		Abrasion Level:		pH:	
				Resistivity:	
FEMA Flood Zone:	No	Zone Type:		Flood Map No(s):	
Existing Bridge or Culvert			Drainage Area:	Ac	
Size, Length, Type & Material:			Skew:		
Lt. Abut./Inlet:			Rt. Abut./Outlet:		
Inlet El.:		Outlet El.:		Slope:	
				Top/Grate El.:	
Low Road El.:	618.2	Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Headwater Elev.					
Outlet Velocity (ft/s)					
PROPOSED CONDITIONS					
Downstream Channel Data			Drainage Area:	1.47	Ac
Stream Name or Description:			Roadway ditch		
Return Interval (years)	2	5	10	25	50
Discharge (cfs)			3.9		5.9
Flow Depth ; Tailwater (ft)			0.70		0.80
Proposed Bridge or Culvert			Drainage Area:	1.47	Ac
Size, Length, Type & Material:			18" entrance pipe - 34 lf		
Lt. Abut./Inlet:	n/a		Rt. Abut./Outlet:	n/a	
Inlet El.:	615.48	Outlet El.:	615.14	Slope:	1.00%
				Top/Grate El.:	
Low Road El.:	617.9	Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)				3.9	5.9
Headwater Elev.				616.77	617.15
Outlet Velocity (ft/s)				4.20	4.90
Flow Over Road (cfs)				0.00	0.00

Kentucky Transportation Cabinet
Division of Highway Design
Drainage Design Summary

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REMARKS and / or CONTROLS															
RECORD HIGHWATER DATA															
Source	1:						2:						3:		
Elevation															
Date															
Location															
PROPOSED CHANNEL LINING / STREAM DISTURBANCE															
Location	Class	Thickness	Depth	Length	Quantity	Quantity Below OHW (CY)									
Upstream															
Downstream															
Total Length of Stream Disturbance (ft):				n/a											
PROPOSED DIVERSION															
Flooding	Return Interval (yrs)			Discharge (cfs)			Elevation								
Design Storm															
Overtopping Storm															
Recommended Size and Type of Opening(s):															
PROPOSED BOX CULVERT OR SPECIAL WING WALLS															
Inlet/Lt. Abut. Skewed		☐		Outlet/Rt. Abut. Skewed		☐									
Location	1	2	3	4											
30 Degree															
Skewed															
Special															
SCOUR															
Analysis Method:				Flow Angle (deg):				D50 (mm)				D95 (mm)			
Contraction Scour (ft):				Local Abut. Scour (ft):				Total Abut. Scour (ft):				0.00			
Pier No.:															
Length (ft):															
Width (ft):															
* Type:															
Local Scour:															
Total Scour:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*	(1) Triangular Nose		(2) Square Nose		(3) Round Nose		(4) Circular Cylinder		(5) Group Cylinders						
Potential for Aggradation/Degradation/Movement:															
Other Factors Affecting Abut./Pier Location:															
Scour Mitigation Measures:															

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HYPACK : KENTUCKY CULVERT DESIGN PROGRAM

US42 Oldham County ENTRANCE PIPE LEFT 113+80

STATION	S	L	AHW	DQ	DTW	CQ	CTW
ft	ft/ft	ft	ft	cfs	ft	cfs	ft
113+ 80.0	0.01000	34.	2.00	4.	0.70	6.	0.80

- - - - -

CSP/CAP (CODE : 111) -- OUTLET CONTM 2ioVERNS
PROJECTING FROM FILL (NO HEADWALL)
USER SIZE SELECTION

OUTLET CONTROL			I.C.TEST					
#	PIPES	DIAM	HW	VO	YO	FROUDE	HWOC	V00C
		in	ft	f/s	ft		ft	f/s
DQ	1	18	1.29	4.2	0.62	0.94	1.18	3.5
CQ	1	18	1.67	4.9	0.80	0.96	1.58	3.6

KTdid: 9802

END OF RUN

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
 ENTRANCE PIPE LEFT 113+80

Zone of Influence : louisville
 C-Factor : .6
 Area (acres) : 1.47

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 100 (ft)
 Overland Friction Factor : N = .4
 2-Year, 24-Hour Precipitation : P = 3.2 (in)
 Average Overland Slope : SO = .02 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 92 (ft)
 Manning's Roughness Coefficient : n = .035
 Bank Full Section Flow Area : AC = 8 (ft²)
 Channel Slope : SC = .02 (ft/ft)
 Wetted Perimeter : WP = 16.12 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	2.3270	19.0130	18.6057	0.4073	2.6383
Q 5	3.2556	16.7510	16.3437	0.4073	3.6911
Q 10	3.8582	15.7082	15.3010	0.4073	4.3744
Q 25	4.6826	14.5281	14.1209	0.4073	5.3091
Q 50	5.2464	13.9029	13.4956	0.4073	5.9482
Q 100	5.8480	13.3310	12.9238	0.4073	6.6304
Q 500	7.3280 (cfs)				

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KTdid: 9802

END OF RUN

 DITCHA : CHECK DEPTH OF FLOW AND DISCHARGE IN DITCHES & CHANNELS
 =====

PROJECT : ENTRANCE PIPE 113+80 LEFT

DEPTH CALCULATIONS :

Q = Discharge = 3.9 (cfs)
 B = Bottom Width = 0 (ft)
 Z = Average Side Slope (Z : 1) = 4
 S = Channel Slope = .01 (ft/ft)
 N = Manning's Roughness Coefficient = .035

CHANNEL HYDRAULICS :

DEPTH = 0.6902 (ft)
 AREA = 1.9055 (ft²)
 VELOCITY = 2.0471 (fps)
 HYDRAULIC RADIUS = 0.3348 (ft)
 WETTED PERIMETER = 5.6915 (ft)

DEPTH CALCULATIONS :

Q = Discharge = 5.9 (cfs)
 B = Bottom Width = 0 (ft)
 Z = Average Side Slope (Z : 1) = 4
 S = Channel Slope = .01 (ft/ft)
 N = Manning's Roughness Coefficient = .035

CHANNEL HYDRAULICS :

DEPTH = 0.8061 (ft)
 AREA = 2.5992 (ft²)
 VELOCITY = 2.2703 (fps)
 HYDRAULIC RADIUS = 0.3910 (ft)
 WETTED PERIMETER = 6.6473 (ft)

KTdid: 9802

END OF RUN

Entrance Pipe
US 42
Left 122+65

Kentucky Transportation Cabinet
Division of Highway Design
DRAINAGE DESIGN SUMMARY

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County :	OLDHAM	Route :	US 42	Item # :	5-441.00
UPN :	FD52 093 0042 000-001	FPN :	STPM 5138(056)	Sta.:	122+65 LT
Latitude (dec deg):	38.36611111	Longitude (dec deg):	85.60027778		
EXISTING CONDITIONS					
Downstream Channel Data			Drainage Area:	Ac	Slope :
Stream Name or Description:			Natural drain.		
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Normal Pool El.		OHW Elev.		Bed Material:	D50 (mm)
Drift:		Abrasion Level:		pH:	
				Resistivity:	
FEMA Flood Zone:	No	Zone Type:		Flood Map No(s):	
Existing Bridge or Culvert			Drainage Area:	Ac	
Size, Length, Type & Material:			Skew:		
Lt. Abut./Inlet:			Rt. Abut./Outlet:		
Inlet El.:		Outlet El.:		Slope:	
Low Road El.:	618.2	Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Headwater Elev.					
Outlet Velocity (ft/s)					
PROPOSED CONDITIONS					
Downstream Channel Data			Drainage Area:	0.27	Ac
Stream Name or Description:			Roadway ditch		
Return Interval (years)	2	5	10	25	50
Discharge (cfs)			0.6		0.9
Flow Depth ; Tailwater (ft)			0.30		0.40
Proposed Bridge or Culvert			Drainage Area:	0.27	Ac
Size, Length, Type & Material:			15" entrance pipe - 42 lf		
Lt. Abut./Inlet:	n/a		Rt. Abut./Outlet:	n/a	
Inlet El.:	617.48	Outlet El.:	617.06	Slope:	1.00%
Low Road El.:	619.6	Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)				0.6	0.9
Headwater Elev.				617.97	618.09
Outlet Velocity (ft/s)				2.50	2.70
Flow Over Road (cfs)				0.00	0.00

Kentucky Transportation Cabinet
Division of Highway Design
Drainage Design Summary

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01/2011
Page 2 of 2

REMARKS and / or CONTROLS															
RECORD HIGHWATER DATA															
Source	1:						2:						3:		
Elevation															
Date															
Location															
PROPOSED CHANNEL LINING / STREAM DISTURBANCE															
Location	Class	Thickness	Depth	Length	Quantity	Quantity Below OHW (CY)									
Upstream															
Downstream															
Total Length of Stream Disturbance (ft):				n/a											
PROPOSED DIVERSION															
Flooding	Return Interval (yrs)			Discharge (cfs)			Elevation								
Design Storm															
Overtopping Storm															
Recommended Size and Type of Opening(s):															
PROPOSED BOX CULVERT OR SPECIAL WING WALLS															
Inlet/Lt. Abut. Skewed		☐		Outlet/Rt. Abut. Skewed		☐									
Location	1	2	3	4											
30 Degree															
Skewed															
Special															
SCOUR															
Analysis Method:				Flow Angle (deg):				D50 (mm)				D95 (mm)			
Contraction Scour (ft):				Local Abut. Scour (ft):				Total Abut. Scour (ft):				0.00			
Pier No.:															
Length (ft):															
Width (ft):															
* Type:															
Local Scour:															
Total Scour:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*	(1) Triangular Nose		(2) Square Nose		(3) Round Nose		(4) Circular Cylinder		(5) Group Cylinders						
Potential for Aggradation/Degradation/Movement:															
Other Factors Affecting Abut./Pier Location:															
Scour Mitigation Measures:															

01-23-2012 19:34:07

HYPACK : KENTUCKY CULVERT DESIGN PROGRAM

US42 Oldham County ENTRANCE PIPE LEFT 122+65

STATION	S	L	AHW	DQ	DTW	CQ	CTW
ft	ft/ft	ft	ft	cfs	ft	cfs	ft
122+ 65.0	0.01000	42.	2.00	1.	0.30	1.	0.40

- - - - -

CSP/CAP (CODE : 111) -- OUTLET CONTM 2ioVERNS
PROJECTING FROM FILL (NO HEADWALL)
USER SIZE SELECTION

OUTLET CONTROL			I.C.TEST					
#	PIPES	DIAM	HW	VO	YO	FROUDE	HWOC	V00C
		in	ft	f/s	ft		ft	f/s
DQ	1	15	0.49	2.5	0.20	0.98	0.45	2.0
CQ	1	15	0.61	2.7	0.27	0.90	0.55	2.4

KTdid: 9802

END OF RUN

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
 ENTRANCE PIPE LEFT 122+65

Zone of Influence : louisville
 C-Factor : .48
 Area (acres) : .27

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 135 (ft)
 Overland Friction Factor : N = .4
 2-Year, 24-Hour Precipitation : P = 3.2 (in)
 Average Overland Slope : SO = .05 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 115 (ft)
 Manning's Roughness Coefficient : n = .035
 Bank Full Section Flow Area : AC = 4 (ft²)
 Channel Slope : SC = .07 (ft/ft)
 Wetted Perimeter : WP = 8.25 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.3663	16.7572	16.4808	0.2764	2.8264
Q 5	0.5093	14.7830	14.5066	0.2764	3.9301
Q 10	0.6034	13.8089	13.5325	0.2764	4.6559
Q 25	0.7286	12.8290	12.5527	0.2764	5.6220
Q 50	0.8154	12.2785	12.0021	0.2764	6.2916
Q 100	0.9074	11.7770	11.5006	0.2764	7.0018
Q 500	1.1313 (cfs)				

=====

KTdid: 9802

END OF RUN

 DITCHA : CHECK DEPTH OF FLOW AND DISCHARGE IN DITCHES & CHANNELS
 =====

PROJECT : ENTRANCE PIPE 122+65 LEFT

DEPTH CALCULATIONS :

Q = Discharge = .6 (cfs)
 B = Bottom Width = 0 (ft)
 Z = Average Side Slope (Z : 1) = 4
 S = Channel Slope = .0235 (ft/ft)
 N = Manning's Roughness Coefficient = .035

CHANNEL HYDRAULICS :

DEPTH = 0.2916 (ft)
 AREA = 0.3401 (ft²)
 VELOCITY = 1.7669 (fps)
 HYDRAULIC RADIUS = 0.1414 (ft)
 WETTED PERIMETER = 2.4046 (ft)

DEPTH CALCULATIONS :

Q = Discharge = .9 (cfs)
 B = Bottom Width = 0 (ft)
 Z = Average Side Slope (Z : 1) = 4
 S = Channel Slope = .0235 (ft/ft)
 N = Manning's Roughness Coefficient = .035

CHANNEL HYDRAULICS :

DEPTH = 0.3394 (ft)
 AREA = 0.4608 (ft²)
 VELOCITY = 1.9551 (fps)
 HYDRAULIC RADIUS = 0.1646 (ft)
 WETTED PERIMETER = 2.7988 (ft)

KTdid: 9802

END OF RUN

Sta. 129+83.43
@ 1.3° Skew Left

Existing 3' X 3' RCBC

Kentucky Transportation Cabinet
Division of Highway Design
DRAINAGE DESIGN SUMMARY

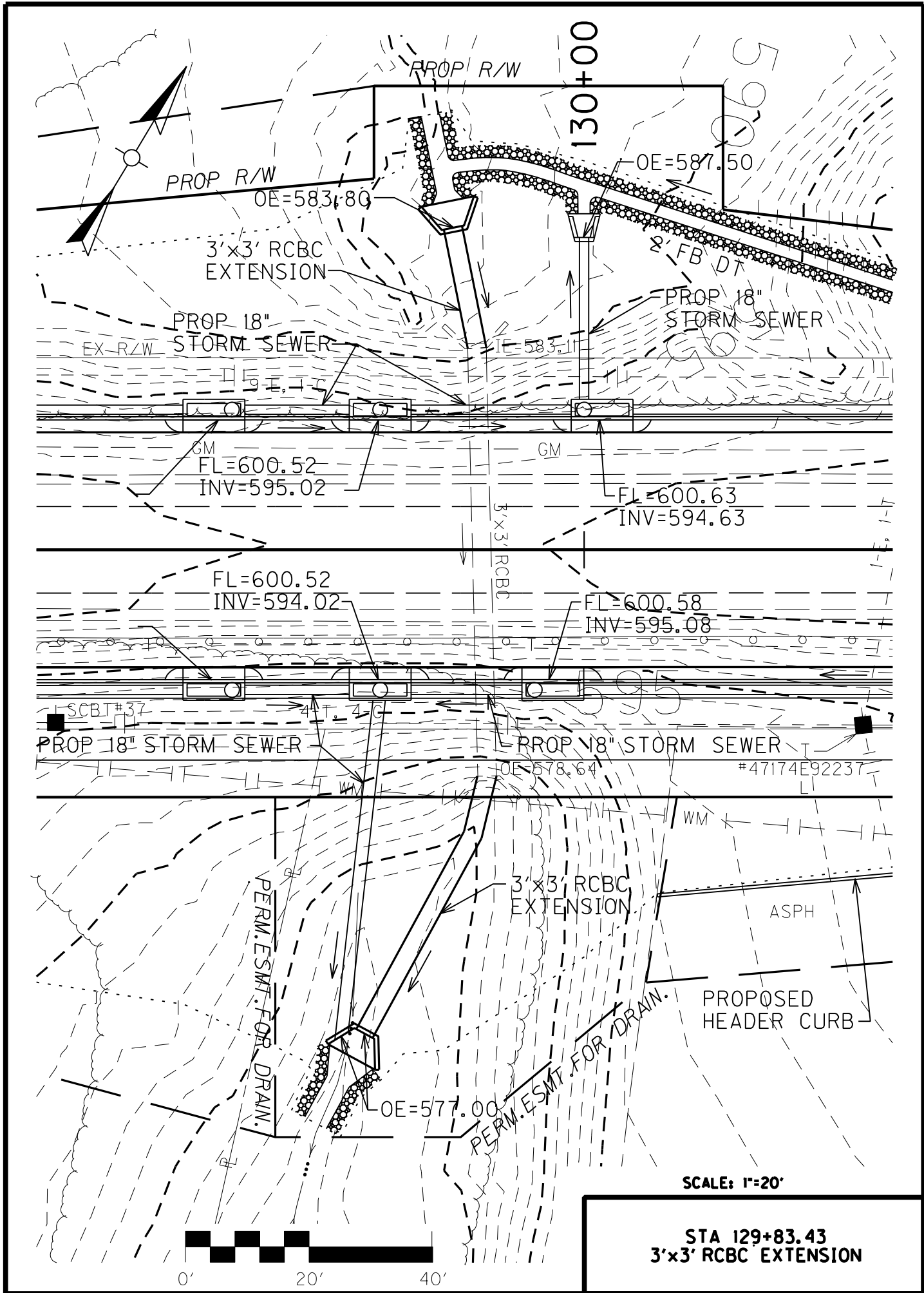
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01/2011
Page 1 of 2

County :	OLDHAM	Route :	US 42	Item # :	5-441.00
UPN :	FD52 093 0042 000-001	FPN :	STPM 5138(056)	Sta.:	129+83.43
Latitude (dec deg):	38.36611111	Longitude (dec deg):	85.60027778		
EXISTING CONDITIONS					
Downstream Channel Data			Drainage Area:	30.89	Ac
Stream Name or Description:			Unnamed tributary to a distant Blueline stream.		
Return Interval (years)	2	5	10	25	50
Discharge (cfs)	36	51	61	73	82
Flow Depth ; Tailwater (ft)			1.11		1.25
Normal Pool El.		OHW Elev.		Bed Material:	D50 (mm)
Drift:		Abrasion Level:		pH:	
				Resistivity:	
FEMA Flood Zone:	No	Zone Type:		Flood Map No(s):	
Existing Bridge or Culvert			Drainage Area:	30.8	Ac
Size, Length, Type & Material:			3' 3' RCBC		
Skew:			1.3° Left		
Lt. Abut./Inlet:	Headwall		Rt. Abut./Outlet:	Headwall	
Inlet El.:	583.11	Outlet El.:	578.64	Slope:	6.03%
Low Road El.:	599.6	Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)	36	51	61	73	82
Headwater Elev.				587.48	588.74
Outlet Velocity (ft/s)				22.70	24.20
PROPOSED CONDITIONS					
Downstream Channel Data			Drainage Area:	30.8	Ac
Stream Name or Description:			Unnamed tributary to a distant Blueline stream.		
Return Interval (years)	2	5	10	25	50
Discharge (cfs)	36	51	61	73	82
Flow Depth ; Tailwater (ft)			1.11		1.25
Proposed Bridge or Culvert			Drainage Area:	30.8	Ac
Size, Length, Type & Material:			3'x3' RCBC extensions with 10°, 15° and 15° deflections.		
Skew:			1.3° Left		
Lt. Abut./Inlet:	Headwall		Rt. Abut./Outlet:	Headwall	
Inlet El.:	583.8	Outlet El.:	577	Slope:	5.0% average
Low Road El.:	601.3 berm behind C&G	Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)	36	51	61	73	82
Headwater Elev.				588.19	589.45
Outlet Velocity (ft/s)				20.90	22.20
Flow Over Road (cfs)				0.00	0.00

Kentucky Transportation Cabinet
Division of Highway Design
Drainage Design Summary

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REMARKS and / or CONTROLS															
Deflections are used in the proposed extension of the Existing RCBC to align the inlet and outlet with the existing meandering channels that lead to and from the existing RCBC.															
RECORD HIGHWATER DATA															
Source	1:					2:					3:				
Elevation															
Date															
Location															
PROPOSED CHANNEL LINING / STREAM DISTURBANCE															
Location	Class	Thickness	Depth	Length	Quantity	Quantity Below OHW (CY)									
Upstream	III	2'	2	15'	25 tons										
Downstream	III	2'	2'	15'	20 tons										
Total Length of Stream Disturbance (ft):			n/a												
PROPOSED DIVERSION															
Flooding		Return Interval (yrs)			Discharge (cfs)			Elevation							
Design Storm															
Overtopping Storm															
Recommended Size and Type of Opening(s):															
PROPOSED BOX CULVERT OR SPECIAL WING WALLS															
Inlet/Lt. Abut. Skewed		☐		Outlet/Rt. Abut. Skewed		☐									
Location	1	2	3	4											
30 Degree															
Skewed															
Special															
SCOUR															
Analysis Method:				Flow Angle (deg):				D50 (mm)				D95 (mm)			
Contraction Scour (ft):				Local Abut. Scour (ft):				Total Abut. Scour (ft):				0.00			
Pier No.:															
Length (ft):															
Width (ft):															
* Type:															
Local Scour:															
Total Scour:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*	(1) Triangular Nose		(2) Square Nose		(3) Round Nose		(4) Circular Cylinder		(5) Group Cylinders						
Potential for Aggradation/Degradation/Movement:															
Other Factors Affecting Abut./Pier Location:															
Scour Mitigation Measures:															



01-22-2012 10:56:33

HYPACK : KENTUCKY CULVERT DESIGN PROGRAM

US42 OLDHAM 3X3 RCBC AT 129+83 EXISTING

STATION	S	L	AHW	DQ	DTW	CQ	CTW
ft	ft/ft	ft	ft	cfs	ft	cfs	ft
129+ 83.0	0.06300	71.	5.00	73.	1.11	92.	1.25

- - - - -

RCBC (CODE : 515) -- INLET CONTROL GOVERNS
30-75 DEGREE WING FLARE (TOP BEVEL OR ROUNDED)
USER SIZE SELECTION

	INLET CONTROL			O.C.TEST				
	SPAN	RISE	HW	VO	YO	FROUDE	HWOC	V00C
	ft	ft	ft	f/s	ft		ft	f/s
DQ	3.0	3.0	4.37	22.7	1.07	3.88	0.03	9.2
CQ	3.0	3.0	5.63	24.2	1.27	3.79	1.19	10.2

KTdid: 9802

END OF RUN

US42 OLDHAM 3X3 RCBC AT 129+83 PROPOSED

STATION	S	L	AHW	DQ	DTW	CQ	CTW
ft	ft/ft	ft	ft	cfs	ft	cfs	ft
129+ 83.0	0.05000	136.	5.00	73.	1.11	92.	1.25

- - - - -

RCBC (CODE : 515) -- INLET CONTROL GOVERNS
30-75 DEGREE WING FLARE (TOP BEVEL OR ROUNDED)
USER SIZE SELECTION

	INLET CONTROL			O.C.TEST				
	SPAN	RISE	HW	VO	YO	FROUDE	HWOC	V00C
	ft	ft	ft	f/s	ft		ft	f/s
DQ	3.0	3.0	4.39	20.9	1.16	3.42	-1.89	9.2
CQ	3.0	3.0	5.65	22.2	1.38	3.33	-0.49	10.2

KTdid: 9802

END OF RUN

US42 OLDHAM 3X3 RCBC AT 129+83 WHAT Q PRODUCES 9'HW ON EXISTING

STATION	S	L	AHW	DQ	DTW	CQ	CTW
ft	ft/ft	ft	ft	cfs	ft	cfs	ft
129+ 83.0	0.06300	71.	5.00	120.	1.11	130.	1.25

- - - - -

RCBC (CODE : 515) -- INLET CONTROL GOVERNS
 30-75 DEGREE WING FLARE (TOP BEVEL OR ROUNDED)
 USER SIZE SELECTION

	INLET CONTROL			O.C.TEST				
	SPAN	RISE	HW	VO	YO	FROUDE	HWOC	V00C
	ft	ft	ft	f/s	ft		ft	f/s
DQ	3.0	3.0	7.96	25.9	1.54	3.67	3.06	13.3
CQ	3.0	3.0	8.93	26.4	1.64	3.63	3.84	14.4

KTdid: 9802

END OF RUN

US42 OLDHAM 3X3 RCBC AT 129+83 AFFECTS OF ENLARGED INLET

STATION	S	L	AHW	DQ	DTW	CQ	CTW
ft	ft/ft	ft	ft	cfs	ft	cfs	ft
129+ 83.0	0.05000	136.	5.00	73.	1.11	92.	1.25

RCBC (CODE : 515) -- INLET CONTROL GOVERNS
 30-75 DEGREE WING FLARE (TOP BEVEL OR ROUNDED)
 USER SIZE SELECTION

	INLET CONTROL					O.C.TEST		
	SPAN	RISE	HW	VO	YO	FROUDE	HWOC	V00C
	ft	ft	ft	f/s	ft		ft	f/s
DQ	4.0	3.0	3.37	20.2	0.91	3.73	-3.11	8.4
CQ	4.0	3.0	4.15	21.7	1.06	3.70	-2.28	9.0

RCBC (CODE : 515) -- INLET CONTROL GOVERNS
 30-75 DEGREE WING FLARE (TOP BEVEL OR ROUNDED)
 USER SIZE SELECTION

	INLET CONTROL					O.C.TEST		
	SPAN	RISE	HW	VO	YO	FROUDE	HWOC	V00C
	ft	ft	ft	f/s	ft		ft	f/s
DQ	4.0	4.0	3.18	20.2	0.91	3.73	-3.13	8.4
CQ	4.0	4.0	3.81	21.7	1.06	3.70	-2.61	9.0

RCBC (CODE : 515) -- INLET CONTROL GOVERNS
 30-75 DEGREE WING FLARE (TOP BEVEL OR ROUNDED)
 USER SIZE SELECTION

	INLET CONTROL					O.C.TEST		
	SPAN	RISE	HW	VO	YO	FROUDE	HWOC	V00C
	ft	ft	ft	f/s	ft		ft	f/s
DQ	3.0	4.0	3.99	20.9	1.16	3.42	-2.38	9.2
CQ	3.0	4.0	4.85	22.2	1.38	3.33	-1.51	9.9

KTdid: 9802

END OF RUN

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
 OLDHAM, US42, 3 X 3 RCBC AT 129+83

Zone of Influence : LOUISVILLE
 C-Factor : .55
 Area (acres) : 30.8

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 220 (ft)
 Overland Friction Factor : N = .4
 2-Year, 24-Hour Precipitation : P = 3.2 (in)
 Average Overland Slope : SO = .059 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 1332 (ft)
 Manning's Roughness Coefficient : n = .035
 Bank Full Section Flow Area : AC = 3 (ft²)
 Channel Slope : SC = .043 (ft/ft)
 Wetted Perimeter : WP = 6.32 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	35.8759	27.7518	23.6088	4.1430	2.1178
Q 5	50.6645	24.7140	20.5711	4.1430	2.9908
Q 10	60.1070	23.3921	19.2492	4.1430	3.5482
Q 25	72.9789	21.9891	17.8462	4.1430	4.3081
Q 50	81.8028	21.1522	17.0092	4.1430	4.8290
Q 100	91.2871	20.4242	16.2812	4.1430	5.3888
Q 500	114.2576	(cfs)			

=====

KTdid: 9802

END OF RUN

 DITCHA : CHECK DEPTH OF FLOW AND DISCHARGE IN DITCHES & CHANNELS
 =====

PROJECT : 3X3 RCBC AT 129+83 TAILWATER CALC

DEPTH CALCULATIONS :

Q = Discharge = 73 (cfs)
 B = Bottom Width = 4 (ft)
 Z = Average Side Slope (Z : 1) = 4
 S = Channel Slope = .052 (ft/ft)
 N = Manning's Roughness Coefficient = .035

CHANNEL HYDRAULICS :

DEPTH = 1.1149 (ft)
 AREA = 9.4311 (ft²)
 VELOCITY = 7.7403 (fps)
 HYDRAULIC RADIUS = 0.7148 (ft)
 WETTED PERIMETER = 13.1934 (ft)

DEPTH CALCULATIONS :

Q = Discharge = 92 (cfs)
 B = Bottom Width = 4 (ft)
 Z = Average Side Slope (Z : 1) = 4
 S = Channel Slope = .052 (ft/ft)
 N = Manning's Roughness Coefficient = .035

CHANNEL HYDRAULICS :

DEPTH = 1.2450 (ft)
 AREA = 11.1795 (ft²)
 VELOCITY = 8.2293 (fps)
 HYDRAULIC RADIUS = 0.7836 (ft)
 WETTED PERIMETER = 14.2662 (ft)

KTdid: 9802

END OF RUN

Commands Read From File: 12983-LI.CHL

```

      JOB US 42 INLET DITCH LEFT 129+83 3X3XRCBC
      UNI 0
** UNITS PARAMETER = 0 (ENGLISH)
      CHL .0506 61
      TRP 3 2 2
** LEFT SIDE SLOPE      2.0 AND RIGHT SIDE SLOPE      2.0
** THE BASE WIDTH OF THE TRAPEZOID (ft)      3.00
      LRR 1.0
** D50 (ft)      1.00
      END

```

*****END OF COMMAND FILE*****

US 42 INLET DITCH LEFT 129+83 3X3XRCBC

INPUT REVIEW

```

      DEFAULT ANGLE OF REPOSE (degrees):      41.74
      DESIGN PARAMETERS:
        DESIGN DISCHARGE (ft^3/s):      61.00
        CHANNEL SHAPE:      TRAPEZOIDAL
        CHANNEL SLOPE (ft/ft):      .051

```

HYDRAULIC CALCULATIONS USING BATHURST

```

FLOW (cfs)      61.00
MAX DEPTH (ft)      1.60
AREA (ft^2)      9.93
WETTED PERIMETER (ft)      10.16
HYDRAULIC RADIUS (ft)      .98
AVG VELOCITY (ft/s)      6.14
MANNINGS EQUIVALENT      .057
Davg / D50      1.06
FROUDE NUMBER      .85
REYNOLDS NUMBER (10^5)      1.28
*** WARNING: REYNOLDS NUMBER IS LARGER THAN 10^5

```

STABILITY ANALYSIS

CONDITION	LINING TYPE	PERMIS SHR (LB/FT^2)	CALC. SHR (LB/FT^2)	STAB. FACTOR	REMARKS
BOTTOM; STRAIGHT	RIPRAP	4.84	5.06	.96	UNSTABLE
SIDE; STRAIGHT	RIPRAP	3.58	3.75	.96	UNSTABLE

*** NORMAL END OF HYCHL ***

Commands Read From File: 12983-LO.CHL

```

      JOB US 42 OUTLET DITCH LEFT 129+83 3X3XRCBC
      UNI 0
**  UNITS PARAMETER = 0 (ENGLISH)
      CHL .0671 61
      TRP 4 2 2
**  LEFT SIDE SLOPE      2.0 AND RIGHT SIDE SLOPE      2.0
**  THE BASE WIDTH OF THE TRAPEZOID (ft)      4.00
      LRR 1.0
**  D50 (ft)      1.00
      END

```

*****END OF COMMAND FILE*****

US 42 OUTLET DITCH LEFT 129+83 3X3XRCBC

INPUT REVIEW

```

      DEFAULT ANGLE OF REPOSE (degrees):      41.74
      DESIGN PARAMETERS:
        DESIGN DISCHARGE (ft^3/s):      61.00
        CHANNEL SHAPE:      TRAPEZOIDAL
        CHANNEL SLOPE (ft/ft):      .067

```

HYDRAULIC CALCULATIONS USING BATHURST

```

      FLOW (cfs)      61.00
      MAX DEPTH (ft)      1.37
      AREA (ft^2)      9.15
      WETTED PERIMETER (ft)      10.09
      HYDRAULIC RADIUS (ft)      .91
      AVG VELOCITY (ft/s)      6.66
      MANNINGS EQUIVALENT      .057
      Davg / D50      .97
      FROUDE NUMBER      1.00
      REYNOLDS NUMBER (10^5)      1.28
      *** WARNING: REYNOLDS NUMBER IS LARGER THAN 10^5

```

STABILITY ANALYSIS

CONDITION	LINING TYPE	PERMIS SHR (LB/FT^2)	CALC. SHR (LB/FT^2)	STAB. FACTOR	REMARKS
BOTTOM; STRAIGHT	RIPRAP	4.84	5.72	.85	UNSTABLE
SIDE; STRAIGHT	RIPRAP	3.58	4.36	.82	UNSTABLE

*** NORMAL END OF HYCHL ***

PIPE DRAINAGE SHEET 10 of 21

COUNTY OF	ITEM NO.	SHEET NO.
OLDHAM	5-441.00	R87

STORM SEWER PIPE

L I N E A R F E E T

DESIGN
PH
LEVEL
MAXIMUM
COVER
HEIGHT
CLASS
CONC
REINF
STEEL

FEET CU YD LBS

595

585

590

580

585

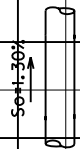
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580

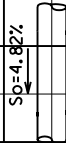
570

FLOW LINE PROJECTED
TO CULVERT BASELINE
So=5.06%
PROP 3' FB INLET
DT WITH 2:1 SIDE
SLOPES

MATCH LINE



PROP 18"
STORM SEWER



PROP 18"
STORM SEWER

MATCH LINE

So=6.71%
PROP 4' FB OUTLET
DT WITH 2:1 SIDE
SLOPES

FLOW LINE PROJECTED
TO CULVERT BASELINE

FLOOD EVALUATION DATA			
RETURN INTERVAL	Q (cfs)	HW	
100-YEAR	92	589.45	
25-YEAR	73	588.19	

LT 129+83.43 - 3'x3'
RCBC HEADWALL

10.0' DEFECTION BACK
STATION @ 52.7' LT

15' DEFECTION BACK
STATION @ 36.6' RT

15' DEFECTION BACK
STATION @ 46.4' RT

M 18.9 45.5 4365

605

605

600

600

595

595

590

590

585

585

580

580

575

575

570

570

CONST 20 LF OF 3'x3'RCBC
EXTENSION AND 1-3'x3' RCBC
HEADWALL @ 52.5' LT

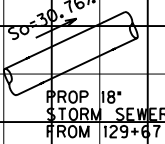


PROP 18"
STORM SEWER



PROP 18"
STORM SEWER

CONST 47 LF OF 3'x3'RCBC
EXTENSION AND 1-3'x3' RCBC
HEADWALL @ 83' RT



PROP 18"
STORM SEWER
FROM 129+67

129+83.43
@ 1.3' SKEW LT

SCALE: 1"=5'

65 70 75 80 85 90

US 42
PIPE SECTION STA 129+83.43
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FILE NAME: G:\PWORK\ALEXI.SMITH\044517\KYC.SHEET.CEL

USER: Alexi Smith
DATE PLOTTED: January 1, 0001

E-SHEET NAME:

MicroStation v8.11.1.180

Entrance Pipe
River Bluff East
Left 49+15 @15° Left

Kentucky Transportation Cabinet
Division of Highway Design
DRAINAGE DESIGN SUMMARY

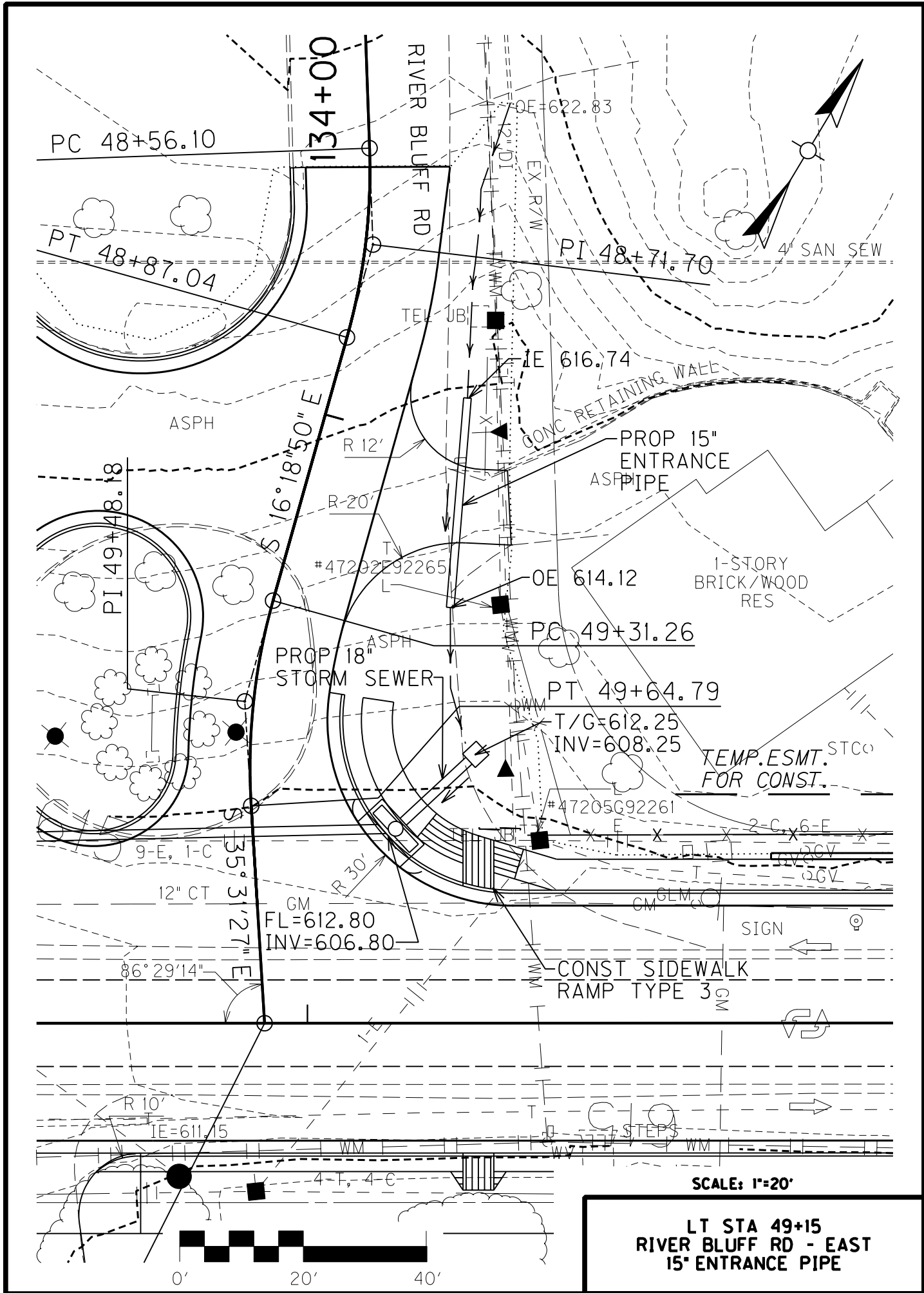
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County :	OLDHAM	Route :	US 42	Item # :	5-441.00
UPN :	FD52 093 0042 000-001	FPN :	STPM 5138(056)	Sta.:	LT 49+56 River Bluff
Latitude (dec deg):	38.36611111	Longitude (dec deg):	85.60027778		
EXISTING CONDITIONS					
Downstream Channel Data			Drainage Area:	Ac	Slope :
Stream Name or Description:			Natural drain.		
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Normal Pool El.		OHW Elev.		Bed Material:	D50 (mm)
Drift:		Abrasion Level:		pH:	
				Resistivity:	
FEMA Flood Zone:	No	Zone Type:		Flood Map No(s):	
Existing Bridge or Culvert			Drainage Area:	Ac	
Size, Length, Type & Material:			Skew:		
Lt. Abut./Inlet:			Rt. Abut./Outlet:		
Inlet El.:		Outlet El.:		Slope:	Top/Grate El.:
Low Road El.:	618.2	Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Headwater Elev.					
Outlet Velocity (ft/s)					
PROPOSED CONDITIONS					
Downstream Channel Data			Drainage Area:	0.54	Ac
Stream Name or Description:			Roadway ditch		
Return Interval (years)	2	5	10	25	50
Discharge (cfs)			2.2		3.3
Flow Depth ; Tailwater (ft)			0.40		0.50
Proposed Bridge or Culvert			Drainage Area:	0.54	Ac
Size, Length, Type & Material:			15" entrance pipe - 34 lf		
Lt. Abut./Inlet:			Rt. Abut./Outlet:		
n/a			n/a		
Inlet El.:	616.74	Outlet El.:	614.12	Slope:	Top/Grate El.:
				7.70%	
Low Road El.:	618.5	Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)				2.2	3.3
Headwater Elev.				617.61	617.89
Outlet Velocity (ft/s)				6.30	7.10
Flow Over Road (cfs)				0.00	0.00

Kentucky Transportation Cabinet
Division of Highway Design
Drainage Design Summary

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REMARKS and / or CONTROLS															
RECORD HIGHWATER DATA															
Source	1:					2:					3:				
Elevation															
Date															
Location															
PROPOSED CHANNEL LINING / STREAM DISTURBANCE															
Location	Class	Thickness	Depth	Length	Quantity	Quantity Below OHW (CY)									
Upstream															
Downstream															
Total Length of Stream Disturbance (ft):				n/a											
PROPOSED DIVERSION															
Flooding	Return Interval (yrs)			Discharge (cfs)			Elevation								
Design Storm															
Overtopping Storm															
Recommended Size and Type of Opening(s):															
PROPOSED BOX CULVERT OR SPECIAL WING WALLS															
Inlet/Lt. Abut. Skewed		☐		Outlet/Rt. Abut. Skewed		☐									
Location	1	2	3	4											
30 Degree															
Skewed															
Special															
SCOUR															
Analysis Method:				Flow Angle (deg):				D50 (mm)				D95 (mm)			
Contraction Scour (ft):				Local Abut. Scour (ft):				Total Abut. Scour (ft):				0.00			
Pier No.:															
Length (ft):															
Width (ft):															
* Type:															
Local Scour:															
Total Scour:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*	(1) Triangular Nose		(2) Square Nose		(3) Round Nose		(4) Circular Cylinder		(5) Group Cylinders						
Potential for Aggradation/Degradation/Movement:															
Other Factors Affecting Abut./Pier Location:															
Scour Mitigation Measures:															



01-23-2012 19:34:07

HYPACK : KENTUCKY CULVERT DESIGN PROGRAM

US42 Oldham County ENTRANCE PIPE LEFT 49+15 RIVER BLUFF

STATION	S	L	AHW	DQ	DTW	CQ	CTW
ft	ft/ft	ft	ft	cfs	ft	cfs	ft
49+ 52.0	0.07700	34.	2.00	2.	0.40	3.	0.50

- - - - -

CSP/CAP (CODE : 111) -- INLET CONTROL GOVERNS
PROJECTING FROM FILL (NO HEADWALL)
USER SIZE SELECTION

INLET CONTROL			O.C.TEST					
#	PIPES	DIAM	HW	VO	YO	FROUDE	HWOC	V00C
		in	ft	f/s	ft		ft	f/s
DQ	1	15	0.87	6.3	0.4	1.72	-1.45	3.7
CQ	1	15	1.15	7.1	0.5	1.78	-1.09	4.3

KTdid: 9802

END OF RUN

01-17-2012 08:57:09

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ENTRANCE PIPE LEFT 49+15 Riverbluff east

Zone of Influence : louisville
C-Factor : .86
Area (acres) : .54

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 125 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .06 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 230 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 6 (ft²)
Channel Slope : SC = .03 (ft/ft)
Wetted Perimeter : WP = 12.17 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	1.3680	15.5000	14.6650	0.8350	2.9458
Q 5	1.8893	13.7712	12.9362	0.8350	4.0682
Q 10	2.2310	12.9157	12.0807	0.8350	4.8041
Q 25	2.6841	12.0567	11.2217	0.8350	5.7796
Q 50	2.9984	11.5717	10.7368	0.8350	6.4564
Q 100	3.3305	11.1307	10.2957	0.8350	7.1716
Q 500	4.1367 (cfs)				

=====

KTdid: 9802

END OF RUN

 DITCHA : CHECK DEPTH OF FLOW AND DISCHARGE IN DITCHES & CHANNELS
 =====

PROJECT : ENTRANCE PIPE 49+15 RIVER BLUFF EAST LEFT

DEPTH CALCULATIONS :

Q = Discharge = 2.2 (cfs)
 B = Bottom Width = 0 (ft)
 Z = Average Side Slope (Z : 1) = 4
 S = Channel Slope = .077 (ft/ft)
 N = Manning's Roughness Coefficient = .035

CHANNEL HYDRAULICS :

DEPTH = 0.3798 (ft)
 AREA = 0.5770 (ft²)
 VELOCITY = 3.8145 (fps)
 HYDRAULIC RADIUS = 0.1842 (ft)
 WETTED PERIMETER = 3.1319 (ft)

DEPTH CALCULATIONS :

Q = Discharge = 3.3 (cfs)
 B = Bottom Width = 0 (ft)
 Z = Average Side Slope (Z : 1) = 4
 S = Channel Slope = .077 (ft/ft)
 N = Manning's Roughness Coefficient = .035

CHANNEL HYDRAULICS :

DEPTH = 0.4421 (ft)
 AREA = 0.7818 (ft²)
 VELOCITY = 4.2210 (fps)
 HYDRAULIC RADIUS = 0.2145 (ft)
 WETTED PERIMETER = 3.6457 (ft)

KTdid: 9802

END OF RUN

Sta. 139+20.00
@ 0° Skew

Existing 4' X 4' RCBC that is part of a existing Storm
Sewer (proposed Storm Sewer No. 4)

Kentucky Transportation Cabinet
Division of Highway Design
DRAINAGE DESIGN SUMMARY

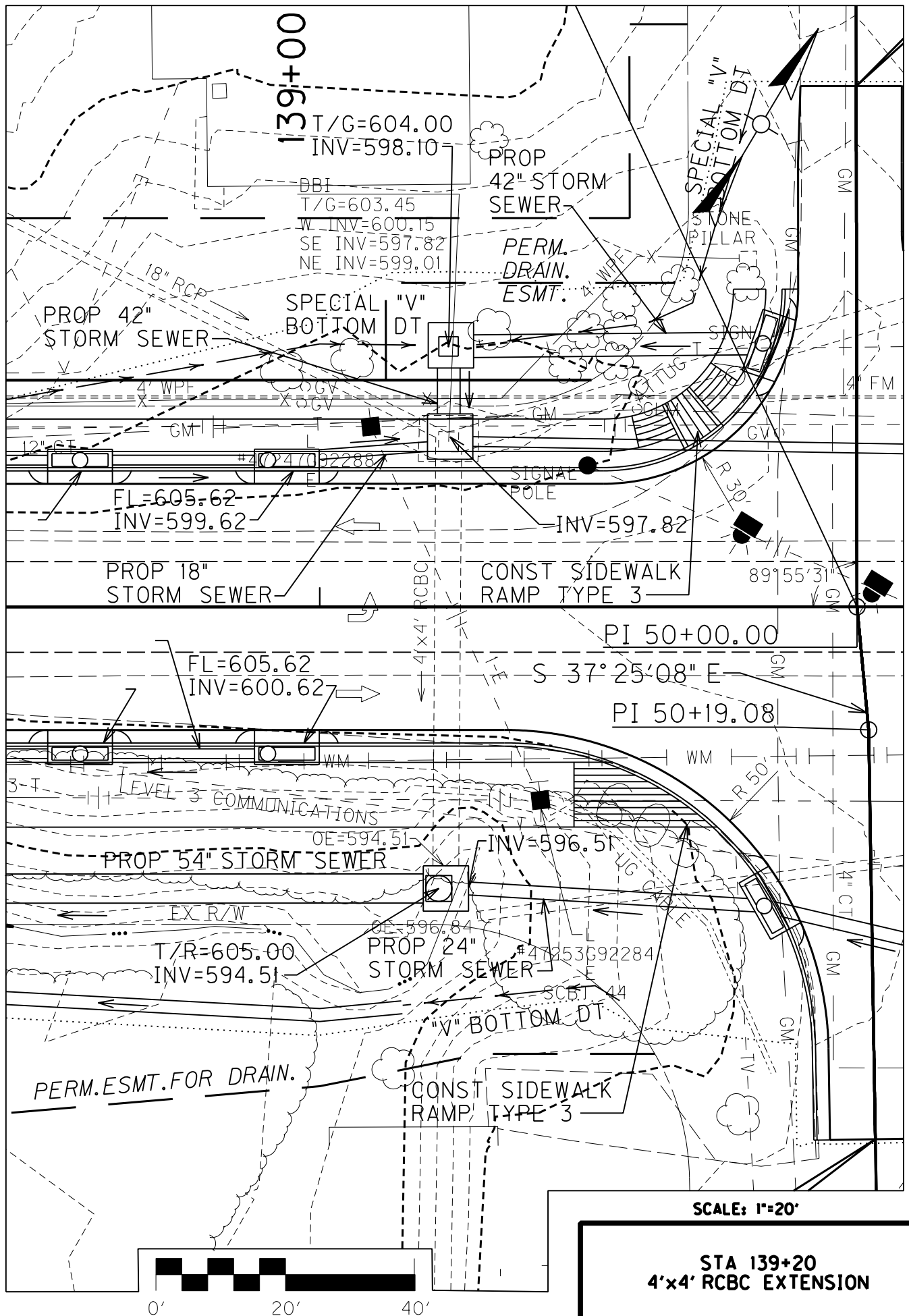
TC 61-100
01/2011
Page 1 of 2

County :	OLDHAM	Route :	US 42	Item # :	5-441.00
UPN :	FD52 093 0042 000-001	FPN :	STPM 5138(056)	Sta.:	139+20
Latitude (dec deg):	38.36611111	Longitude (dec deg):	85.60027778		
EXISTING CONDITIONS					
Downstream Channel Data			Drainage Area:	58.6	Ac
Stream Name or Description:			The now developed headwaters of a blueliune stream.		
Return Interval (years)	2	5	10	25	50
Discharge (cfs)	43	62	74	90	100
Flow Depth ; Tailwater (ft)			1.25		1.55
Normal Pool El.		OHW Elev.		Bed Material:	D50 (mm)
Drift:		Abrasion Level:		pH:	
FEMA Flood Zone:	No	Zone Type:		Resistivity:	
		Flood Map No(s):			
Existing Bridge or Culvert			Drainage Area:	58.6	Ac
Size, Length, Type & Material:			4'X4' RCBC 65 LF - the last leg of an existing storm sewer		
Lt. Abut./Inlet:			storm sewert system, DBI and pipes		
Rt. Abut./Outlet:			end of RCBC		
Inlet El.:	597.82	Outlet El.:	594.51	Slope:	5.13%
Low Road El.:	605.8	Low Beam El.:		Top/Grate El.:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)	43	62	74	90	100
Headwater Elev.			1.25		1.55
Outlet Velocity (ft/s)			20.40		23.20
PROPOSED CONDITIONS					
Downstream Channel Data			Drainage Area:		Ac
Stream Name or Description:			See Storm Sewer No 4 for additional information.		
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Proposed Bridge or Culvert			Drainage Area:	58.43	Ac
Size, Length, Type & Material:			EX 4'X4' RCBC to be extended with 54" pipes and MHs.		
Lt. Abut./Inlet:			junction box		
Rt. Abut./Outlet:			manhole		
Inlet El.:	597.82	Outlet El.:	594.51	Slope:	5.13%
Low Road El.:		Low Beam El.:		Top/Grate El.:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)			72		110
Headwater Elev.					
Outlet Velocity (ft/s)			21.80		24.60
Flow Over Road (cfs)					

Kentucky Transportation Cabinet
Division of Highway Design
Drainage Design Summary

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REMARKS and / or CONTROLS													
This 4' X 4' RCBC is the last leg of an existing storm sewer. It is proposed to be extend as a storm sewer, with 54" pipe and manholes. The following HYPACK analysis shows that the depth of flow in the RCBC is 0.91' and 1.21' for the 10 and 100 year Q.													
The Headwater calculation is not applicable since the RCBC is part of a stormsewer. See SS No. 4 for more information.													
RECORD HIGHWATER DATA													
Source	1:				2:				3:				
Elevation													
Date													
Location													
PROPOSED CHANNEL LINING / STREAM DISTURBANCE													
Location	Class	Thickness	Depth	Length	Quantity	Quantity Below OHW (CY)							
Upstream													
Downstream													
Total Length of Stream Disturbance (ft):				n/a									
PROPOSED DIVERSION													
Flooding		Return Interval (yrs)			Discharge (cfs)			Elevation					
Design Storm													
Overtopping Storm													
Recommended Size and Type of Opening(s):													
PROPOSED BOX CULVERT OR SPECIAL WING WALLS													
Inlet/Lt. Abut. Skewed		☐		Outlet/Rt. Abut. Skewed		☐							
Location	1	2	3	4									
30 Degree													
Skewed													
Special													
SCOUR													
Analysis Method:				Flow Angle (deg):				D50 (mm)				D95 (mm)	
Contraction Scour (ft):				Local Abut. Scour (ft):				Total Abut. Scour (ft):				0.00	
Pier No.:													
Length (ft):													
Width (ft):													
* Type:													
Local Scour:													
Total Scour:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*	(1) Triangular Nose		(2) Square Nose		(3) Round Nose		(4) Circular Cylinder		(5) Group Cylinders				
Potential for Aggradation/Degradation/Movement:													
Other Factors Affecting Abut./Pier Location:													
Scour Mitigation Measures:													



SCALE: 1"=20'

STA 139+20
4'x4' RCBC EXTENSION

01-30-2012 11:25:54

HYPACK : KENTUCKY CULVERT DESIGN PROGRAM

US42 OLDHAM 4X4 RCBC AT 139+20

STATION	S	L	AHW	DQ	DTW	CQ	CTW
ft	ft/ft	ft	ft	cfs	ft	cfs	ft
139+ 20.0	0.05130	65.	5.00	74.	1.25	112.	1.55

- - - - -

RCP/PEP (CODE : 225) -- INLET CONTROL GOVERNS
HEADWALL w/SOCKET END EXPOSED
USER SIZE SELECTION

INLET CONTROL			O.C.TEST						
#	PIPES	DIAM	HW	VO	YO	FROUDE	HWOC	VOOC	
		in	ft	f/s	ft		ft	f/s	
DQ	1	54	3.49	20.6	1.2	3.24	0.70	8.0	
CQ	1	54	4.54	24.2	1.5	3.49	1.62	9.4	

- - - - -

RCBC (CODE : 515) -- INLET CONTROL GOVERNS
30-75 DEGREE WING FLARE (TOP BEVEL OR ROUNDED)
USER SIZE SELECTION

INLET CONTROL			O.C.TEST						
	SPAN	RISE	HW	VO	YO	FROUDE	HWOC	VOOC	
	ft	ft	ft	f/s	ft		ft	f/s	
DQ	4.0	4.0	3.21	20.4	0.91	3.78	0.29	8.4	
CQ	4.0	4.0	4.48	23.2	1.21	3.72	1.27	9.6	

KTdid: 9802

END OF RUN

The 4' X 4' RCBC has an end area of 16 sq ft.
The 54" pipe has and end area of 15.9 sq ft. - The 54" pipe will be used for
extending the culvert.

01-30-2012 10:51:00

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
US 42 Oldham County, 4x4 RCBC, Exist and Proposed 139+20

Zone of Influence : louisville
C-Factor : .48
Area (acres) : 58.6

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 300 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .05 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 2870 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 4 (ft²)
Channel Slope : SC = .018 (ft/ft)
Wetted Perimeter : WP = 6.47 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	43.3685	45.4669	33.9084	11.5585	1.5418
Q 5	61.7884	41.0206	29.4621	11.5585	2.1967
Q 10	73.5365	39.0020	27.4435	11.5585	2.6144
Q 25	89.7313	36.9239	25.3653	11.5585	3.1901
Q 50	100.2097	35.8826	24.3241	11.5585	3.5626
Q 100	111.9794	34.8487	23.2902	11.5585	3.9811
Q 500	140.0195	(cfs)			

=====

KTdid: 9802

END OF RUN

 DITCHA : CHECK DEPTH OF FLOW AND DISCHARGE IN DITCHES & CHANNELS
 =====

PROJECT : US 42 Oldham County, 4x4 RCBC, Exist 139+20

DEPTH CALCULATIONS :

Q = Discharge = 73.5 (cfs)
 B = Bottom Width = 4 (ft)
 Z = Average Side Slope (Z : 1) = 2
 S = Channel Slope = .057 (ft/ft)
 N = Manning's Roughness Coefficient = .035

CHANNEL HYDRAULICS :

DEPTH = 1.2479 (ft)
 AREA = 8.1058 (ft²)
 VELOCITY = 9.0675 (fps)
 HYDRAULIC RADIUS = 0.8461 (ft)
 WETTED PERIMETER = 9.5806 (ft)

DEPTH CALCULATIONS :

Q = Discharge = 112 (cfs)
 B = Bottom Width = 4 (ft)
 Z = Average Side Slope (Z : 1) = 2
 S = Channel Slope = .057 (ft/ft)
 N = Manning's Roughness Coefficient = .035

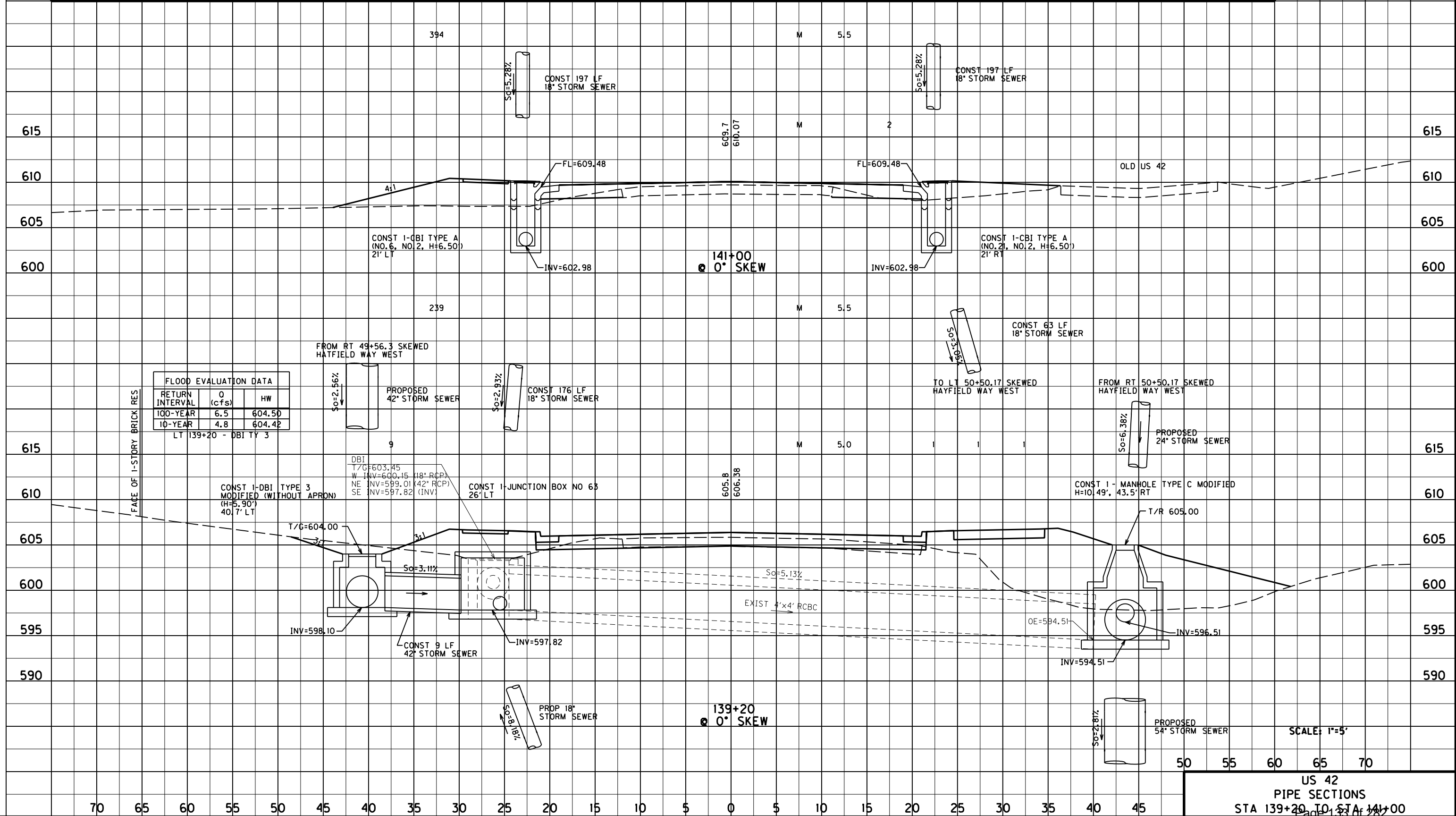
CHANNEL HYDRAULICS :

DEPTH = 1.5497 (ft)
 AREA = 11.0014 (ft²)
 VELOCITY = 10.1805 (fps)
 HYDRAULIC RADIUS = 1.0065 (ft)
 WETTED PERIMETER = 10.9302 (ft)

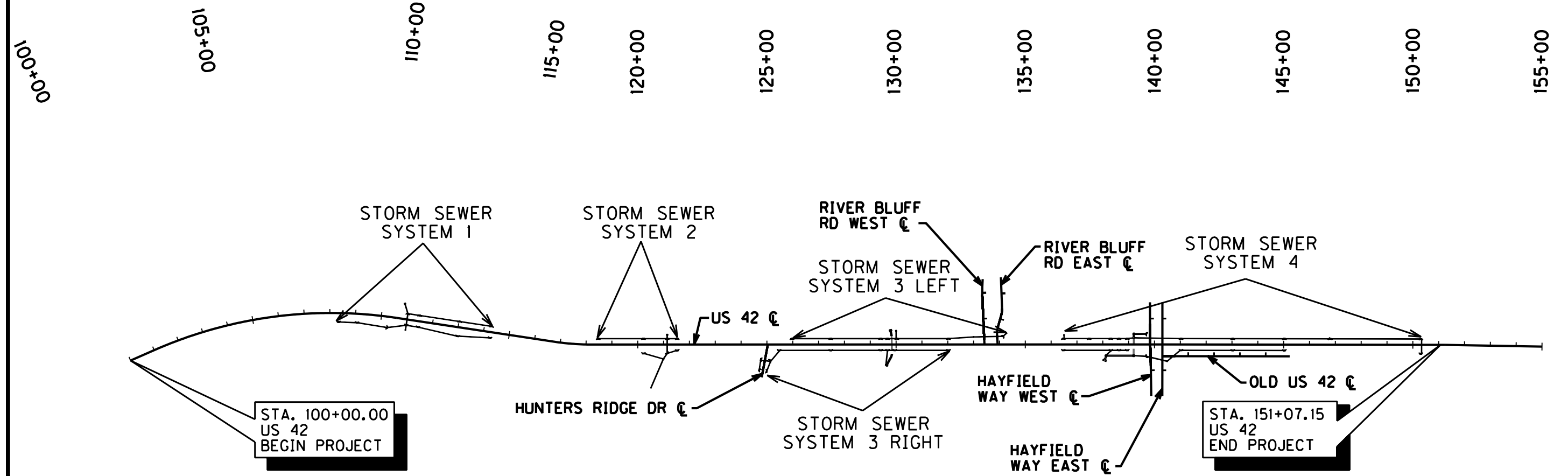
KTdid: 9802

END OF RUN

COUNTY OF	ITEM NO.	SHEET NO.
OLDHAM	5-441.00	R93

[illegible]

Section 7 – Storm Sewer Systems



NOTE:
SEE INDIVIDUAL STORM SEWER
SYSTEM MAPS FOR ENLARGED VIEW.



SCALE: 1"=400'
STORM SEWER SYSTEM
KEY MAP

Storm Sewer Analysis
Storm Sewer No. 1
Outfall – Left 111+00

Kentucky Transportation Cabinet
Division of Highway Design
STORM SEWER SYSTEM SUMMARY

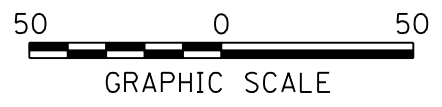
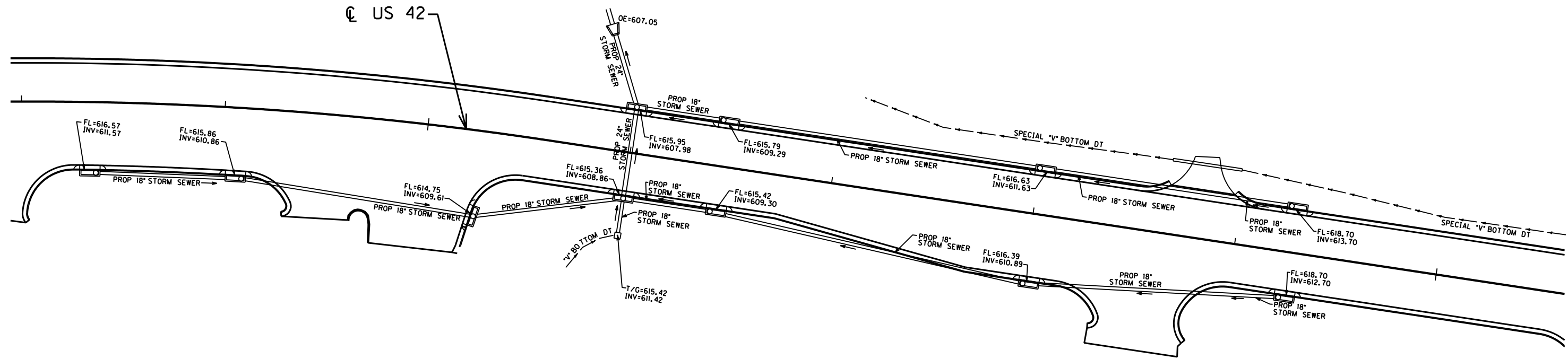
TC 61-517
01/2011

County :	Oldham	Route :	US 42	Item # :	5-441.00
UPN :	FD52 093 0042 000-001		FPN :	STPM 5138(056)	
Outfall Station:	Left 111+00 with a deflection		Outfall Offset:	60	ft
System Sta. to Sta. :	108+37		to	114+25	
EXISTING CONDITIONS					
Downstream Receiving Structure :			Tailwater Control :		
Receiving Structure	Area :	Ac	Wtd "C":	Tc:	min. Slope :
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Existing Culvert or Channel at Outfall					
Channel	Side Slopes	Lt: :1	Rt: :1	Bottom Width:	ft Slope:
Culvert Outlet	Size :	Dia	Material	Outlet Elev.	
Outlet Conditions	Area :	Ac	Wtd "C":	Tc:	min. Slope :
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)					
Flow Depth (ft)					
Velocity (ft/s)					
PROPOSED CONDITIONS					
Downstream Receiving Structure :			Tailwater Control :		
Receiving Structure	Area :	Ac	Wtd "C":	Tc:	min. Slope :
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Proposed Outfall Structure		24" Sloped and Flared Headwall			
Stm Swr Outfall	Size :	24 In	Dia 37	Ft	Material Outlet Elev. 607.05
Outlet Conditions	Area :	3.59	Ac	Wtd "C": 0.89	Tc: 8.9 min. Slope : 2.50%
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)			18		26
Flow Depth (ft)					
Velocity (ft/s)			12.10		13.30
Analysis Software (and version)		Civil-Design-Network			
Additional Comments:		This is the outfall of storm sewer No. 1.			
All pipes are flowing less than 0.8diameter full, therefore no pressure flow occurred in the 10 year or 100 year event.					

110+00

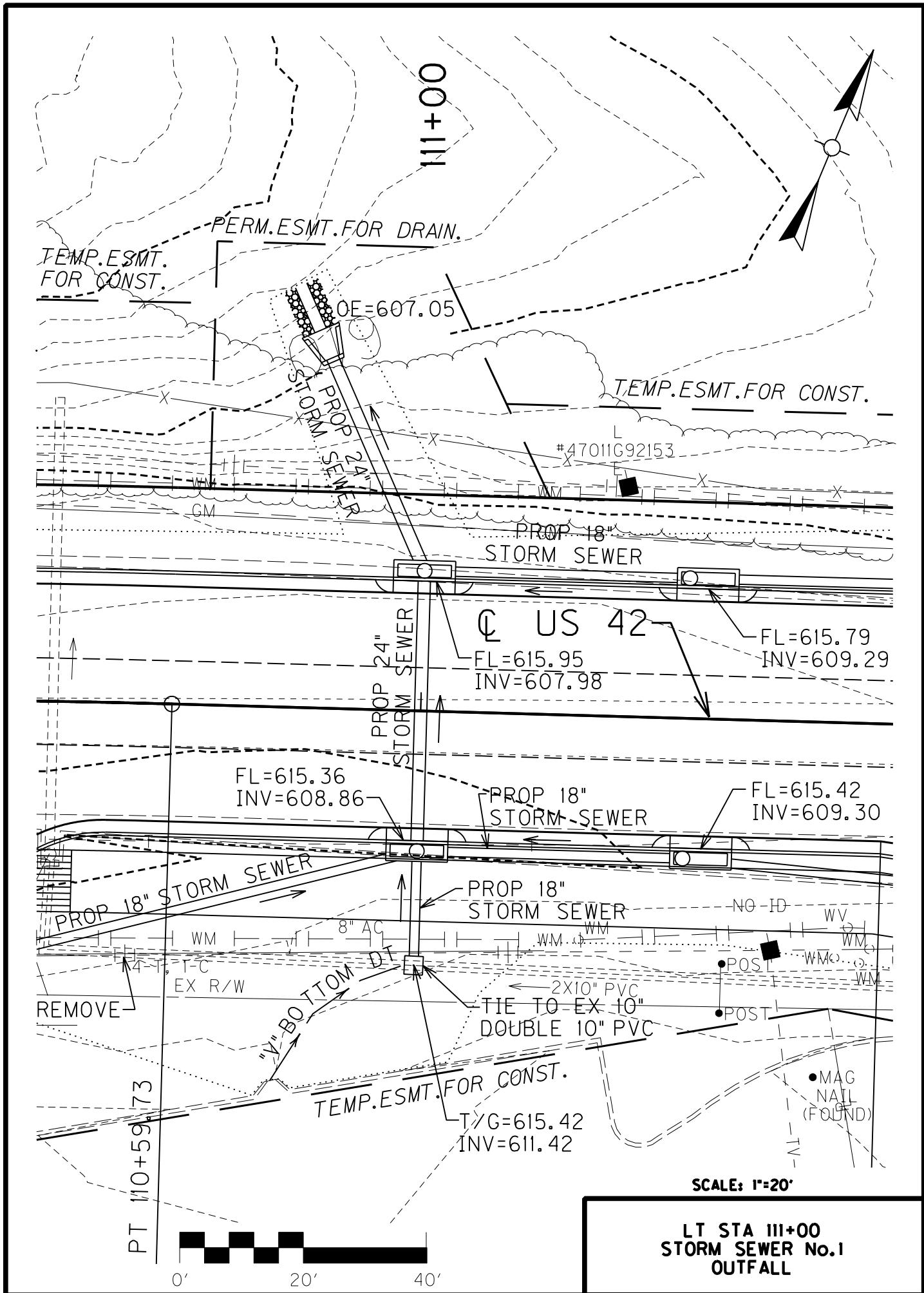
115+00

US 42



SCALE: 1"=50'

STORM SEWER
SYSTEM 1



SCALE: 1"=20'

LT STA III+00
STORM SEWER No.1
OUTFALL

US 42 Oldham County
Storm Sewer System No.1
10 Year

Node	Sta	DA	C	DCA	SCA	DT	ST	RI Q	L	So	Dia	Vo	Q(.8d)	Qf
Start New Section =====														
1	108+37R	0.26	.90	0.23	0.23	0.0	4.4	7.22						
								1.7	69.0	.0103	18	4.7	11.3	12.4
2	109+10R	0.13	.90	0.12	0.35	0.2	4.6	7.10						
								2.5	113.0	.0111	18	5.4	11.7	12.9
3	110+24R	0.28	.90	0.25	0.60	0.4	5.0	6.94						
								4.2	72.0	.0104	18	6.0	11.3	12.5
4	111+00R	0.00	.00	0.00	0.60	0.2	5.2	6.94						
↑ Junction =====														
↑ End System (Outlet)=====														
Start New Section =====														
7	114+25R	0.44	.90	0.40	0.40	0.0	6.0	6.54						
								2.6	123.0	.0147	18	6.0	13.5	14.8
6	113+00R	0.29	.90	0.26	0.66	0.3	6.3	6.41						
								4.2	155.0	.0103	18	6.0	11.3	12.4
5	111+43R	0.19	.90	0.17	0.83	0.4	6.8	6.26						
								5.2	40.0	.0110	18	6.5	11.7	12.8
4	111+00R	0.00	.00	0.00	0.83	0.1	6.9	6.26						
↑ Junction =====														
↑ End System (Outlet)=====														
Start New Section =====														
13	114+25L	0.21	.90	0.19	0.19	0.0	4.5	7.17						
								1.4	122.0	.0170	18	5.3	14.5	16.0
12	113+00L	0.07	.90	0.06	0.25	0.4	4.9	7.00						
								1.7	154.0	.0152	18	5.4	13.7	15.1
11	111+43L	0.09	.90	0.08	0.33	0.5	5.4	6.79						
								2.2	40.0	.0328	18	7.7	20.2	22.2
9	111+00L	0.00	.00	0.00	0.33	0.1	5.4	6.79						
↑ Junction =====														
↑ End System (Outlet)=====														
Start New Section =====														
8	111+00R	0.18	.80	0.14	1.27	0.0	8.8	5.66						
								7.2	17.0	.1506	18	18.4	43.2	47.5
4	111+00R	0.20	.90	0.18	2.88	0.0	8.8	5.66						
								16.3	44.0	.0200	24	10.9	33.9	37.3
9	111+00L	0.00	.00	0.00	3.21	0.1	8.9	5.64						
								18.1	37.0	.0250	24	12.1	37.9	41.7
10	111+00L	0.00	.00	0.00	3.21	0.1	8.9	5.64						

US 42 Oldham County
Storm Sewer System No.1
10 Year

Node	Sta	DA	C	DCA	SCA	DT	ST	RI	Q	L	So	Dia	Vo	Q(.8d)	Qf
------	-----	----	---	-----	-----	----	----	----	---	---	----	-----	----	--------	----

↑ Junction =====

↑ End System (Outlet)=====

END =====

Summary of Pipes

18	905.00
24	81.00

US 42 Oldham County
Storm Sewer System No.1
100 Year

Node	Sta	DA	C	DCA	SCA	DT	ST	RI Q	L	So	Dia	Vo	Q(.8d)	Qf
Start New Section =====														
1	108+37R	0.26	.90	0.23	0.23	0.0	3.8	10.19						
								2.3	69.0	.0103	18	5.1	11.3	12.4
2	109+10R	0.13	.90	0.12	0.35	0.2	4.0	10.06						
								3.5	113.0	.0111	18	5.9	11.7	12.9
3	110+24R	0.28	.90	0.25	0.60	0.3	4.3	9.88						
								5.9	72.0	.0104	18	6.6	11.3	12.5
4	111+00R	0.00	.00	0.00	0.60	0.2	4.5	9.88						
↑ Junction =====														
↑ End System (Outlet)=====														
Start New Section =====														
7	114+25R	0.44	.90	0.40	0.40	0.0	5.3	9.37						
								3.7	123.0	.0147	18	6.6	13.5	14.8
6	113+00R	0.29	.90	0.26	0.66	0.3	5.6	9.22						
								6.1	155.0	.0103	18	6.6	11.3	12.4
5	111+43R	0.19	.90	0.17	0.83	0.4	6.0	9.04						
								7.5	40.0	.0110	18	7.1	11.7	12.8
4	111+00R	0.00	.00	0.00	0.83	0.1	6.1	9.04						
↑ Junction =====														
↑ End System (Outlet)=====														
Start New Section =====														
13	114+25	0.21	.90	0.19	0.19	0.0	4.0	10.07						
								1.9	122.0	.0170	18	5.8	14.5	16.0
12	113+00L	0.07	.90	0.06	0.25	0.4	4.4	9.87						
								2.5	154.0	.0152	18	6.0	13.7	15.1
11	111+43L	0.09	.90	0.08	0.33	0.4	4.8	9.64						
								3.2	40.0	.0328	18	8.5	20.2	22.2
9	111+00L	0.00	.00	0.00	0.33	0.1	4.9	9.64						
↑ Junction =====														
↑ End System (Outlet)=====														
Start New Section =====														
8	111+00R	0.18	.80	0.14	1.27	0.0	8.0	8.20						
								10.4	17.0	.1506	18	20.5	43.2	47.5
4	111+00R	0.20	.90	0.18	2.88	0.0	8.0	8.19						
								23.6	44.0	.0200	24	11.9	33.9	37.3
9	111+00L	0.00	.00	0.00	3.21	0.1	8.1	8.17						
								26.2	37.0	.0250	24	13.3	37.9	41.7
10	111+00L	0.00	.00	0.00	3.21	0.0	8.1	8.17						

US 42 Oldham County
Storm Sewer System No.1
100 Year

Node	Sta	DA	C	DCA	SCA	DT	ST	RI Q	L	So	Dia	Vo	Q(.8d)	Qf
------	-----	----	---	-----	-----	----	----	---------	---	----	-----	----	--------	----

↑ Junction =====

↑ End System (Outlet)=====

END =====

Summary of Pipes

18	905.00
24	81.00

Commands Read From File: 11100-L.CHL

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      JOB US 42 OUTLET DITCH LEFT 111+00
      UNI 0
**  UNITS PARAMETER = 0 (ENGLISH)
      CHL .025 18.1
      TRP 2 2 2
**  LEFT SIDE SLOPE      2.0 AND RIGHT SIDE SLOPE      2.0
**  THE BASE WIDTH OF THE TRAPEZOID (ft)      2.00
      LRR .5
**  D50 (ft)      .50
      END

```

*****END OF COMMAND FILE*****

US 42 OUTLET DITCH LEFT 111+00

INPUT REVIEW

```

      DEFAULT ANGLE OF REPOSE (degrees):      41.31
      DESIGN PARAMETERS:
        DESIGN DISCHARGE (ft^3/s):      18.10
        CHANNEL SHAPE:      TRAPEZOIDAL
        CHANNEL SLOPE (ft/ft):      .025

```

HYDRAULIC CALCULATIONS USING BATHURST

```

FLOW (cfs)      18.10
MAX DEPTH (ft)      1.10
AREA (ft^2)      4.59
WETTED PERIMETER (ft)      6.90
HYDRAULIC RADIUS (ft)      .67
AVG VELOCITY (ft/s)      3.94
MANNINGS EQUIVALENT      .048
Davg / D50      1.44
FROUDE NUMBER      .66
REYNOLDS NUMBER (10^5)      .45

```

STABILITY ANALYSIS

CONDITION	LINING TYPE	PERMIS SHR (LB/FT^2)	CALC. SHR (LB/FT^2)	STAB. FACTOR	REMARKS
BOTTOM; STRAIGHT	RIPRAP	2.42	1.71	1.42	STABLE
SIDE; STRAIGHT	RIPRAP	1.78	1.27	1.40	STABLE

*** NORMAL END OF HYCHL ***

MicroStation v8.11.1.180 E-SHEET NAME: USER: Alexi Smith DATE PLOTTED: January 1, 0001 FILE NAME: G:\PWORK\ALEXI.SMITH\0401451\KAYC.SHEET.CEL

PIPE DRAINAGE SHEET 2 of 21

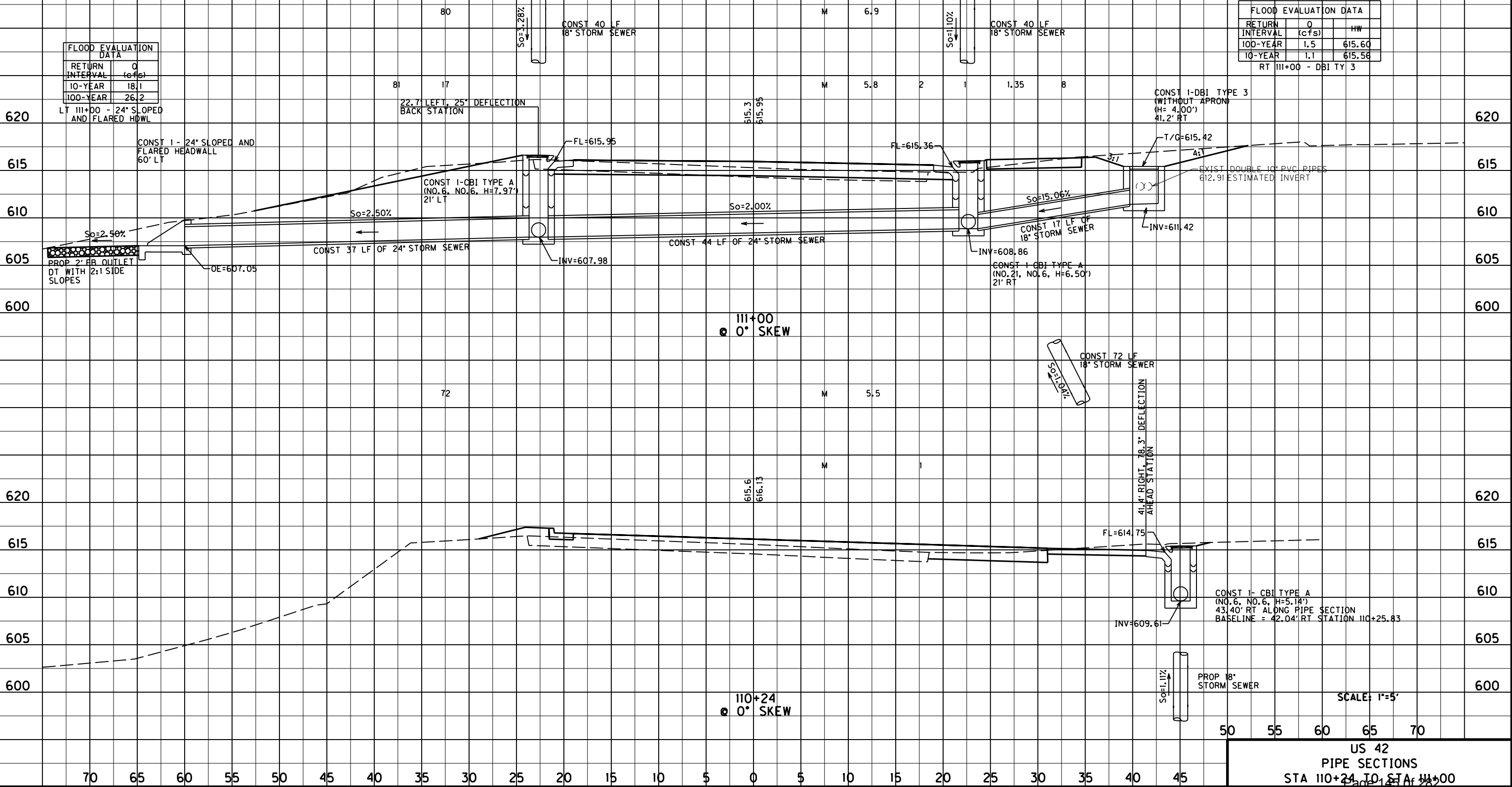
COUNTY OF	ITEM NO.	SHEET NO.
OLDHAM	5-441.00	R79

STORM SEWER PIPE

LINEAR FEET										DESIGN PIPE LEVEL	MAXIMUM COVER HEIGHT	CBI TYPE A	DBI TYPE 3 (WITHOUT APRON)	CLASS "A" CONC	REINF STEEL				
											FEET	EACH	EACH	CU YD	LBS				

FLOOD EVALUATION DATA		
RETURN INTERVAL	Q (cfs)	HW
10-YEAR	18.1	615.60
100-YEAR	26.2	615.56
RT III+00 - DBI TY 3		

FLOOD EVALUATION DATA		
RETURN INTERVAL	Q (cfs)	HW
10-YEAR	18.1	615.60
100-YEAR	26.2	615.56



SCALE: 1"=5'

US 42
PIPE SECTIONS
STA 110+24 TO STA III+00

Right Sta. 111+00.00
@ 0° Skew

DBI Type 3

Kentucky Transportation Cabinet
Division of Highway Design
DRAINAGE DESIGN SUMMARY

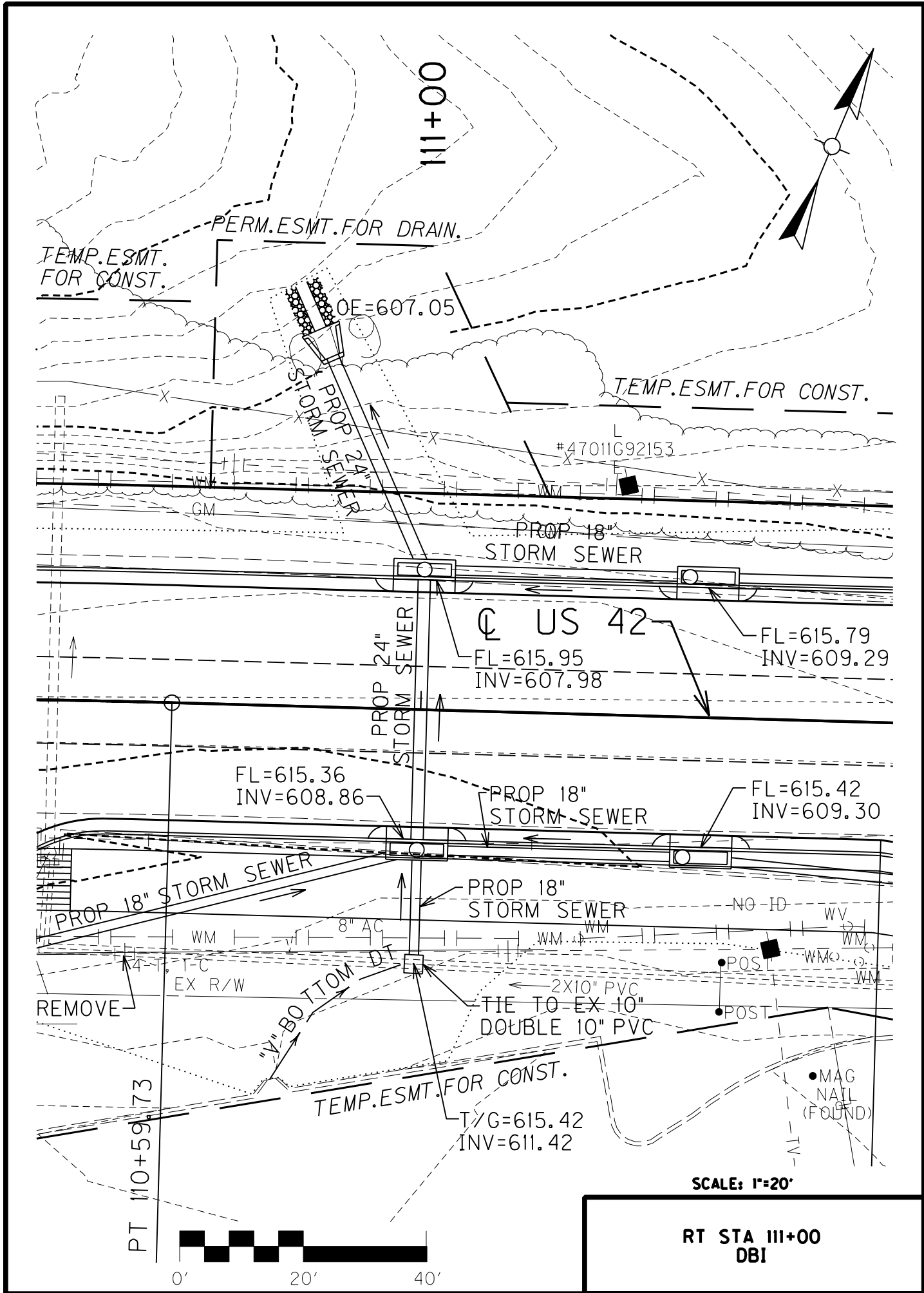
TC 61-100
01/2011
Page 1 of 2

County : OLDHAM		Route : US 42		Item # : 5-441.00	
UPN : FD52 093 0042 000-001		FPN : STPM 5138(056)		Sta.: 111+00.00 RT	
Latitude (dec deg): 38.36611111		Longitude (dec deg): 85.60027778			
EXISTING CONDITIONS					
Downstream Channel Data			Drainage Area:		Ac Slope :
Stream Name or Description:					
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Normal Pool El.		OHW Elev.		Bed Material:	D50 (mm)
Drift:		Abrasion Level:		pH:	Resistivity: Date Taken:
FEMA Flood Zone:	No	Zone Type:		Flood Map No(s):	
Existing Bridge or Culvert			Drainage Area:		Ac
Size, Length, Type & Material:			Skew:		
Lt. Abut./Inlet:		Rt. Abut./Outlet:			
Inlet El.:		Outlet El.:		Slope:	Top/Grate El.:
Low Road El.:		Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)					
Headwater Elev.					
Outlet Velocity (ft/s)					
PROPOSED CONDITIONS					
Downstream Channel Data			Drainage Area:		Ac Slope :
Stream Name or Description:			storm sewer system		
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Proposed Bridge or Culvert			Drainage Area:		0.18 Ac
Size, Length, Type & Material:			18 storm sewer, 17 lf		Skew:
Lt. Abut./Inlet:		DBI Type 3		Rt. Abut./Outlet: 18" Storm Sewer	
Inlet El.:	611.42	Outlet El.:	608.86	Slope:	15.06% Top/Grate El.: 615.42
Low Road El.:	616.4 berm around DBI	Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)			1.1		1.5
Headwater Elev.			615.56		615.60
Outlet Velocity (ft/s)			18.40		20.50
Flow Over Road (cfs)			0.00		0.00

Kentucky Transportation Cabinet
Division of Highway Design
Drainage Design Summary

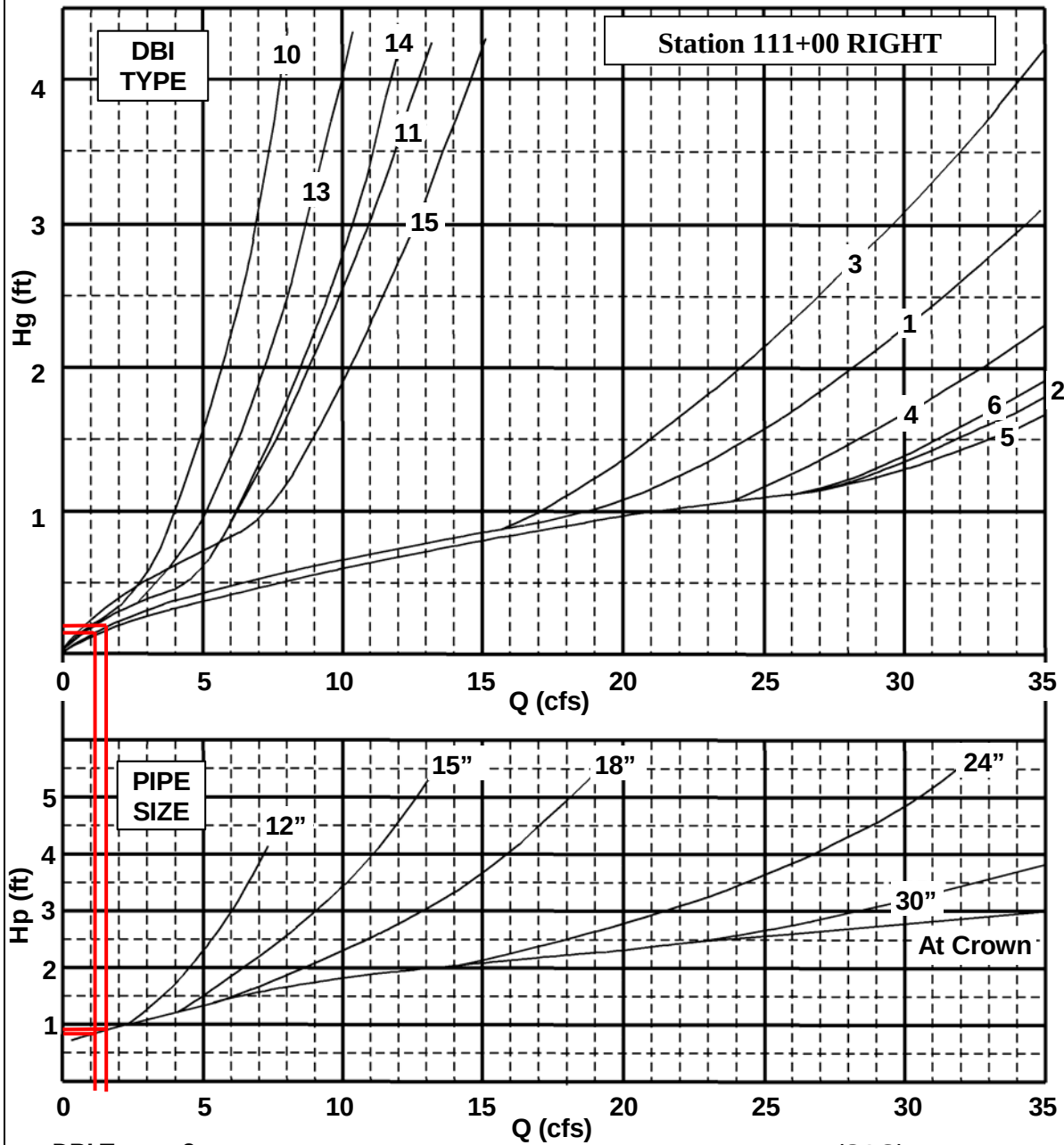
TC 61-100
01/2011
Page 2 of 2

REMARKS and / or CONTROLS															
RECORD HIGHWATER DATA															
Source	1:					2:					3:				
Elevation															
Date															
Location															
PROPOSED CHANNEL LINING / STREAM DISTURBANCE															
Location	Class	Thickness	Depth	Length	Quantity	Quantity Below OHW (CY)									
Upstream															
Downstream															
Total Length of Stream Disturbance (ft):				n/a											
PROPOSED DIVERSION															
Flooding		Return Interval (yrs)			Discharge (cfs)			Elevation							
Design Storm															
Overtopping Storm															
Recommended Size and Type of Opening(s):															
PROPOSED BOX CULVERT OR SPECIAL WING WALLS															
Inlet/Lt. Abut. Skewed		☐		Outlet/Rt. Abut. Skewed		☐									
Location	1	2	3	4											
30 Degree															
Skewed															
Special															
SCOUR															
Analysis Method:				Flow Angle (deg):				D50 (mm)				D95 (mm)			
Contraction Scour (ft):				Local Abut. Scour (ft):				Total Abut. Scour (ft):				0.00			
Pier No.:															
Length (ft):															
Width (ft):															
* Type:															
Local Scour:															
Total Scour:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*	(1) Triangular Nose		(2) Square Nose		(3) Round Nose		(4) Circular Cylinder		(5) Group Cylinders						
Potential for Aggradation/Degradation/Movement:															
Other Factors Affecting Abut./Pier Location:															
Scour Mitigation Measures:															



SCALE: 1"=20'

RT STA 111+00
DBI



DBI Type = 3

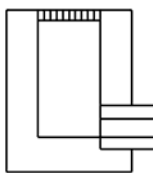
(SAG)

GE = 615.42

$$\text{HW} = \text{GE} + \text{Hg}$$

OR

$$\text{HW} = \text{IE} + \text{Hp}$$



IE = 611.42

D = 18"

	Q ₁₀ = 1.1	Q ₂₅	Q ₁₀₀ = 1.5
Hg	0.14		0.18
HW	615.56		615.60
Hp	0.85		0.90
HW	612.27		612.32

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ditch to inlet 111+00

Zone of Influence : louisville
C-Factor : .8
Area (acres) : .18

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 65 (ft)
Overland Friction Factor : N = .1
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .03 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 30 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 4 (ft²)
Channel Slope : SC = .07 (ft/ft)
Wetted Perimeter : WP = 8.25 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.7376	4.3446	4.2725	0.0721	5.1219
Q 5	0.9506	3.9341	3.8620	0.0721	6.6017
Q 10	1.0887	3.7307	3.6586	0.0721	7.5602
Q 25	1.2662	3.5162	3.4441	0.0721	8.7928
Q 50	1.3937	3.3865	3.3144	0.0721	9.6787
Q 100	1.5225	3.2712	3.1991	0.0721	10.5726
Q 500	1.8358	(cfs)			

=====

KTdid: 9802

END OF RUN

FILE NAME: G:\PWORK\ALEXI.SMITH\04014517\KTYC.SHEET.CEL

USER: Alexi Smith
DATE PLOTTED: January 1, 0001

E-SHEET NAME:

MicroStation v8.11.1.180

PIPE DRAINAGE SHEET 2 of 21

COUNTY OF	ITEM NO.	SHEET NO.
OLDHAM	5-441.00	R79

STORM SEWER PIPE

							24"	18"									DBI L	MA C H	CBI	DBI (WITHO	C C	R S							
LINEAR FEET																		FEET	EACH	EACH	CU YD	LBS							

Storm Sewer No. 1
Qways runs

Qways for Storm Sewer No. 1 Analysis

12-12-2011 15:27:08

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
114+25 right, ss#1

Zone of Influence : Louisville
C-Factor : .9
Area (acres) : .44

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 80 (ft)
Overland Friction Factor : N = .1
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .02 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 320 (ft)
Manning's Roughness Coefficient : n = .016
Bank Full Section Flow Area : AC = 2 (ft²)
Channel Slope : SC = .02 (ft/ft)
Wetted Perimeter : WP = 8 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	1.7058	6.8762	5.8510	1.0252	4.3075
Q 5	2.2447	6.2734	5.2482	1.0252	5.6684
Q 10	2.5933	5.9809	4.9557	1.0252	6.5487
Q 25	3.0463	5.6731	4.6479	1.0252	7.6926
Q 50	3.3711	5.4732	4.4481	1.0252	8.5129
Q 100	3.7005	5.3104	4.2852	1.0252	9.3447
Q 500	4.5047	(cfs)			

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
108+37 right , ss#1

Zone of Influence : Louisville
C-Factor : .9
Area (acres) : .24

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 60 (ft)
Overland Friction Factor : N = .1
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .02 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 110 (ft)
Manning's Roughness Coefficient : n = .016
Bank Full Section Flow Area : AC = 2 (ft²)
Channel Slope : SC = .02 (ft/ft)
Wetted Perimeter : WP = 8 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	1.0488	5.0489	4.6965	0.3524	4.8557
Q 5	1.3612	4.5868	4.2344	0.3524	6.3018
Q 10	1.5635	4.3594	4.0070	0.3524	7.2384
Q 25	1.8245	4.1197	3.7673	0.3524	8.4466
Q 50	2.0114	3.9759	3.6235	0.3524	9.3119
Q 100	2.2008	3.8477	3.4953	0.3524	10.1889
Q 500	2.6617	(cfs)			

Qways for Storm Sewer No. 1 Analysis

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :

ALL water ENTERING OR PASSING PROPOSED DBI RT 111+00, ss#1

Zone of Influence : Louisville

C-Factor : .09

Area (acres) : 1.43

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 140 (ft)
 Overland Friction Factor : N = .1
 2-Year, 24-Hour Precipitation : P = 3.2 (in)
 Average Overland Slope : SO = .02 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 460 (ft)
 Manning's Roughness Coefficient : n = .016
 Bank Full Section Flow Area : AC = 2 (ft²)
 Channel Slope : SC = .02 (ft/ft)
 Wetted Perimeter : WP = 8 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.4656	10.2427	8.7691	1.4737	3.6175
Q 5	0.6258	9.2798	7.8061	1.4737	4.8621
Q 10	0.7293	8.8217	7.3481	1.4737	5.6665
Q 25	0.8665	8.3098	6.8362	1.4737	6.7329
Q 50	0.9621	8.0298	6.5561	1.4737	7.4757
Q 100	1.0614	7.7774	6.3037	1.4737	8.2469
Q 500	1.3037 (cfs)				

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :

114+25 left, ss#1

Zone of Influence : Louisville

C-Factor : .9

Area (acres) : .21

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 50 (ft)
 Overland Friction Factor : N = .1
 2-Year, 24-Hour Precipitation : P = 3.2 (in)
 Average Overland Slope : SO = .02 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 280 (ft)
 Manning's Roughness Coefficient : n = .016
 Bank Full Section Flow Area : AC = 2 (ft²)
 Channel Slope : SC = .02 (ft/ft)
 Wetted Perimeter : WP = 8 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.9135	5.1122	4.2152	0.8970	4.8336
Q 5	1.1817	4.7018	3.8048	0.8970	6.2526
Q 10	1.3554	4.4994	3.6024	0.8970	7.1714
Q 25	1.5795	4.2857	3.3887	0.8970	8.3572
Q 50	1.7398	4.1574	3.2604	0.8970	9.2053
Q 100	1.9025	4.0429	3.1458	0.8970	10.0659
Q 500	2.2982 (cfs)				

=====

KTdid: 9802

END OF RUN

Storm Sewer Analysis
Storm Sewer No. 2
Outfall – Right 121+14

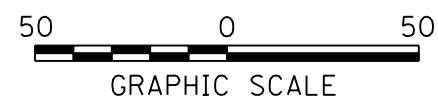
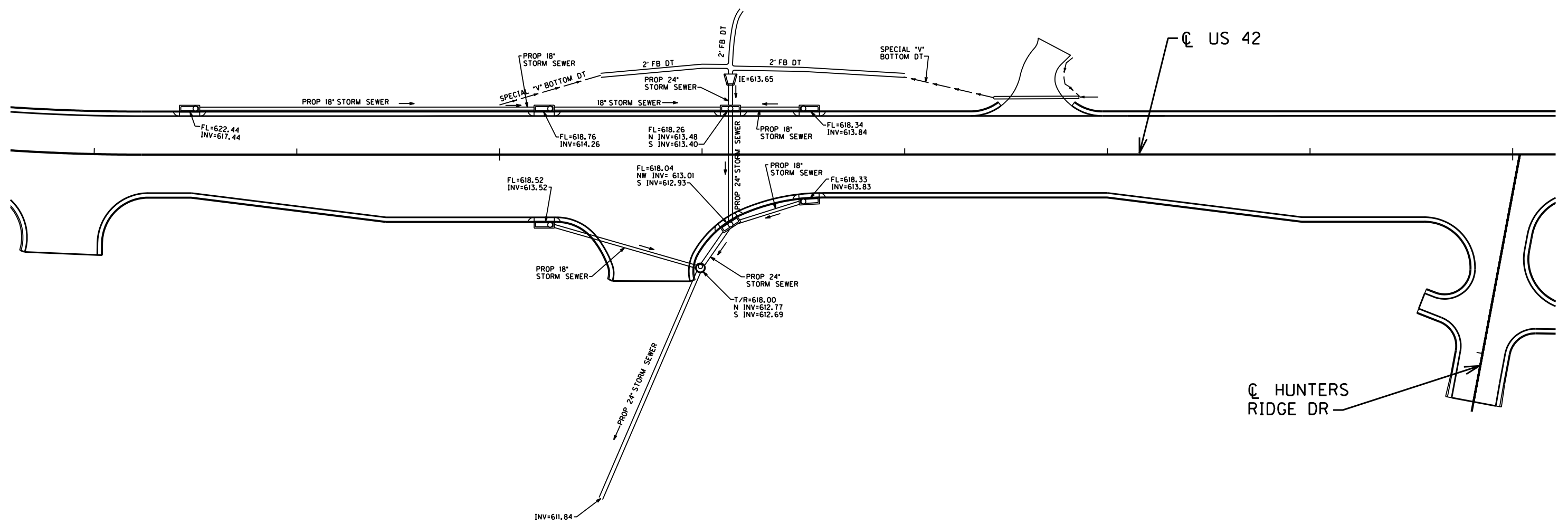
Kentucky Transportation Cabinet
Division of Highway Design
STORM SEWER SYSTEM SUMMARY

TC 61-517
01/2011

County :	Oldham	Route :	US 42	Item # :	5-441.00
UPN :	FD52 093 0042 000-001		FPN :	STPM 5138(056)	
Outfall Station:	Right 121+14 with two deflections		Outfall Offset:	184	ft
System Sta. to Sta. :	118+50		to	121+50	
EXISTING CONDITIONS					
Downstream Receiving Structure :			Tailwater Control :		
Receiving Structure	Area :	Ac	Wtd "C":	Tc:	min. Slope :
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Existing Culvert or Channel at Outfall					
Channel	Side Slopes	Lt: :1	Rt: :1	Bottom Width:	ft Slope:
Culvert Outlet	Size :	Dia	Material	Outlet Elev.	
Outlet Conditions	Area :	Ac	Wtd "C":	Tc:	min. Slope :
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)					
Flow Depth (ft)					
Velocity (ft/s)					
PROPOSED CONDITIONS					
Downstream Receiving Structure :			Tailwater Control :		
Receiving Structure	Area :	Ac	Wtd "C":	Tc:	min. Slope :
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Proposed Outfall Structure		Existing DBI			
Stm Swr Outfall	Size :	24 In	Dia 122	Ft	Material Outlet Elev. 611.84
Outlet Conditions	Area :	9.57	Ac	Wtd "C": 0.5	Tc: 14.6 min. Slope : 0.70%
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)			22		32
Flow Depth (ft)					
Velocity (ft/s)			7.40		10.40
Analysis Software (and version)		Civil-Design-Network			
Additional Comments:		This is the oufall of storm sewer No. 2.			
The existing 18" storm sewer was undersized, therefore the proposed 24" storm sewer was continued downstream until it tied into an existing 24" pipe. See Form TC61-100 for Sta 121+14 for more information.					
The last two segment of the proposed storm sewer are flowing just less than Qfull on the 10 year event.					

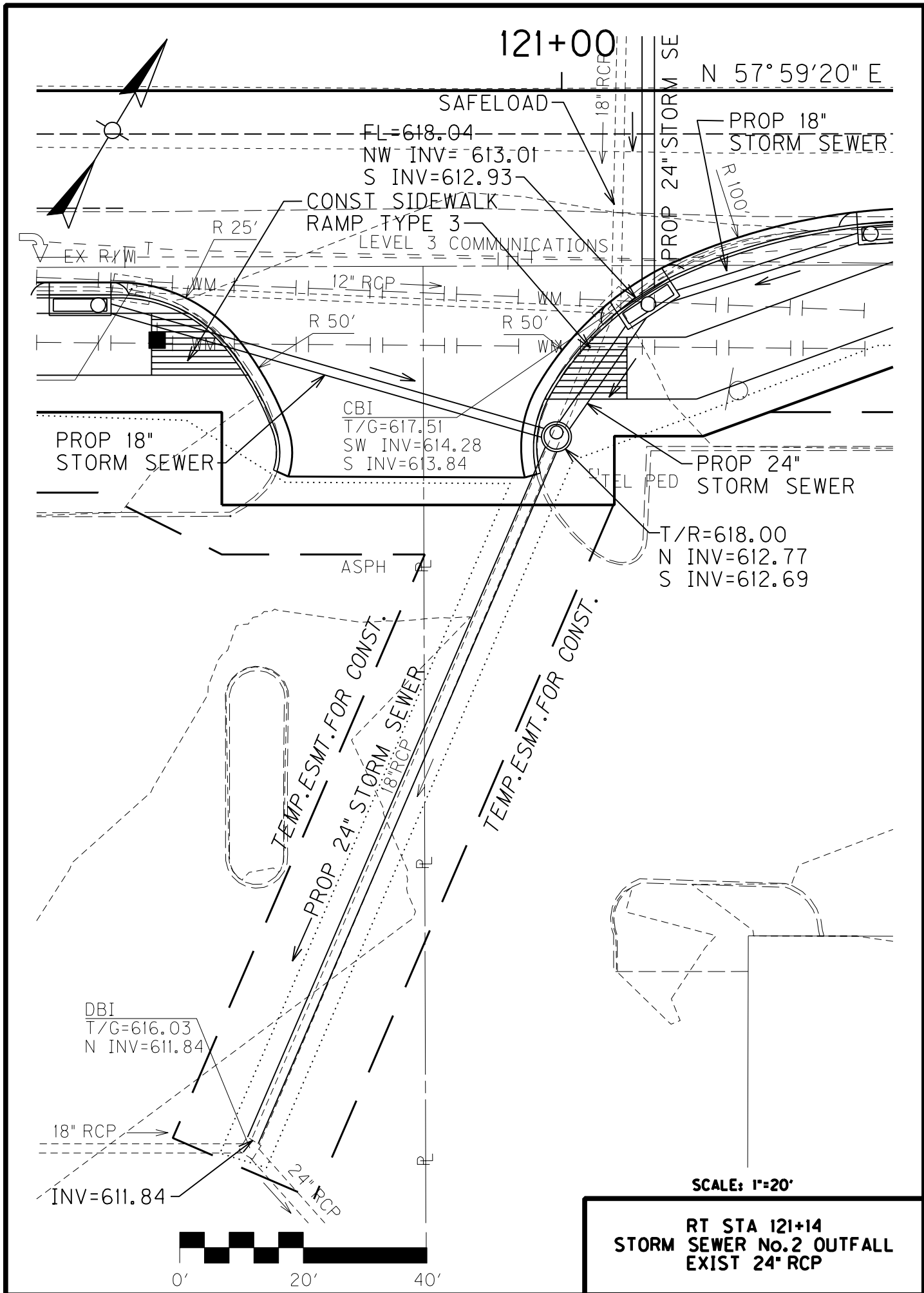
120+00

125+00



SCALE: 1"=50'

STORM SEWER
SYSTEM 2



US 42 Oldham County
Storm Sewer System No.2
10 Year

Node	Sta	DA	C	DCA	SCA	DT	ST	RI	Q	L	So	Dia	Vo	Q(.8d)	Qf
Start New Section =====															
14	118+50L	0.37	.64	0.24	0.24	0.0	11.0	5.15							
								1.2	172.0	.0185	18	5.3	15.1	16.6	
15	120+25L	0.45	.57	0.26	0.50	0.5	11.5	5.03							
								2.5	86.0	.0091	18	5.0	10.6	11.7	
18	121+14L	0.00	.00	0.00	0.50	0.3	11.8	5.03							
↑ Junction =====															
↑ End System (Outlet)=====															
Start New Section =====															
16	121+50L	0.15	.88	0.13	0.13	0.0	2.6	8.21							
								1.1	33.0	.0109	18	4.2	11.6	12.8	
18	121+14L	0.00	.00	0.00	0.13	0.1	2.7	8.21							
↑ Junction =====															
↑ End System (Outlet)=====															
Start New Section =====															
24	121+50R	0.16	.90	0.14	0.14	0.0	2.6	8.21							
								1.1	35.0	.0234	18	5.6	17.0	18.7	
19	121+14R	0.00	.00	0.00	0.14	0.1	2.7	8.21							
↑ Junction =====															
↑ End System (Outlet)=====															
Start New Section =====															
23	120+25R	0.20	.90	0.18	0.18	0.0	2.6	8.21							
								1.5	74.0	.0101	18	4.5	11.2	12.3	
20	121+14R	0.00	.00	0.00	0.18	0.3	2.9	8.21							
↑ Junction =====															
↑ End System (Outlet)=====															
Start New Section =====															
17	121+14L	8.03	.45	3.61	3.61	0.0	14.1	4.57							
								16.5	13.0	.0131	24	9.3	27.4	30.2	
18	121+14L	0.08	.90	0.07	4.31	0.0	14.1	4.57							
								19.7	55.0	.0070	24	7.4	20.0	22.1	
19	121+14R	0.13	.90	0.12	4.57	0.1	14.2	4.55							
								20.8	23.0	.0070	24	7.4	20.0	22.1	
20	121+14R	0.00	.00	0.00	4.75	0.1	14.3	4.54							

US 42 Oldham County
Storm Sewer System No.2
10 Year

Node	Sta	DA	C	DCA	SCA	DT	ST	RI Q	L	So	Dia	Vo	Q(.8d)	Qf	
21	121+14R	2.00	.90	1.80	6.55	0.3	14.6	4.50	21.6	122.0	.0070	24	7.4	20.0	22.1
22	121+14R	0.00	.00	0.00	6.55	0.3	14.8	4.50	29.5	193.0	.0183	24	11.9	32.4	35.7
↑ Junction =====															

↑ End System (Outlet)=====

END =====

Summary of Pipes

18	400.00
24	406.00

US 42 Oldham County
Storm Sewer System No.2
100 Year

Node	Sta	DA	C	DCA	SCA	DT	ST	RI Q	L	So	Dia	Vo	Q(.8d)	Qf
Start New Section =====														
14	118+50L	0.37	.64	0.24	0.24	0.0	9.5	7.67						
								1.8	172.0	.0185	18	5.9	15.1	16.6
15	120+25L	0.45	.57	0.26	0.50	0.5	10.0	7.52						
								3.8	86.0	.0091	18	5.6	10.6	11.7
18	1211+4L	0.00	.00	0.00	0.50	0.3	10.2	7.52						
↑ Junction =====														
↑ End System (Outlet)=====														
Start New Section =====														
16	121+50L	0.15	.88	0.13	0.13	0.0	2.3	11.14						
								1.4	33.0	.0109	18	4.6	11.6	12.8
18	121+14L	0.00	.00	0.00	0.13	0.1	2.4	11.14						
↑ Junction =====														
↑ End System (Outlet)=====														
Start New Section =====														
24	121+50R	0.16	.90	0.14	0.14	0.0	2.3	11.14						
								1.6	35.0	.0234	18	6.1	17.0	18.7
19	121+14R	0.00	.00	0.00	0.14	0.1	2.4	11.14						
↑ Junction =====														
↑ End System (Outlet)=====														
Start New Section =====														
23	120+25R	0.20	.90	0.18	0.18	0.0	2.4	11.08						
								2.0	74.0	.0101	18	4.9	11.2	12.3
20	121+14R	0.00	.00	0.00	0.18	0.3	2.7	11.08						
↑ Junction =====														
↑ End System (Outlet)=====														
Start New Section =====														
17	121+14L	8.03	.45	3.61	3.61	0.0	12.3	6.86						
								24.8	13.0	.0131	24	10.1	27.4	30.2
18	121+14L	0.08	.90	0.07	4.31	0.0	12.3	6.86						
								29.5	55.0	.0070	24	9.5	20.0	22.1
19	121+14R	0.13	.90	0.12	4.57	0.1	12.4	6.83						
								31.2	23.0	.0070	24	10.0	20.0	22.1
20	121+14R	0.00	.00	0.00	4.75	0.0	12.5	6.82						

US 42 Oldham County
Storm Sewer System No.2
100 Year

Node	Sta	DA	C	DCA	SCA	DT	ST	RI	Q	L	So	Dia	Vo	Q(.8d)	Qf
21	121+14R	2.00	.90	1.80	6.55	0.2	12.7	6.77	32.4	122.0	.0070	24	10.4	20.0	22.1
22	121+14R	0.00	.00	0.00	6.55	0.2	12.9	6.77	44.4	193.0	.0183	24	14.2	32.4	35.7

↑ Junction =====

↑ End System (Outlet)=====

END =====

Summary of Pipes

18	400.00
24	406.00

Commands Read From File: 12114-L.CHL

```

      JOB US 42 INLET DITCH LEFT 121+14
      UNI 0
**  UNITS PARAMETER = 0 (ENGLISH)
      CHL .076 16.5
      TRP 2 2 2
**  LEFT SIDE SLOPE      2.0 AND RIGHT SIDE SLOPE      2.0
**  THE BASE WIDTH OF THE TRAPEZOID (ft)      2.00
      LRR 1.0
**  D50 (ft)      1.00
      END

```

*****END OF COMMAND FILE*****

US 42 INLET DITCH LEFT 121+14

INPUT REVIEW

```

      DEFAULT ANGLE OF REPOSE (degrees):      41.74
      DESIGN PARAMETERS:
        DESIGN DISCHARGE (ft^3/s):      16.50
        CHANNEL SHAPE:      TRAPEZOIDAL
        CHANNEL SLOPE (ft/ft):      .076

```

HYDRAULIC CALCULATIONS USING BATHURST

```

      FLOW (cfs)      16.50
      MAX DEPTH (ft)      .94
      AREA (ft^2)      3.65
      WETTED PERIMETER (ft)      6.20
      HYDRAULIC RADIUS (ft)      .59
      AVG VELOCITY (ft/s)      4.52
      MANNINGS EQUIVALENT      .067
      Davg / D50      .63
      FROUDE NUMBER      .82
      REYNOLDS NUMBER (10^5)      1.28
***  WARNING:  REYNOLDS NUMBER IS LARGER THAN 10^5

```

STABILITY ANALYSIS

CONDITION	LINING TYPE	PERMIS SHR (LB/FT^2)	CALC. SHR (LB/FT^2)	STAB. FACTOR	REMARKS
BOTTOM; STRAIGHT	RIPRAP	4.84	4.45	1.09	STABLE
SIDE; STRAIGHT	RIPRAP	3.58	3.31	1.08	STABLE

*** NORMAL END OF HYCHL ***

COUNTY OF	ITEM NO.	SHEET NO.
OLDHAM	5-441.00	R82

US 42
PIPE SECTION STA 121+14
Page 165 of 282

MicroStation v8.11.7.180

Sta. 121+14.00
@ 0° Skew

24" Storm Sewer

Kentucky Transportation Cabinet
Division of Highway Design
DRAINAGE DESIGN SUMMARY

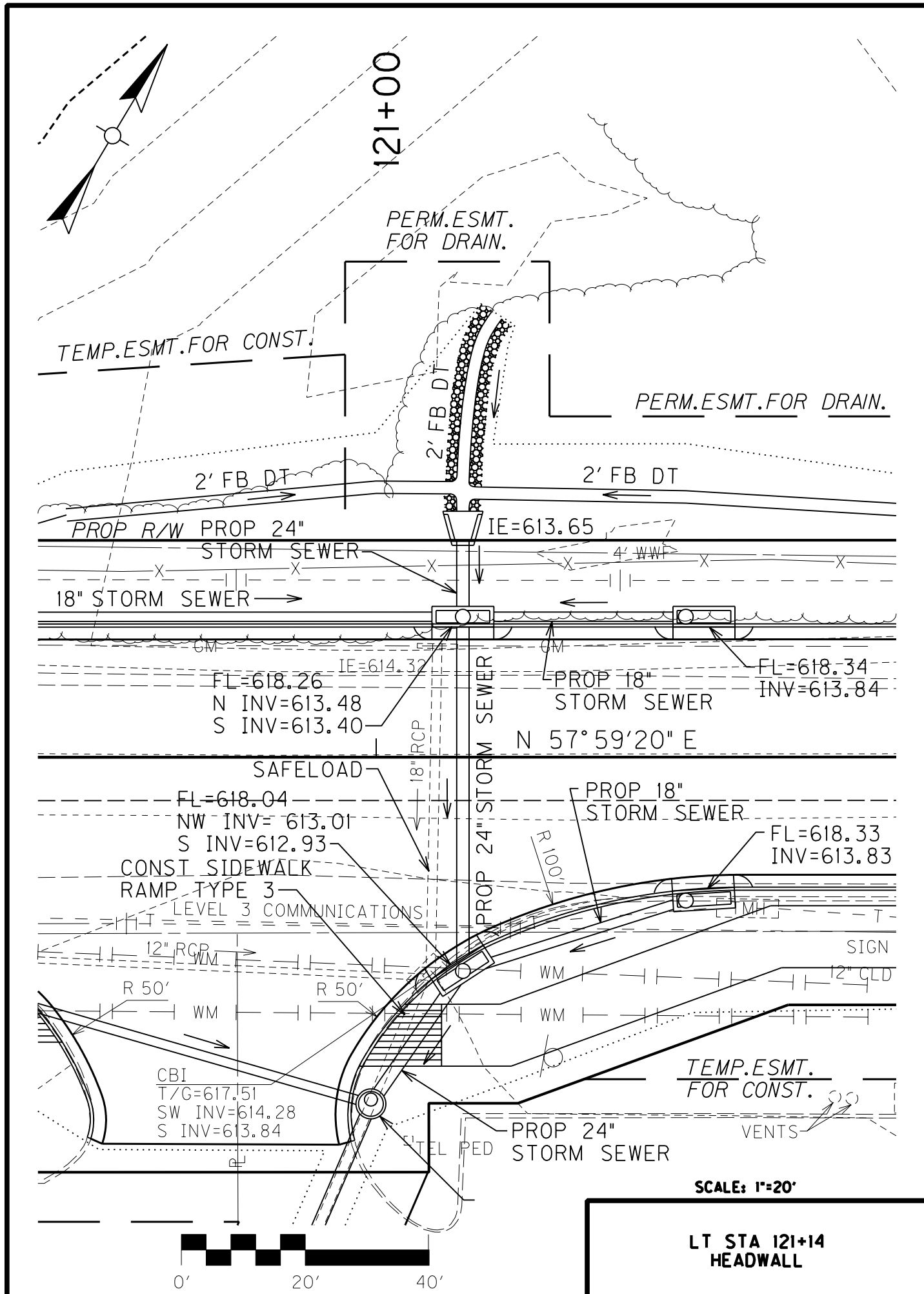
TC 61-100
01/2011
Page 1 of 2

County :	OLDHAM	Route :	US 42	Item # :	5-441.00
UPN :	FD52 093 0042 000-001	FPN :	STPM 5138(056)	Sta.:	121+14.00
Latitude (dec deg):	38.36611111	Longitude (dec deg):	85.60027778		
EXISTING CONDITIONS					
Downstream Channel Data			Drainage Area:	8.03	Ac
Stream Name or Description:			Natural drain.		
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Normal Pool El.		OHW Elev.		Bed Material:	D50 (mm)
Drift:		Abrasion Level:		pH:	
				Resistivity:	
FEMA Flood Zone:	No	Zone Type:		Flood Map No(s):	
Existing Bridge or Culvert			Drainage Area:	8.03	Ac
Size, Length, Type & Material:			18" RCP -54 lin ft		
Lt. Abut./Inlet:	Headwall		Rt. Abut./Outlet:	MH- Storm sewer system	
Inlet El.:	614.32	Outlet El.:	613.84	Slope:	0.89%
Low Road El.:	618.2	Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)	10	14	17	20	22
Headwater Elev.				619.38	621.56
Outlet Velocity (ft/s)				11.40	14.10
PROPOSED CONDITIONS					
Downstream Channel Data			Drainage Area:		Ac
Stream Name or Description:			Natural drain.		
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Proposed Bridge or Culvert			Drainage Area:	8.03	Ac
Size, Length, Type & Material:			24" Storm sewer, 13lin ft		
Lt. Abut./Inlet:	Headwall		Rt. Abut./Outlet:	CBI - Storm sewer system	
Inlet El.:	613.65	Outlet El.:	613.48	Slope:	1.31%
Low Road El.:	618.9 berm behind C&G	Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)	10	14	17	20	22
Headwater Elev.				616.27	616.92
Outlet Velocity (ft/s)				9.70	10.10
Flow Over Road (cfs)				0.00	0.00

Kentucky Transportation Cabinet
Division of Highway Design
Drainage Design Summary

TC 61-100
01/2011
Page 2 of 2

REMARKS and / or CONTROLS															
Current hydraulic analysis procedures show the existing culvert to be undersized, therefore the culvert is proposed to be up															
upsized. The diameter of the proposed pipe was influenced by the size of the existing storm sewer at the discharge point, 24".															
RECORD HIGHWATER DATA															
Source	1:					2:					3:				
Elevation															
Date															
Location															
PROPOSED CHANNEL LINING / STREAM DISTURBANCE															
Location	Class	Thickness	Depth	Length	Quantity	Quantity Below OHW (CY)									
Upstream	III	2'	1'	35'	24 tons										
Downstream															
Total Length of Stream Disturbance (ft):				n/a											
PROPOSED DIVERSION															
Flooding		Return Interval (yrs)			Discharge (cfs)			Elevation							
Design Storm															
Overtopping Storm															
Recommended Size and Type of Opening(s):															
PROPOSED BOX CULVERT OR SPECIAL WING WALLS															
Inlet/Lt. Abut. Skewed		☐		Outlet/Rt. Abut. Skewed		☐									
Location	1	2	3	4											
30 Degree															
Skewed															
Special															
SCOUR															
Analysis Method:				Flow Angle (deg):				D50 (mm)				D95 (mm)			
Contraction Scour (ft):				Local Abut. Scour (ft):				Total Abut. Scour (ft):				0.00			
Pier No.:															
Length (ft):															
Width (ft):															
* Type:															
Local Scour:															
Total Scour:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*	(1) Triangular Nose		(2) Square Nose		(3) Round Nose		(4) Circular Cylinder		(5) Group Cylinders						
Potential for Aggradation/Degradation/Movement:															
Other Factors Affecting Abut./Pier Location:															
Scour Mitigation Measures:															



01-22-2012 12:06:23

HYPACK : KENTUCKY CULVERT DESIGN PROGRAM

US42 Oldham County 121+14 PROPOSED INLET HEADWALL

STATION	S	L	AHW	DQ	DTW	CQ	CTW
ft	ft/ft	ft	ft	cfs	ft	cfs	ft
121+ 14.0	0.01310	13.	3.00	20.	0.50	25.	0.60

- - - - -

RCP/PEP (CODE : 225) -- INLET CONTROL GOVERNS
HEADWALL w/SOCKET END EXPOSED
USER SIZE SELECTION

INLET CONTROL			O.C.TEST					
# PIPES	DIAM		HW	VO	YO	FROUDE	HWOC	V00C
	in		ft	f/s	ft		ft	f/s
DQ	1	24	2.62	9.7	1.2	1.53	2.48	7.3
CQ	1	24	3.27	10.1	1.5	1.47	3.01	8.4

KTdid: 9802

END OF RUN

US42 Oldham County 121+09.5 EXISTING INLET HEADWALL

STATION	S	L	AHW	DQ	DTW	CQ	CTW
ft	ft/ft	ft	ft	cfs	ft	cfs	ft
121+ 9.0	0.00890	54.	3.00	20.	0.50	25.	0.60

- - - - -

RCP/PEP (CODE : 225) -- OUTLET CONTM GOVERNS
HEADWALL w/SOCKET END EXPOSED
USER SIZE SELECTION

OUTLET CONTROL			I.C.TEST					
# PIPES	DIAM		HW	VO	YO	FROUDE	HWOC	V00C
	in		ft	f/s	ft		ft	f/s
DQ	1	18	5.06	11.4	1.17	1.85	4.78	11.3
CQ	1	18	7.24	14.1	1.18	2.28	6.82	14.0

KTdid: 9802

END OF RUN

12-12-2011 15:27:08

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
inlet headwall left 121+14

Zone of Influence : louisville
C-Factor : .45
Area (acres) : 8.03

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 100 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .04 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 700 (ft)
Manning's Roughness Coefficient : n = .03
Bank Full Section Flow Area : AC = 4 (ft²)
Channel Slope : SC = .025 (ft/ft)
Wetted Perimeter : WP = 6 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	10.2473	16.6529	14.7035	1.9494	2.8358
Q 5	14.1363	14.9214	12.9721	1.9494	3.9121
Q 10	16.6483	14.1171	12.1678	1.9494	4.6073
Q 25	20.0435	13.2162	11.2669	1.9494	5.5468
Q 50	22.3703	12.7330	10.7837	1.9494	6.1908
Q 100	24.8365	12.2919	10.3425	1.9494	6.8732
Q 500	30.8638	(cfs)			

=====

KTdid: 9802

END OF RUN

Commands Read From File: 12114-L.CHL

```

      JOB US 42 INLET DITCH LEFT 121+14
      UNI 0
**  UNITS PARAMETER = 0 (ENGLISH)
      CHL .076 16.5
      TRP 2 2 2
**  LEFT SIDE SLOPE      2.0 AND RIGHT SIDE SLOPE      2.0
**  THE BASE WIDTH OF THE TRAPEZOID (ft)      2.00
      LRR 1.0
**  D50 (ft)      1.00
      END

```

*****END OF COMMAND FILE*****

US 42 INLET DITCH LEFT 121+14

INPUT REVIEW

```

      DEFAULT ANGLE OF REPOSE (degrees):      41.74
      DESIGN PARAMETERS:
        DESIGN DISCHARGE (ft^3/s):      16.50
        CHANNEL SHAPE:      TRAPEZOIDAL
        CHANNEL SLOPE (ft/ft):      .076

```

HYDRAULIC CALCULATIONS USING BATHURST

```

      FLOW (cfs)      16.50
      MAX DEPTH (ft)      .94
      AREA (ft^2)      3.65
      WETTED PERIMETER (ft)      6.20
      HYDRAULIC RADIUS (ft)      .59
      AVG VELOCITY (ft/s)      4.52
      MANNINGS EQUIVALENT      .067
      Davg / D50      .63
      FROUDE NUMBER      .82
      REYNOLDS NUMBER (10^5)      1.28
***  WARNING:  REYNOLDS NUMBER IS LARGER THAN 10^5

```

STABILITY ANALYSIS

CONDITION	LINING TYPE	PERMIS SHR (LB/FT^2)	CALC. SHR (LB/FT^2)	STAB. FACTOR	REMARKS
BOTTOM; STRAIGHT	RIPRAP	4.84	4.45	1.09	STABLE
SIDE; STRAIGHT	RIPRAP	3.58	3.31	1.08	STABLE

*** NORMAL END OF HYCHL ***

COUNTY OF	ITEM NO.	SHEET NO.
OLDHAM	5-441.00	R82

STORM SEWER PIPE

DESIGN D.H. LEVEL	MAXIMUM COVER HEIGHT	CBI TYPE A	MANHOLE TYPE A	CLASS "A" CONC	REINF STEEL	REMOVE PIPE
	FEET	EACH	EACH	CU YD	LBS	LF

FLOOD EVALUATION DATA		
RETURN INTERVAL	0	(cfs)
10-YEAR	21.6	
100-YEAR	32.4	

RT 121+14 - PROPOSED 24" STORM SEWER

FLOOD EVALUATION DATA		
RETURN INTERVAL	0	HW
100-YEAR	24.8	616.92
25-YEAR	20.0	616.27

RT 121+14 - 24" SLOPED AND FLARED HDWL

CONST 1- CBI TYPE A (NO. 6, NO. 6, H=4.86) 21' LT

CONST 1- CBI TYPE A (NO. 44, NO. 6, H=5.11) 32.2' RT

121+14
0° SKEW

50	55	60
		PIPE

FLOOD EVALUATION DATA		
RETURN INTERVAL	Q (cfs)	HW
100-YEAR	24.8	616.92
25-YEAR	20.0	616.27

RT 121+14 - 24" SLOPED
AND FLARED HDWL

US 42
PIPE SECTION STA 121+14
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MicroStation v8.11.7.180

Storm Sewer No. 2
Qways runs

Qways for Storm Sewer No 2 Analysis

12-12-2011 15:27:08

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
118+50 left, ss#2

Zone of Influence : Louisville
C-Factor : .64
Area (acres) : .37

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 60 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .02 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 180 (ft)
Manning's Roughness Coefficient : n = .03
Bank Full Section Flow Area : AC = 4 (ft²)
Channel Slope : SC = .02 (ft/ft)
Wetted Perimeter : WP = 6 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.7555	13.2732	12.7128	0.5604	3.1903
Q 5	1.0351	11.8184	11.2580	0.5604	4.3713
Q 10	1.2191	11.0794	10.5190	0.5604	5.1482
Q 25	1.4613	10.3454	9.7850	0.5604	6.1709
Q 50	1.6302	9.9272	9.3668	0.5604	6.8844
Q 100	1.8075	9.5487	8.9883	0.5604	7.6332
Q 500	2.2383	(cfs)			

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
120+50 right, ss#2

Zone of Influence : Louisville
C-Factor : .9
Area (acres) : .2

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 20 (ft)
Overland Friction Factor : N = .1
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .02 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 200 (ft)
Manning's Roughness Coefficient : n = .016
Bank Full Section Flow Area : AC = 2 (ft²)
Channel Slope : SC = .02 (ft/ft)
Wetted Perimeter : WP = 8 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	1.0477	2.8982	2.2575	0.6407	5.8205
Q 5	1.3113	2.7042	2.0634	0.6407	7.2850
Q 10	1.4826	2.6051	1.9643	0.6407	8.2367
Q 25	1.7021	2.4993	1.8585	0.6407	9.4561
Q 50	1.8612	2.4339	1.7931	0.6407	10.3399
Q 100	2.0205	2.3758	1.7350	0.6407	11.2251
Q 500	2.4102	(cfs)			

Qways for Storm Sewer No 2 Analysis

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
121+50 left, ss#2

Zone of Influence : Louisville
C-Factor : .9
Area (acres) : .15

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 20 (ft)
Overland Friction Factor : N = .1
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .02 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 190 (ft)
Manning's Roughness Coefficient : n = .016
Bank Full Section Flow Area : AC = 2 (ft²)
Channel Slope : SC = .02 (ft/ft)
Wetted Perimeter : WP = 8 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.7885	2.8631	2.2544	0.6087	5.8409
Q 5	0.9864	2.6697	2.0610	0.6087	7.3068
Q 10	1.1150	2.5709	1.9622	0.6087	8.2595
Q 25	1.2798	2.4654	1.8567	0.6087	9.4799
Q 50	1.3992	2.4001	1.7914	0.6087	10.3647
Q 100	1.5188	2.3422	1.7335	0.6087	11.2506
Q 500	1.8114 (cfs)				

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
121+50 right, ss#2

Zone of Influence : Louisville
C-Factor : .9
Area (acres) : .15

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 20 (ft)
Overland Friction Factor : N = .1
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .02 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 190 (ft)
Manning's Roughness Coefficient : n = .016
Bank Full Section Flow Area : AC = 2 (ft²)
Channel Slope : SC = .02 (ft/ft)
Wetted Perimeter : WP = 8 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.7885	2.8631	2.2544	0.6087	5.8409
Q 5	0.9864	2.6697	2.0610	0.6087	7.3068
Q 10	1.1150	2.5709	1.9622	0.6087	8.2595
Q 25	1.2798	2.4654	1.8567	0.6087	9.4799
Q 50	1.3992	2.4001	1.7914	0.6087	10.3647
Q 100	1.5188	2.3422	1.7335	0.6087	11.2506
Q 500	1.8114 (cfs)				

Qways for Storm Sewer No 2 Analysis

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
inlet headwall left 121+14, ss#2

Zone of Influence : louisville
C-Factor : .45
Area (acres) : 8.03

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 100 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .04 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 700 (ft)
Manning's Roughness Coefficient : n = .03
Bank Full Section Flow Area : AC = 4 (ft²)
Channel Slope : SC = .025 (ft/ft)
Wetted Perimeter : WP = 6 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	10.2473	16.6529	14.7035	1.9494	2.8358
Q 5	14.1363	14.9214	12.9721	1.9494	3.9121
Q 10	16.6483	14.1171	12.1678	1.9494	4.6073
Q 25	20.0435	13.2162	11.2669	1.9494	5.5468
Q 50	22.3703	12.7330	10.7837	1.9494	6.1908
Q 100	24.8365	12.2919	10.3425	1.9494	6.8732
Q 500	30.8638	(cfs)			

=====

KTdid: 9802

END OF RUN

Storm Sewer Analysis
Storm Sewer No. 3 Right
Outfall – Right 129+67

Kentucky Transportation Cabinet
Division of Highway Design
STORM SEWER SYSTEM SUMMARY

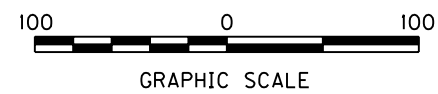
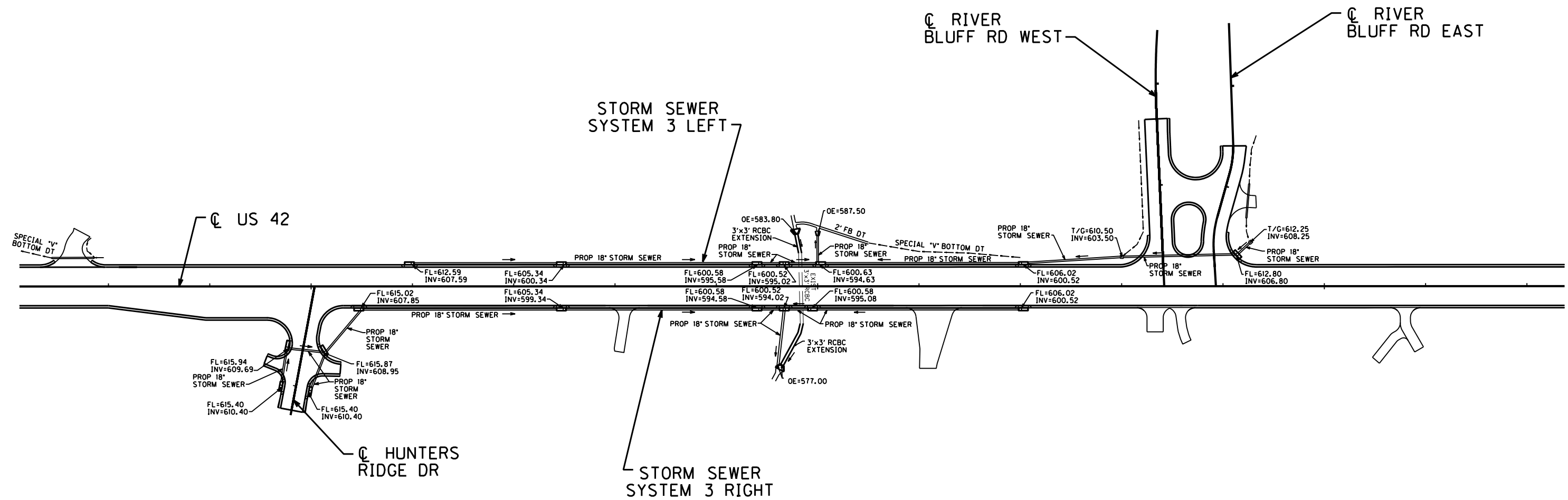
TC 61-517
01/2011

County :	Oldham	Route :	US 42	Item # :	5-441.00
UPN :	FD52 093 0042 000-001	FPN :	STPM 5138(056)		
Outfall Station:	129+67 with a deflection	Outfall Offset:	79	ft	
System Sta. to Sta. :	51+03 Hunters Ridge = 124+70 US 42		to	132+00	
EXISTING CONDITIONS					
Downstream Receiving Structure :			Tailwater Control :		
Receiving Structure	Area :	Ac	Wtd "C":	Tc:	min. Slope :
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Existing Culvert or Channel at Outfall					
Channel	Side Slopes	Lt: :1	Rt: :1	Bottom Width:	ft Slope:
Culvert Outlet	Size :	Dia	Material	Outlet Elev.	
Outlet Conditions	Area :	Ac	Wtd "C":	Tc:	min. Slope :
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)					
Flow Depth (ft)					
Velocity (ft/s)					
PROPOSED CONDITIONS					
Downstream Receiving Structure :			Tailwater Control :		
Receiving Structure	Area :	Ac	Wtd "C":	Tc:	min. Slope :
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Proposed Outfall Structure					
Stm Swr Outfall	Size :	18 In	Dia	58 Ft	Material
Outlet Conditions	Area :	1.91	Ac	Wtd "C":	0.77 Tc: 8.6 min. Slope : 30.76%
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)			9		12
Flow Depth (ft)					
Velocity (ft/s)			25.20		28.10
Analysis Software (and version)		Civil-Design-Network			
Additional Comments:		This is the outfall of storm sewer No. 3 Right.			
All pipes are flowing less than 0.8diameter full, therefore no pressure flow occurred in the 10 year or 100 year event.					

125+00

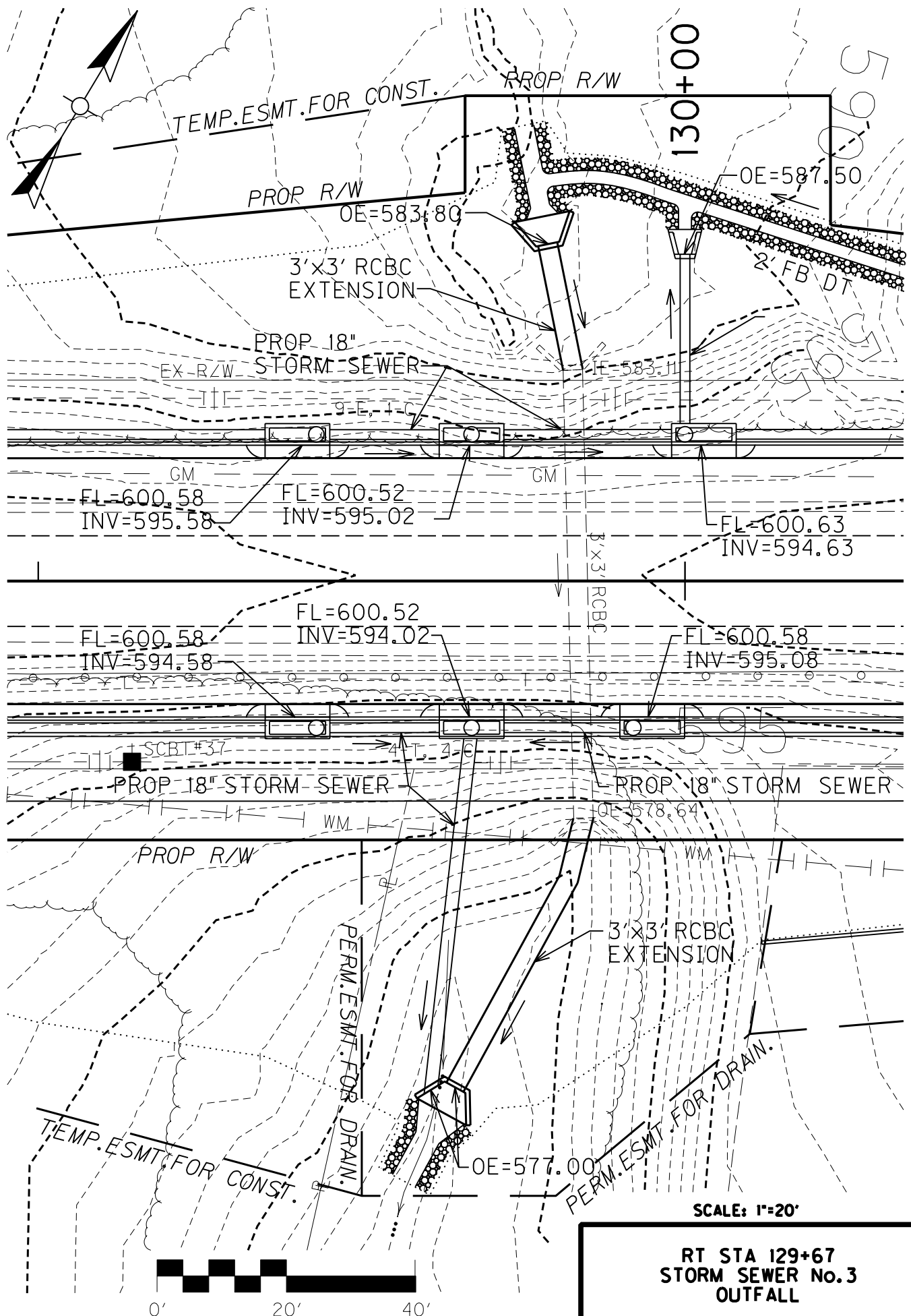
130+00

135+00



SCALE: 1"=100'

STORM SEWER SYSTEM
3 LEFT & RIGHT



SCALE: 1"=20'

RT STA 129+67
STORM SEWER No. 3
OUTFALL

US 42 Oldham County
Storm Sewer System No.3 Right
10 Year

Node	Sta	DA	C	DCA	SCA	DT	ST	RI	Q	L	So	Dia	Vo	Q(.8d)	Qf
Start New Section =====															
39	132+00R	0.25	.88	0.22	0.22	0.0	3.8	7.52							
								1.7	205.0	.0265	18	6.4	18.1	19.9	
40	129+92R	0.22	.90	0.20	0.42	0.5	4.3	7.25							
								3.0	22.0	.0482	18	9.6	24.4	26.9	
37	129+67R	0.00	.00	0.00	0.42	0.0	4.4	7.25							
↑ Junction =====															
↑ End System (Outlet)=====															
Start New Section =====															
30	51+03L HR	0.10	.90	0.09	0.09	0.0	4.8	7.03							
								0.6	39.0	.0372	18	5.6	21.5	23.6	
33	50+64L HR	0.00	.00	0.00	0.09	0.1	4.9	7.03							
↑ Junction =====															
↑ End System (Outlet)=====															
Start New Section =====															
31	51+03R HR	0.72	.58	0.42	0.42	0.0	7.6	6.00							
								2.5	35.0	.0203	18	6.7	15.9	17.4	
32	50+64R HR	0.17	.90	0.15	0.57	0.1	7.7	5.97							
								3.4	37.0	.0200	18	7.2	15.7	17.3	
33	50+64L HR	0.03	.90	0.03	0.69	0.1	7.8	5.95							
								4.1	54.0	.0204	18	7.7	15.9	17.5	
34	125+50R	0.03	.90	0.03	0.72	0.1	7.9	5.91							
								4.3	197.0	.0432	18	10.2	23.1	25.4	
35	127+50R	0.17	.88	0.15	0.87	0.3	8.2	5.82							
								5.1	190.0	.0251	18	8.8	17.6	19.4	
36	129+43R	0.18	.90	0.16	1.03	0.4	8.6	5.72							
								5.9	21.0	.0267	18	9.3	18.2	20.0	
37	129+67R	0.04	.90	0.04	1.49	0.0	8.6	5.71							
								8.5	54.0	.3152	18	25.2	62.5	68.7	
38	129+67R	0.00	.00	0.00	1.49	0.0	8.6	5.71							
↑ Junction =====															
↑ End System (Outlet)=====															
END =====															

Summary of Pipes

18 854.00

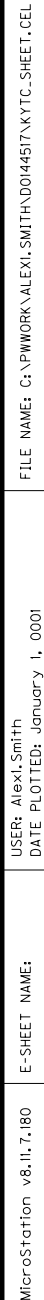
US 42 Oldham County
Storm Sewer System No.3 Right
100 Year

Node	Sta	DA	C	DCA	SCA	DT	ST	RI	Q	L	So	Dia	Vo	Q(.8d)	Qf
Start New Section =====															
39	132+00R	0.25	.88	0.22	0.22	0.0	3.4	10.43							
								2.3	205.0	.0265	18	7.2	18.1	19.9	
40	129+92R	0.22	.90	0.20	0.42	0.5	3.9	10.14							
								4.3	22.0	.0482	18	10.6	24.4	26.9	
37	129+67R	0.00	.00	0.00	0.42	0.0	3.9	10.14							
↑ Junction =====															
↑ End System (Outlet)=====															
Start New Section =====															
30	51+03L HR	0.10	.90	0.09	0.09	0.0	4.6	9.74							
								0.9	39.0	.0372	18	6.1	21.5	23.6	
33	50+64L HR	0.00	.00	0.00	0.09	0.1	4.7	9.74							
↑ Junction =====															
↑ End System (Outlet)=====															
Start New Section =====															
31	51+03R HR	0.72	.58	0.42	0.42	0.0	6.7	8.73							
								3.7	35.0	.0203	18	7.4	15.9	17.4	
32	50+64R HR	0.17	.90	0.15	0.57	0.1	6.8	8.69							
								5.0	37.0	.0200	18	8.0	15.7	17.3	
33	50+64L HR	0.03	.90	0.03	0.69	0.1	6.9	8.66							
								6.0	54.0	.0204	18	8.5	15.9	17.5	
34	125+50R	0.03	.90	0.03	0.72	0.1	7.0	8.61							
								6.2	197.0	.0432	18	11.3	23.1	25.4	
35	127+50R	0.17	.88	0.15	0.87	0.3	7.3	8.49							
								7.4	190.0	.0251	18	9.7	17.6	19.4	
36	129+43R	0.18	.90	0.16	1.03	0.3	7.6	8.36							
								8.6	21.0	.0267	18	10.3	18.2	20.0	
37	129+67R	0.04	.90	0.04	1.49	0.0	7.6	8.35							
								12.4	54.0	.3152	18	28.1	62.5	68.7	
38	129+67R	0.00	.00	0.00	1.49	0.0	7.6	8.35							
↑ Junction =====															
↑ End System (Outlet)=====															
END =====															

Summary of Pipes

18 854.00

COUNTY OF	ITEM NO.	SHEET NO.
OLDHAM	5-441.00	R86

[illegible]

Storm Sewer No. 3 Right
Qways runs

Qways for Storm Sewer 3 Right Analysis

12-12-2011 15:27:08

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
132+00 right, ss#3 right

Zone of Influence : Louisville
C-Factor : .88
Area (acres) : .25

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 40 (ft)
Overland Friction Factor : N = .1
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .02 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 230 (ft)
Manning's Roughness Coefficient : n = .016
Bank Full Section Flow Area : AC = 2 (ft²)
Channel Slope : SC = .02 (ft/ft)
Wetted Perimeter : WP = 8 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	1.1273	4.3390	3.6021	0.7368	5.1242
Q 5	1.4454	3.9991	3.2623	0.7368	6.5701
Q 10	1.6515	3.8299	3.0931	0.7368	7.5070
Q 25	1.9168	3.6510	2.9141	0.7368	8.7125
Q 50	2.1072	3.5426	2.8058	0.7368	9.5783
Q 100	2.2997	3.4461	2.7093	0.7368	10.4530
Q 500	2.7684 (cfs)				

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
51+03 right Hunter Ridge, ss#3 right

Zone of Influence : Louisville
C-Factor : .55
Area (acres) : .62

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 60 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .08 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 260 (ft)
Manning's Roughness Coefficient : n = .02
Bank Full Section Flow Area : AC = 2 (ft²)
Channel Slope : SC = .02 (ft/ft)
Wetted Perimeter : WP = 8 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	1.3202	8.8257	7.7846	1.0412	3.8715
Q 5	1.7632	7.9868	6.9456	1.0412	5.1708
Q 10	2.0525	7.5589	6.5177	1.0412	6.0192
Q 25	2.4282	7.1353	6.0941	1.0412	7.1209
Q 50	2.6931	6.8882	5.8470	1.0412	7.8977
Q 100	2.9665	6.6663	5.6252	1.0412	8.6995
Q 500	3.6292 (cfs)				

=====

KTdid: 9802

END OF RUN

Storm Sewer Analysis
Storm Sewer No. 3 Left
Outfall – Left 130+00

Kentucky Transportation Cabinet
Division of Highway Design
STORM SEWER SYSTEM SUMMARY

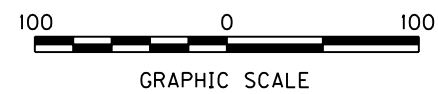
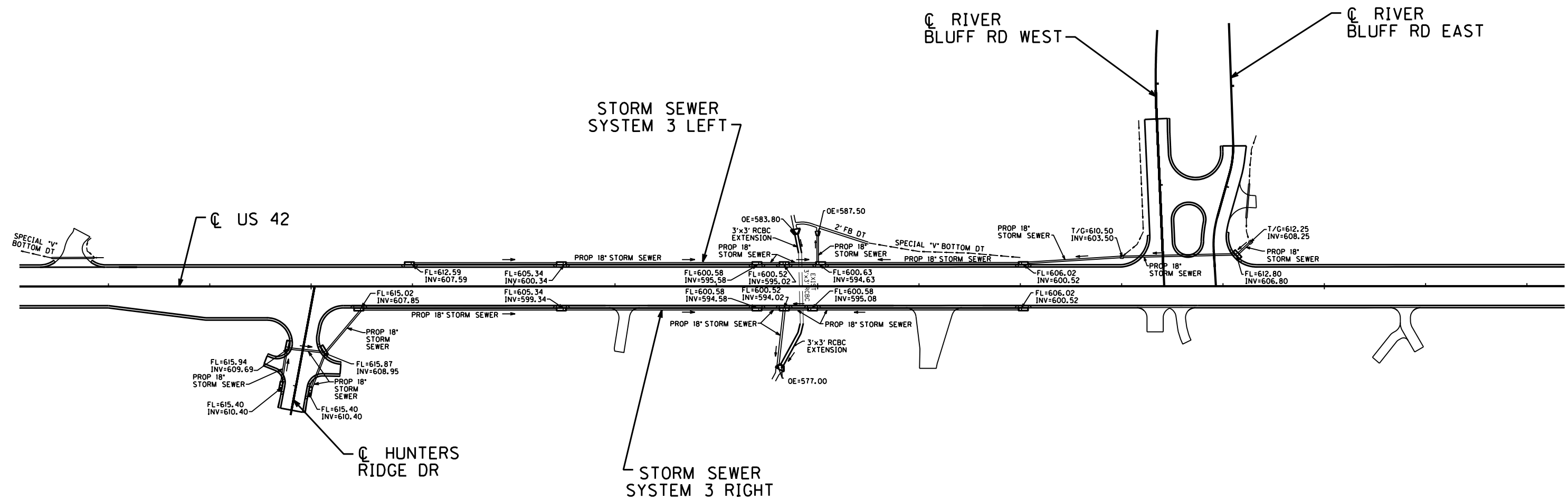
TC 61-517
01/2011

County :	Oldham	Route :	US 42	Item # :	5-441.00
UPN :	FD52 093 0042 000-001		FPN :	STPM 5138(056)	
Outfall Station:	Left 130+00	Outfall Offset:	50.5	ft	
System Sta. to Sta. :	126+00	to	49+69 River Bluff =134+27 US 42		
EXISTING CONDITIONS					
Downstream Receiving Structure :			Tailwater Control :		
Receiving Structure	Area :	Ac	Wtd "C":	Tc:	min. Slope :
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Existing Culvert or Channel at Outfall					
Channel	Side Slopes	Lt: :1	Rt: :1	Bottom Width:	ft Slope:
Culvert Outlet	Size :	Dia	Material	Outlet Elev.	
Outlet Conditions	Area :	Ac	Wtd "C":	Tc:	min. Slope :
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)					
Flow Depth (ft)					
Velocity (ft/s)					
PROPOSED CONDITIONS					
Downstream Receiving Structure :			Tailwater Control :		
Receiving Structure	Area :	Ac	Wtd "C":	Tc:	min. Slope :
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Proposed Outfall Structure					
18" Sloped and Flared Headwall					
Stm Swr Outfall	Size :	18 In	Dia 28	Ft	Material Outlet Elev. 857.5
Outlet Conditions	Area :	2.07	Ac	Wtd "C": 0.76	Tc: 12.4 min. Slope : 25.46%
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)			9		13
Flow Depth (ft)					
Velocity (ft/s)			23.60		26.30
Analysis Software (and version)		Civil-Design-Network			
Additional Comments:		This is the outfall of storm sewer No. 3 Left.			
All pipes are flowing less than 0.8diameter full, therefore no pressure flow occurred in the 10 year or 100 year event.					

125+00

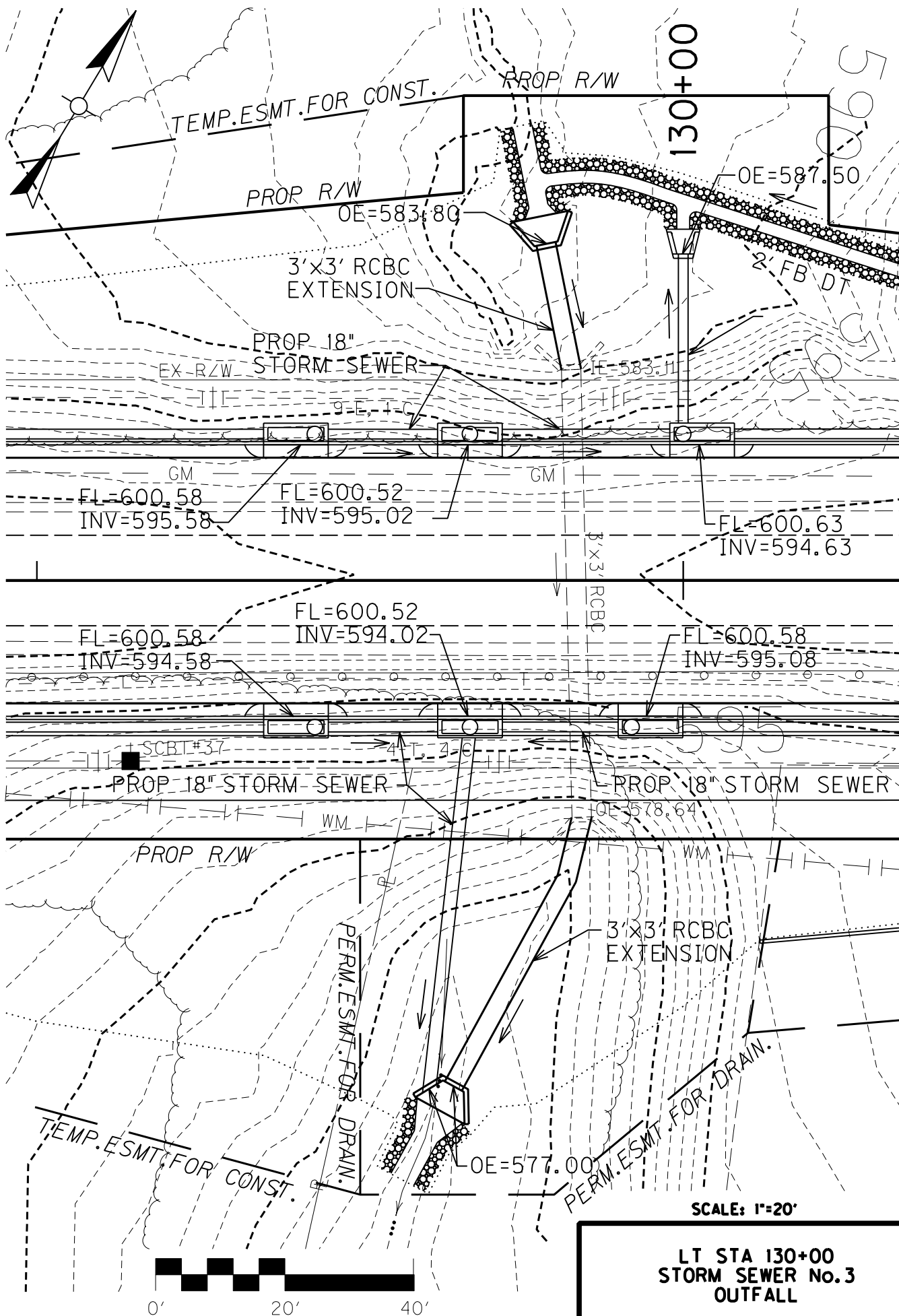
130+00

135+00



SCALE: 1"=100'

STORM SEWER SYSTEM
3 LEFT & RIGHT



SCALE: 1"=20'

LT STA 130+00
STORM SEWER No. 3
OUTFALL

US 42 Oldham County
Storm Sewer System No.3 Left
10 Year

Node	Sta	DA	C	DCA	SCA	DT	ST	RI	Q	L	So	Dia	Vo	Q(.8d)	Qf
Start New Section =====															
41	49+54L	0.54	.86	0.46	0.46	0.0	11.6	5.02							
								2.3	16.0	.0906	18	11.2	33.5	36.8	
42	49+69L	0.07	.90	0.06	0.52	0.0	11.6	5.02							
								2.6	111.0	.0297	18	7.7	19.2	21.1	
43	133+00L	0.27	.88	0.24	0.76	0.2	11.9	4.97							
								3.8	98.0	.0304	18	8.7	19.4	21.3	
44	132+00L	0.16	.90	0.14	0.90	0.2	12.1	4.93							
								4.4	197.0	.0299	18	9.0	19.2	21.2	
49	130+00L	0.00	.00	0.00	0.90	0.4	12.4	4.93							
↑ Junction =====															

↑ End System (Outlet)=====

Start New Section =====															
45	126+00L	0.55	.50	0.28	0.28	0.0	8.4	5.77							
								1.6	147.0	.0493	18	8.1	24.7	27.2	
46	127+50L	0.17	.70	0.12	0.40	0.3	8.7	5.69							
								2.3	190.0	.0251	18	7.0	17.6	19.4	
47	129+43L	0.14	.87	0.12	0.52	0.5	9.2	5.57							
								2.9	21.0	.0267	18	7.7	18.2	20.0	
48	129+67L	0.04	.90	0.04	0.56	0.0	9.2	5.56							
								3.1	30.0	.0130	18	6.1	12.7	14.0	
49	130+00L	0.13	.90	0.12	1.58	0.1	12.4	5.54							
								8.8	28.0	.2546	18	23.6	56.2	61.8	
50	130+00L	0.00	.00	0.00	1.58	0.0	12.4	5.54							
↑ Junction =====															

↑ End System (Outlet)=====

END =====

Summary of Pipes

18 838.00

US 42 Oldham County
Storm Sewer System No.3 Left
100 Year

Node	Sta	DA	C	DCA	SCA	DT	ST	RI	Q	L	So	Dia	Vo	Q(.8d)	Qf
Start New Section =====															
41	49+54L	0.54	.86	0.46	0.46	0.0	10.1	7.48							
								3.4	16.0	.0906	18	12.4	33.5	36.8	
42	49+69L	0.07	.90	0.06	0.52	0.0	10.1	7.48							
								3.9	111.0	.0297	18	8.7	19.2	21.1	
43	133+00L	0.27	.88	0.24	0.76	0.2	10.3	7.41							
								5.6	98.0	.0304	18	9.7	19.4	21.3	
44	132+00L	0.16	.90	0.14	0.90	0.2	10.5	7.36							
								6.6	197.0	.0299	18	10.0	19.2	21.2	
49	130+00L	0.00	.00	0.00	0.90	0.3	10.8	7.36							
↑ Junction =====															

↑ End System (Outlet)=====

Start New Section =====															
45	126+00L	0.55	.50	0.28	0.28	0.0	7.3	8.47							
								2.4	147.0	.0493	18	9.0	24.7	27.2	
46	127+50L	0.17	.70	0.12	0.40	0.3	7.6	8.37							
								3.3	190.0	.0251	18	7.8	17.6	19.4	
47	129+43L	0.14	.87	0.12	0.52	0.4	8.0	8.21							
								4.3	21.0	.0267	18	8.6	18.2	20.0	
48	129+67L	0.04	.90	0.04	0.56	0.0	8.0	8.19							
								4.6	30.0	.0130	18	6.7	12.7	14.0	
49	130+00L	0.13	.90	0.12	1.58	0.1	10.8	8.17							
								12.9	28.0	.2546	18	26.3	56.2	61.8	
50	130+00L	0.00	.00	0.00	1.58	0.0	10.8	8.17							
↑ Junction =====															

↑ End System (Outlet)=====

END =====

Summary of Pipes

18 838.00

Commands Read From File: 13000-L.CHL

```

      JOB US 42 OUTLET DITCH LEFT 130+00
      UNI 0
**  UNITS PARAMETER = 0 (ENGLISH)
      CHL .0569 8.8
      TRP 2 2 2
**  LEFT SIDE SLOPE      2.0 AND RIGHT SIDE SLOPE      2.0
**  THE BASE WIDTH OF THE TRAPEZOID (ft)      2.00
      LRR .5
**  D50 (ft)      .50
      END

```

*****END OF COMMAND FILE*****

US 42 OUTLET DITCH LEFT 130+00

INPUT REVIEW

```

      DEFAULT ANGLE OF REPOSE (degrees):      41.31
      DESIGN PARAMETERS:
        DESIGN DISCHARGE (ft^3/s):      8.80
        CHANNEL SHAPE:      TRAPEZOIDAL
        CHANNEL SLOPE (ft/ft):      .057

```

HYDRAULIC CALCULATIONS USING BATHURST

```

FLOW (cfs)      8.80
MAX DEPTH (ft)   .66
AREA (ft^2)      2.19
WETTED PERIMETER (ft)  4.95
HYDRAULIC RADIUS (ft) .44
AVG VELOCITY (ft/s)  4.01
MANNINGS EQUIVALENT .054
Davg / D50      .94
FROUDE NUMBER    .87
REYNOLDS NUMBER (10^5) .45

```

STABILITY ANALYSIS

CONDITION	LINING TYPE	PERMIS SHR (LB/FT^2)	CALC. SHR (LB/FT^2)	STAB. FACTOR	REMARKS
BOTTOM; STRAIGHT	RIPRAP	2.42	2.34	1.03	STABLE
SIDE; STRAIGHT	RIPRAP	1.78	1.79	1.00	UNSTABLE

*** NORMAL END OF HYCHL ***

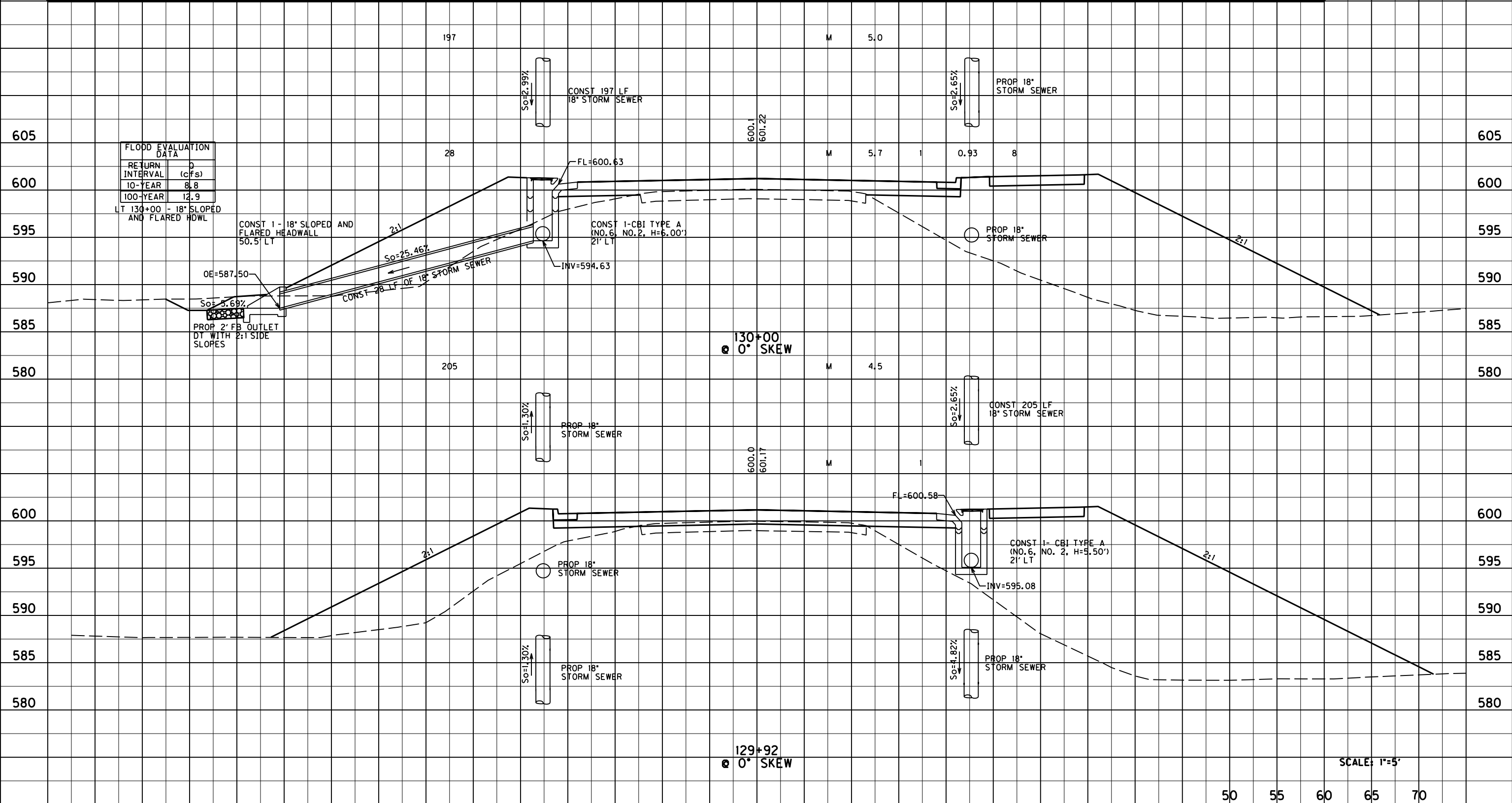
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PIPE DRAINAGE SHEET 11 of 21

COUNTY OF	ITEM NO.	SHEET NO.
OLDHAM	5-441.00	R88

STORM SEWER PIPE

										DESIGN PIPE LEVEL	MAXIMUM COVER HEIGHT	CBI TYPE A	CLASS "A" CONC	REINF STEEL					
18"																			
L I N E A R F E E T											FEET	EACH	CU YD	LBS					



SCALE: 1"=5'

US 42
PIPE SECTIONS
STA 129+92 TO STA 130+00

Left Sta. 133+00.00
@ 0° Skew

DBI Type 3

Kentucky Transportation Cabinet
Division of Highway Design
DRAINAGE DESIGN SUMMARY

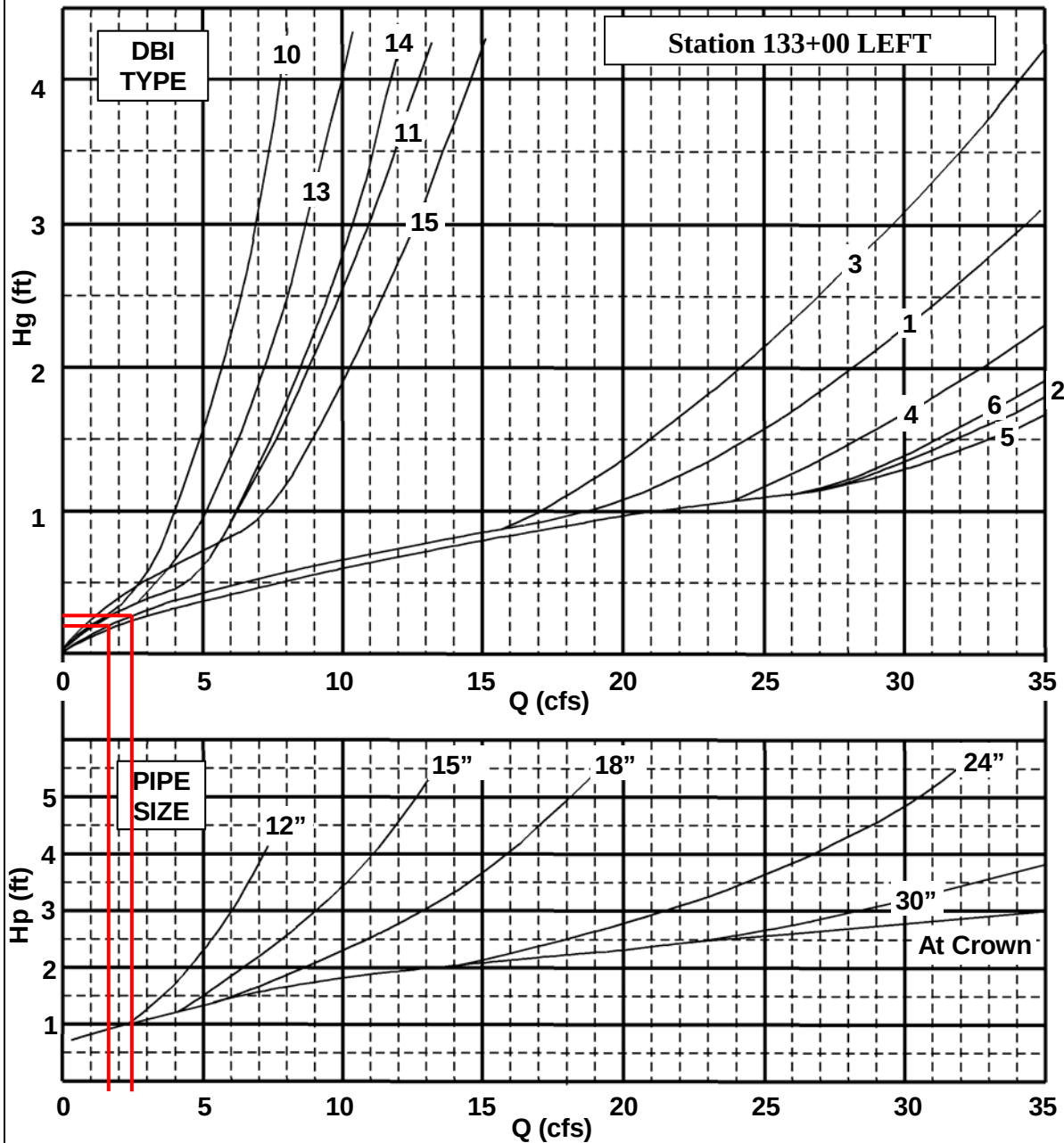
TC 61-100
01/2011
Page 1 of 2

County :	OLDHAM	Route :	US 42	Item # :	5-441.00
UPN :	FD52 093 0042 000-001	FPN :	STPM 5138(056)	Sta.:	133+00 LT
Latitude (dec deg):	38.36611111	Longitude (dec deg):	85.60027778		
EXISTING CONDITIONS					
Downstream Channel Data			Drainage Area:	Ac	Slope :
Stream Name or Description:					
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Normal Pool El.		OHW Elev.		Bed Material:	D50 (mm)
Drift:		Abrasion Level:		pH:	
				Resistivity:	
FEMA Flood Zone:	No	Zone Type:		Flood Map No(s):	
PROPOSED CONDITIONS					
Downstream Channel Data			Drainage Area:	Ac	Slope :
Stream Name or Description: storm sewer system					
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Proposed Bridge or Culvert			Drainage Area:	0.27	Ac
Size, Length, Type & Material:			18 storm sewer, 98 lf		
Skew:					
Lt. Abut./Inlet:	DBI Type 3		Rt. Abut./Outlet:	18" Storm Sewer	
Inlet El.:	603.5	Outlet El.:	600.52	Slope:	3.04%
				Top/Grate El.:	610.5
Low Road El.:	611.3 berm around DBI		Low Beam El.:		Net Opening:
Return Interval (years)	2	5	10	25	50
Discharge (cfs)			1.7		2.4
Headwater Elev.			610.70		610.75
Outlet Velocity (ft/s)			8.70		9.70
Flow Over Road (cfs)			0.00		0.00

Kentucky Transportation Cabinet
Division of Highway Design
Drainage Design Summary

TC 61-100
01/2011
Page 2 of 2

REMARKS and / or CONTROLS													
RECORD HIGHWATER DATA													
Source	1:					2:					3:		
Elevation													
Date													
Location													
PROPOSED CHANNEL LINING / STREAM DISTURBANCE													
Location	Class	Thickness	Depth	Length	Quantity	Quantity Below OHW (CY)							
Upstream													
Downstream													
Total Length of Stream Disturbance (ft):				n/a									
PROPOSED DIVERSION													
Flooding	Return Interval (yrs)			Discharge (cfs)			Elevation						
Design Storm													
Overtopping Storm													
Recommended Size and Type of Opening(s):													
PROPOSED BOX CULVERT OR SPECIAL WING WALLS													
Inlet/Lt. Abut. Skewed		☐		Outlet/Rt. Abut. Skewed		☐							
Location	1	2	3	4									
30 Degree													
Skewed													
Special													
SCOUR													
Analysis Method:				Flow Angle (deg):				D50 (mm)				D95 (mm)	
Contraction Scour (ft):				Local Abut. Scour (ft):				Total Abut. Scour (ft):				0.00	
Pier No.:													
Length (ft):													
Width (ft):													
* Type:													
Local Scour:													
Total Scour:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*	(1) Triangular Nose		(2) Square Nose		(3) Round Nose		(4) Circular Cylinder		(5) Group Cylinders				
Potential for Aggradation/Degradation/Movement:													
Other Factors Affecting Abut./Pier Location:													
Scour Mitigation Measures:													



(SAG)

	$Q_{10} = 1.7$	Q_{25}	$Q_{100} = 2.4$
Hg	0.20		0.25
HW	610.70		610.75
Hp			
HW			

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
DBI LEFT 133+00

Zone of Influence : LOUISVILLE
C-Factor : .88
Area (acres) : .27

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 115 (ft)
Overland Friction Factor : N = .1
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .06 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 127 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 4 (ft²)
Channel Slope : SC = .08 (ft/ft)
Wetted Perimeter : WP = 8.25 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	1.1321	5.3145	5.0289	0.2855	4.7646
Q 5	1.4745	4.8138	4.5283	0.2855	6.2057
Q 10	1.6962	4.5681	4.2826	0.2855	7.1390
Q 25	1.9847	4.2932	4.0077	0.2855	8.3532
Q 50	2.1898	4.1386	3.8531	0.2855	9.2162
Q 100	2.3978	4.0012	3.7157	0.2855	10.0919
Q 500	2.9068	(cfs)			

=====

KTdid: 9802

END OF RUN

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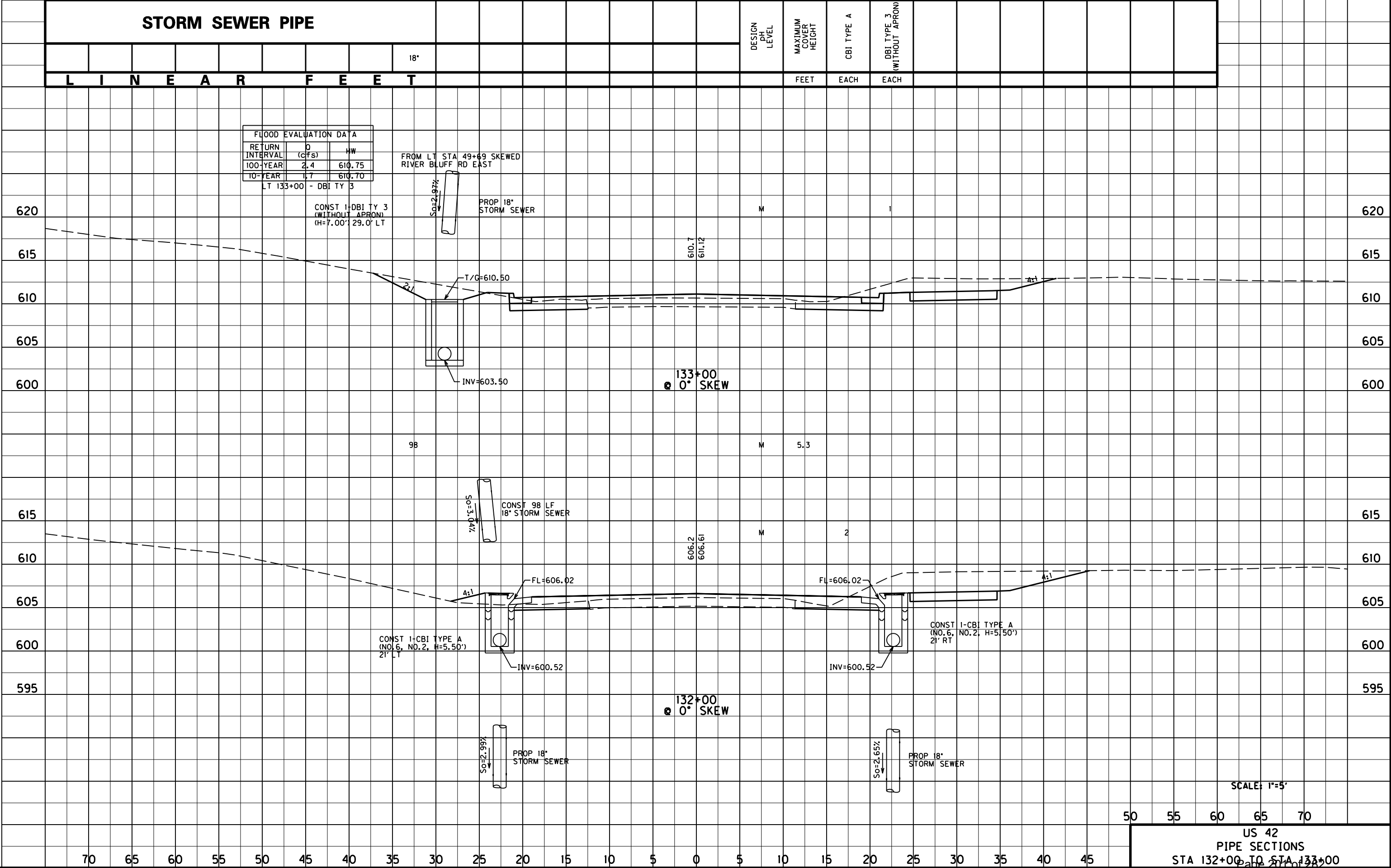
USER: Alexi Smith
DATE PLOTTED: January 1, 0001

E-SHEET NAME:

MicroStation v8.11.7.180

PIPE DRAINAGE SHEET 12 of 21

COUNTY OF	ITEM NO.	SHEET NO.
OLDHAM	5-441.00	R89



Left Sta. 49+69
@ 8.5° Skew RT
River Bluff Road East

DBI Type 3

Kentucky Transportation Cabinet
Division of Highway Design
DRAINAGE DESIGN SUMMARY

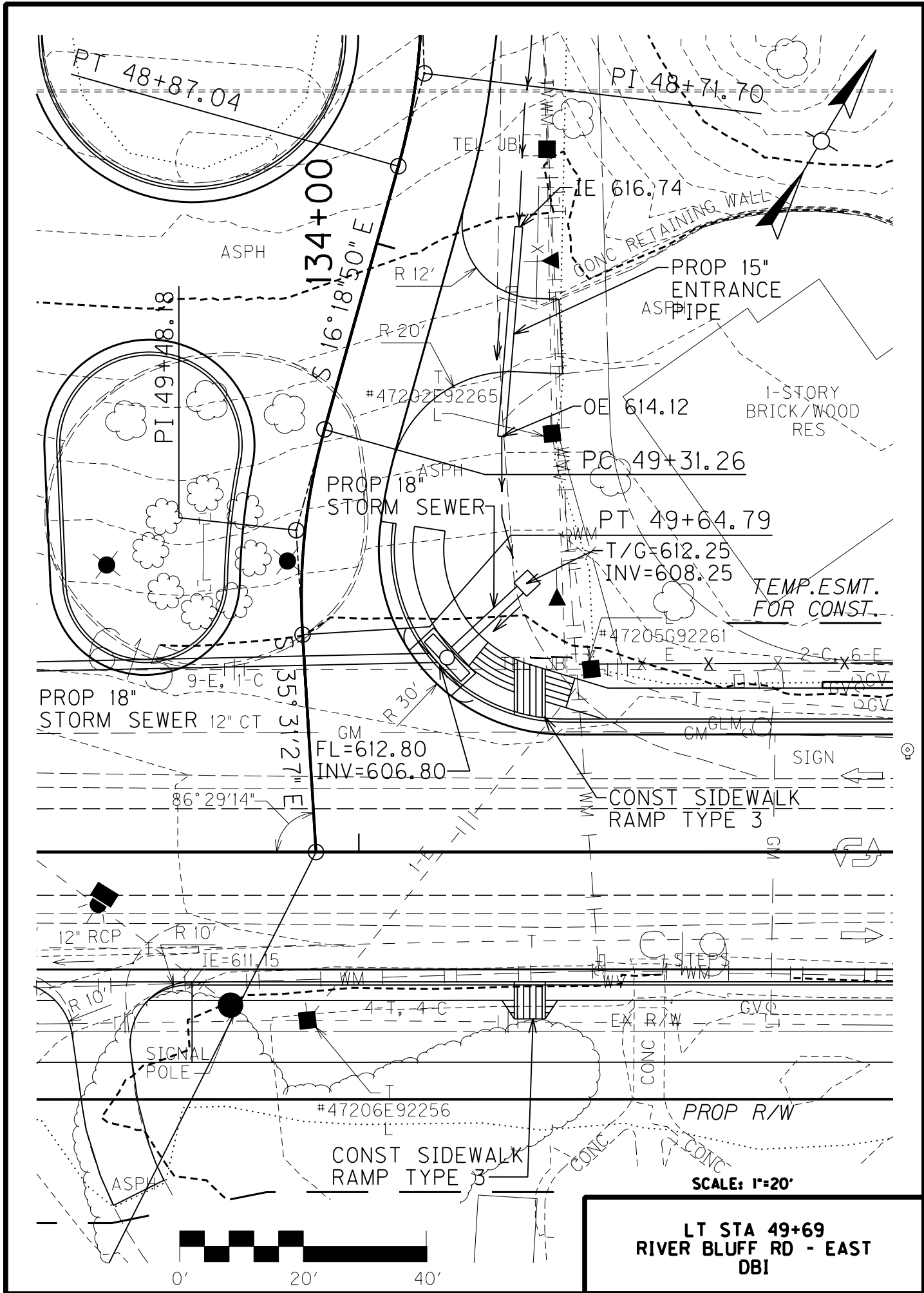
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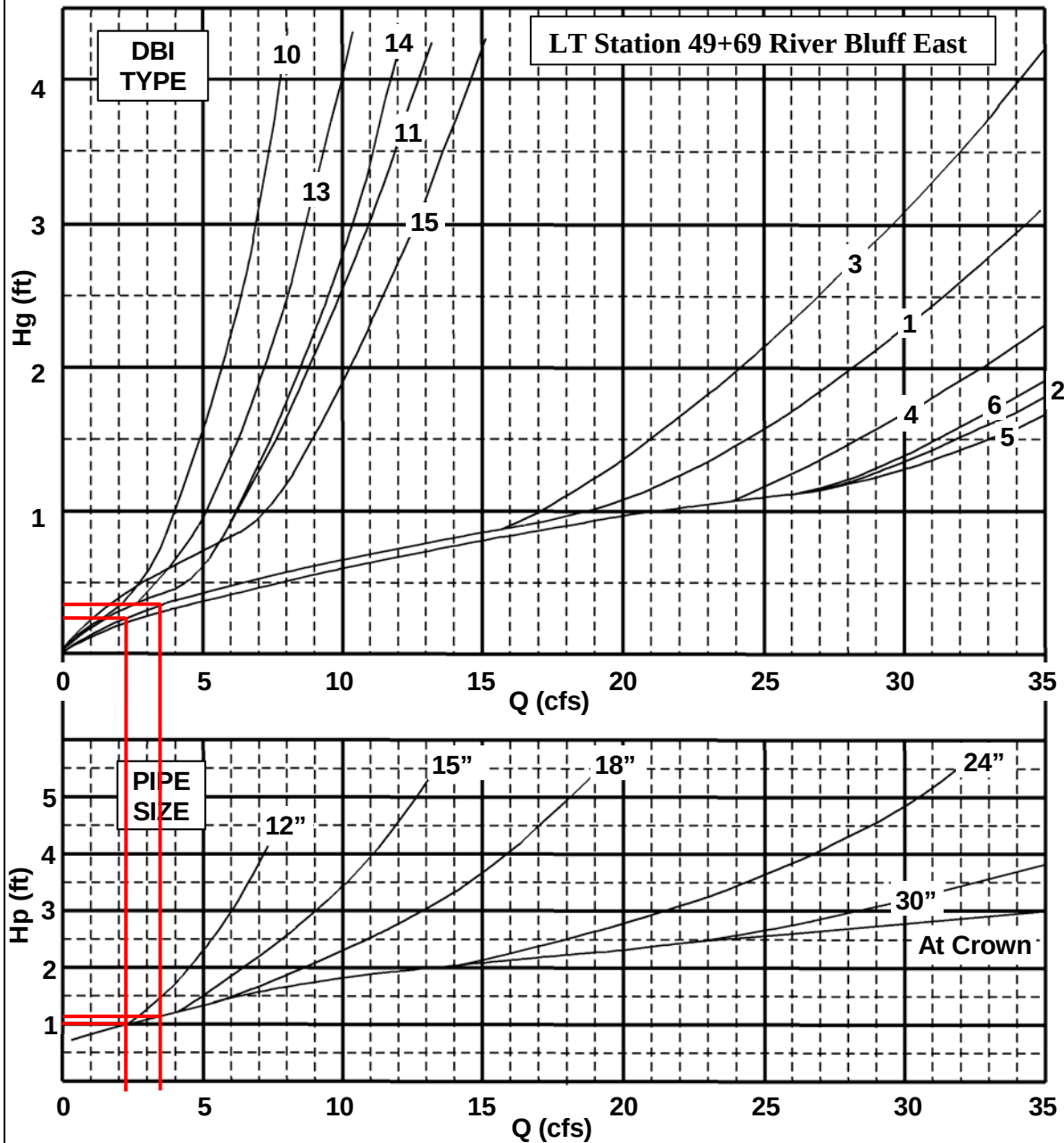
County :	OLDHAM	Route :	US 42	Item # :	5-441.00
UPN :	FD52 093 0042 000-001	FPN :	STPM 5138(056)	Sta.:	LT 49+69 River Bluff
Latitude (dec deg):	38.36611111	Longitude (dec deg):	85.60027778		
EXISTING CONDITIONS					
Downstream Channel Data			Drainage Area:	Ac	Slope :
Stream Name or Description:					
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Normal Pool El.		OHW Elev.		Bed Material:	D50 (mm)
Drift:		Abrasion Level:		pH:	
				Resistivity:	
FEMA Flood Zone:	No	Zone Type:		Flood Map No(s):	
Existing Bridge or Culvert			Drainage Area:	Ac	
Size, Length, Type & Material:			Skew:		
Lt. Abut./Inlet:			Rt. Abut./Outlet:		
Inlet El.:		Outlet El.:		Slope:	
				Top/Grate El.:	
Low Road El.:		Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Headwater Elev.					
Outlet Velocity (ft/s)					
PROPOSED CONDITIONS					
Downstream Channel Data			Drainage Area:	Ac	Slope :
Stream Name or Description: storm sewer system					
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Proposed Bridge or Culvert			Drainage Area:	0.54	Ac
Size, Length, Type & Material:			Skew:		
Lt. Abut./Inlet:	DBI Type 3		Rt. Abut./Outlet:	18" Storm Sewer	
Inlet El.:	608.25	Outlet El.:	606.8	Slope:	9.06%
				Top/Grate El.:	612.25
Low Road El.:	613.6 berm behind SW		Low Beam El.:		Net Opening:
Return Interval (years)	2	5	10	25	50
Discharge (cfs)			2.3		3.5
Headwater Elev.			612.49		612.59
Outlet Velocity (ft/s)			11.20		12.40
Flow Over Road (cfs)			0.00		0.00

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Division of Highway Design
Drainage Design Summary

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REMARKS and / or CONTROLS															
RECORD HIGHWATER DATA															
Source	1:					2:					3:				
Elevation															
Date															
Location															
PROPOSED CHANNEL LINING / STREAM DISTURBANCE															
Location	Class	Thickness	Depth	Length	Quantity	Quantity Below OHW (CY)									
Upstream															
Downstream															
Total Length of Stream Disturbance (ft):				n/a											
PROPOSED DIVERSION															
Flooding		Return Interval (yrs)			Discharge (cfs)			Elevation							
Design Storm															
Overtopping Storm															
Recommended Size and Type of Opening(s):															
PROPOSED BOX CULVERT OR SPECIAL WING WALLS															
Inlet/Lt. Abut. Skewed		☐		Outlet/Rt. Abut. Skewed		☐									
Location	1	2	3	4											
30 Degree															
Skewed															
Special															
SCOUR															
Analysis Method:				Flow Angle (deg):				D50 (mm)				D95 (mm)			
Contraction Scour (ft):				Local Abut. Scour (ft):				Total Abut. Scour (ft):				0.00			
Pier No.:															
Length (ft):															
Width (ft):															
* Type:															
Local Scour:															
Total Scour:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*	(1) Triangular Nose		(2) Square Nose		(3) Round Nose		(4) Circular Cylinder		(5) Group Cylinders						
Potential for Aggradation/Degradation/Movement:															
Other Factors Affecting Abut./Pier Location:															
Scour Mitigation Measures:															





DBI Type = 3

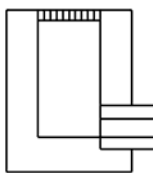
(SAG)

GE = 612.25

$$\text{HW} = \text{GE} + \text{Hg}$$

OR

$$\text{HW} = \text{IE} + \text{Hp}$$



IE = 608.25

D = 18"

	Q ₁₀ = 2.3	Q ₂₅	Q ₁₀₀ = 3.5
Hg	0.24		0.34
HW	612.49		612.59
Hp	1.00		1.15
HW	609.25		609.40

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
 LEFT OF 49+69 RIVER BLUFF EAST DBI, ss#3 left

Zone of Influence : Louisville
 C-Factor : .86
 Area (acres) : .54

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 100 (ft)
 Overland Friction Factor : N = .4
 2-Year, 24-Hour Precipitation : P = 3.2 (in)
 Average Overland Slope : SO = .06 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 360 (ft)
 Manning's Roughness Coefficient : n = .04
 Bank Full Section Flow Area : AC = 2 (ft²)
 Channel Slope : SC = .04 (ft/ft)
 Wetted Perimeter : WP = 4 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	1.4527	13.7996	12.5182	1.2814	3.1282
Q 5	1.9877	12.3705	11.0891	1.2814	4.2801
Q 10	2.3381	11.6510	10.3696	1.2814	5.0347
Q 25	2.8003	10.9304	9.6490	1.2814	6.0300
Q 50	3.1218	10.5208	9.2394	1.2814	6.7222
Q 100	3.4596	10.1491	8.8677	1.2814	7.4497
Q 500	4.2795	(cfs)			

=====

KTdid: 9802

END OF RUN

COUNTY OF	ITEM NO.	SHEET NO.
OLDHAM	5-441.00	R97

[illegible]

FLOOD EVALUATION DATA		
RETURN INTERVAL	Q (cfs)	HW
100-YEAR	3.5	612.59
10-YEAR	2.3	612.49

LT 49+69	- DBI TY 3
----------	------------

CONST 1-DBI TYPE 3	
(WITHOUT APRON)	
(H= 4.00')	
40.8' LT	

STATION	DEFLECTION
23.1' LEFT	41.6°

CONST 1-	CBI	TYPE A
(NO. 25,	NO. 6,	H=6.00')
21. ' LT		

PROP	RIVER	BLUFF	RD	EAST
------	-------	-------	----	------

PROP RIVER BLUFF RD WEST

PROP DBI TY 3,	29.0' LT
STA 133+00 US	42

T/G=610.50

CONST 16 LF OF	
STORM SEWER	

INV=606.80

So=2.97%

CONST III LF OF 18" STORM SEWER					
---------------------------------	--	--	--	--	--

INV=603.50 PROP
18" STORM
SEWER

PROP
18" STORM
SEWER

49+69 RIVER BLUFF RD. EAST
@ 8.5° SKEW RT

SCALE: 1"=5'

PIPE SECTION
RIVER BLUFF RD EAST
STA 49+69
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Storm Sewer No. 3 Left
Qways runs

Qways for Storm Sewer No. 3 Left Analysis

12-12-2011 15:27:08

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
LEFT OF 49+69 RIVER BLUFF EAST DBI, ss#3 left

Zone of Influence : Louisville
C-Factor : .86
Area (acres) : .54

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 100 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .06 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 360 (ft)
Manning's Roughness Coefficient : n = .04
Bank Full Section Flow Area : AC = 2 (ft²)
Channel Slope : SC = .04 (ft/ft)
Wetted Perimeter : WP = 4 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	1.4527	13.7996	12.5182	1.2814	3.1282
Q 5	1.9877	12.3705	11.0891	1.2814	4.2801
Q 10	2.3381	11.6510	10.3696	1.2814	5.0347
Q 25	2.8003	10.9304	9.6490	1.2814	6.0300
Q 50	3.1218	10.5208	9.2394	1.2814	6.7222
Q 100	3.4596	10.1491	8.8677	1.2814	7.4497
Q 500	4.2795	(cfs)			

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
126+00 left, ss#3 left

Zone of Influence : Louisville
C-Factor : .5
Area (acres) : .55

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 60 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .05 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 230 (ft)
Manning's Roughness Coefficient : n = .016
Bank Full Section Flow Area : AC = 2 (ft²)
Channel Slope : SC = .02 (ft/ft)
Wetted Perimeter : WP = 8 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	1.0114	9.8838	9.1470	0.7368	3.6778
Q 5	1.3623	8.8745	8.1377	0.7368	4.9538
Q 10	1.5920	8.3603	7.6234	0.7368	5.7892
Q 25	1.8912	7.8532	7.1163	0.7368	6.8773
Q 50	2.1017	7.5593	6.8225	0.7368	7.6426
Q 100	2.3199	7.2951	6.5583	0.7368	8.4360
Q 500	2.8488	(cfs)			

=====

KTdid: 9802

END OF RUN

Storm Sewer Analysis
Storm Sewer No. 4
Outfall – Right 138+34

Kentucky Transportation Cabinet
Division of Highway Design
STORM SEWER SYSTEM SUMMARY

TC 61-517
01/2011

County :	Oldham	Route :	US 42	Item # :	5-441.00
UPN :	FD52 093 0042 000-001		FPN :	STPM 5138(056)	
Outfall Station:	138+34 with two deflections		Outfall Offset:	65.5	ft
System Sta. to Sta. :	136+50		to	150+34 (proposed system)	
EXISTING CONDITIONS					
Downstream Receiving Structure :			Tailwater Control :		
Receiving Structure	Area :	Ac	Wtd "C":	Tc:	min. Slope :
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Existing Culvert or Channel at Outfall					
Channel	Side Slopes	Lt: :1	Rt: :1	Bottom Width:	ft Slope:
Culvert Outlet	Size :	Dia	Material	Outlet Elev.	
Outlet Conditions	Area :	Ac	Wtd "C":	Tc:	min. Slope :
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)					
Flow Depth (ft)					
Velocity (ft/s)					
PROPOSED CONDITIONS					
Downstream Receiving Structure :			Tailwater Control :		
Receiving Structure	Area :	Ac	Wtd "C":	Tc:	min. Slope :
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Proposed Outfall Structure					
54" Pipe Culvert Headwall					
Stm Swr Outfall	Size :	54 In	Dia 11 In	Material	Outlet Elev. 591.3
Outlet Conditions	Area :	63.64	Ac	Wtd "C": 0.48	Tc: 39.4 min. Slope : 3.64%
Return Interval (years)	2	5	10	25	50 100 500
Discharge (cfs)			79		122
Flow Depth (ft)					
Velocity (ft/s)			19.80		22.30
Analysis Software (and version)		Civil-Design-Network			
Additional Comments:		This is the outfall of storm sewer No. 4.			
All proposed pipes are flowing less than 0.8diameter full, therefore no pressure flow occurred in the 10 year or 100 year event.					
The existing 4' X 4' RCBC is part of the existing stormsewer system, and is therefore being extended as such.					
The majority of the drainage area to this system is coming in through the existing 42" RCP that connects to the RCBC					

140+00

145+00

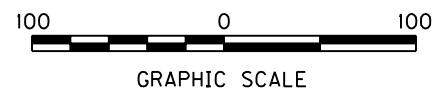
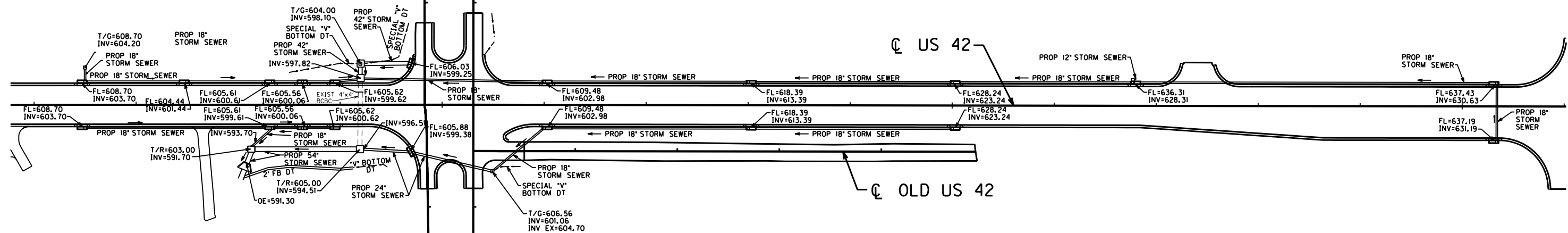
150+00

CL HATFIELD
WAY WEST

CL HATFIELD
WAY EAST

CL US 42

CL OLD US 42



SCALE: 1"=100'

STORM SEWER
SYSTEM 4

US 42 Oldham County
Storm Sewer System No.4
10 Year

Node	Sta	DA	C	DCA	SCA	DT	ST	RI	Q	L	So	Dia	Vo	Q(.8d)	Qf
Start New Section =====															
60	136+50R	0.17	.90	0.15	0.15	0.0	3.8	7.52							
								1.1	181.0	.0226	18	5.5	16.7	18.4	
63	138+34R	0.00	.00	0.00	0.15	0.5	4.3	7.52							
↑ Junction =====															
↑ End System (Outlet)=====															
Start New Section =====															
61	138+92R	0.07	.90	0.06	0.06	0.0	3.2	7.86							
								0.5	26.0	.0215	18	4.2	16.3	17.9	
62	138+63R	0.06	.90	0.05	0.11	0.1	3.3	7.80							
								0.9	26.0	.0173	18	4.7	14.6	16.1	
63	138+34R	0.17	.90	0.15	0.41	0.1	4.3	7.74							
								3.2	25.0	.2364	18	17.2	54.1	59.5	
88	138+34R	0.00	.00	0.00	0.41	0.0	4.4	7.74							
↑ Junction =====															
↑ End System (Outlet)=====															
Start New Section =====															
64	145+00R	0.36	.88	0.32	0.32	0.0	3.3	7.80							
								2.5	197.0	.0500	18	9.2	24.9	27.4	
65	143+00R	0.26	.85	0.22	0.54	0.4	3.7	7.60							
								4.1	197.0	.0528	18	10.8	25.6	28.1	
66	141+00R	0.23	.85	0.20	0.74	0.3	4.0	7.44							
								5.5	63.0	.0305	18	9.6	19.4	21.4	
67	50+50L HF	3.69	.42	1.55	2.29	0.1	6.9	6.22							
								14.2	80.0	.0210	24	10.7	34.7	38.2	
68	50+50R HF	0.20	.90	0.18	2.47	0.1	7.0	6.18							
								15.3	45.0	.0638	24	16.3	60.5	66.6	
87	139+20R	0.00	.00	0.00	2.47	0.0	7.1	6.18							
↑ Junction =====															
↑ End System (Outlet)=====															
Start New Section =====															
69	136+50L	1.48	.58	0.86	0.86	0.0	21.4	3.72							
								3.2	12.0	.0417	18	9.2	22.7	25.0	
70	136+50L	0.44	.82	0.36	1.22	0.0	21.4	3.72							
								4.5	97.0	.0233	18	8.3	17.0	18.7	
90	137+50L	0.35	.78	0.27	1.49	0.2	21.6	3.70							
								5.5	81.0	.0102	18	6.4	11.2	12.4	
71	138+34L	0.19	.78	0.15	1.64	0.2	21.8	3.68							

US 42 Oldham County
Storm Sewer System No.4
10 Year

Node	Sta	DA	C	DCA	SCA	DT	ST	RI	Q	L	So	Dia	Vo	Q(.8d)	Qf
								6.0	26.0	.0212	18	8.7	16.2	17.8	
72	138+63L	0.04	.90	0.04	1.68	0.1	21.9	3.67							
								6.2	26.0	.0169	18	8.0	14.5	15.9	
73	138+92L	0.08	.90	0.07	1.75	0.1	21.9	3.67							
								6.4	22.0	.0818	18	14.4	31.8	35.0	
86	139+20L	0.00	.00	0.00	1.75	0.0	22.0	3.67							
↑ Junction =====															
↑ End System (Outlet)=====															
Start New Section =====															
74	147+25L	0.08	.90	0.07	0.07	0.0	2.5	8.28							
								0.6	49.0	.0076	12	3.2	3.3	3.6	
77	146+77L	0.00	.00	0.00	0.07	0.3	2.8	8.28							
↑ Junction =====															
↑ End System (Outlet)=====															
Start New Section =====															
75	150+34L	0.22	.90	0.20	0.20	0.0	2.9	8.03							
								1.6	56.0	.0100	18	4.6	11.1	12.2	
76	150+34L	0.15	.90	0.14	0.34	0.2	3.1	7.91							
								2.7	354.0	.0066	18	4.5	9.0	9.9	
77	146+77L	0.03	.90	0.03	0.44	1.3	4.4	7.22							
								3.2	174.0	.0291	18	8.1	19.0	20.9	
78	145+00L	0.17	.90	0.15	0.59	0.4	4.8	7.05							
								4.2	197.0	.0500	18	10.6	24.9	27.4	
79	143+00L	0.29	.82	0.24	0.83	0.3	5.1	6.92							
								5.7	197.0	.0528	18	11.9	25.6	28.1	
80	141+00L	0.19	.87	0.17	1.00	0.3	5.3	6.80							
								6.8	176.0	.0293	18	10.1	19.0	21.0	
86	139+20L	0.00	.00	0.00	1.00	0.3	5.6	6.80							
↑ Junction =====															
↑ End System (Outlet)=====															
Start New Section =====															
81	138+42L	2.63	.45	1.18	1.18	0.0	17.1	4.16							
								4.9	85.0	.0241	18	8.6	17.3	19.0	
86	139+20L	0.00	.00	0.00	1.18	0.2	17.3	4.16							
↑ Junction =====															
↑ End System (Outlet)=====															

US 42 Oldham County
Storm Sewer System No.4
10 Year

Node	Sta	DA	C	DCA	SCA	DT	ST	RI	Q	L	So	Dia	Vo	Q(.8d)	Qf
+ Start New Section =====															
83	49+56L HF	51.33	.45	23.10	23.10	0.0	39.0	2.61							
								60.4	88.0	.0047	42	8.6	73.0	80.4	
84	49+56R HF	0.07	.90	0.06	23.16	0.2	39.2	2.61							
								60.4	45.0	.0256	42	16.5	170.4	187.6	
85	139+20L	0.69	.84	0.58	23.74	0.0	39.2	2.60							
								61.8	9.0	.0311	42	17.8	187.9	206.8	
86	139+20L	0.00	.00	0.00	27.67	0.0	39.2	2.60							
								72.0	65.0	.0513	54	21.8	471.5	519.0	
87	139+20R	0.00	.00	0.00	30.14	0.0	39.3	2.60							
								78.4	100.0	.0281	54	18.0	349.0	384.2	
88	138+14R	0.00	.00	0.00	30.55	0.1	39.4	2.60							
								79.4	11.0	.0364	54	19.8	397.2	437.2	
89	138+14R	0.00	.00	0.00	30.55	0.0	39.4	2.60							

↑ Junction =====

↑ End System (Outlet)=====

END =====

Summary of Pipes

18	2218.00
24	125.00
12	49.00
42	142.00
54	176.00

US 42 Oldham County
Storm Sewer System No.4
100 Year

Node	Sta	DA	C	DCA	SCA	DT	ST	RI Q	L	So	Dia	Vo	Q(.8d)	Qf
Start New Section =====														
60	136+50R	0.17	.90	0.15	0.15	0.0	3.4	10.43						
								1.6	181.0	.0226	18	6.1	16.7	18.4
63	138+34R	0.00	.00	0.00	0.15	0.5	3.9	10.43						
↑ Junction =====														
↑ End System (Outlet)=====														
Start New Section =====														
61	138+92R	0.07	.90	0.06	0.06	0.0	2.9	10.74						
								0.6	26.0	.0215	18	4.5	16.3	17.9
62	138+63R	0.06	.90	0.05	0.11	0.1	3.0	10.68						
								1.2	26.0	.0173	18	5.1	14.6	16.1
63	138+34R	0.17	.90	0.15	0.41	0.1	3.9	10.63						
								4.4	25.0	.2364	18	18.8	54.1	59.5
88	138+34R	0.00	.00	0.00	0.41	0.0	3.9	10.63						
↑ Junction =====														
↑ End System (Outlet)=====														
Start New Section =====														
64	145+00R	0.36	.88	0.32	0.32	0.0	3.0	10.68						
								3.4	197.0	.0500	18	10.0	24.9	27.4
65	143+00R	0.26	.85	0.22	0.54	0.3	3.3	10.47						
								5.7	197.0	.0528	18	11.8	25.6	28.1
66	141+00R	0.23	.85	0.20	0.74	0.3	3.6	10.30						
								7.6	63.0	.0305	18	10.5	19.4	21.4
67	50+50L HF	3.69	.42	1.55	2.29	0.1	6.4	8.86						
								20.3	80.0	.0210	24	11.7	34.7	38.2
68	50+50R HF	0.20	.90	0.18	2.47	0.1	6.5	8.81						
								21.8	45.0	.0638	24	18.0	60.5	66.6
87	139+20R	0.00	.00	0.00	2.47	0.0	6.6	8.81						
↑ Junction =====														
↑ End System (Outlet)=====														
Start New Section =====														
69	136+50L	1.48	.58	0.86	0.86	0.0	18.2	5.71						
								4.9	12.0	.0417	18	10.4	22.7	25.0
70	136+50L	0.44	.82	0.36	1.22	0.0	18.2	5.71						
								7.0	97.0	.0233	18	9.3	17.0	18.7
90	137+50L	0.35	.78	0.27	1.49	0.2	18.4	5.68						
								8.5	81.0	.0102	18	7.1	11.2	12.4
71	138+34L	0.19	.78	0.15	1.64	0.2	18.6	5.66						

US 42 Oldham County
Storm Sewer System No.4
100 Year

Node	Sta	DA	C	DCA	SCA	DT	ST	RI	Q	L	So	Dia	Vo	Q(.8d)	Qf
72	138+63L	0.04	.90	0.04	1.68	0.0	18.6	5.65	9.3	26.0	.0212	18	9.6	16.2	17.8
73	138+92L	0.08	.90	0.07	1.75	0.0	18.7	5.64	9.5	26.0	.0169	18	8.9	14.5	15.9
86	139+20L	0.00	.00	0.00	1.75	0.0	18.7	5.64	9.9	22.0	.0818	18	16.2	31.8	35.0
↑ Junction =====															
↑ End System (Outlet)=====															
↓ Start New Section =====															
74	147+25L	0.08	.90	0.07	0.07	0.0	2.2	11.21	0.8	49.0	.0076	12	3.5	3.3	3.6
77	146+77L	0.00	.00	0.00	0.07	0.2	2.4	11.21							
↑ Junction =====															
↑ End System (Outlet)=====															
↓ Start New Section =====															
75	150+34L	0.22	.90	0.20	0.20	0.0	2.7	10.87	2.2	56.0	.0100	18	5.0	11.1	12.2
76	150+34L	0.15	.90	0.14	0.34	0.2	2.9	10.75	3.7	354.0	.0066	18	4.9	9.0	9.9
77	146+77L	0.03	.90	0.03	0.44	1.2	4.1	10.02	4.4	174.0	.0291	18	8.9	19.0	20.9
78	145+00L	0.17	.90	0.15	0.59	0.3	4.4	9.84	5.8	197.0	.0500	18	11.7	24.9	27.4
79	143+00L	0.29	.82	0.24	0.83	0.3	4.7	9.69	8.0	197.0	.0528	18	13.0	25.6	28.1
80	141+00L	0.19	.87	0.17	1.00	0.3	4.9	9.56	9.6	176.0	.0293	18	11.0	19.0	21.0
86	139+20L	0.00	.00	0.00	1.00	0.3	5.2	9.56							
↑ Junction =====															
↑ End System (Outlet)=====															
↓ Start New Section =====															
81	138+42R	2.63	.45	1.18	1.18	0.0	14.9	6.28	7.4	85.0	.0241	18	9.6	17.3	19.0
86	139+20R	0.00	.00	0.00	1.18	0.1	15.0	6.28							
↑ Junction =====															
↑ End System (Outlet)=====															

US 42 Oldham County
Storm Sewer System No.4
100 Year

Node	Sta	DA	C	DCA	SCA	DT	ST	RI	Q	L	So	Dia	Vo	Q(.8d)	Qf
↓ Start New Section =====															
83	49+56L HF	51.33	.45	23.10	23.10	0.0	34.8	4.00							
								92.3	88.0	.0047	42	9.7	73.0	80.4	
84	49+56R HF	0.07	.90	0.06	23.16	0.2	35.0	3.98							
								92.3	45.0	.0256	42	18.4	170.4	187.6	
85	139+20L	0.69	.84	0.58	23.74	0.0	35.0	3.98							
								94.5	9.0	.0311	42	19.9	187.9	206.8	
86	139+20L	0.00	.00	0.00	27.67	0.0	35.0	3.98							
								110.2	65.0	.0513	54	24.6	471.5	519.0	
87	139+20R	0.00	.00	0.00	30.14	0.0	35.0	3.98							
								119.9	100.0	.0281	54	20.2	349.0	384.2	
88	138+14R	0.00	.00	0.00	30.55	0.1	35.1	3.97							
								121.4	11.0	.0364	54	22.3	397.2	437.2	
89	138+14R	0.00	.00	0.00	30.55	0.0	35.1	3.97							
↑ Junction =====															

↑ End System (Outlet)=====

END =====

Summary of Pipes

18	2218.00
24	125.00
12	49.00
42	142.00
54	176.00

Commands Read From File: 13834-LO.CHL

```

      JOB US 42 OUTLET DITCH LEFT 138+05 545" PIPE
      UNI 0
**  UNITS PARAMETER = 0 (ENGLISH)
      CHL .10 79.4
      TRP 5 2 2
**  LEFT SIDE SLOPE      2.0 AND RIGHT SIDE SLOPE      2.0
**  THE BASE WIDTH OF THE TRAPEZOID (ft)      5.00
      LRR 1.0
**  D50 (ft)      1.00
      END

```

*****END OF COMMAND FILE*****

US 42 OUTLET DITCH LEFT 138+05 545" PIPE

INPUT REVIEW

```

      DEFAULT ANGLE OF REPOSE (degrees):      41.74
      DESIGN PARAMETERS:
        DESIGN DISCHARGE (ft^3/s):      79.40
        CHANNEL SHAPE:      TRAPEZOIDAL
        CHANNEL SLOPE (ft/ft):      .100

```

HYDRAULIC CALCULATIONS USING BATHURST

```

      FLOW (cfs)      79.40
      MAX DEPTH (ft)      1.26
      AREA (ft^2)      9.48
      WETTED PERIMETER (ft)      10.64
      HYDRAULIC RADIUS (ft)      .89
      AVG VELOCITY (ft/s)      8.38
      MANNINGS EQUIVALENT      .054
      Davg / D50      .94
      FROUDE NUMBER      1.31
      REYNOLDS NUMBER (10^5)      1.28
      *** WARNING: REYNOLDS NUMBER IS LARGER THAN 10^5

```

STABILITY ANALYSIS

CONDITION	LINING TYPE	PERMIS SHR (LB/FT^2)	CALC. SHR (LB/FT^2)	STAB. FACTOR	REMARKS
BOTTOM; STRAIGHT	RIPRAP	4.84	7.88	.61	UNSTABLE
SIDE; STRAIGHT	RIPRAP	3.58	6.07	.59	UNSTABLE

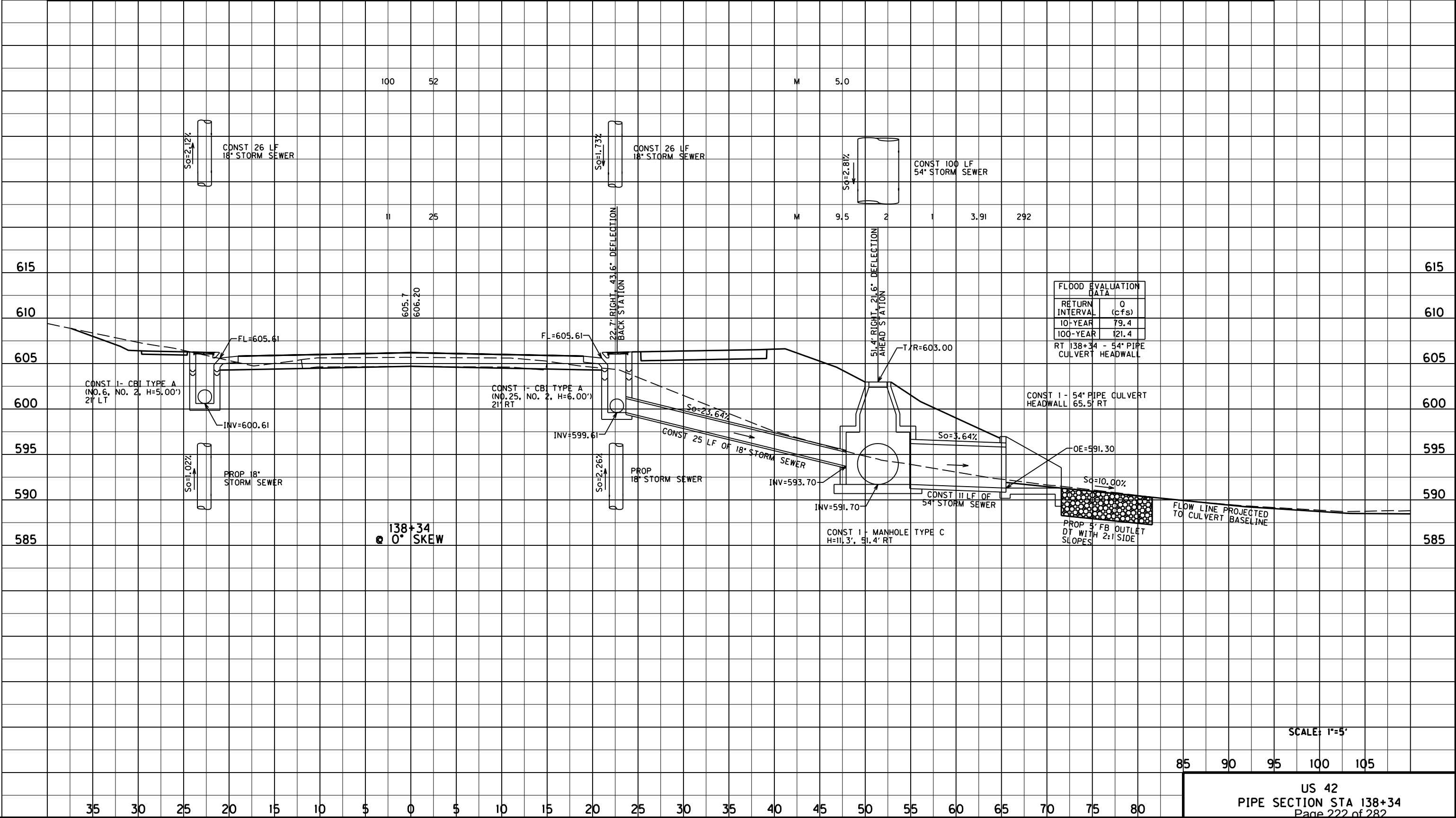
*** NORMAL END OF HYCHL ***

MicroStation v8.11.1.180 E-SHEET NAME: USER: Alex Smith DATE PLOTTED: January 1, 0001 FILE NAME: G:\PWORK\ALEX1.SMITH\DO14517\KTYC.SHEET.CEL

PIPE DRAINAGE SHEET 14 of 21

COUNTY OF	ITEM NO.	SHEET NO.
OLDHAM	5-441.00	R91

STORM SEWER PIPE										DESIGN D.H. LEVEL	MAXIMUM COVER HEIGHT	CBI TYPE A	MH TYPE C	CLASS "A" CONC	REINF STEEL				
								54"	18"										
LINE AR FEET											FEET	EACH	EACH	CU YD	LBS				



FLOOD EVALUATION DATA	
RETURN INTERVAL	0 (cfs)
10-YEAR	79.4
100-YEAR	121.4
RT 138+34 - 54" PIPE CULVERT HEADWALL	

SCALE: 1"=5'

Left Sta. 136+50.00
@ 0° Skew

DBI Type 3

Kentucky Transportation Cabinet
Division of Highway Design
DRAINAGE DESIGN SUMMARY

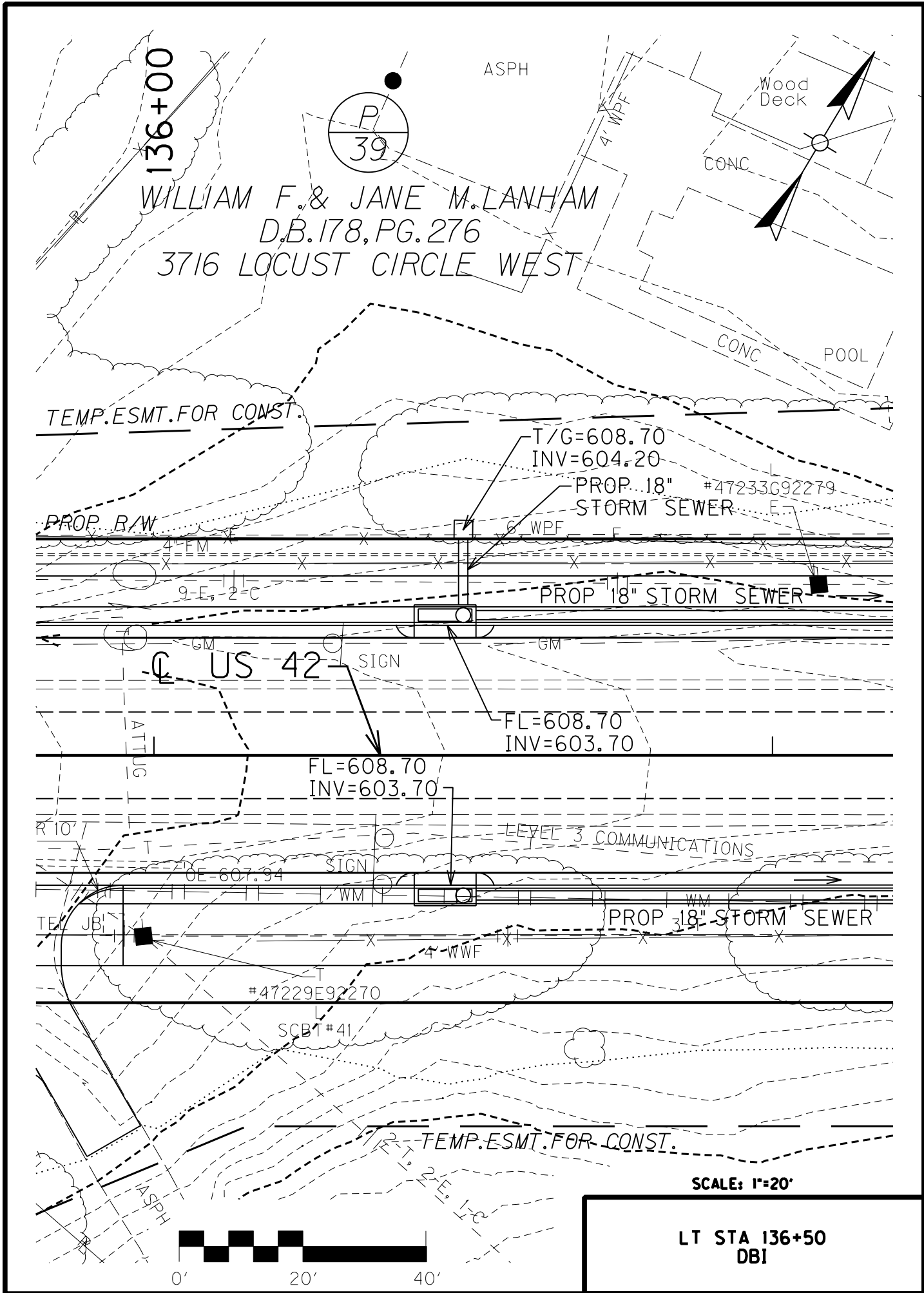
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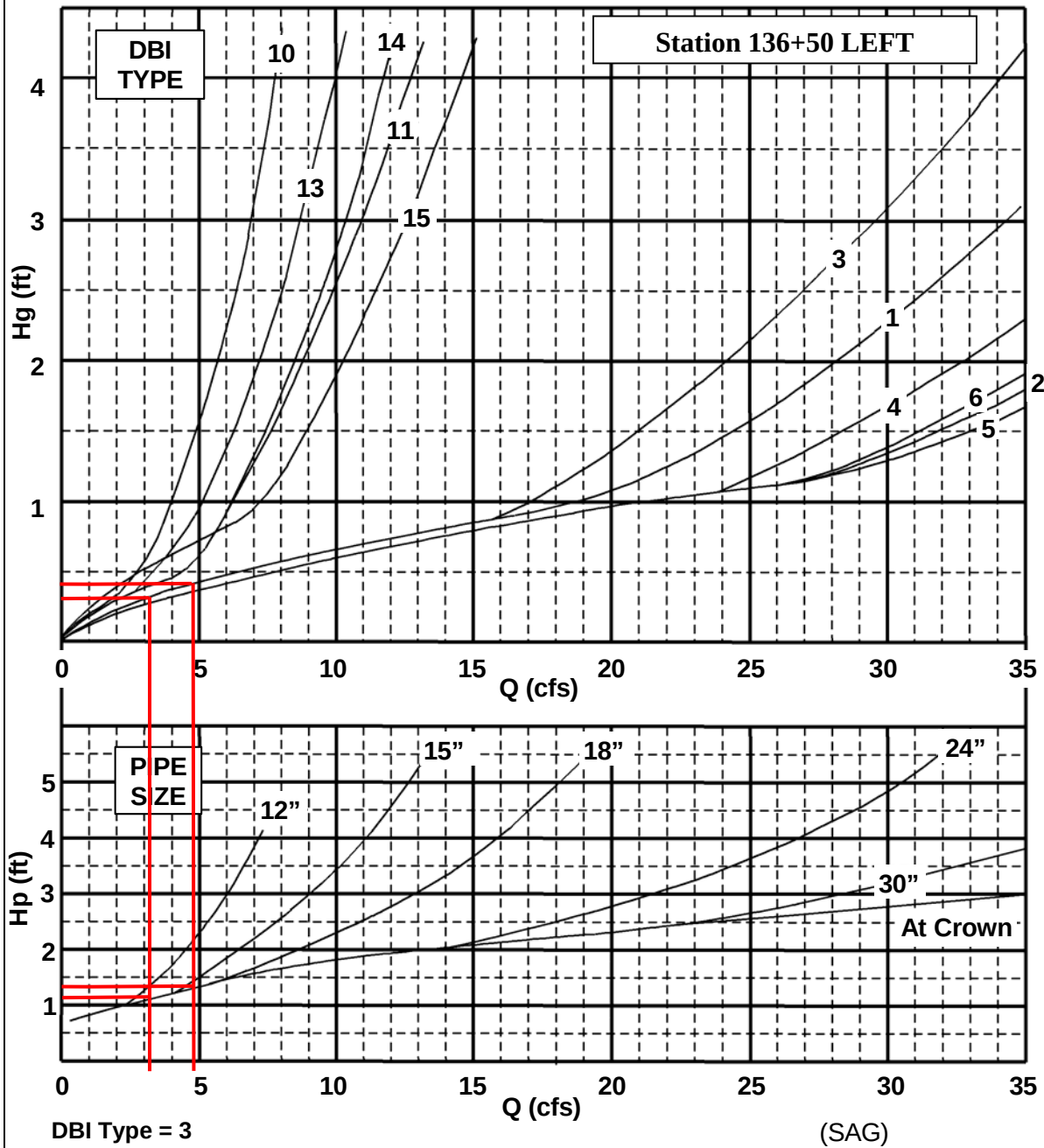
County :	OLDHAM	Route :	US 42	Item # :	5-441.00
UPN :	FD52 093 0042 000-001	FPN :	STPM 5138(056)	Sta.:	136+50 LT
Latitude (dec deg):	38.36611111	Longitude (dec deg):	85.60027778		
EXISTING CONDITIONS					
Downstream Channel Data			Drainage Area:	Ac	Slope :
Stream Name or Description:					
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Normal Pool El.		OHW Elev.		Bed Material:	D50 (mm)
Drift:		Abrasion Level:		pH:	
				Resistivity:	
FEMA Flood Zone:	No	Zone Type:		Flood Map No(s):	
Existing Bridge or Culvert			Drainage Area:	Ac	
Size, Length, Type & Material:			Skew:		
Lt. Abut./Inlet:			Rt. Abut./Outlet:		
Inlet El.:		Outlet El.:		Slope:	
				Top/Grate El.:	
Low Road El.:		Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Headwater Elev.					
Outlet Velocity (ft/s)					
PROPOSED CONDITIONS					
Downstream Channel Data			Drainage Area:	Ac	Slope :
Stream Name or Description: storm sewer system					
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Proposed Bridge or Culvert			Drainage Area:	1.48	Ac
Size, Length, Type & Material:			Skew:		
Lt. Abut./Inlet:	DBI Type 3		Rt. Abut./Outlet:	18" Storm Sewer	
Inlet El.:	604.2	Outlet El.:	603.7	Slope:	4.17%
				Top/Grate El.:	608.7
Low Road El.:	609.7 berm around DBI		Low Beam El.:		Net Opening:
Return Interval (years)	2	5	10	25	50
Discharge (cfs)			3.2		4.9
Headwater Elev.			609.05		609.10
Outlet Velocity (ft/s)			9.20		10.40
Flow Over Road (cfs)			0.00		0.00

Kentucky Transportation Cabinet
Division of Highway Design
Drainage Design Summary

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Page 2 of 2

REMARKS and / or CONTROLS															
RECORD HIGHWATER DATA															
Source	1:					2:					3:				
Elevation															
Date															
Location															
PROPOSED CHANNEL LINING / STREAM DISTURBANCE															
Location	Class	Thickness	Depth	Length	Quantity	Quantity Below OHW (CY)									
Upstream															
Downstream															
Total Length of Stream Disturbance (ft):				n/a											
PROPOSED DIVERSION															
Flooding	Return Interval (yrs)			Discharge (cfs)			Elevation								
Design Storm															
Overtopping Storm															
Recommended Size and Type of Opening(s):															
PROPOSED BOX CULVERT OR SPECIAL WING WALLS															
Inlet/Lt. Abut. Skewed		☐		Outlet/Rt. Abut. Skewed		☐									
Location	1	2	3	4											
30 Degree															
Skewed															
Special															
SCOUR															
Analysis Method:				Flow Angle (deg):				D50 (mm)				D95 (mm)			
Contraction Scour (ft):				Local Abut. Scour (ft):				Total Abut. Scour (ft):				0.00			
Pier No.:															
Length (ft):															
Width (ft):															
* Type:															
Local Scour:															
Total Scour:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*	(1) Triangular Nose		(2) Square Nose		(3) Round Nose		(4) Circular Cylinder		(5) Group Cylinders						
Potential for Aggradation/Degradation/Movement:															
Other Factors Affecting Abut./Pier Location:															
Scour Mitigation Measures:															



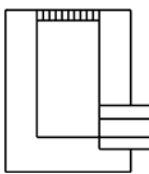


GE = 608.70

$$\text{HW} = \text{GE} + \text{Hg}$$

OR

$$\text{HW} = \text{IE} + \text{Hp}$$



IE = 604.20

D = 18"

	Q ₁₀ = 3.2	Q ₂₅	Q ₁₀₀ = 4.9
Hg	0.35		0.40
HW	609.05		609.10
Hp	1.15		1.35
HW	605.35		605.55

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
 136+50 lt dbi, ss#4

Zone of Influence : louisville
 C-Factor : .58
 Area (acres) : 1.48

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 235 (ft)
 Overland Friction Factor : N = .4
 2-Year, 24-Hour Precipitation : P = 3.2 (in)
 Average Overland Slope : SO = .05 (ft/ft)

Channel Flow Travel Time Components :

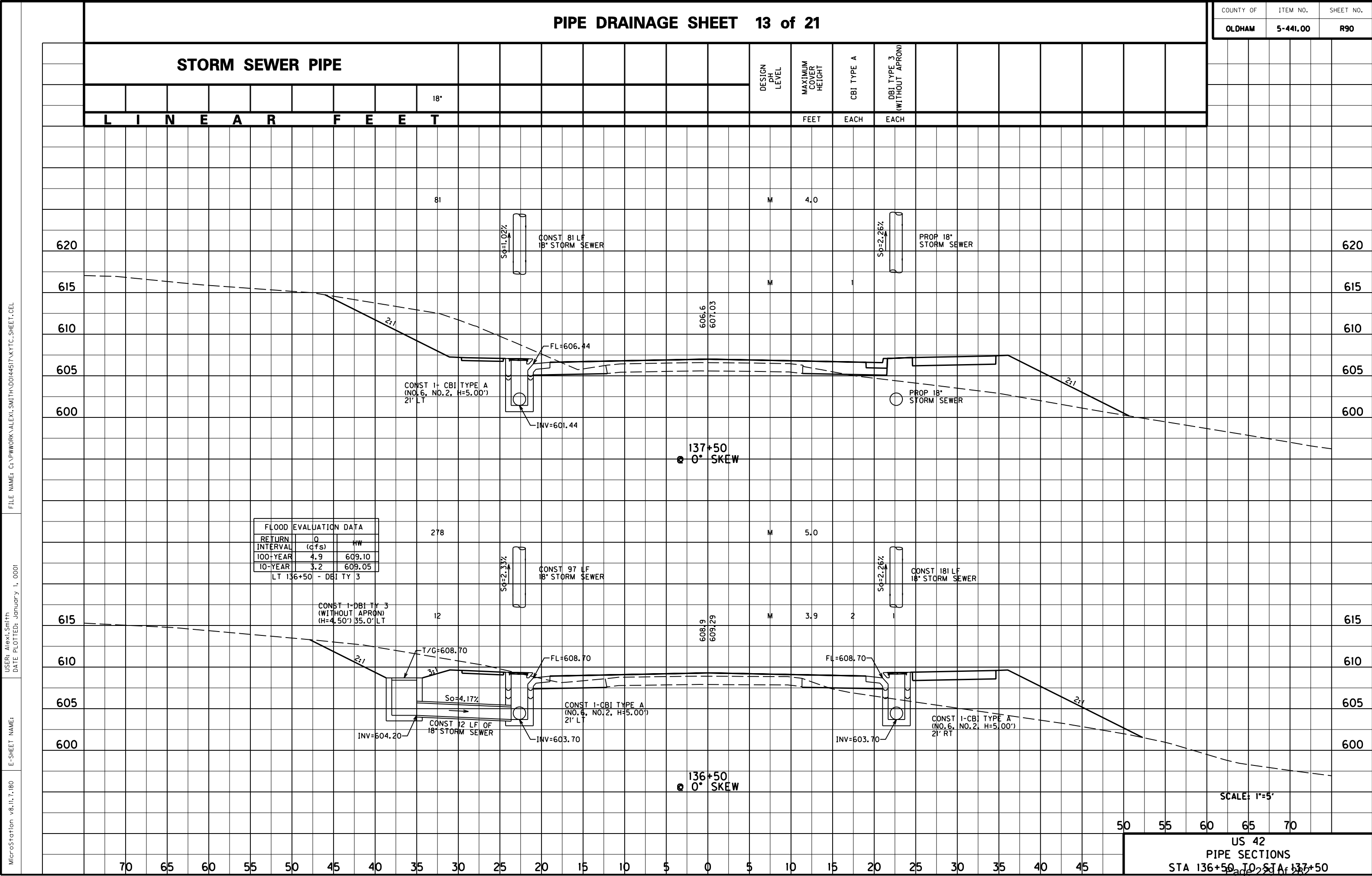
Length of Channel Flow : LC = 290 (ft)
 Manning's Roughness Coefficient : n = .035
 Bank Full Section Flow Area : AC = 20 (ft²)
 Channel Slope : SC = .055 (ft/ft)
 Wetted Perimeter : WP = 40.05 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	1.8812	26.2246	25.4537	0.7709	2.1915
Q 5	2.6837	22.8476	22.0767	0.7709	3.1264
Q 10	3.1957	21.4366	20.6657	0.7709	3.7228
Q 25	3.9074	19.8165	19.0456	0.7709	4.5519
Q 50	4.3897	18.9551	18.1842	0.7709	5.1138
Q 100	4.9129	18.1577	17.3868	0.7709	5.7233
Q 500	6.1915 (cfs)				

=====

KTdid: 9802

END OF RUN



Left Sta. 139+20.00
@ 0° Skew

DBI Type 3 Modified

Kentucky Transportation Cabinet
Division of Highway Design
DRAINAGE DESIGN SUMMARY

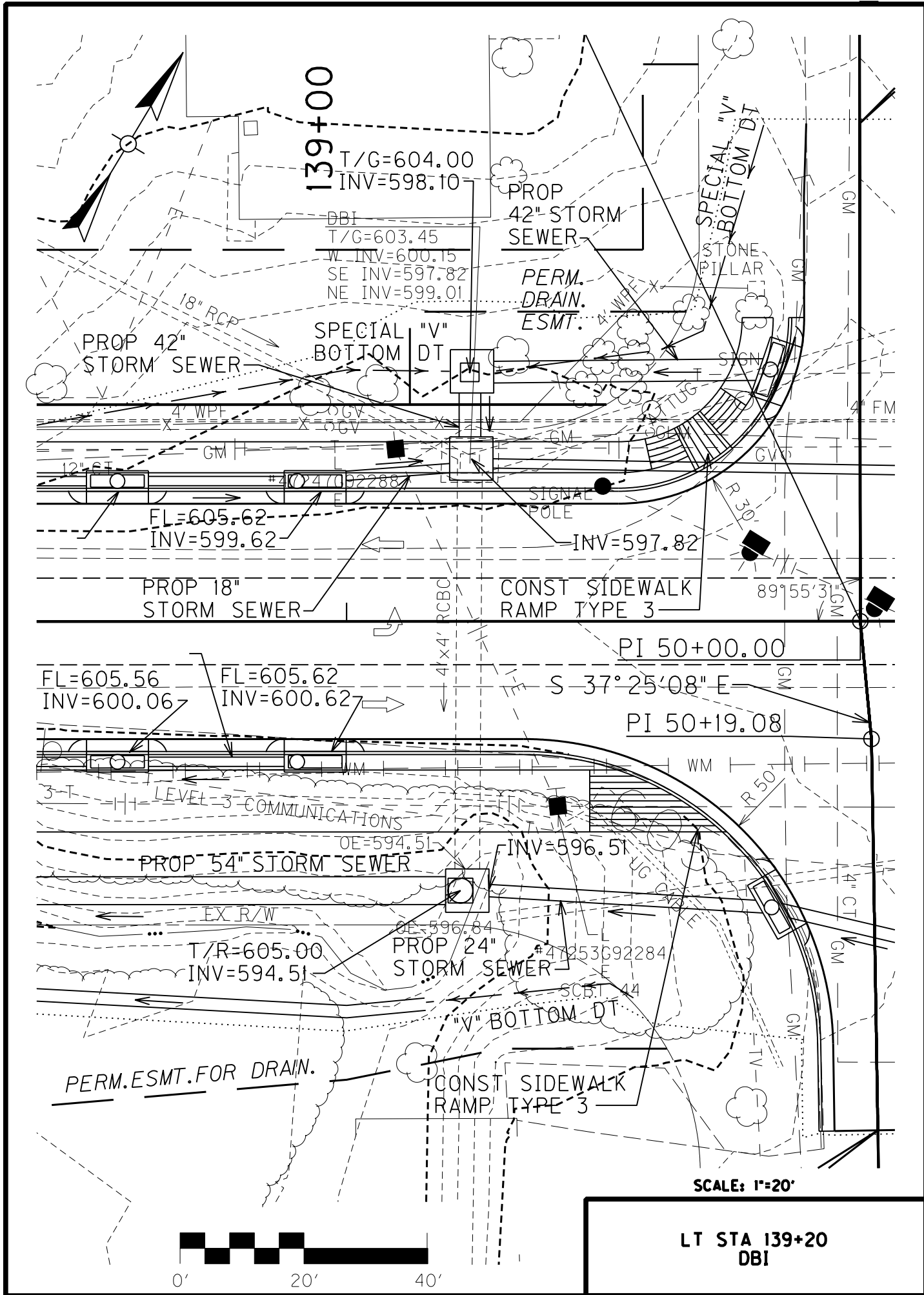
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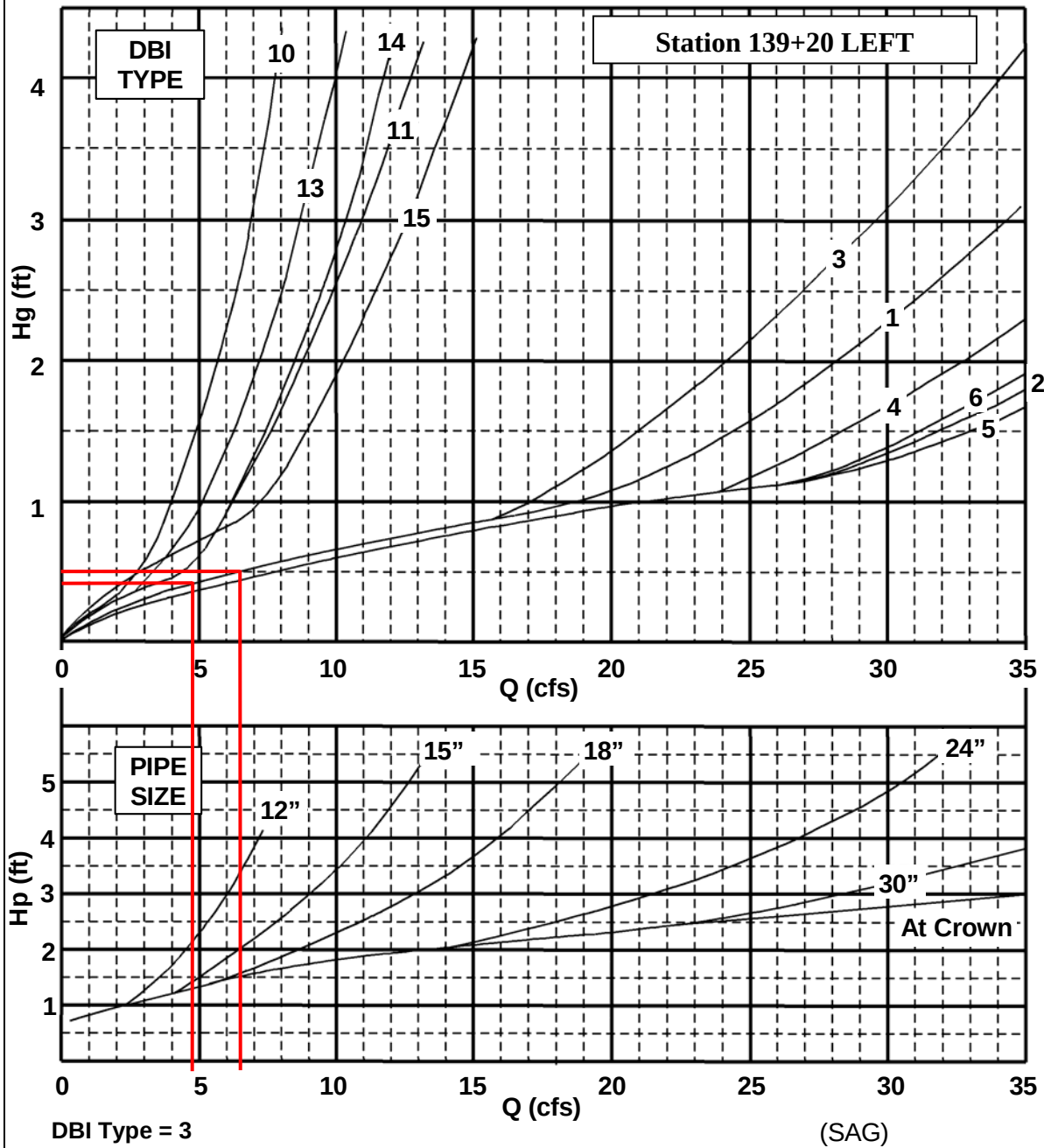
County :	OLDHAM	Route :	US 42	Item # :	5-441.00
UPN :	FD52 093 0042 000-001	FPN :	STPM 5138(056)	Sta.:	139+20 LT
Latitude (dec deg):	38.36611111	Longitude (dec deg):	85.60027778		
EXISTING CONDITIONS					
Downstream Channel Data			Drainage Area:	Ac	Slope :
Stream Name or Description:					
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Normal Pool El.		OHW Elev.		Bed Material:	D50 (mm)
Drift:		Abrasion Level:		pH:	
				Resistivity:	
FEMA Flood Zone:	No	Zone Type:		Flood Map No(s):	
Existing Bridge or Culvert					
				Drainage Area:	Ac
Size, Length, Type & Material:				Skew:	
Lt. Abut./Inlet:				Rt. Abut./Outlet:	
Inlet El.:		Outlet El.:		Slope:	
Low Road El.:		Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Headwater Elev.					
Outlet Velocity (ft/s)					
PROPOSED CONDITIONS					
Downstream Channel Data			Drainage Area:	Ac	Slope :
Stream Name or Description: storm sewer system including an existing 4' X4' RCBC					
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Proposed Bridge or Culvert					
				Drainage Area:	0.69 Ac
Size, Length, Type & Material: 42" storm sewer, 9 lf				Skew:	
Lt. Abut./Inlet: DBI Type 3 modified		Rt. Abut./Outlet: 42" Storm Sewer			
Inlet El.: 598.1	Outlet El.: 597.82	Slope: 3.10%	Top/Grate El.: 604		
Low Road El.: 606.8 berm behind SW	Low Beam El.:		Net Opening:		
Return Interval (years)	2	5	10	25	50
Discharge (cfs)			4.8		6.5
Headwater Elev.			604.42		604.50
Outlet Velocity (ft/s)			17.80		19.90
Flow Over Road (cfs)			0.00		0.00

Kentucky Transportation Cabinet
Division of Highway Design
Drainage Design Summary

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REMARKS and / or CONTROLS															
The existing 4' X 4" RCBC is part of the existing and proposed storm sewer system. Therefore it has been analyzed in the															
storm sewer analysis for storm sewer No. 4.															
RECORD HIGHWATER DATA															
Source	1:					2:					3:				
Elevation															
Date															
Location															
PROPOSED CHANNEL LINING / STREAM DISTURBANCE															
Location	Class	Thickness	Depth	Length	Quantity	Quantity Below OHW (CY)									
Upstream															
Downstream															
Total Length of Stream Disturbance (ft):				n/a											
PROPOSED DIVERSION															
Flooding		Return Interval (yrs)			Discharge (cfs)			Elevation							
Design Storm															
Overtopping Storm															
Recommended Size and Type of Opening(s):															
PROPOSED BOX CULVERT OR SPECIAL WING WALLS															
Inlet/Lt. Abut. Skewed		☐		Outlet/Rt. Abut. Skewed		☐									
Location	1	2	3	4											
30 Degree															
Skewed															
Special															
SCOUR															
Analysis Method:				Flow Angle (deg):				D50 (mm)				D95 (mm)			
Contraction Scour (ft):				Local Abut. Scour (ft):				Total Abut. Scour (ft):				0.00			
Pier No.:															
Length (ft):															
Width (ft):															
* Type:															
Local Scour:															
Total Scour:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*	(1) Triangular Nose		(2) Square Nose		(3) Round Nose		(4) Circular Cylinder		(5) Group Cylinders						
Potential for Aggradation/Degradation/Movement:															
Other Factors Affecting Abut./Pier Location:															
Scour Mitigation Measures:															



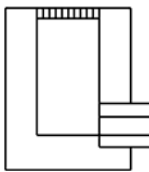


GE = 604.00

$$HW = GE + H_g$$

OR

$$HW = IE + H_p$$



IE = 598.10

D = 42"

	$Q_{10} = 4.8$	Q_{25}	$Q_{100} = 6.5$
Hg	0.42		0.50
HW	604.42		604.50
Hp			
HW			

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
DBI LEFT OF 139+20

Zone of Influence : LOUISVILLE
C-Factor : .84
Area (acres) : .69

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 50 (ft)
Overland Friction Factor : N = .1
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .08 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 131 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 6 (ft²)
Channel Slope : SC = .06 (ft/ft)
Wetted Perimeter : WP = 12.17 (ft)

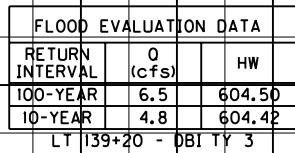
	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	3.3661	2.9208	2.5845	0.3363	5.8076
Q 5	4.2254	2.6958	2.3596	0.3363	7.2902
Q 10	4.7831	2.5814	2.2451	0.3363	8.2525
Q 25	5.4969	2.4595	2.1232	0.3363	9.4840
Q 50	6.0141	2.3843	2.0480	0.3363	10.3763
Q 100	6.5317	2.3176	1.9813	0.3363	11.2693
Q 500	7.7960	(cfs)			

=====

KTdid: 9802

END OF RUN

COUNTY OF	ITEM NO.	SHEET NO.
OLDHAM	5-441.00	R93

[illegible]

US 42
PIPE SECTIONS
STA 139+20 TO STA 141+00

Left Sta. 49+56
@ 16.3° Skew LT
Hayfield Way West

Existing DBI

Kentucky Transportation Cabinet
Division of Highway Design
DRAINAGE DESIGN SUMMARY

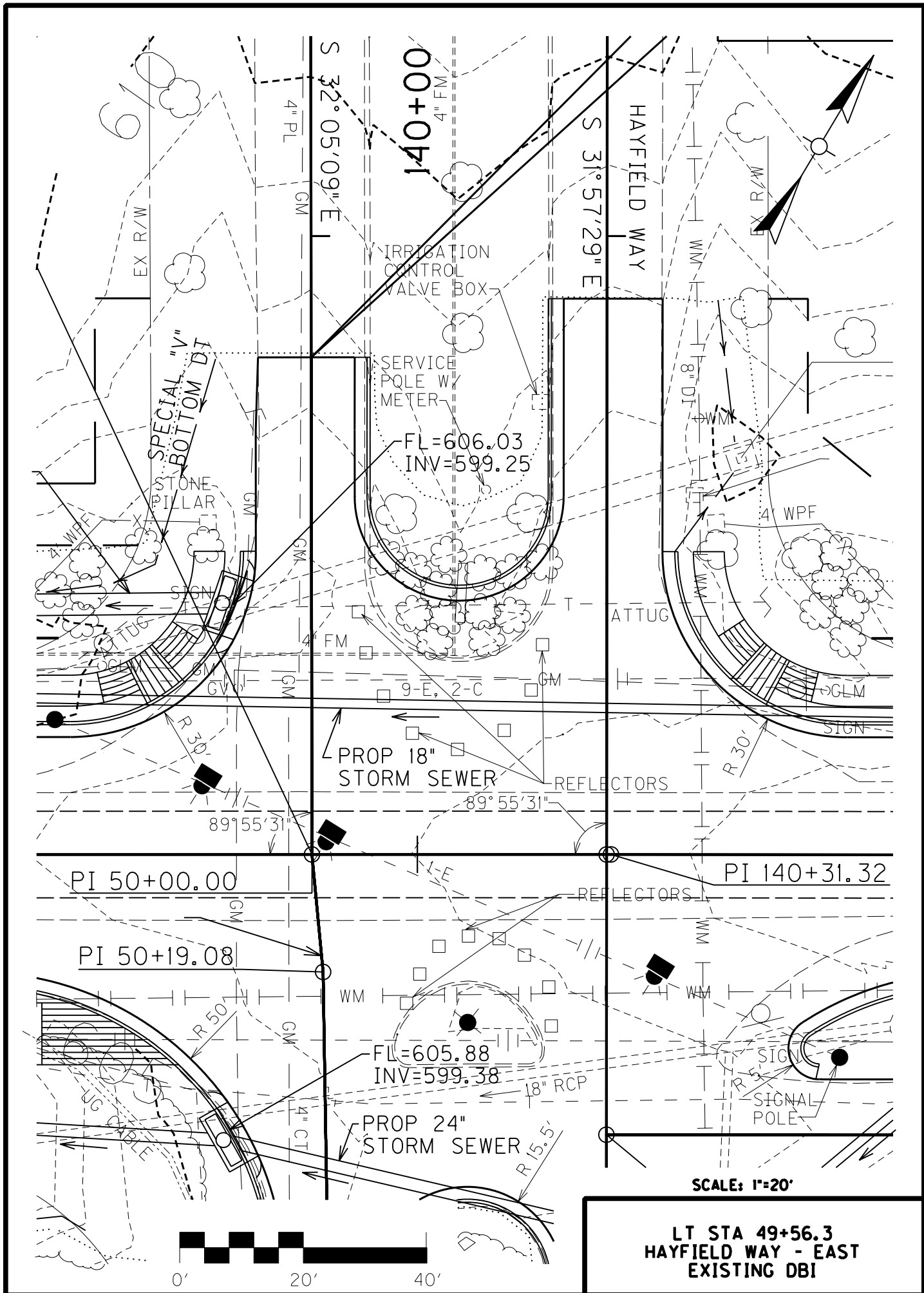
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County :	OLDHAM	Route :	US 42	Item # :	5-441.00		
UPN :	FD52 093 0042 000-001	FPN :	STPM 5138(056)	Sta.:	LT 49+56.3 Hayfield		
Latitude (dec deg):	38.36611111	Longitude (dec deg):	85.60027778				
EXISTING CONDITIONS							
Downstream Channel Data				Drainage Area:		Ac	Slope :
Stream Name or Description:							
Return Interval (years)	2	5	10	25	50	100	500
Discharge (cfs)							
Flow Depth ; Tailwater (ft)							
Normal Pool El.		OHW Elev.		Bed Material:		D50 (mm)	
Drift:		Abrasion Level:		pH:		Resistivity:	Date Taken:
FEMA Flood Zone:	No	Zone Type:		Flood Map No(s):			
Existing Bridge or Culvert				Drainage Area:		Ac	
Size, Length, Type & Material:				Skew:			
Lt. Abut./Inlet:				Rt. Abut./Outlet:			
Inlet El.:		Outlet El.:		Slope:		Top/Grate El.:	
Low Road El.:		Low Beam El.:		Net Opening:			
Return Interval (years)	2	5	10	25	50	100	500
Discharge (cfs)							
Headwater Elev.							
Outlet Velocity (ft/s)							
PROPOSED CONDITIONS							
Downstream Channel Data				Drainage Area:		Ac	Slope :
Stream Name or Description:				storm sewer system			
Return Interval (years)	2	5	10	25	50	100	500
Discharge (cfs)							
Flow Depth ; Tailwater (ft)							
Proposed Bridge or Culvert				Drainage Area:	0.81	Ac	
Size, Length, Type & Material:				Existing 42" RCP, 135 lf			
Lt. Abut./Inlet:		Existing DBI		Rt. Abut./Outlet:		Existing 42" RCP	
Inlet El.:	599.66	Outlet El.:	599.01	Slope:	47.00%	Top/Grate El.:	604.59
Low Road El.:	606.8	Low Beam El.:		Net Opening:			
Return Interval (years)	2	5	10	25	50	100	500
Discharge (cfs)			3.0			4.3	
Headwater Elev.			604.89			604.97	
Outlet Velocity (ft/s)			8.60			9.70	
Flow Over Road (cfs)			0.00			0.00	

Kentucky Transportation Cabinet
Division of Highway Design
Drainage Design Summary

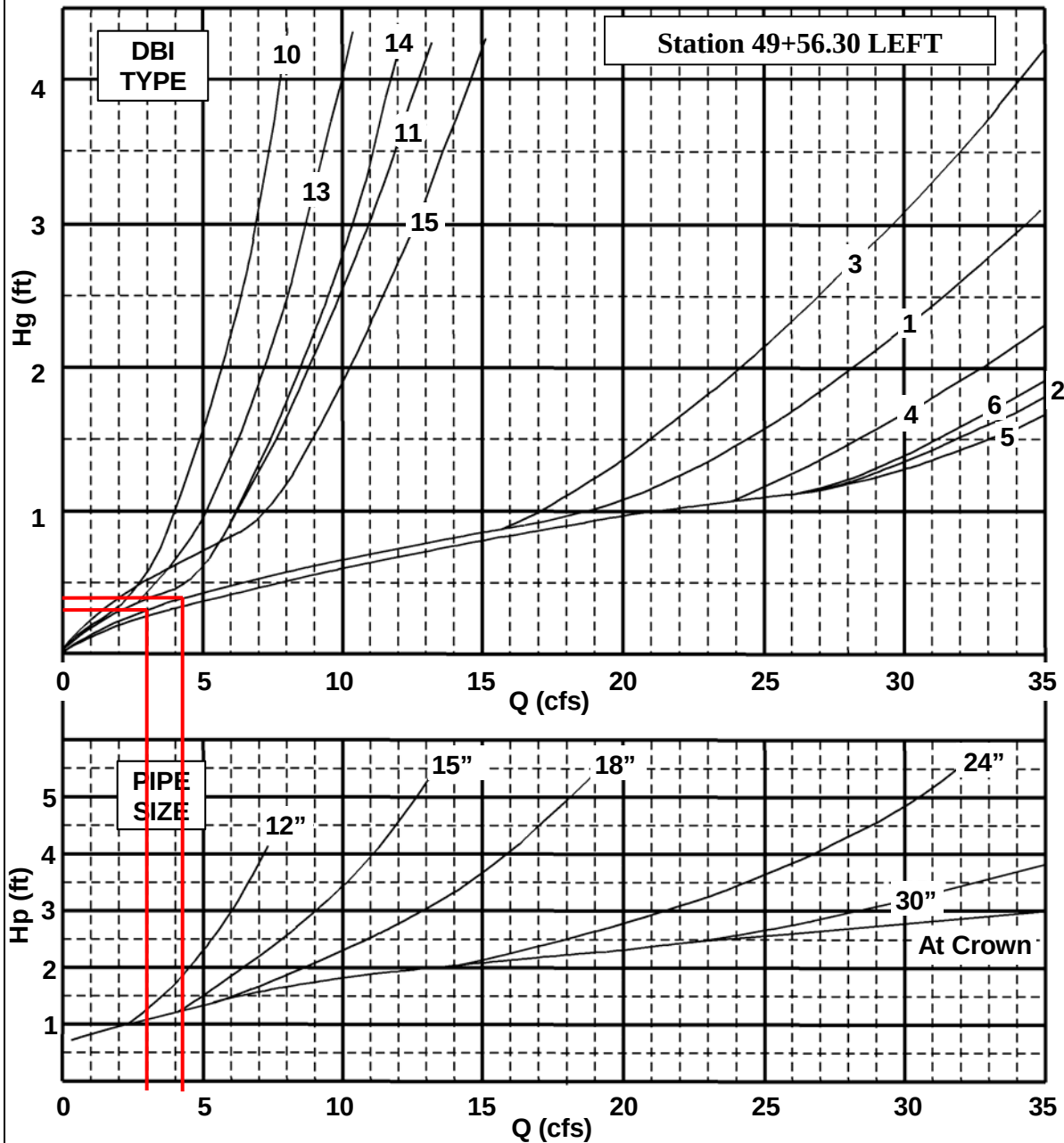
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REMARKS and / or CONTROLS													
The existing DBI is unaffected by the proposed construction. The hydraulic analysis of the existing DBI showed that it can handel the proposed runoff, therefore the existing DBI will not be replaced.													
RECORD HIGHWATER DATA													
Source	1:					2:					3:		
Elevation													
Date													
Location													
PROPOSED CHANNEL LINING / STREAM DISTURBANCE													
Location	Class	Thickness	Depth	Length	Quantity	Quantity Below OHW (CY)							
Upstream													
Downstream													
Total Length of Stream Disturbance (ft):				n/a									
PROPOSED DIVERSION													
Flooding		Return Interval (yrs)			Discharge (cfs)			Elevation					
Design Storm													
Overtopping Storm													
Recommended Size and Type of Opening(s):													
PROPOSED BOX CULVERT OR SPECIAL WING WALLS													
Inlet/Lt. Abut. Skewed		☐		Outlet/Rt. Abut. Skewed		☐							
Location	1	2	3	4									
30 Degree													
Skewed													
Special													
SCOUR													
Analysis Method:				Flow Angle (deg):				D50 (mm)				D95 (mm)	
Contraction Scour (ft):				Local Abut. Scour (ft):				Total Abut. Scour (ft):				0.00	
Pier No.:													
Length (ft):													
Width (ft):													
* Type:													
Local Scour:													
Total Scour:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*	(1) Triangular Nose	(2) Square Nose		(3) Round Nose		(4) Circular Cylinder		(5) Group Cylinders					
Potential for Aggradation/Degradation/Movement:													
Other Factors Affecting Abut./Pier Location:													
Scour Mitigation Measures:													



SCALE: 1"=20'

LT STA 49+56.3
HAYFIELD WAY - EAST
EXISTING DBI



DBI Type = 3

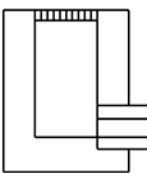
(SAG)

GE = 604.59

$$\text{HW} = \text{GE} + \text{Hg}$$

OR

$$\text{HW} = \text{IE} + \text{Hp}$$



IE = 599.66

D = 42"

	Q ₁₀ = 3.0	Q ₂₅	Q ₁₀₀ = 4.3
Hg	0.30		0.38
HW	604.89		604.97
Hp			
HW			

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
 EX DBI LEFT OF 49+56 HAYFIELD

Zone of Influence : LOUISVILLE
 C-Factor : .6
 Area (acres) : .81

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 70 (ft)
 Overland Friction Factor : N = .4
 2-Year, 24-Hour Precipitation : P = 3.2 (in)
 Average Overland Slope : SO = .1 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 156 (ft)
 Manning's Roughness Coefficient : n = .035
 Bank Full Section Flow Area : AC = 6 (ft²)
 Channel Slope : SC = .05 (ft/ft)
 Wetted Perimeter : WP = 12.17 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	1.9281	8.3501	7.9114	0.4387	3.9673
Q 5	2.5764	7.4972	7.0585	0.4387	5.3013
Q 10	3.0012	7.0577	6.6190	0.4387	6.1753
Q 25	3.5513	6.6269	6.1883	0.4387	7.3071
Q 50	3.9403	6.3750	5.9364	0.4387	8.1076
Q 100	4.3410	6.1495	5.7108	0.4387	8.9321
Q 500	5.3127	(cfs)			

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END OF RUN

COUNTY OF	ITEM NO.	SHEET NO.
OLDHAM	5-441.00	R98

[illegible]

FLOOD EVALUATION DATA		
RETURN INTERVAL	Q (cfs)	HW
100-YEAR	13.8	607.36
10-YEAR	9.6	607.20

LT	50+50.17	- DBI TY	3
----	----------	----------	---

CONST 1 - DBI TY 3
WITHOUT APRON
(H=5.50') 65.8' LT

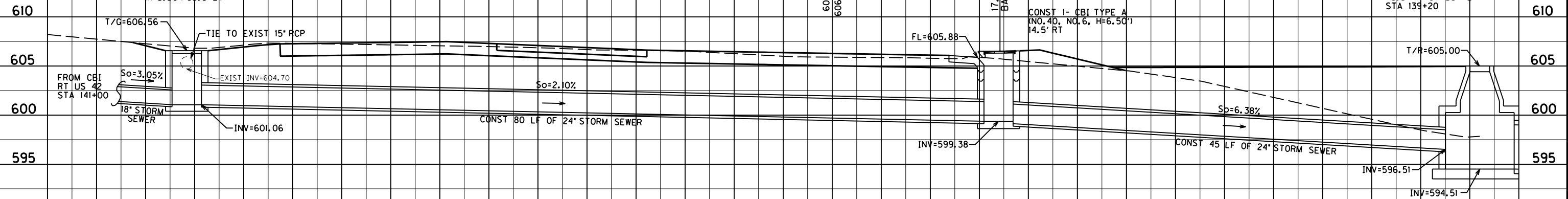
PROP HAYFIELD WAY EAST

PROP	HAYFIELD	WAY	WEST
------	----------	-----	------

[illegible]

CONST 1- CBI TYPE A			
(NO. 40, NO. 6, H=6.50')			
14.5' RT			

PROPOSED	1-MH	TYPE C
MODIFIED		
43.5' RT OF	US 42	
STA 139+20		



50+50.17	HAYFIELD WAY WEST
@ 14°	SKEW RT

FLOOD EVALUATION DATA		
RETURN INTERVAL	Q (cfs)	HW
100-YEAR	4.3	604.97
10-YEAR	3.0	604.89

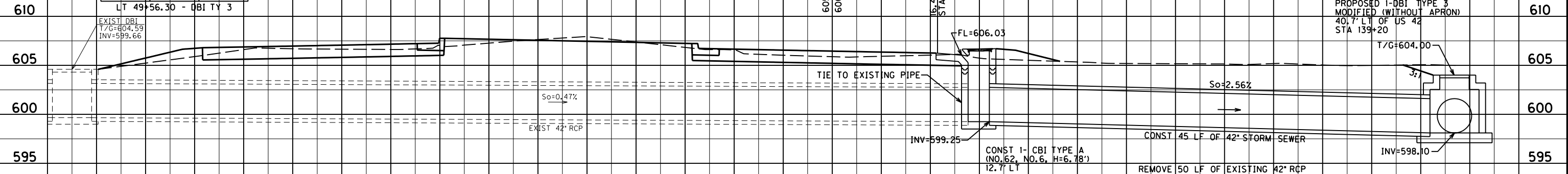
LT 49+56.30 - DBI TY 3

PROP	HAYFIELD	WAY	EAST
------	----------	-----	------

PROP	HAYFIELD	WAY	WEST
------	----------	-----	------

6.4 DEFLECTION BACK
STATION 10.8' RT

PROPOSED I-DBI TYPE 3 MODIFIED (WITHOUT APRON) 40.7' LT OF US 42 STA 139+20			
--	--	--	--



49+56.30	HAYFIELD WAY WEST
@ 16.3'	SKEW LT

REMOVE	50 LF OF	EXISTING	42" RCP
--------	----------	----------	---------

SCALE: 1"=5'

45	50	55	60	65	70
----	----	----	----	----	----

HAYFIELD WAY TO WEST
PIPE SECTIONS
STA 49+56.30 TO STA 50+50.17

Left Sta. 50+50.17
@ 14° Skew RT
Hayfield Way West

DBI Type 3

Kentucky Transportation Cabinet
Division of Highway Design
DRAINAGE DESIGN SUMMARY

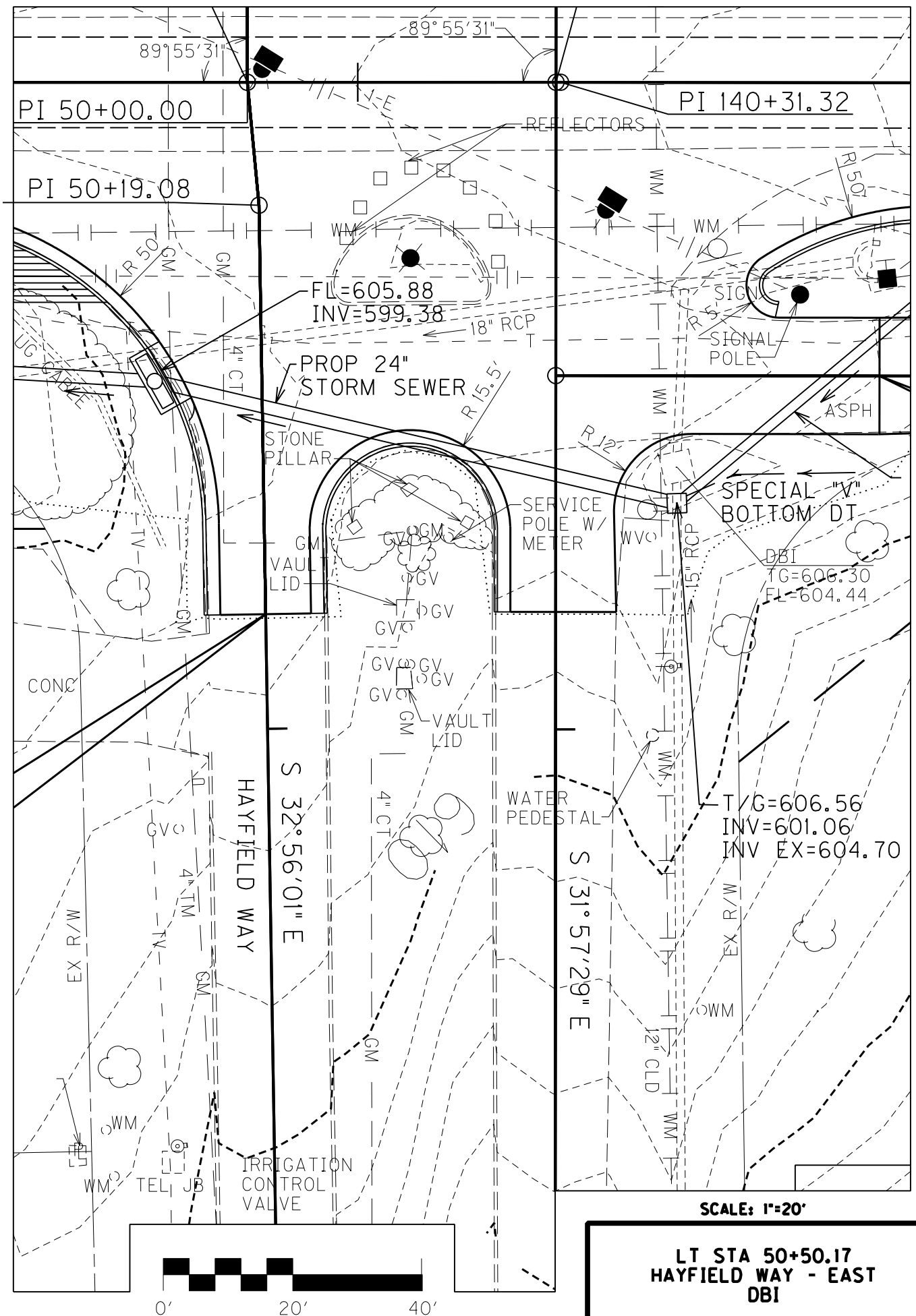
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County :	OLDHAM	Route :	US 42	Item # :	5-441.00
UPN :	FD52 093 0042 000-001	FPN :	STPM 5138(056)	Sta.:	LT 50+50.17 Hayfield
Latitude (dec deg):	38.36611111	Longitude (dec deg):	85.60027778		
EXISTING CONDITIONS					
Downstream Channel Data			Drainage Area:	Ac	Slope :
Stream Name or Description:					
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Normal Pool El.		OHW Elev.		Bed Material:	D50 (mm)
Drift:		Abrasion Level:		pH:	
				Resistivity:	
FEMA Flood Zone:	No	Zone Type:		Flood Map No(s):	
Existing Bridge or Culvert			Drainage Area:	Ac	
Size, Length, Type & Material:			Skew:		
Lt. Abut./Inlet:			Rt. Abut./Outlet:		
Inlet El.:		Outlet El.:		Slope:	
				Top/Grate El.:	
Low Road El.:		Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Headwater Elev.					
Outlet Velocity (ft/s)					
PROPOSED CONDITIONS					
Downstream Channel Data			Drainage Area:	Ac	Slope :
Stream Name or Description: storm sewer system					
Return Interval (years)	2	5	10	25	50
Discharge (cfs)					
Flow Depth ; Tailwater (ft)					
Proposed Bridge or Culvert			Drainage Area:	3.69	Ac
Size, Length, Type & Material:			Skew:		
Lt. Abut./Inlet:	DBI Type 3		Rt. Abut./Outlet:	24" storm sewer	
Inlet El.:	601.06	Outlet El.:	599.39	Slope:	2.10%
				Top/Grate El.:	606.56
Low Road El.:	607.3	Low Beam El.:		Net Opening:	
Return Interval (years)	2	5	10	25	50
Discharge (cfs)			9.6	11.3	13.8
Headwater Elev.			607.20	607.26	607.36
Outlet Velocity (ft/s)			10.70		11.70
Flow Over Road (cfs)			0.00	0.00	0.00

Kentucky Transportation Cabinet
Division of Highway Design
Drainage Design Summary

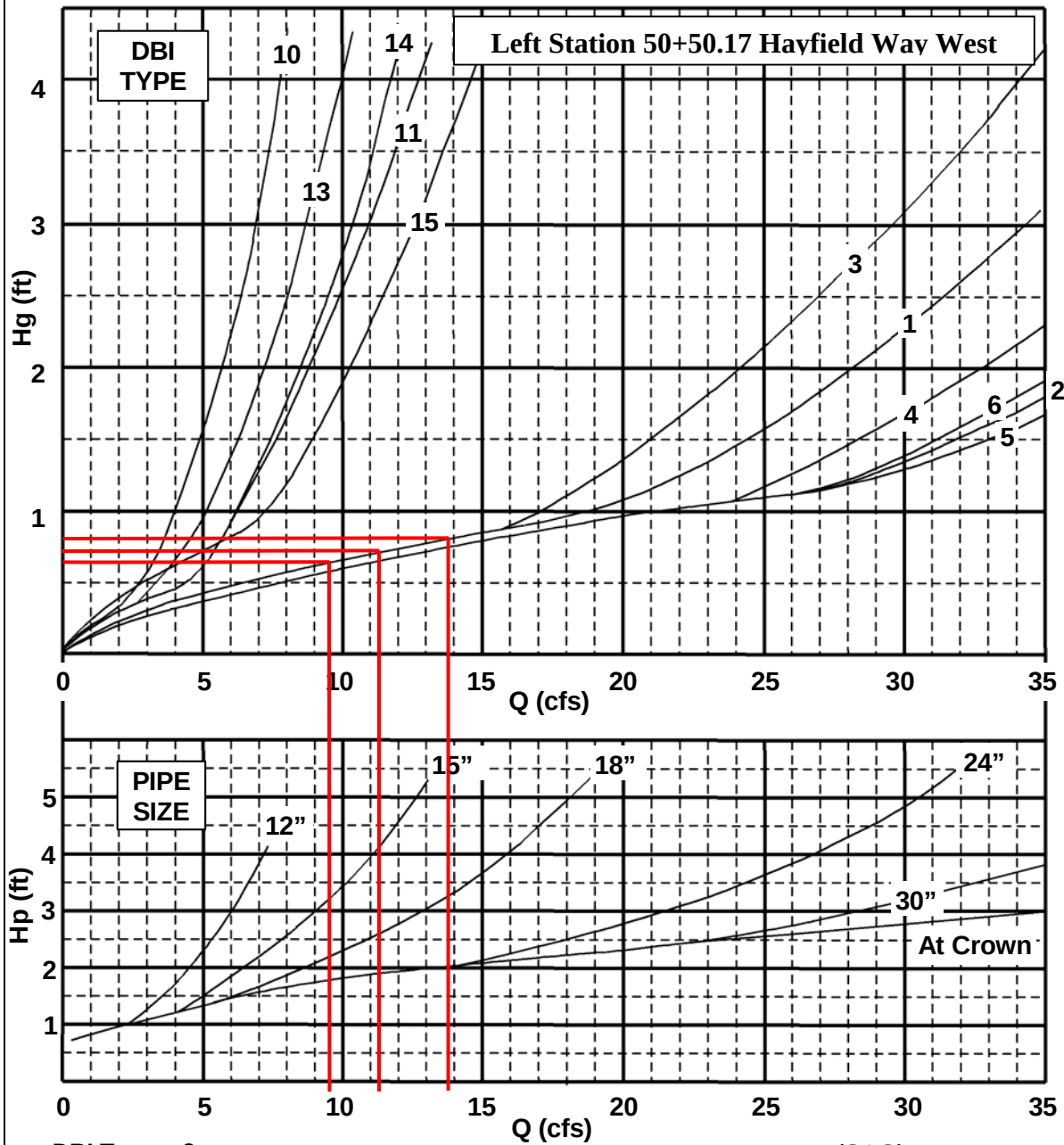
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REMARKS and / or CONTROLS													
This proposed DBI replaces an existing DBI that is 5' away. The TG of the DBI has been set as low as possible so that it intercepts the existing 15" RCP that is running along Hayfield Way. The 10 and 25 year storm stay off of the pavement, but the 100 year storm will pond on to the driving surface of Hayfield Way, but will not cross the crown of the street.													
RECORD HIGHWATER DATA													
Source	1:					2:					3:		
Elevation													
Date													
Location													
PROPOSED CHANNEL LINING / STREAM DISTURBANCE													
Location	Class	Thickness	Depth	Length	Quantity	Quantity Below OHW (CY)							
Upstream													
Downstream													
Total Length of Stream Disturbance (ft):				n/a									
PROPOSED DIVERSION													
Flooding		Return Interval (yrs)			Discharge (cfs)			Elevation					
Design Storm													
Overtopping Storm													
Recommended Size and Type of Opening(s):													
PROPOSED BOX CULVERT OR SPECIAL WING WALLS													
Inlet/Lt. Abut. Skewed		☐		Outlet/Rt. Abut. Skewed		☐							
Location	1	2	3	4									
30 Degree													
Skewed													
Special													
SCOUR													
Analysis Method:				Flow Angle (deg):				D50 (mm)				D95 (mm)	
Contraction Scour (ft):				Local Abut. Scour (ft):				Total Abut. Scour (ft):				0.00	
Pier No.:													
Length (ft):													
Width (ft):													
* Type:													
Local Scour:													
Total Scour:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*	(1) Triangular Nose		(2) Square Nose		(3) Round Nose		(4) Circular Cylinder		(5) Group Cylinders				
Potential for Aggradation/Degradation/Movement:													
Other Factors Affecting Abut./Pier Location:													
Scour Mitigation Measures:													



SCALE: 1"=20'

LT STA 50+50.17
HAYFIELD WAY - EAST
DBI



(SAG)

	Q ₁₀ = 9.6	Q ₂₅ = 11.3	Q ₁₀₀ = 13.8
Hg	0.64	0.7	0.80
HW	607.20	607.26	607.40
Hp			
HW			

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
 LEFT 50+50 HAYFIELD WAY DBI, ss#4

Zone of Influence : Louisville
 C-Factor : .42
 Area (acres) : 3.69

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 20 (ft)
 Overland Friction Factor : N = .4
 2-Year, 24-Hour Precipitation : P = 3.2 (in)
 Average Overland Slope : SO = .02 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 500 (ft)
 Manning's Roughness Coefficient : n = .03
 Bank Full Section Flow Area : AC = 2 (ft²)
 Channel Slope : SC = .02 (ft/ft)
 Wetted Perimeter : WP = 4 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	6.3086	7.8690	5.9814	1.8877	4.0706
Q 5	8.3246	7.2467	5.3591	1.8877	5.3714
Q 10	9.6265	6.9461	5.0585	1.8877	6.2114
Q 25	11.3231	6.6295	4.7418	1.8877	7.3062
Q 50	12.5206	6.4435	4.5558	1.8877	8.0788
Q 100	13.7525	6.2761	4.3884	1.8877	8.8737
Q 500	16.7409	(cfs)			

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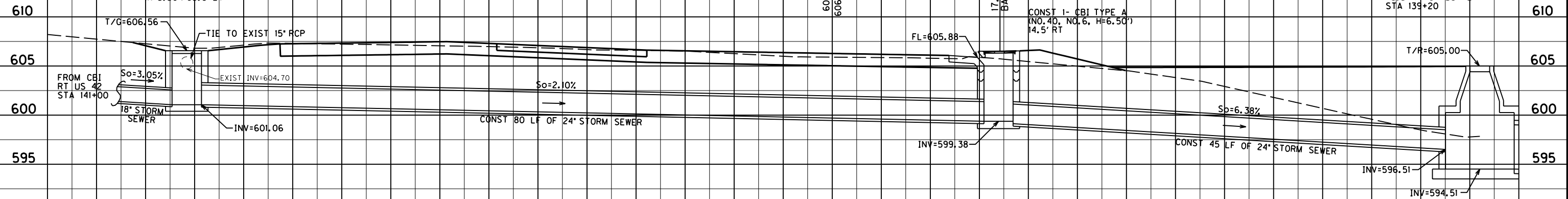
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END OF RUN

COUNTY OF	ITEM NO.	SHEET NO.
OLDHAM	5-441.00	R98

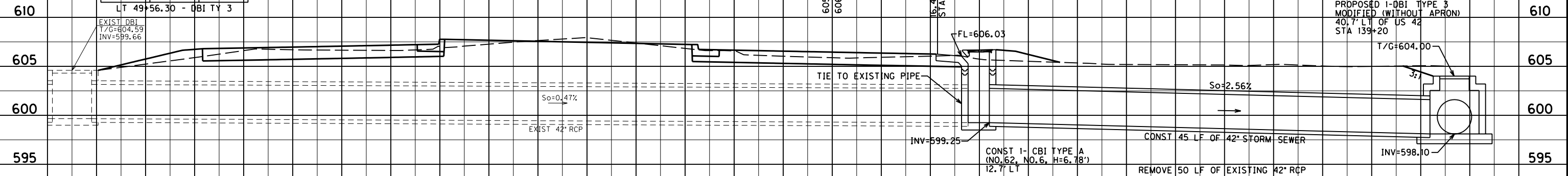
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PROPOSED 1-MH	TYPE C
MODIFIED	
43.5' RT OF US 42	
STA 139+20	



50+50.17	HAYFIELD WAY WEST
@ 14°	SKEW RT

PROPOSED I-DBI TYPE 3 MODIFIED (WITHOUT APRON)			
40.7' LT OF US 42			
STA 139+20			



49+56.30	HAYFIELD WAY WEST
@ 16.3'	SKEW LT

REMOVE	50 LF OF	EXISTING	42" RCP
--------	----------	----------	---------

SCALE: 1"=5'

HAYFIELD WAY TO WEST
PIPE SECTIONS
STA 49+56.30 TO STA 50+50.17

Storm Sewer No. 4
Qways runs

Qways for Storm Sewer No. 4 Analysis

12-12-2011 15:27:08

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
138+92 right, ss#4

Zone of Influence : louisville
C-Factor : .9
Area (acres) : .07

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 40 (ft)
Overland Friction Factor : N = .1
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .02 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 64 (ft)
Manning's Roughness Coefficient : n = .012
Bank Full Section Flow Area : AC = 6.25 (ft²)
Channel Slope : SC = .012 (ft/ft)
Wetted Perimeter : WP = 25.5 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.3394	3.7339	3.5327	0.2012	5.3876
Q 5	0.4330	3.4066	3.2054	0.2012	6.8735
Q 10	0.4937	3.2429	3.0417	0.2012	7.8363
Q 25	0.5715	3.0696	2.8684	0.2012	9.0714
Q 50	0.6276	2.9640	2.7629	0.2012	9.9619
Q 100	0.6840	2.8703	2.6691	0.2012	10.8572
Q 500	0.8215	(cfs)			

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
136+50 lt dbi, ss#4

Zone of Influence : louisville
C-Factor : .58
Area (acres) : 1.48

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 235 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .05 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 290 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 20 (ft²)
Channel Slope : SC = .055 (ft/ft)
Wetted Perimeter : WP = 40.05 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	1.8812	26.2246	25.4537	0.7709	2.1915
Q 5	2.6837	22.8476	22.0767	0.7709	3.1264
Q 10	3.1957	21.4366	20.6657	0.7709	3.7228
Q 25	3.9074	19.8165	19.0456	0.7709	4.5519
Q 50	4.3897	18.9551	18.1842	0.7709	5.1138
Q 100	4.9129	18.1577	17.3868	0.7709	5.7233
Q 500	6.1915	(cfs)			

Qways for Storm Sewer No. 4 Analysis

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
147+25 left, ss#4

Zone of Influence : louisville
C-Factor : .9
Area (acres) : .08

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 26 (ft)
Overland Friction Factor : N = .1
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .02 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 90 (ft)
Manning's Roughness Coefficient : n = .012
Bank Full Section Flow Area : AC = 6.25 (ft²)
Channel Slope : SC = .023 (ft/ft)
Wetted Perimeter : WP = 25.5 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.4214	2.8427	2.6383	0.2043	5.8528
Q 5	0.5287	2.6136	2.4092	0.2043	7.3427
Q 10	0.5983	2.4970	2.2926	0.2043	8.3093
Q 25	0.6873	2.3728	2.1684	0.2043	9.5455
Q 50	0.7518	2.2961	2.0918	0.2043	10.4415
Q 100	0.8163	2.2281	2.0238	0.2043	11.3373
Q 500	0.9738 (cfs)				

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
138+42 left dbi, ss#4

Zone of Influence : louisville
C-Factor : .45
Area (acres) : 2.63

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 160 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .056 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 660 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 8 (ft²)
Channel Slope : SC = .042 (ft/ft)
Wetted Perimeter : WP = 16.2 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	2.9999	20.4235	18.4007	2.0228	2.5348
Q 5	4.1852	18.1966	16.1738	2.0228	3.5363
Q 10	4.9510	17.1720	15.1492	2.0228	4.1833
Q 25	5.9952	16.0258	14.0030	2.0228	5.0656
Q 50	6.7062	15.4139	13.3911	2.0228	5.6664
Q 100	7.4673	14.8516	12.8288	2.0228	6.3095
Q 500	9.3285 (cfs)				

Qways for Storm Sewer No. 4 Analysis

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
49+56.3 ex dbi east of Hayfield, ss#4

Zone of Influence : louisville
C-Factor : .45
Area (acres) : 51.33

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 300 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .05 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 2870 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 4 (ft²)
Channel Slope : SC = .018 (ft/ft)
Wetted Perimeter : WP = 6.47 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	35.6139	45.4669	33.9084	11.5585	1.5418
Q 5	50.7402	41.0206	29.4621	11.5585	2.1967
Q 10	60.3876	39.0020	27.4435	11.5585	2.6144
Q 25	73.6867	36.9239	25.3653	11.5585	3.1901
Q 50	82.2914	35.8826	24.3241	11.5585	3.5626
Q 100	91.9567	34.8487	23.2902	11.5585	3.9811
Q 500	114.9830	(cfs)			

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
LEFT 50+50 HAYFIELD WAY DBI, ss#4

Zone of Influence : Louisville
C-Factor : .42
Area (acres) : 3.69

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 20 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .02 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 500 (ft)
Manning's Roughness Coefficient : n = .03
Bank Full Section Flow Area : AC = 2 (ft²)
Channel Slope : SC = .02 (ft/ft)
Wetted Perimeter : WP = 4 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	6.3086	7.8690	5.9814	1.8877	4.0706
Q 5	8.3246	7.2467	5.3591	1.8877	5.3714
Q 10	9.6265	6.9461	5.0585	1.8877	6.2114
Q 25	11.3231	6.6295	4.7418	1.8877	7.3062
Q 50	12.5206	6.4435	4.5558	1.8877	8.0788
Q 100	13.7525	6.2761	4.3884	1.8877	8.8737
Q 500	16.7409	(cfs)			

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KTdid: 9802

END OF RUN

Section 8 – Pavement Inlet Spread Calculations

CURB BOX INLET CALCULATIONS																				v11-11	
County	Oldham				Item No.		5-441.00		Road No.		US 42		Road Name		Louisville - Cincinnati						
	Speed	Lane	W	n	I	Gu.Dp.		State Project No.		FD52 093 0042 000-001											
	Limit	Width	(ft)		(iph)	(in)		Federal Project No.		STPM 5138(056)											
	35	12	2		0.016	4		0	Emars No.		79216 01 D										
Sag	Station	CBI	L	C	Area	SI	Sx	Sw	LTI	Qt	T	Ts	Qs	di	Eo	Se	E	Qi	Qby	Allow	
Location		Type	(ft)		(ac)		(ft/ft)		(ft)	(cfs)	(ft)		(ft)	(cfs)		(ft)		(ft/ft)	(cfs)	T (ft)	
	108+37 rt	AS	10	0.9	0.26	0.0098	0.031	0.031	7.37	0.936	5.372	3.372	0.271	0.167	0.711	0.09	1	0.936	0	8	
	109+10 rt	AS	10	0.9	0.13	0.0098	0.031	0.031	5.182	0.468	4.144	2.144	0.081	0.128	0.828	0.1	1	0.468	0	8	
	110+24 rt	AS	10	0.9	0.28	0.0048	0.031	0.031	6.398	1.008	6.305	4.305	0.363	0.195	0.639	0.084	1	1.008	0	8	
sag	111+00 rt	AS	10	0.9	0.2	0	0.02	0.103		0.72	4.046			0.248	0.959	0.103		0.72	0	8	
	114+25 rt	AS	10	0.9	0.44	0.0206	0.02	0.02	13.74	1.584	7.488	5.488	0.693	0.15	0.563	0.067	0.904	1.432	0.15	8	
	113+00 rt	AS	10	0.9	0.29	0.0127	0.02	0.02	10.51	1.196	7.383	5.383	0.517	0.148	0.569	0.067	0.996	1.191	0.01	8	
	111+43 rt	AS	10	0.9	0.19	0.0027	0.02	0.02	5.402	0.689	8	6	0.321	0.16	0.536	0.065	1	0.689	0	8	
sag	111+00 rt	AS	10	0.9	0.2	0	0.02	0.103		0.72	4.046			0.248	0.959	0.103		0.72	0	8	
	120+25 rt	AS	10	0.9	0.2	0.0112	0.02	0.02	7.762	0.72	6.236	4.236	0.256	0.125	0.643	0.074	1	0.72	0	8	
sag	121+14 rt	AS	10	0.9	0.13	0	0.02	0.103		0.468	3.036			0.227	0.991	0.103		0.468	0	8	
	121+50 rt	AS	10	0.9	0.16	0.0045	0.02	0.02	5.524	0.576	6.806	4.806	0.227	0.136	0.605	0.07	1	0.576	0	8	
sag	121+14 rt	AS	10	0.9	0.13	0	0.02	0.103		0.468	3.036			0.227	0.991	0.103		0.468	0	8	
	50+64 rt	AS	10	0.9	0.17	0.026	0.02	0.02	8.764	0.612	5.016	3.016	0.158	0.1	0.742	0.082	1	0.612	0	8	
sag	51+03 rt	AS	10	0.58	0.72	0	0.02	0.103		1.67	7.09			0.308	0.779	0.103		1.67	0	8	
	50+64 lt	AS	10	0.9	0.03	0.026	0.02	0.02	3.717	0.108	2.62	0.62	0.002	0.052	0.979	0.102	1	0.108	0	8	
sag	51+03 lt	AS	10	0.9	0.1	0	0.02	0.103		0.36	2.549			0.218	0.998	0.103		0.36	0	8	
	125+50 rt	AS	10	0.9	0.03	0.0486	0.02	0.02	4.451	0.108	2.33	0.33	6E-04	0.047	0.995	0.103	1	0.108	0	8	
	127+50 rt	AS	10	0.88	0.17	0.0444	0.02	0.02	9.898	0.598	4.5	2.5	0.125	0.09	0.791	0.086	1	0.598	0	8	
	129+43 rt	AS	10	0.9	0.18	0.005	0.02	0.02	6.04	0.648	6.972	4.972	0.263	0.139	0.594	0.07	1	0.648	0	8	
sag	129+67 rt	AS	10	0.9	0.04	0	0.02	0.103		0.144	1.384			0.194	1	0.103		0.144	0	8	
	132+00 rt	AS	10	0.88	0.25	0.0452	0.02	0.02	12.16	0.88	5.182	3.182	0.24	0.104	0.728	0.081	0.955	0.841	0.04	8	
	129+92 rt	AS	10	0.9	0.22	0.005	0.02	0.02	6.906	0.831	7.665	5.665	0.372	0.153	0.553	0.066	1	0.831	0	8	
sag	129+67 rt	AS	10	0.9	0.04	0	0.02	0.103		0.144	1.384			0.194	1	0.103		0.144	0	8	
	136+50 rt	AS	10	0.9	0.17	0.0296	0.02	0.02	9.053	0.612	4.895	2.895	0.151	0.098	0.754	0.083	1	0.612	0	8	
	138+34 rt	AS	10	0.9	0.17	0.004	0.02	0.02	5.546	0.612	7.121	5.121	0.254	0.142	0.585	0.069	1	0.612	0	8	
sag	138+63 rt	AS	10	0.9	0.06	0	0.02	0.103		0.216	1.813			0.203	1	0.103		0.216	0	8	
	145+00 rt	AS	10	0.88	0.36	0.0492	0.02	0.02	15.06	1.267	5.845	3.845	0.415	0.117	0.673	0.076	0.86	1.089	0.18	8	
	143+00 rt	AS	10	0.85	0.26	0.0492	0.02	0.02	13.71	1.062	5.471	3.471	0.316	0.109	0.703	0.079	0.905	0.961	0.1	8	

CURB BOX INLET CALCULATIONS																				v11-11
County	Oldham				Item No.		5-441.00		Road No.		US 42		Road Name		Louisville - Cincinnati					
	Speed	Lane	W	n	I	Gu.Dp.			State Project No.		FD52 093 0042 000-001									
	Limit	Width	(ft)		(iph)	(in)			Federal Project No.		STPM 5138(056)									
	35	12	2		0.016	4			0	Emars No.		79216 01 D								
Sag	Station	CBI	L	C	Area	SI	Sx	Sw	LTI	Qt	T	Ts	Qs	di	Eo	Se	E	Qi	Qby	Allow
Location		Type	(ft)		(ac)		(ft/ft)		(ft)	(cfs)	(ft)	(ft)	(cfs)	(ft)		(ft/ft)		(cfs)	T (ft)	
	141+00 rt	AS	10	0.85	0.23	0.0331	0.02	0.02	11.28	0.883	5.501	3.501	0.265	0.11	0.7	0.078	0.98	0.866	0.02	8
	139+68 rt	AS	10	0.9	0.2	0.0147	0.02	0.02	8.403	0.738	5.977	3.977	0.248	0.12	0.663	0.075	1	0.738	0	8
	138+92 rt	AS	10	0.9	0.07	0.0041	0.02	0.02	3.481	0.252	5.085	3.085	0.067	0.102	0.736	0.081	1	0.252	0	8
sag	138+63 rt	AS	10	0.9	0.06	0	0.02	0.103		0.216	1.813			0.203	1	0.103		0.216	0	8
	150+34 rt	AS	10	0.9	0.22	0.0063	0.02	0.02	7.109	0.792	7.203	5.203	0.332	0.144	0.58	0.068	1	0.792	0	8
	114+25 lt	AS	10	0.9	0.21	0.0206	0.02	0.02	9.248	0.756	5.672	3.672	0.237	0.113	0.686	0.077	1	0.756	0	8
	113+00 lt	AS	10	0.9	0.07	0.0127	0.02	0.02	4.622	0.252	4.116	2.116	0.043	0.082	0.83	0.089	1	0.252	0	8
sag	111+43 lt	AS	10	0.9	0.09	0	0.02	0.103		0.324	2.376			0.214	0.999	0.103		0.324	0	8
	118+50 lt	AS	10	0.64	0.37	0.0243	0.02	0.02	10.85	0.947	5.974	3.974	0.318	0.119	0.663	0.075	0.99	0.937	0.01	8
	120+25 lt	AS	10	0.57	0.45	0.0112	0.02	0.02	9.434	1.036	7.151	5.151	0.431	0.143	0.583	0.069	1	1.036	0	8
sag	121+14 lt	AS	10	0.9	0.08	0	0.02	0.103		0.288	2.196			0.211	1	0.103		0.288	0	8
	121+50 lt	AS	10	0.88	0.15	0.0045	0.02	0.02	5.272	0.528	6.587	4.587	0.201	0.132	0.619	0.072	1	0.528	0	8
sag	121+14 lt	AS	10	0.9	0.08	0	0.02	0.103		0.288	2.196			0.211	1	0.103		0.288	0	8
	126+00 lt	AS	10	0.5	0.55	0.0486	0.02	0.02	13.93	1.1	5.556	3.556	0.335	0.111	0.696	0.078	0.897	0.987	0.11	8
	127+50 lt	AS	10	0.7	0.17	0.0444	0.02	0.02	9.816	0.589	4.473	2.473	0.121	0.089	0.794	0.086	1	0.589	0	8
	129+43 lt	AS	10	0.87	0.14	0.005	0.02	0.02	5.183	0.487	6.262	4.262	0.174	0.125	0.642	0.073	1	0.487	0	8
sag	129+67 lt	AS	10	0.9	0.04	0	0.02	0.103		0.144	1.384			0.194	1	0.103		0.144	0	8
	49+69 lt	AS	10	0.9	0.07	0.0084	0.02	0.02	4.165	0.252	4.446	2.446	0.051	0.089	0.797	0.086	1	0.252	0	8
	132+00 lt	AS	10	0.9	0.16	0.0452	0.02	0.02	9.749	0.576	4.421	2.421	0.116	0.088	0.799	0.087	1	0.576	0	8
	130+00 lt	AS	10	0.9	0.13	0.0066	0.02	0.02	5.434	0.468	5.86	3.86	0.154	0.117	0.672	0.076	1	0.468	0	8
sag	129+67 lt	AS	10	0.9	0.04	0	0.02	0.103		0.144	1.384			0.194	1	0.103		0.144	0	8
	136+50 lt	AS	10	0.82	0.44	0.0296	0.02	0.02	14.27	1.443	6.743	4.743	0.564	0.135	0.609	0.071	0.886	1.279	0.16	8
	137+50 lt	AS	10	0.78	0.35	0.0157	0.02	0.02	11.36	1.256	7.213	5.213	0.528	0.144	0.579	0.068	0.978	1.229	0.03	8
	138+34 lt	AS	10	0.78	0.19	0.004	0.02	0.02	5.586	0.62	7.158	5.158	0.259	0.143	0.583	0.069	1	0.62	0	8
sag	138+63 lt	AS	10	0.9	0.4	0	0.02	0.103		1.44	6.422			0.295	0.822	0.103		1.44	0	8
	146+77 lt	AS	10	0.9	0.11	0.0324	0.02	0.02	7.393	0.396	4.09	2.09	0.066	0.082	0.833	0.089	1	0.396	0	8
	145+00 lt	AS	10	0.9	0.17	0.0492	0.02	0.02	10.28	0.612	4.451	2.451	0.125	0.089	0.796	0.086	0.998	0.611	0	8
	143+00 lt	AS	10	0.82	0.29	0.0492	0.02	0.02	12.95	0.952	5.252	3.252	0.266	0.105	0.722	0.08	0.93	0.886	0.07	8
	141+00 lt	AS	10	0.87	0.19	0.0331	0.02	0.02	10.19	0.728	5.115	3.115	0.194	0.102	0.733	0.081	0.999	0.727	0	8

CURB BOX INLET CALCULATIONS																				v11-11
County	Oldham				Item No.		5-441.00		Road No.		US 42		Road Name		Louisville - Cincinnati					
	Speed	Lane	W	n	I	Gu.Dp.		State Project No.		FD52 093 0042 000-001										
	Limit	Width	(ft)		(iph)	(in)		Federal Project No.		STPM 5138(056)										
	35	12	2		0.016	4		0	Emars No.		79216 01 D									
Sag	Station	CBI	L	C	Area	SI	Sx	Sw	LTI	Qt	T	Ts	Qs	di	Eo	Se	E	Qi	Qby	Allow
Location		Type	(ft)		(ac)	(ft/ft)			(ft)	(cfs)	(ft)			(cfs)		(ft)		(ft/ft)	(cfs)	T (ft)
	49+56 lt	AS	10	0.9	0.07	0.0147	0.02	0.02	4.805	0.253	4.007	2.007	0.04	0.08	0.842	0.09	1	0.253	0	8
	138+92 lt	AS	10	0.9	0.08	0.0041	0.02	0.02	3.735	0.288	5.346	3.346	0.083	0.107	0.713	0.079	1	0.288	0	8
sag	138+63 lt	AS	10	0.9	0.04	0	0.02	0.103		0.144	1.384			0.194	1	0.103		0.144	0	8
	150+34 lt	AS	10	0.9	0.15	0.0063	0.02	0.02	5.788	0.54	6.236	4.236	0.192	0.125	0.643	0.074	1	0.54	0	8

Section 9 – Channel Calculations

Ditch Analysis US 42

Ditch Analysis – 10 Year storm US 42 Ditches

node	Sta	Da	C	Dca	Sca	Tc	I	Q	N	So	Dn	Vn	Lining	τ (lbs/ft ²)
Start section =====														
1	107+00	RT												
			0.00	.00	0.00	0.00	7.10	6.15	0.00	.035	.0100	0.00	0.00	
					(LS 4.0:1)	(W 0.0)	(RS 4.0:1)	(LTH 119.00)						
			0.10	.45	0.05	0.05	9.02	5.61	0.25	.035	.0100	0.25	1.03	ECB 0.16
2	105+81	RT												
Junction =====														
Start section =====														
3	110+78	RT												
			0.00	.00	0.00	0.00	3.70	7.58	0.00	.035	.0553	0.00	0.00	
					(LS 4.0:1)	(W 0.0)	(RS 4.0:1)	(LTH 30.00)						
			0.18	.80	0.14	0.14	3.88	7.48	1.08	.035	.0553	0.31	2.82	TRM 1.07
4	111+00	RT												
Junction =====														
Start section =====														
5	117+50	LT												
			0.00	.00	0.00	0.00	15.70	4.34	0.00	.035	.0200	0.00	0.00	
					(LS 4.0:1)	(W 0.0)	(RS 4.0:1)	(LTH 350.00)						
			1.47	.60	0.88	0.88	17.94	4.07	3.59	.035	.0200	0.59	2.60	ECB 0.74
6	114+00	LT												
			0.00	.00	0.00	0.88	17.94	4.07	3.59	.035	.0100	0.67	2.00	
					(LS 4.0:1)	(W 0.0)	(RS 4.0:1)	(LTH 200.00)						
			0.37	.60	0.22	1.10	19.53	3.91	4.31	.035	.0100	0.72	2.10	ECB 0.45
7	112+10	LT												
Junction =====														
Start section =====														
8	120+00	LT												
			0.00	.00	0.00	0.00	13.80	4.62	0.00	.035	.0846	0.00	0.00	
					(LS 4.0:1)	(W 0.0)	(RS 4.0:1)	(LTH 50.00)						
			0.13	.45	0.06	0.06	14.16	4.56	0.27	.035	.0846	0.17	2.33	ECB 0.90
9	120+50	LT												
			0.00	.00	0.00	0.06	15.50	4.36	0.26	.035	.0234	0.09	1.19	
					(LS 4.0:1)	(W 2.0)	(RS 4.0:1)	(LTH 64.00)						
			0.65	.45	0.29	0.35	16.01	4.29	1.51	.035	.0234	0.24	2.08	ECB 0.35
10	121+14	LT												
Junction =====														
Start section =====														
11	122+95	LT												
			0.00	.00	0.00	0.00	13.80	4.62	0.00	.035	.0235	0.00	0.00	
					(LS 4.0:1)	(W 0.0)	(RS 4.0:1)	(LTH 95.00)						
			0.27	.48	0.13	0.13	14.70	4.48	0.58	.035	.0235	0.29	1.75	ECB 0.43
12	122+00	LT												
			0.00	.00	0.00	0.13	14.70	4.48	0.58	.035	.0235	0.14	1.55	
					(LS 4.0:1)	(W 2.0)	(RS 4.0:1)	(LTH 86.00)						
			0.09	.54	0.05	0.18	15.55	4.36	0.78	.035	.0235	0.17	1.70	ECB 0.25
13	121+14	LT												
Junction =====														

Ditch Analysis – 10 Year storm
US 42 Ditches

node	Sta	Da	C	Dca	Sca	Tc	I	Q	N	So	Dn	Vn	Lining	τ (lbs/ft ²)
Start section =====														
14	132+00	LT												
			0.00	.00	0.00	0.00	10.40	5.29	0.00	.035	.0640	0.00	0.00	
			(LS 4.0:1) (W 0.0) (RS 4.0:1) (LTH 150.00)											
			0.38	.45	0.17	0.17	11.29	5.09	0.87	.035	.0640	0.28	2.82	ECB 1.12
15	130+50	LT												
			0.00	.00	0.00	0.17	11.29	5.09	0.87	.069	.2250	0.14	2.41	
			(LS 4.0:1) (W 2.0) (RS 4.0:1) (LTH 75.00)											
			0.04	.45	0.02	0.19	11.79	4.98	0.94	.069	.2250	0.15	2.47	CLASS II 2.11
16	129+77	LT												
Junction =====														
Start section =====														
21	138+50	LT												
			0.00	.00	0.00	0.00	8.00	5.88	0.00	.035	.0428	0.00	0.00	
			(LS 4.0:1) (W 0.0) (RS 4.0:1) (LTH 70.00)											
			0.24	.55	0.13	0.13	8.50	5.74	0.76	.035	.0428	0.28	2.34	ECB 0.75
22	139+20	LT												
Junction =====														
Start section =====														
25	139+47	RT												
			0.00	.00	0.00	0.00	3.70	7.58	0.00	.035	.1276	0.00	0.00	
			(LS 4.0:1) (W 0.0) (RS 4.0:1) (LTH 35.00)											
			0.13	.45	0.06	0.06	3.89	7.48	0.44	.035	.1276	0.19	3.08	TRM 1.51
26	139+10	RT												
			0.00	.00	0.00	0.06	3.89	7.48	0.44	.035	.0380	0.11	1.67	
			(LS 4.0:1) (W 2.0) (RS 4.0:1) (LTH 105.00)											
			0.07	.45	0.03	0.09	4.82	7.02	0.63	.035	.0380	0.13	1.88	ECB 0.31
27	138+12	RT												
Junction =====														
END =====														

Ditch Analysis Approach Roads

Ditch Analysis – 10 Year storm Approach Roads

RIVER BLUFF

node	Sta	Da	C	Dca	Sca	Tc	I	Q	N	So	Dn	Vn	Lining	τ (lbs/ft ²)
Start section =====														
17	48+35	RT	River Bluff West											
			0.00	.00	0.00	0.00	4.60	7.13	0.00	.035	.0946	0.00	0.00	
			(LS 4.0:1) (W 0.0) (RS 4.0:1) (LTH 143.00)											
			0.27	.88	0.24	0.24	5.22	6.85	1.63	.035	.0946	0.33	3.82	TRM 1.95
18	133+00	LT	US 42											
Junction =====														
Start section =====														
19	48+50	LT	River Bluff East											
			0.00	.00	0.00	0.00	12.90	4.77	0.00	.035	.0770	0.00	0.00	
			(LS 4.0:1) (W 0.0) (RS 4.0:1) (LTH 100.00)											
			0.54	.86	0.46	0.46	13.34	4.70	2.18	.035	.0770	0.38	3.81	TRM 1.83
20	49+50	LT	River Bluff East											
Junction =====														
END =====														

HAYFIELD WAY

node	Sta	Da	C	Dca	Sca	Tc	I	Q	N	So	Dn	Vn	Lining	τ (lbs/ft ²)
Start section =====														
23	49+20	RT	Hayfield Way West											
			0.00	.00	0.00	0.00	2.40	8.34	0.00	.035	.0307	0.00	0.00	
			(LS 4.0:1) (W 0.0) (RS 4.0:1) (LTH 70.00)											
			0.44	.70	0.31	0.31	2.82	8.08	2.49	.035	.0307	0.47	2.79	ECB 0.90
24	139+20	LT	US 42											
Junction =====														
Start section =====														
29	49+10	LT	Hayfield Way East											
			0.00	.00	0.00	0.00	2.50	8.28	0.00	.035	.0619	0.00	0.00	
			(LS 4.0:1) (W 0.0) (RS 4.0:1) (LTH 36.00)											
			0.12	.45	0.05	0.05	2.76	8.12	0.44	.035	.0619	0.22	2.35	ECB 0.85
30	49+36	LT	Hayfield Way East											
Junction =====														
Start section =====														
31	49+50	LT	Hayfield Way East											
			0.00	.00	0.00	0.00	1.90	8.62	0.00	.035	.1468	0.00	0.00	
			(LS 4.0:1) (W 0.0) (RS 4.0:1) (LTH 16.00)											
			0.07	.90	0.06	0.06	1.98	8.62	0.54	.035	.1468	0.20	3.42	TRM 1.83
32	49+36	LT	Hayfield Way East											
Junction =====														
END =====														

OLD US 42

node	Sta	Da	C	Dca	Sca	Tc	I	Q	N	So	Dn	Vn	Lining	τ (lbs/ft ²)
Start section =====														
33	20+50	RT	Old US 42											
			0.00	.00	0.00	0.00	8.20	5.82	0.00	.035	.0465	0.00	0.00	
			(LS 4.0:1) (W 0.0) (RS 4.0:1) (LTH 31.00)											
			0.60	.50	0.30	0.30	8.37	5.78	1.73	.035	.0465	0.38	2.97	ECB 1.10
34	20+19	RT	Old US 42											
Junction =====														
END =====														

Ditch Analysis
US 42 and Approach Roads
Qways runs

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ditch rt 107-106

Zone of Influence : louisville
C-Factor : .45
Area (acres) : .1

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 60 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .06 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 13 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 8 (ft²)
Channel Slope : SC = .06 (ft/ft)
Wetted Perimeter : WP = 16.12 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.1775	8.4609	8.4276	0.0332	3.9445
Q 5	0.2384	7.5121	7.4789	0.0332	5.2972
Q 10	0.2777	7.0694	7.0361	0.0332	6.1715
Q 25	0.3292	6.6073	6.5740	0.0332	7.3146
Q 50	0.3656	6.3373	6.3041	0.0332	8.1236
Q 100	0.4031	6.0958	6.0625	0.0332	8.9572
Q 500	0.4941	(cfs)			

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ditch to inlet 111+00

Zone of Influence : louisville
C-Factor : .8
Area (acres) : .18

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 65 (ft)
Overland Friction Factor : N = .1
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .03 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 30 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 4 (ft²)
Channel Slope : SC = .07 (ft/ft)
Wetted Perimeter : WP = 8.25 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.7376	4.3446	4.2725	0.0721	5.1219
Q 5	0.9506	3.9341	3.8620	0.0721	6.6017
Q 10	1.0887	3.7307	3.6586	0.0721	7.5602
Q 25	1.2662	3.5162	3.4441	0.0721	8.7928
Q 50	1.3937	3.3865	3.3144	0.0721	9.6787
Q 100	1.5225	3.2712	3.1991	0.0721	10.5726
Q 500	1.8358	(cfs)			

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ditch lt 1175+0 114+00

Zone of Influence : louisville
C-Factor : .6
Area (acres) : 1.47

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 100 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .02 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 92 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 8 (ft²)
Channel Slope : SC = .02 (ft/ft)
Wetted Perimeter : WP = 16.12 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	2.3270	19.0130	18.6057	0.4073	2.6383
Q 5	3.2556	16.7510	16.3437	0.4073	3.6911
Q 10	3.8582	15.7082	15.3010	0.4073	4.3744
Q 25	4.6826	14.5281	14.1209	0.4073	5.3091
Q 50	5.2464	13.9029	13.4956	0.4073	5.9482
Q 100	5.8480	13.3310	12.9238	0.4073	6.6304
Q 500	7.3280	(cfs)			

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ditch lt 114+00 - 112+00

Zone of Influence : louisville
C-Factor : .6
Area (acres) : .37

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 75 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .03 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 50 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 8 (ft²)
Channel Slope : SC = .08 (ft/ft)
Wetted Perimeter : WP = 16.12 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.7162	12.9801	12.8694	0.1107	3.2263
Q 5	0.9848	11.4444	11.3338	0.1107	4.4359
Q 10	1.1606	10.6947	10.5841	0.1107	5.2281
Q 25	1.3919	9.9544	9.8438	0.1107	6.2697
Q 50	1.5535	9.5321	9.4214	0.1107	6.9980
Q 100	1.7230	9.1504	9.0397	0.1107	7.7613
Q 500	2.1334	(cfs)			

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ditch 120+00 to 120+50 lt

Zone of Influence : louisville
C-Factor : .45
Area (acres) : .13

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 85 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .02 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 115 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 8 (ft²)
Channel Slope : SC = .07 (ft/ft)
Wetted Perimeter : WP = 16.12 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.1657	16.6963	16.4242	0.2721	2.8319
Q 5	0.2303	14.7298	14.4577	0.2721	3.9371
Q 10	0.2728	13.7591	13.4870	0.2721	4.6638
Q 25	0.3294	12.7830	12.5109	0.2721	5.6311
Q 50	0.3686	12.2344	11.9623	0.2721	6.3016
Q 100	0.4102	11.7348	11.4627	0.2721	7.0126
Q 500	0.5114	(cfs)			

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ditch lt 120+50 to 121+14

Zone of Influence : louisville
C-Factor : .45
Area (acres) : .65

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 100 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.25 (in)
Average Overland Slope : SO = .02 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 110 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 8 (ft²)
Channel Slope : SC = .07 (ft/ft)
Wetted Perimeter : WP = 16.12 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.7760	18.8211	18.5608	0.2603	2.6531
Q 5	1.0858	16.5649	16.3046	0.2603	3.7123
Q 10	1.2869	15.5244	15.2642	0.2603	4.3998
Q 25	1.5620	14.3480	14.0878	0.2603	5.3403
Q 50	1.7503	13.7237	13.4634	0.2603	5.9839
Q 100	1.9511	13.1529	12.8926	0.2603	6.6705
Q 500	2.4453	(cfs)			

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
cross drain lt 121+14

Zone of Influence : lousiville
C-Factor : .45
Area (acres) : 8.01

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 225 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .04 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 675 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 4 (ft²)
Channel Slope : SC = .023 (ft/ft)
Wetted Perimeter : WP = 8.25 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	7.2342	30.2901	27.4599	2.8302	2.0070
Q 5	10.3213	26.6530	23.8228	2.8302	2.8634
Q 10	12.2935	25.0962	22.2660	2.8302	3.4106
Q 25	14.9980	23.4433	20.6131	2.8302	4.1609
Q 50	16.8564	22.4556	19.6254	2.8302	4.6765
Q 100	18.8617	21.5964	18.7662	2.8302	5.2328
Q 500	23.7266 (cfs)				

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ditch left 122+90

Zone of Influence : louisville
C-Factor : .48
Area (acres) : .27

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 135 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .05 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 115 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 4 (ft²)
Channel Slope : SC = .07 (ft/ft)
Wetted Perimeter : WP = 8.25 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.3663	16.7572	16.4808	0.2764	2.8264
Q 5	0.5093	14.7830	14.5066	0.2764	3.9301
Q 10	0.6034	13.8089	13.5325	0.2764	4.6559
Q 25	0.7286	12.8290	12.5527	0.2764	5.6220
Q 50	0.8154	12.2785	12.0021	0.2764	6.2916
Q 100	0.9074	11.7770	11.5006	0.2764	7.0018
Q 500	1.1313 (cfs)				

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ditch 122+50 - 121+12 lt

Zone of Influence : louisville
C-Factor : .54
Area (acres) : .09

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 60 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .07 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 20 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 6 (ft²)
Channel Slope : SC = .1 (ft/ft)
Wetted Perimeter : WP = 12.17 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.1963	8.0118	7.9721	0.0398	4.0392
Q 5	0.2628	7.1221	7.0823	0.0398	5.4072
Q 10	0.3057	6.7064	6.6666	0.0398	6.2910
Q 25	0.3618	6.2724	6.2326	0.0398	7.4446
Q 50	0.4015	6.0181	5.9783	0.0398	8.2622
Q 100	0.4424	5.7908	5.7510	0.0398	9.1029
Q 500	0.5415 (cfs)				

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ditch 132+00 130+50 lt

Zone of Influence : louisville
C-Factor : .45
Area (acres) : .38

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 100 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .06 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 125 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 8 (ft²)
Channel Slope : SC = .12 (ft/ft)
Wetted Perimeter : WP = 16.12 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.5611	12.5443	12.3184	0.2259	3.2816
Q 5	0.7688	11.1075	10.8816	0.2259	4.4961
Q 10	0.9052	10.3917	10.1658	0.2259	5.2933
Q 25	1.0842	9.6852	9.4593	0.2259	6.3401
Q 50	1.2094	9.2813	9.0554	0.2259	7.0724
Q 100	1.3405	8.9165	8.6906	0.2259	7.8390
Q 500	1.6583 (cfs)				

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ditch on Riverbluff west

Zone of Influence : louisville
C-Factor : .88
Area (acres) : .27

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 115 (ft)
Overland Friction Factor : N = .1
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .06 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 127 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 4 (ft²)
Channel Slope : SC = .08 (ft/ft)
Wetted Perimeter : WP = 8.25 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	1.1321	5.3145	5.0289	0.2855	4.7646
Q 5	1.4745	4.8138	4.5283	0.2855	6.2057
Q 10	1.6962	4.5681	4.2826	0.2855	7.1390
Q 25	1.9847	4.2932	4.0077	0.2855	8.3532
Q 50	2.1898	4.1386	3.8531	0.2855	9.2162
Q 100	2.3978	4.0012	3.7157	0.2855	10.0919
Q 500	2.9068 (cfs)				

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ditch on Riverbluff east

Zone of Influence : louisville
C-Factor : .86
Area (acres) : .54

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 125 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .06 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 230 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 6 (ft²)
Channel Slope : SC = .03 (ft/ft)
Wetted Perimeter : WP = 12.17 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	1.3680	15.5000	14.6650	0.8350	2.9458
Q 5	1.8893	13.7712	12.9362	0.8350	4.0682
Q 10	2.2310	12.9157	12.0807	0.8350	4.8041
Q 25	2.6841	12.0567	11.2217	0.8350	5.7796
Q 50	2.9984	11.5717	10.7368	0.8350	6.4564
Q 100	3.3305	11.1307	10.2957	0.8350	7.1716
Q 500	4.1367 (cfs)				

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ditch Hayfield west 49+20 139+20

Zone of Influence : louisville
C-Factor : .7
Area (acres) : .44

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 30 (ft)
Overland Friction Factor : N = .1
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .06 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 204 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 4 (ft²)
Channel Slope : SC = .05 (ft/ft)
Wetted Perimeter : WP = 8.25 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	1.8425	2.6282	2.0481	0.5801	5.9822
Q 5	2.2933	2.4562	1.8761	0.5801	7.4457
Q 10	2.5865	2.3678	1.7877	0.5801	8.3977
Q 25	2.9620	2.2732	1.6931	0.5801	9.6168
Q 50	3.2347	2.2145	1.6343	0.5801	10.5022
Q 100	3.5073	2.1622	1.5821	0.5801	11.3875
Q 500	4.1749 (cfs)				

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ditch 138+50 139+20 lt

Zone of Influence : louisville
C-Factor : .55
Area (acres) : .24

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 75 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .07 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 100 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 4 (ft²)
Channel Slope : SC = .1 (ft/ft)
Wetted Perimeter : WP = 8.25 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.4918	9.6078	9.4067	0.2011	3.7260
Q 5	0.6646	8.5326	8.3315	0.2011	5.0346
Q 10	0.7763	8.0314	7.8303	0.2011	5.8809
Q 25	0.9229	7.5083	7.3072	0.2011	6.9916
Q 50	1.0263	7.2048	7.0037	0.2011	7.7747
Q 100	1.1333	6.9325	6.7314	0.2011	8.5855
Q 500	1.3929 (cfs)				

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ditch 139+50 138+00rt

Zone of Influence : louisville
C-Factor : .45
Area (acres) : .13

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 85 (ft)
Overland Friction Factor : N = .1
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .05 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 30 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 6 (ft²)
Channel Slope : SC = .1 (ft/ft)
Wetted Perimeter : WP = 12.17 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.2991	4.3685	4.3089	0.0597	5.1122
Q 5	0.3856	3.9540	3.8943	0.0597	6.5920
Q 10	0.4417	3.7486	3.6889	0.0597	7.5505
Q 25	0.5138	3.5320	3.4724	0.0597	8.7833
Q 50	0.5656	3.4012	3.3415	0.0597	9.6692
Q 100	0.6179	3.2848	3.2252	0.0597	10.5632
Q 500	0.7453 (cfs)				

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ditch Hayfield east 49+10 49+40

Zone of Influence : louisville
C-Factor : .45
Area (acres) : .12

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 40 (ft)
Overland Friction Factor : N = .1
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .05 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 90 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 4 (ft²)
Channel Slope : SC = .07 (ft/ft)
Wetted Perimeter : WP = 8.25 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.3172	2.8080	2.5917	0.2163	5.8732
Q 5	0.3975	2.5837	2.3674	0.2163	7.3620
Q 10	0.4497	2.4694	2.2531	0.2163	8.3280
Q 25	0.5164	2.3477	2.1314	0.2163	9.5634
Q 50	0.5648	2.2725	2.0562	0.2163	10.4590
Q 100	0.6131	2.2058	1.9895	0.2163	11.3543
Q 500	0.7312 (cfs)				

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ditch hayfield east 49+50 to 49+40

Zone of Influence : louisville
C-Factor : .9
Area (acres) : .07

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 30 (ft)
Overland Friction Factor : N = .1
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .07 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 75 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 20 (ft²)
Channel Slope : SC = .07 (ft/ft)
Wetted Perimeter : WP = 40.05 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	0.3999	2.0871	1.9104	0.1767	6.3471
Q 5	0.4922	1.9340	1.7573	0.1767	7.8129
Q 10	0.5523	1.8545	1.6778	0.1767	8.7665
Q 25	0.6290	1.7690	1.5923	0.1767	9.9847
Q 50	0.6850	1.7155	1.5387	0.1767	10.8727
Q 100	0.7406	1.6679	1.4912	0.1767	11.7561
Q 500	0.8771 (cfs)				

RATIONAL METHOD (Q = KCIA)

County, Route, Item No., Stream Name :
ditch right Old US 42 20+50 - 20+19

Zone of Influence : louisville
C-Factor : .5
Area (acres) : .6

Overland Flow Travel Time Components :

Length of Overland Flow : LO = 60 (ft)
Overland Friction Factor : N = .4
2-Year, 24-Hour Precipitation : P = 3.2 (in)
Average Overland Slope : SO = .06 (ft/ft)

Channel Flow Travel Time Components :

Length of Channel Flow : LC = 415 (ft)
Manning's Roughness Coefficient : n = .035
Bank Full Section Flow Area : AC = 4 (ft²)
Channel Slope : SC = .07 (ft/ft)
Wetted Perimeter : WP = 8.25 (ft)

	Q	TC	Tov	Tch	I
	-----	-----	-----	-----	-----
Q 2	1.1175	9.6137	8.6163	0.9974	3.7249
Q 5	1.5004	8.6709	7.6735	0.9974	5.0015
Q 10	1.7507	8.1915	7.1940	0.9974	5.8358
Q 25	2.0766	7.7170	6.7196	0.9974	6.9219
Q 50	2.3058	7.4416	6.4442	0.9974	7.6859
Q 100	2.5431	7.1940	6.1966	0.9974	8.4770
Q 500	3.1184 (cfs)				

=====

KTdid: 9802

END OF RUN

Section 10 – Other Water Related Impacts

WATER RELATED IMPACTS SUMMARY

County	Oldham	Route No.	US 42	Item No.	5-441.00
Date	1-30-2012	Program #	79216 01 D		
Federal Project No.	STMP 5138(056)				
State Project No.	FD52 093 0042 000-001				
Location Engineer					

Section 1: Impact Checklist

Complete this section for each alternative considered at the conclusion of Phase 1 design.

FLOODPLAIN IMPACTS		
FEMA Study Type	Yes	Community No.
Detailed FEMA Study with delineated floodway*		
Detailed FEMA Study without delineated floodway*		
Approximate FEMA Study		
No FEMA Study	X	210397, 215193, 210185
* May require initiation of the map revision process if impacts to water surface elevations cannot be avoided. Potential impacts to floodplains and/or floodways shall be assessed early in the project. Refer to Sections DR 203 and DR 204 of the Drainage Manual.		

SIGNIFICANT RESOURCE IMPACTS				
Are open sinkholes impacted? If so, how many sinkholes are impacted?	Yes	☐	No	X
Are wetlands impacted? If so, how many total acres are estimated? _____ acres	Yes	☐	No	X
Are any of the streams in the project area designated "Special Use Waters" (e.g. Wild Rivers, Exceptional Waters, Outstanding State Resource Water, etc.)?	Yes	☐	No	X
		☐		☐
Where possible, alignments should be developed that avoid significant resources. When it becomes impossible to avoid a significant resource, the project should be designed to minimize these impacts. Significant resource impacts are discussed in DR 202 of the drainage manual. Wetland impacts and their costs are also discussed in DR 500 of the Drainage Manual. Projects that impact special use waters may require an individual KPDES Erosion Control Permit. Contact the Division of Environment analysis for more information.				

STREAM CHANNEL IMPACTS				
Will stream relocations (channel changes) be needed? If so, how many total linear feet are estimated? <u>140</u> LF	Yes	X	No	
Will new culverts or culvert extensions be constructed? If so, how many total linear feet are estimated? <u>187</u> LF	Yes	X	No	
Will temporary stream crossings be needed?	Yes		No	X
Will excess material sites that require permitting be needed?	Yes		No	X
Will bridges be constructed?	Yes		No	X
On highway projects that involve stream crossings such as bridge and culverts, it is often not feasible to totally avoid stream channel impacts. In these cases, design the project to minimize the impacts. Stream relocations should be avoided if possible. If stream relocations are unavoidable design to project to minimize their impacts. Stream channel impacts are discussed in DR 506, 601-3, 608-2, and 802-3 of the drainage manual.				

Section 2 : Impact Discussion

Complete this section for the chosen alternate. Discuss the selected alternate's influence on each of the impacts listed above. Discuss any avoidance, minimization and/or mitigation measures included in the project.

2 IMPACT DISCUSSION FOR THE WATER RELATED IMPACTS SUMMARY

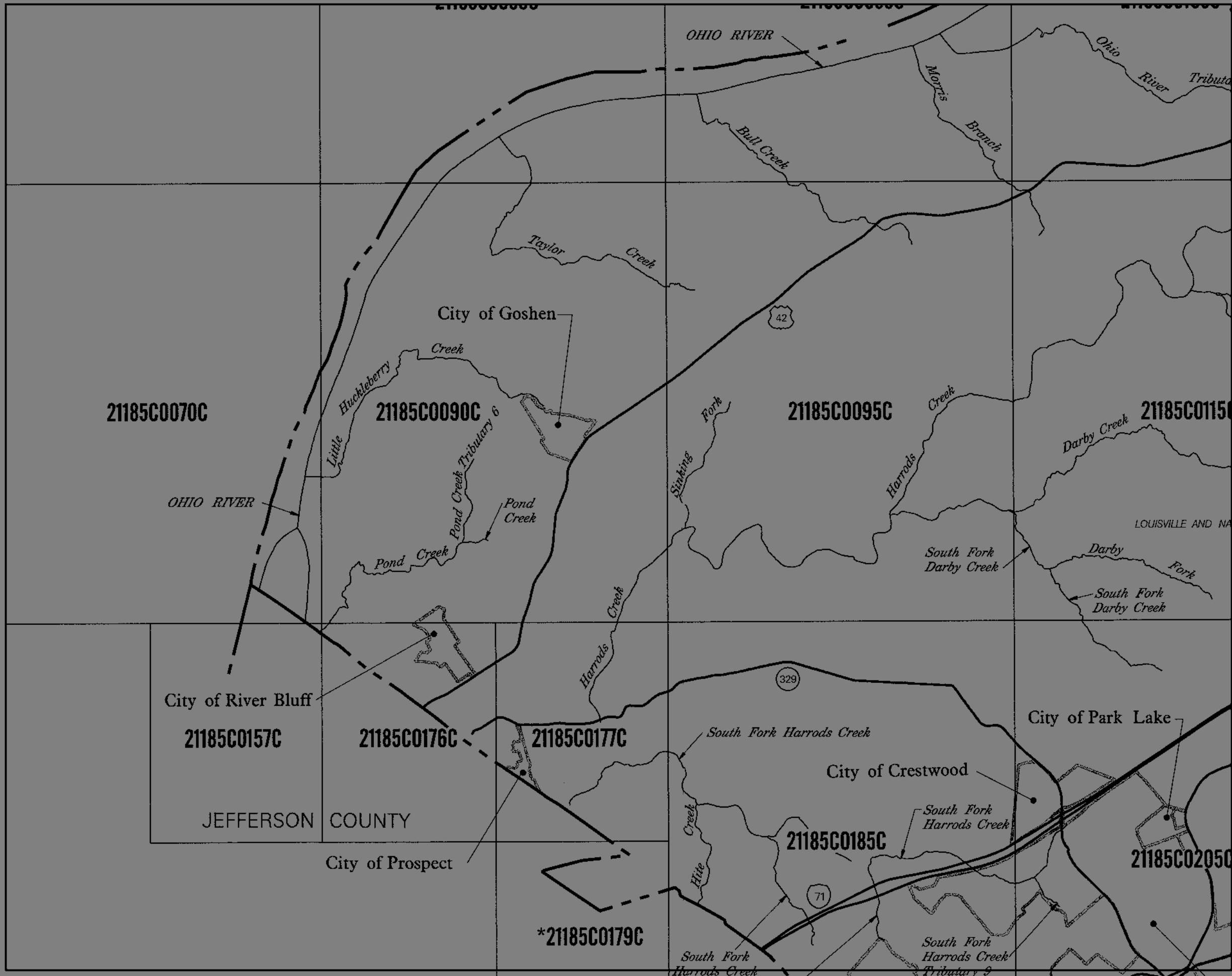
Blue Line Stream Impact

The existing alignment crosses one blue line stream (a tributary of the Harrods Creek) as identified on the ANCHORAGE, KY quad map. The headwater of this blue line stream begins to the north of the office building on the left at the end of the project. It crosses US 42 perpendicularly through an existing 4' x 4' culvert at (Station 139+20) AT the Hayfield Way/US 42 intersection. The stream leaves the project limits behind the residences on the south side of US 42. All of the build alternatives would have required widening of the existing 4' x 4' box culvert structure to accommodate the proposed three-lane roadway section because the stream crosses US 42, therefore there is not an avoidance alternative. In order to protect the waterway, typical erosion control and sediment control measures will be utilized to minimize erosion within the project limits. These measures will include silt fence, ditch checks, silt traps, temporary ditches, seeding and protecting and inlet protection.

The inlet of the existing 4' X 4' RCBC is located in a junction box that has a grate, 18" RCP and a 42" RCP all contributing runoff. Therefore the RCBC is functioning as the last segment of the existing Storm sewer system. At the outlet of the RCBC the channel immediately bends 90° to the west and then runs parallel to US 42 for approx. 100' before turning away from the road. Because this segment of channel is located so close to existing US 42, the fill slopes from the Proposed roadway will spill over and fill in this section of channel.

Instead of doing a traditional RCBC extension, which would require approximately 120' of relocated channel and drastically impact the adjacent residential yard; the RCBC will be extended as a storm sewer. By extending the RCBC as a storm sewer, the discharge can be returned to the natural channel sooner, and less land is disturbed. The extension will be made with round 54" storm sewer pipe and will follow the approximate alignment of the existing channel. Two manholes will be used. One manhole will be at the end of the existing RCBC to create a 90° bend, and the other will be 105' down stream to bend the alignment to match with the existing channel as it discharges. This will result in 140 lf of existing channel being filled over and replaced with a storm sewer pipe.

The FEMA maps show the drainage area of this RCBC to be in Zone X (outside the 100 year flood plain). Also no Detailed FEMA Studies were available. Since the overall drainage area of the discharge point did not change, and the impervious areas are realistically the same, this extension is expected to have minimal impact on the existing channel. Furthermore, this channel is currently receiving the discharge from this existing storm sewer; the proposed conditions will just discharge to the natural channel another 140' down stream.



NATIONAL FLOOD INSURANCE PROGRAM

MAP INDEX

FIRM
FLOOD INSURANCE RATE MAP
OLDHAM COUNTY,
KENTUCKY
AND INCORPORATED AREAS
(SEE LISTING OF COMMUNITIES TABLE)

MAP INDEX

PANELS PRINTED: 15, 20, 40, 70, 80, 85,
90, 95, 105, 110, 115, 120, 130, 139, 157, 176,
177, 185, 205, 210, 211, 212, 216, 217, 230,
231, 236



MAP NUMBER
21185CINDOA
EFFECTIVE DATE
SEPTEMBER 20, 2006

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



onal Flood Insurance Program at 1-800-638-6620.


MAP SCALE 1" = 1000'
500 0 1000 2000 FEET

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0090C

FIRM
FLOOD INSURANCE RATE MAP
OLDHAM COUNTY,
KENTUCKY
AND INCORPORATED AREAS

PANEL 90 OF 237
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GOSHEN, CITY OF	210397	0090	C
OLDHAM COUNTY	210185	0090	C
RIVER BLUFF, CITY OF	215193	0090	C

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.


MAP NUMBER
21185C0090C
EFFECTIVE DATE
SEPTEMBER 20, 2006
Federal Emergency Management Agency

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onal Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0176C

FIRM
FLOOD INSURANCE RATE MAP
OLDHAM COUNTY,
KENTUCKY
AND INCORPORATED AREAS

PANEL 176 OF 237

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
OLDHAM COUNTY	210185	0176	C
RIVER BLUFF, CITY OF	215193	0176	C

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MAP NUMBER
21185C0176C

EFFECTIVE DATE
SEPTEMBER 20, 2006

Federal Emergency Management Agency

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National Flood Insurance Program at 1-800-638-6620.


MAP SCALE 1" = 500'
250 0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0177C

FIRM
FLOOD INSURANCE RATE MAP
OLDHAM COUNTY,
KENTUCKY
AND INCORPORATED AREAS

PANEL 177 OF 237
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
OLDHAM COUNTY	210185	0177	C

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

 **MAP NUMBER**
21185C0177C
EFFECTIVE DATE
SEPTEMBER 20, 2006
Federal Emergency Management Agency

Oldham County
Unincorporated Areas
210185

329

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov