

Original Report Date: 01/25/2022	Proposed SN: 019-2026	Route: FAP 17 (IL 64)
Revised Date: 05/25/2022	Existing SN: 019-2004	Section: (125C3)ES
Geotechnical Engineer: Jeremy Brown, P.E. (IDOT D3)		County: DeKalb
Structural Engineer: Benjamin A. Nebel, P.E., S.E. (Hutchison Eng.)		Contract: 66M04

Indicate the proposed structure type, substructure types, and foundation locations (attach plan and elevation drawing): The proposed structure is a double 12 ft by 5 ft concrete box culvert with a 55 degree right forward skew. The proposed structure will be located at station 881+62.55.

Discuss the existing boring data, existing plans foundation information, new subsurface exploration and need for any additional exploration to be provided with SGR Technical Memo (attach all data and subsurface profile plot): The existing structure is a triple 8 ft by 4 ft concrete box culvert. Two soil borings were performed by IDOT in 2021. The soil boring logs are attached.

Provide the location and maximum height of any new soil fill or magnitude of footing bearing pressure. Estimate the amount and time of the expected settlement. Indicate if further testing, analysis, and/or ground improvement/treatment is necessary: The profile of the roadway is expected to remain unchanged. There will be no increase in loading. A site visit found no signs of settlement at the existing structure. No settlement analysis is warranted.

Identify any new cuts or fill slope angles and heights. Estimate the factor of safety against slope failure. Indicate if further testing, analysis or ground improvement/treatment is necessary: The fill over the top of the proposed box culvert will be approximately 1.75 feet high from the top of the culvert and is shown to have side slopes of 3.5H:1V or flatter on the preliminary TS&L. The slopes will be constructed according to section 205 of the Standard Spec Book utilizing approved materials. The slopes are relatively short in height and will also be supported at the toes by the 9 inch concrete headwalls at the ends of the box culvert.

The proposed box culvert will be longer in length than the existing structure and will require minor embankment construction to widen the roadway to accommodate new HMA shoulders. The maximum embankment height will be approximately 4 feet high with side slopes of 3H:1V or flatter according to the preliminary plans. Soil Boring log 2 shows a weak layer of medium silty loam/silty clay material that the embankment widening will be constructed on. Based on the cross sections there will be approximately 2-3 feet of material added to the existing slopes. Given the small amount of fill that will be added to the slopes, there is no concern over slope stability assuming they are constructed according to section 205 of the Standard Spec Book utilizing approved materials. A slope stability study was also performed using the Slide 2 program at station 881+62.6 based on soil boring log 2 in a drained state. This study yielded a factor of safety (FOS) of 1.892, which is greater the 1.5 FOS required by the IDOT Geotechnical Manual for fill sections. A site visit showed no slope stability concerns and no further analysis is warranted.

Indicate at each substructure, the 100-year and 200-year total scour depths in the Hydraulics report, the non-granular scour depth reduction, the proposed ground surface, and the recommended foundation design scour elevations: Not required for closed bottom culverts.

Determining the seismic soil site class, the seismic performance zone, the 0.2 and 1.0 second design spectral accelerations and indicate if that the soils are liquefiable: Not required for closed bottom culverts.

Confirm feasibility of the proposed foundation or wall type and provide design parameters. Attach a pile design table indicating feasible pile types, various nominal required bearings, factored resistances available and corresponding estimated lengths at locations where piles will be used. Provide factored bearing resistance and unit sliding resistance at various elevations and confirm no ground improvement/treatment is necessary where spread footings are proposed. Estimated top of rock elevations as well as preliminary factored unit side and tip resistance values shall be indicated when drilled shafts are proposed: Based on Figure 4.1.3.1-2 of the IDOT culvert manual, the estimated lengths of the wingwalls will be approximately 7 feet for the short wingwalls and 20.5 feet for the long wingwalls. Horizontal cantilever wingwalls are feasible for the 7 foot long wingwalls since they may be utilized for wingwalls up to 16 feet in length. Two-way cantilever L-type wingwalls are feasible for the 20.5 foot wingwalls since they may be used for lengths of up to 30 feet.

Based on the invert elevations on the TS&L, the base of the proposed concrete box culvert is to be constructed on a layer of stiff silty clay loam till which has adequate strength to support the proposed structure. The soil boring logs show very consistent soils and strengths underneath the proposed structure, therefore differential settlement is not a concern. Construction of a cast-in-place or a precast concrete box culvert is feasible at this location.

Based on the strengths shown in the soil boring logs there is no need to remove any material below the barrel of the proposed box culvert. The only aggregate needed under the concrete box culvert is the 6 inches required by Article 540.05 of the Standard Specifications if a precast concrete box culvert is chosen.

Calculate the estimated water surface elevation and determine the need for cofferdams (type 1 or 2), and seal coat: The structure can be constructed using standard methods of water diversion determined by the contractor. The estimated water surface elevation is 837.9.

Assess the need for sheeting or soil retention or temporary construction slope and provide recommendation for other construction concerns: The new structure will be constructed using staged construction. The soils do not show a Q_u greater than 4.5 tsf or blow counts greater than 45 bpf below the bottom of the proposed box culvert, therefore, temporary sheet piling is feasible.

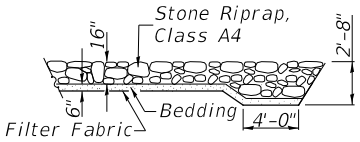
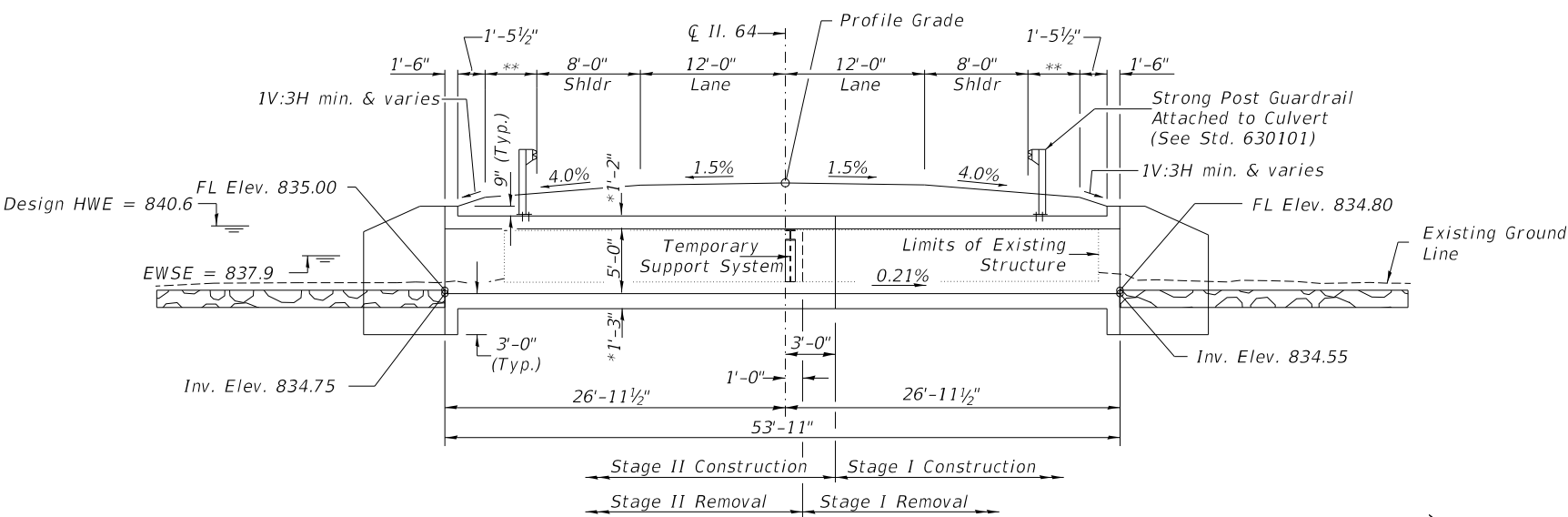
B.M.: Cut "□" on NE corner of 10'x10' concrete pad located on the south side of IL-64.
STA 877+89, 63' RT.
Elev. 847.33

R.R. Spike set in North side of power pole.
STA 886+42, 38'RT.
Elev. 839.08

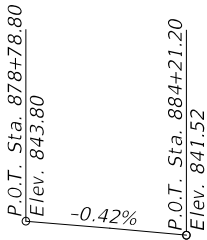
Existing Structure:
The existing structure, S.N. 019-2004, was constructed in 1937 under FA-136, Section 125-A. The structure consists of a triple barrel 8'x4' concrete box culvert. The structure is 84'-3" in length and is skewed 55° right ahead. A "jump slab" was constructed over the box culvert in 2021. The existing structure and jump slab are to be removed and replaced. Traffic will be maintained utilizing stage construction.

Salvage: None

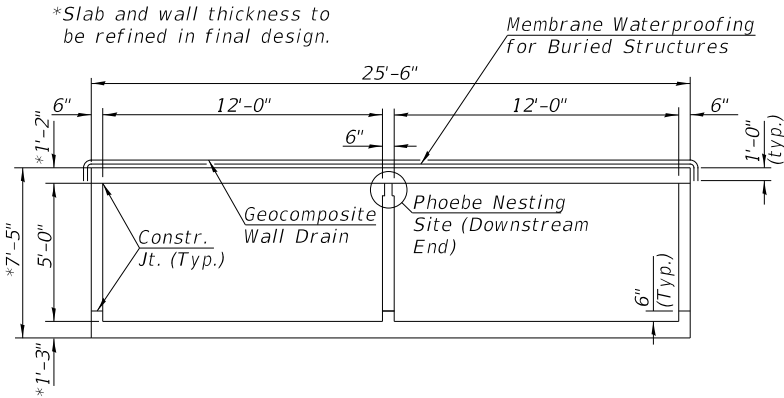
Precast alternate is not allowed.



SECTION A-A



PROFILE GRADE
(Along CL IL Rte. 64)

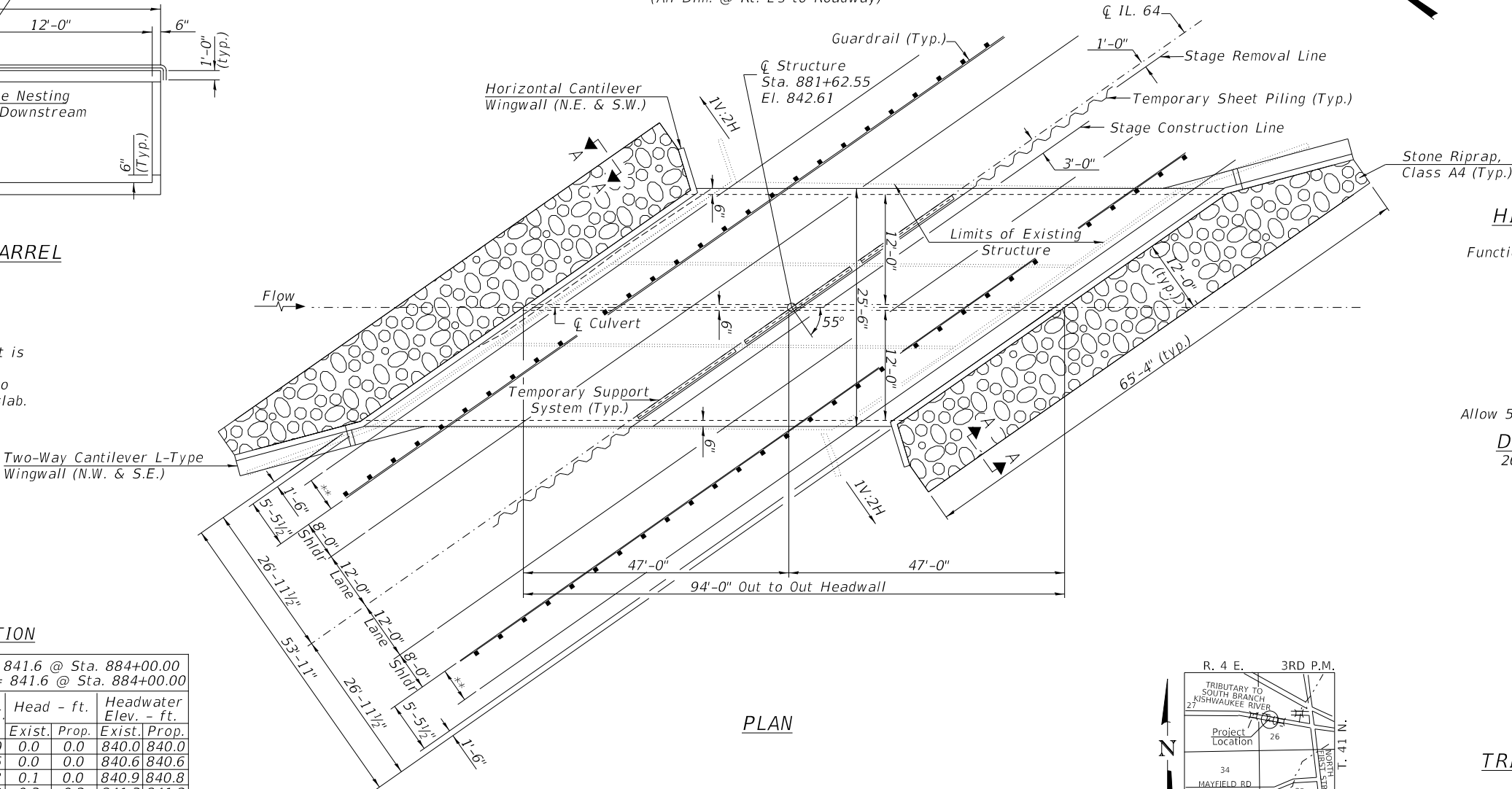


SECTION THRU BARREL

Note:
Main reinforcement in existing culvert is perpendicular to culvert.
Existing Jump Slab has been placed to remove live loading from existing top slab.

**3'-0" HMA Stabilization & 1'-0" Earth Shoulder

LONGITUDINAL SECTION
(Looking East)
(All Dim. @ Rt. L's to Roadway)



PLAN

WATERWAY INFORMATION

Drainage Area = 3.3 Sq. Mi.		Existing Overtopping Elev. = 841.6 @ Sta. 884+00.00 Proposed Overtopping Elev. = 841.6 @ Sta. 884+00.00							
Flood	Freq. Yr.	Discharge C.F.S.	Opening Sq. ft.		Nat. H.W.E. ft.	Head - ft.		Headwater Elev. - ft.	
			Exist.	Prop.		Exist.	Prop.	Exist.	Prop.
Ten-Year	10	286	96	120	840.0	0.0	0.0	840.0	840.0
Design	50	436	96	120	840.6	0.0	0.0	840.6	840.6
Base	100	499	96	120	840.8	0.1	0.0	840.9	840.8
Scour Check	200	562	96	120	841.0	0.3	0.2	841.3	841.2
Max. Calc.	500	645	96	120	841.2	0.5	0.4	841.7	841.6
10-Year Velocity through Existing Structure = 3.0 ft/s									
10-Year Velocity through Proposed Structure = 2.4 ft/s									

10-Year Velocity through Existing Structure = 3.0 ft/s
10-Year Velocity through Proposed Structure = 2.4 ft/s

HIGHWAY CLASSIFICATION

F.A.P. Rte. 17 - IL Rte. 64
Functional Class: Minor Arterial (Non-Urban)
ADT: 5,517 (2022); 7,675(2042)
ADTT: 607 (2022); 844 (2042)
DHV: 552 (2022); 768 (2042)
Design Speed: 60 mph
Posted Speed: 55 mph
Two-Way Traffic
Directional Distribution: 50:50

LOADING HL-93

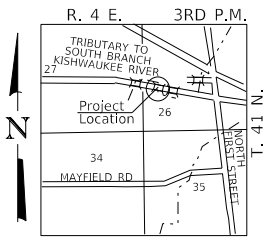
Allow 50#/sq. ft. for future wearing surface.

DESIGN SPECIFICATIONS

2020 AASHTO LRFD Bridge Design Specifications, 9th Edition

DESIGN STRESSES

(FIELD UNITS)
f'c = 3,500 p.s.i.
fy = 60,000 p.s.i. (Rein.)



LOCATION SKETCH

GENERAL PLAN
IL ROUTE 64 OVER
TRIBUTARY TO SOUTH BRANCH
KISHWAUKEE RIVER
F.A.P. RTE. 17 - SEC. (125C3)ES
DEKALB COUNTY
STATION 881+62.55
STRUCTURE NO. 019-2026

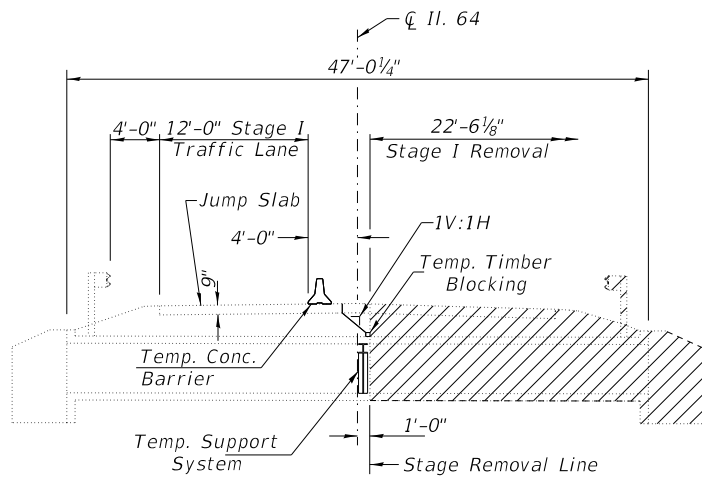
MODEL: STATION NAMES
FILE: NAME: 17033107 - IL 64 over Ditch - TSS4 - IDOT PTD199-023 (IDOT D-3)CADD/CADD Sheets0192026-66M04-TSS4.dgn

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PLOT DATE = 5/4/2022	CHECKED - JPS/BAN	REVISED -
	DATE -	REVISED -

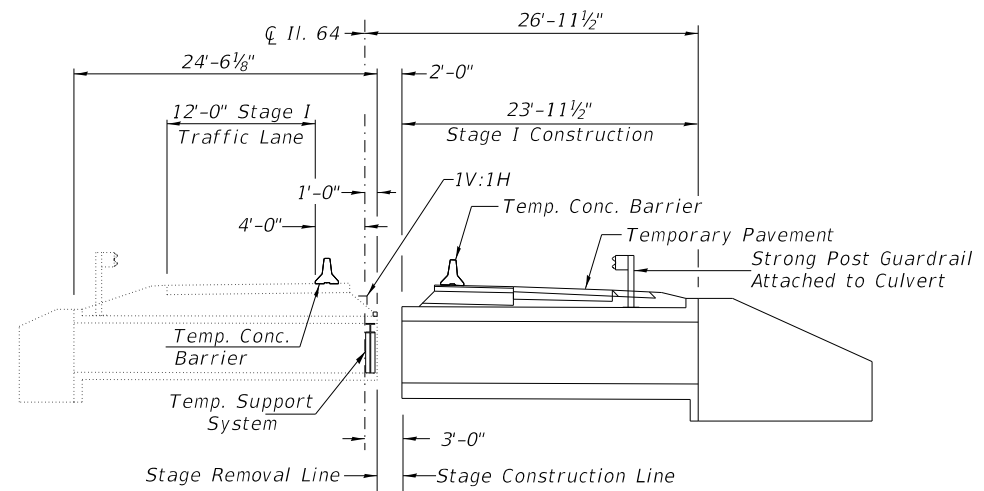
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

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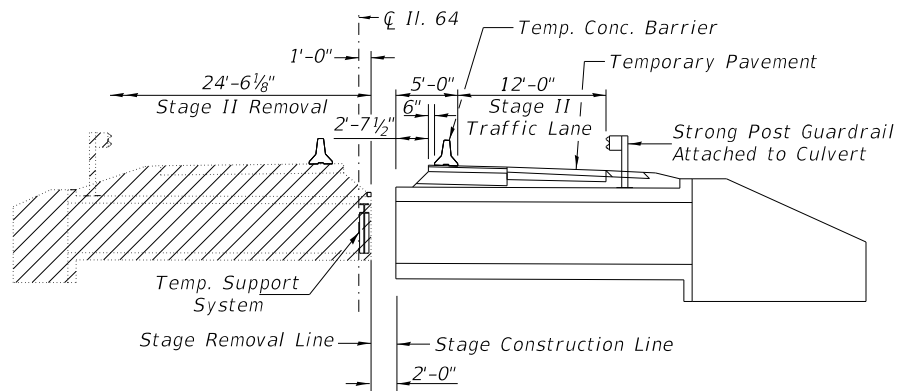
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17	(125C3)ES	DEKALB	2	1
S.N. 019-2026		CONTRACT NO. 66M04		
FED. ROAD DIST. NO. 7		ILLINOIS FED. AID PROJ. NO.		



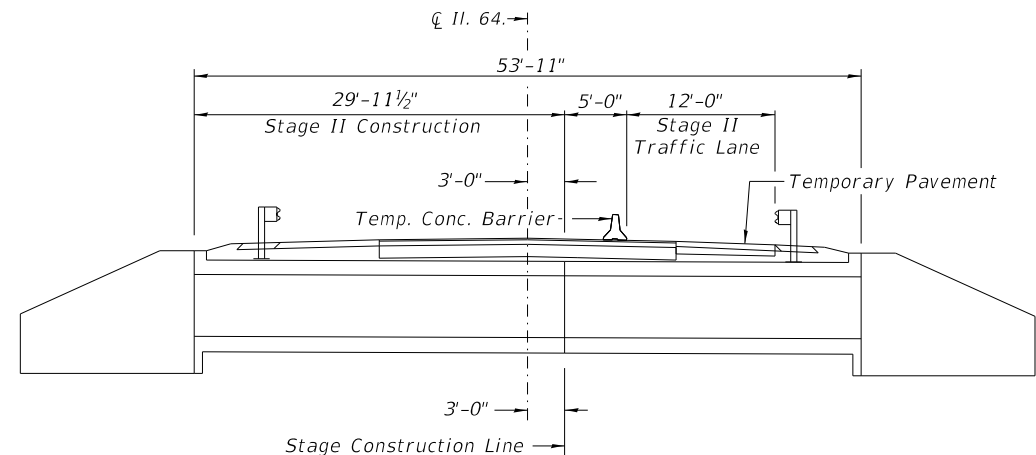
STAGE I REMOVAL
(All Dim. @ Rt. L's to Roadway)



STAGE I CONSTRUCTION
(All Dim. @ Rt. L's to Roadway)



STAGE II REMOVAL
(All Dim. @ Rt. L's to Roadway)



STAGE II CONSTRUCTION
(All Dim. @ Rt. L's to Roadway)

STAGE CONSTRUCTION DETAILS
(Looking East)

STAGE CONSTRUCTION DETAILS
IL ROUTE 64 OVER
TRIBUTARY TO SOUTH BRANCH
KISHWAUKEE RIVER
F.A.P. RTE. 17 - SEC. (125C3)ES
DEKALB COUNTY
STATION 881+62.55
STRUCTURE NO. 019-2026

MODEL: STAGE I REMOVAL
FILE: STAGE I REMOVAL.dgn
DATE: 5/4/2022

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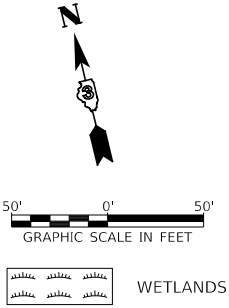
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SCALE: N/A SHEET 2 OF 2 SHEETS

FAP RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
17	(125C3)ES	DEKALB	2	2
S.N. 019-2026 CONTRACT NO. 66M04				
FED. ROAD DIST. NO. 7 ILLINOIS FED. AID PROJ. NO.				

PROFILE	SURVEYED _____	BY _____	DATE _____
	PLOTTED _____		
NOTE BOOK _____	GRADES CHECKED _____		
NO. _____	B.M. NOTED _____		
	STRUCTURE NOTATIONS CHKD _____		

EX. PROF. PR. PROF.	LT. DT. RT. DT.
860	860
855	855
850	850
845	845
840	840
835	835
830	830
825	825
844.49	
844.23	843.16 843.09
843.95	842.42 843.40
843.70 843.72	842.55
843.44 843.50	841.45
843.19 843.29	840.89
843.04 843.08	840.67
842.85 842.87	839.66
842.73 842.66	839.33
842.48 842.45	838.47
842.15 842.24	838.25
841.89 842.03	838.28
841.76 841.82	838.26
841.60 841.61	839.00
841.41	839.20
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840.90	
840.83	
EX. PROF. PR. PROF.	LT. DT. RT. DT.

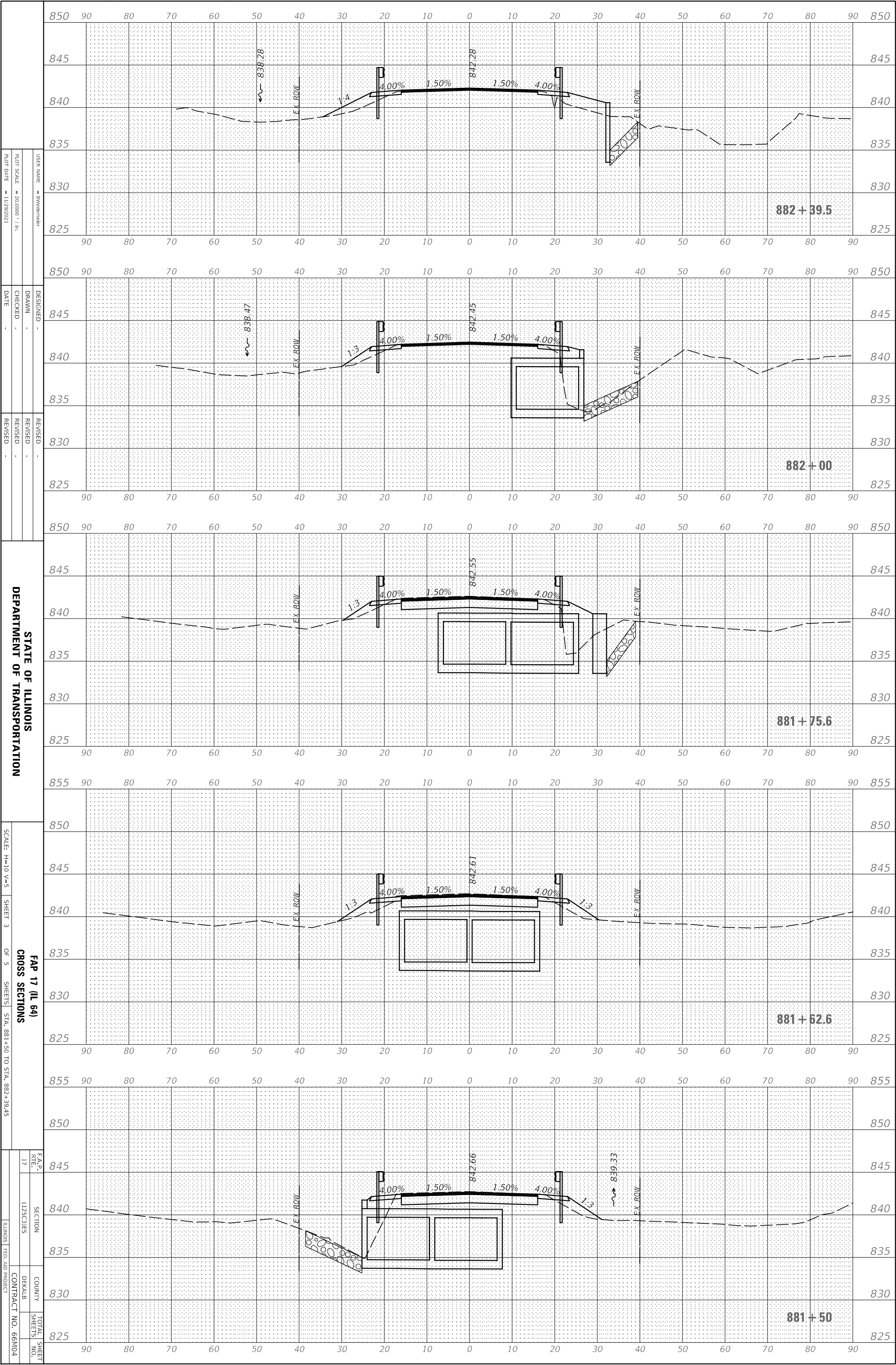


USER NAME = BWedemeier	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	FAP 17 (IL 64) PLAN AND PROFILE				F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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PLOT DATE = 1/19/2022	DATE -	REVISED -		SCALE: H=50 V=5	SHEET 1	OF 1 SHEETS	STA. 874+00	TO STA. 889+00				
								ILLINOIS	FED. AID PROJECT			

ORIGINAL SURVEY		BY	DATE
	SURVEYED _____		
	PLOTTED _____		
NOTE BOOK	TEMPLATE _____		
	AREAS _____		
NO. _____	AREAS CHECKED _____		

FINAL SURVEY	SURVEYED _____	BY _____	DATE _____
	PLOTTED _____		
NOTE BOOK	TEMPLATE _____		
	AREAS _____		
NO. _____	AREAS CHECKED _____		

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Drained State - Slope Stability Analysis - 66M04

Boring No.: 02(N.W. Quad.)

Station: 881+62.6

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Allow Sliding	Water Surface	Ru
New Embankment		120	Mohr-Coulomb	25	27		None	0
Silty Clay Fill		120	Mohr-Coulomb	0	26		None	0
Medium Silty Loam/Silty Clay		120	Mohr-Coulomb	0	27		None	0
Stiff Silty Clay Loam Till		120	Mohr-Coulomb	0	28		None	0
Concrete		150	Infinite strength			No	None	0

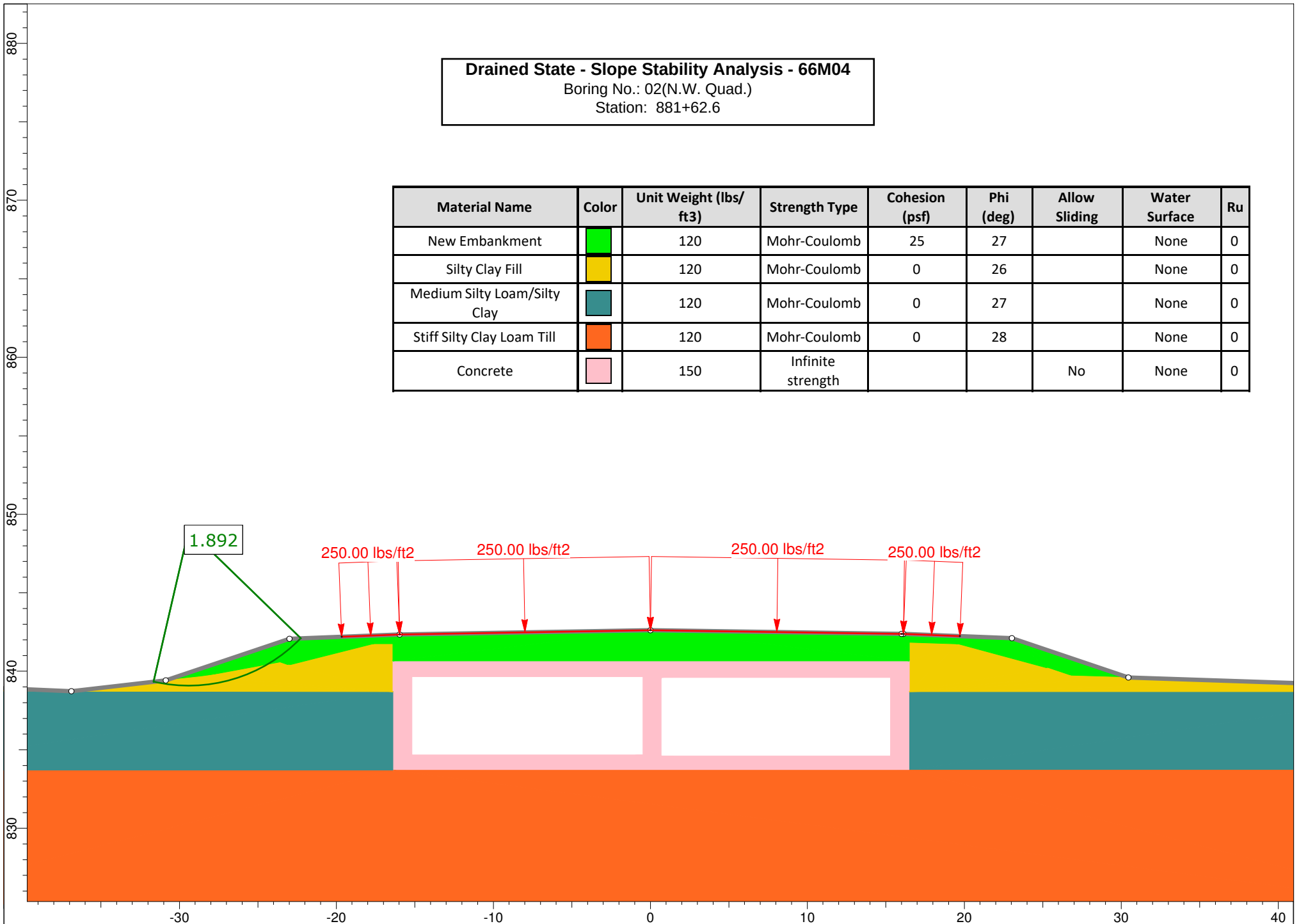
1.892

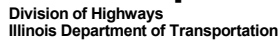
250.00 lbs/ft2

250.00 lbs/ft2

250.00 lbs/ft2

250.00 lbs/ft2





Date 9/28/21

SOIL BORING 019-2004.GPJ IL DOT.GDT 10/21/21



Illinois Department of Transportation

Division of Highways
Illinois Department of Transportation

SOIL BORING LOG

Page 1 of 1

Date 9/29/21

ROUTE FAP 17 (IL 64) DESCRIPTION IL 64 over Drainage Ditch 2.3 Miles West of Sycamore LOGGED BY Larry Myers

SECTION (125C3)ES LOCATION SW 1/4, SEC. 26, TWP. 41, RNG. 4, 3rd PM,
Latitude 42.0011096, Longitude -88.751756

COUNTY DeKalb DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME Automatic

STRUCT. NO. 019-2004 (Existing)
Station 881+65

BORING NO. 2 (N.W. Quad.)

Station 881+05

Offset 17.0 ft Lt.

Ground Surface Elev. 843.20 ft

D E P T H (ft)	B L O W S (/6")	U C S (tsf)	M O I S T (%)
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Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft
Groundwater Elev.:
First Encounter 830.7 ft ▼
Upon Completion 825.2 ft ▼
After _____ Hrs. _____ ft

D E P T H (ft)	B L O W S (/6")	U C S (tsf)	M O I S T (%)
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Augered Shoulder Stone, Sand and Gravel Fill, Brown and Black Silty Clay Fill

840.70

Medium Black Silty Clay Fill

838.70

Medium Brown and Gray Silty Loam / Silty Clay with Sand Layers - Alluvial Deposits

-5

833.70

Stiff to Very Stiff Reddish Brown Silty Clay Loam Till - Monolithic

-10

▼

-15

▽

-20

Stiff to Very Stiff Reddish Brown Silty Clay Loam Till - Monolithic (continued)

3
5 2.0 13
7 B

3
4 1.9 15
5 B

-25
2
5 1.9 14
5 B

3
4 2.0 14
6 B

-30
3
4 1.7 13
3 B

-35
3
5 2.0 16
7 B

806.70

End of Boring

-40

SOIL BORING 019-2004.GPJ IL_DOT.GDT 10/21/21

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

BBS, form 137 (Rev. 8-99)