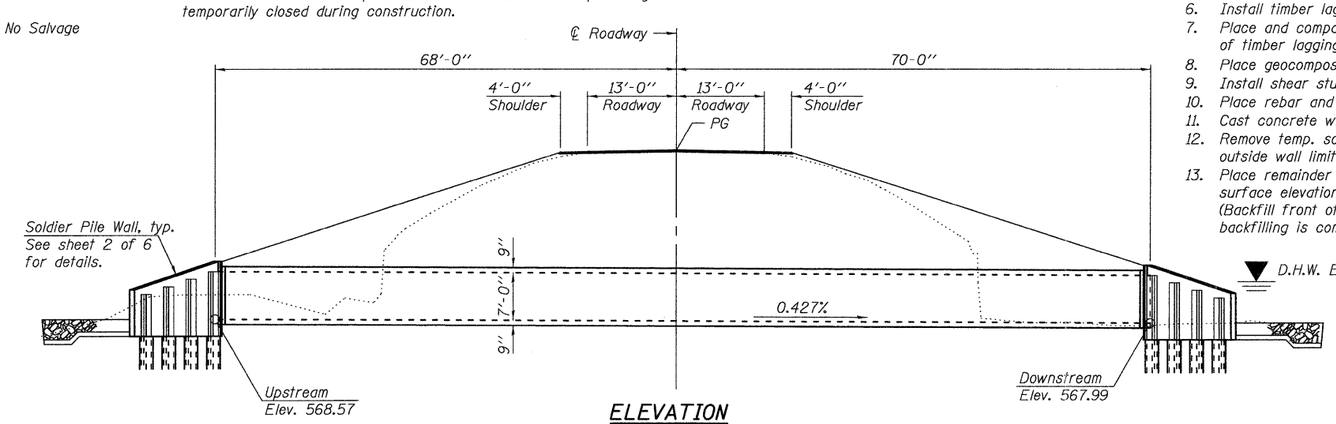
Benchmark (B.M. 308): Station 554+90 25' LT Cut square on the northwest corner of a box culvert 1000' west of CR 975E Elev. 594.058

Benchmark (B.M. 309): Station 539+95 23' LT Cut square on the sortheast corner of a box culvert on a private entrance 1500' east of CR 975E Elev. 599.339

Benchmark (B.M. 324): Station 547+00 23' RT Chisled square on the top center of a concrete headwall for a private entrance to the south Elev. 594.261

Existing Structure: S.N. 018-8638 is a 8' x 8' single barrel concrete box culvert. The culvert headwall and wingwalls are parallel to the roadway. Existing structure is to be removed and replaced with a precast double box culvert with cast-in-place end sections and soldier pile wingwalls. The road is to be temporarily closed during construction.

No Salvage



ELEVATION

CULVERT CONSTRUCTION SEQUENCE

1. Remove existing structure.
2. Place precast box culvert sections.
3. Build cutoff wall.
4. Form and place concrete for portion of end sections to be cast onto precast box sections.
5. Drill soldier piles (May be completed prior to box placement).
6. Install timber lagging.
7. Place and compact backfill behind wall to top of timber lagging.
8. Place geocomposite wall drain.
9. Install shear stud connectors.
10. Place rebar and form wall face.
11. Cast concrete wingwall.
12. Remove temp. soldier pile and remaining timber outside wall limits.
13. Place remainder of backfill to proposed ground surface elevations on both sides of wall. (Backfill front of wall as much as possible before backfilling is completed.)

GENERAL NOTES

Reinforcement bars shall conform to the requirements of ASTM A 706, Gr. 60.

Layout of slope protection system may be varied to suit ground conditions in the field as directed by the Engineer.

The design fill height for this structure is 18 feet. The precast concrete box culvert sections shall conform to the requirements of ASTM C1433.

Areas of the precast box culvert in contact with cast-in-place concrete shall be sand blasted, cleaned, and wetted prior to placing concrete in the field according to Article 503.09(b) of the Standard Specifications.

In order to minimize excessive deflection and/or stresses in the soldier piles, compaction equipment used within 4 feet of the back face of the timber lagging shall be limited to lightweight mechanical tampers, rollers, or vibratory systems.

Build top of headwalls parallel to the grade lines.

All construction joints shall be bonded according to Article 503.09 of the Standard Specifications.

End Sections will be paid for at the contract unit price each for BOX CULVERT END SECTIONS as outlined in Section 540 of the Standard Specifications.

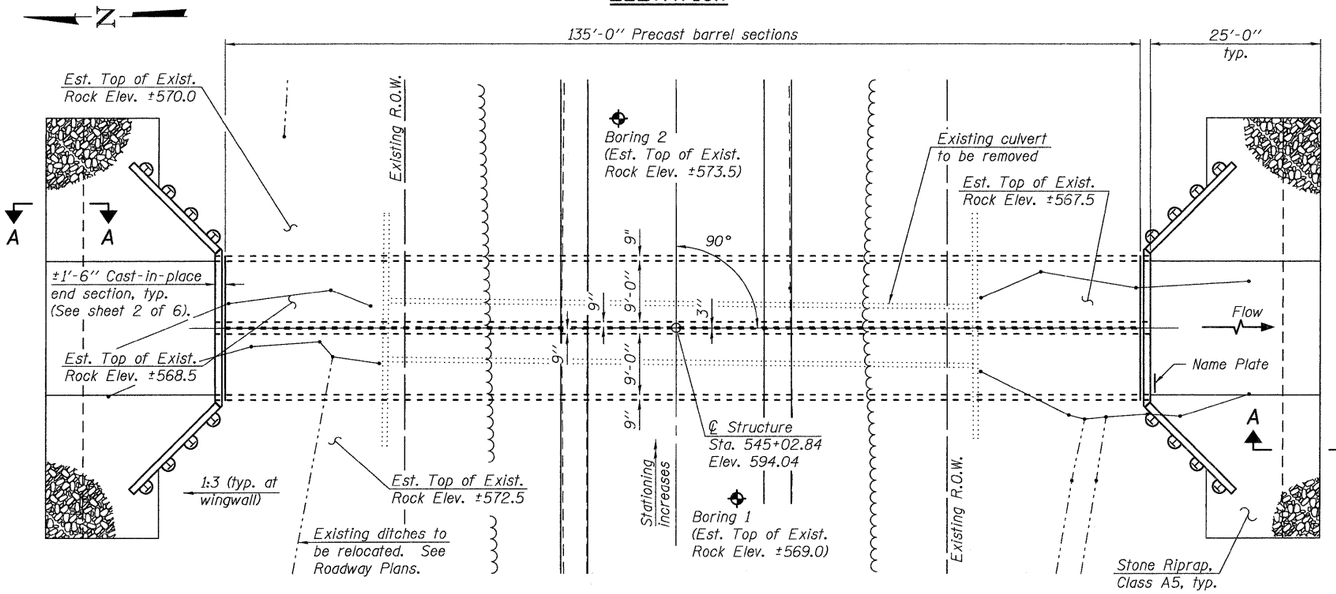
The box culvert end section shall be built in the field and a precast option is not allowed. Class SI concrete shall be used for the concrete cast in the field for the cutoff walls, portions of the end sections being cast onto the end of the precast box sections, and the concrete facing for the walls.

Concrete, rebar, and welded wire fabric quantities and lengths calculated for the end sections may vary based upon the precast box culverts supplied.

The ends of the precast box sections adjacent to the end sections shall be formed without the tongue and groove shapes specified in Article 8.1 of ASTM C1433.

The longitudinal reinforcement of the welded wire fabric extending from the precast boxes into the end sections shall have a minimum area of 0.20 in^2/ft. Substitution of reinforcement bars for welded wire fabric is not allowed.

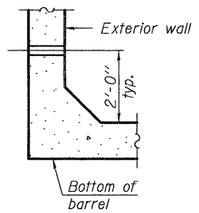
The joints between precast box sections shall be sealed and all voids filled with a mastic joint sealer. In addition, the joints shall be externally sealed on all four sides with a 13 inch wide external sealing band. The seal shall be centered over the joint, secured in place, and protected during the backfilling process.



PLAN

DRAIN DETAIL

Provide 3" ϕ drain holes in exterior walls at ±8' cts. See Article 503.11 of the Standard Specifications.



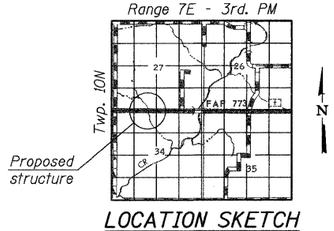
INDEX OF SHEETS

STATION 545+02.84
BUILT 201 BY
STATE OF ILLINOIS
F.A.P. RTE. 828 SEC. (108,109,110)RS-3
LOADING HS 20-44
STRUCTURE NO. 018-8311

NAME PLATE

See Std. 515001

Range 7E - 3rd. PM



LOCATION SKETCH

TOTAL BILL OF MATERIAL

ITEM	UNIT	TOTAL
Stone Riprap, Class A5	Sq. yd.	337
Filter Fabric	Sq. yd.	337
Removal of Existing Structures No. 2	Each	1
Structure Excavation	Cu. yd.	1,382
Rock Excavation for Structures	Cu. yd.	368
Name Plates	Each	1
Box Culvert End Sections, Culvert No. 2	Each	2
Precast Concrete Box Culvert 9' x 7'	Foot	270

DESIGN STRESSES

FIELD UNITS

f'c = 3,500 psi
fy = 60,000 psi (Reinforcement)
fy = 36,000 psi (AASHTO M270, Gr. 36) (Soldier Piles)

PRECAST UNITS

f'c = 5,000 psi
fy = 65,000 psi (welded wire fabric)

LOADING HS 20-44

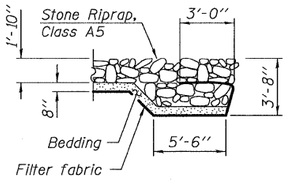
Allow 50#/sq. ft. for future wearing surface.

DESIGN SPECIFICATIONS

2002 AASHTO - Standard Specifications

DESIGN SCOUR ELEVATION TABLE

Design Scour Elevation (ft.)	Upstream	Downstream
	566.57	565.99



SECTION A-A

WATERWAY INFORMATION

Drainage Area = 0.53 $mi.^2$
Proposed Low Grade Elev. 594.06 @ Sta. 545+32
Existing Low Grade Elev. 594.06 @ Sta. 545+32

Flood	Freq. Yr.	Q C.F.S.	Opening Sq. Ft. Exist.	Opening Sq. Ft. Prop.	Nat. H.W.E.	Head - Ft. Exist.	Head - Ft. Prop.	Headwater El. Exist.	Headwater El. Prop.
	10	371	39	92	573.7	2.1	0	575.8	573.7
Design	50	625	48	112	574.8	4.0	0	578.8	574.8
Base	100	744	51	119	575.2	5.4	0	580.6	575.2
Max. Calc.	500	1040	57	126	575.9	9.6	0.3	585.5	576.2

10 year velocity through existing bridge = 11.7 ft./sec.
10 year velocity through proposed culvert = 6.6 ft./sec.

LICENSED STRUCTURAL ENGINEER
DAVID CARL PUZEY
081-005470
SPRINGFIELD ILLINOIS
STATE OF ILLINOIS

EXPIRES 11-30-2012

GENERAL PLAN & ELEVATION
ILL. ROUTE 121 OVER STREAM
F.A.P. RTE. 828 - SEC. (108,109,110)RS-3
CUMBERLAND COUNTY
STATION 545+02.84
STRUCTURE NO. 018-8311

DESIGNED -	David Puzey	EXAMINED	Thomas J. Domagalski
CHECKED -	Michael D. Kelsall		ENGINEER OF BRIDGE DESIGN
DRAWN -	MICHAEL B. MOSSMAN	PASSED	Carl Puzey
CHECKED -	MDR /DLG		ENGINEER OF BRIDGES AND STRUCTURES

DATE - August 1, 2011

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

GENERAL PLAN AND ELEVATION
STRUCTURE NO. 018-8311
SHEET NO. 1 OF 6 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
828	(108,109,110)RS-3	CUMBERLAND	56	39
		CONTRACT NO. 74252		
		ILLINOIS FED. AID PROJECT		