Design Support Report for Programmatic Section 4(f) Alternatives Analysis

U.S. Highway 60 Bridge Over Horse Creek

Afton, Ottawa County

Job Piece No.: 31715(05)

NBI Bridge No.: 05017
Structure No.: 5806 0256 X

Prepared for

Federal Highway Administration

and

Oklahoma Department of Transportation

Prepared by

Mead & Hunt

www.meadhunt.com

September 2016

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

Tables

Appendices

1. Introduction

According to Section 4(f) regulations (23 CFR 774), the Federal Highway Administration (FHWA) may not approve an action that uses publicly owned parks, recreation areas, wildlife and waterfowl refuges, or historic sites, including historic bridges, when there is a feasible and prudent alternative to the action. Actions that "use" a historic bridge are those that result in the demolition or removal of the structure or that reconstruct it to such an extent that the character-defining features that give it historic significance are eliminated or substantially impaired.[1] As established by the Programmatic Section 4(f) Evaluation for Historic Bridges, a limited number of avoidance alternatives must be evaluated and rejected before the FHWA can approve an action that uses a historic bridge.[2] The purpose of this report is to present the alternatives analysis for the U.S. Highway (US) 60 Bridge over Horse Creek to enable the FHWA and the Oklahoma Department of Transportation (ODOT) to assess the feasibility and prudence of the alternatives.

To prepare this report, a Mead & Hunt, Inc. (Mead & Hunt) qualified professional historian and professional structural engineer conducted a site visit to the bridge on April 20, 2016; reviewed bridge inspection reports, bridge plans, and other documents related to the bridge; and participated in conference calls with representatives from ODOT and the design consultant.

Constructed in 1936, the US 60 Bridge over Horse Creek is listed in the National Register of Historic Places (NRHP) under *Criterion A: Transportation.* The bridge is significant as a unique example of the need to accommodate pedestrians in a time when the automobile was becoming the dominant mode of transportation. The 143-foot-long steel I-beam bridge is known locally as "the side-walk" bridge for its double reinforced-concrete walkway design.[3] The sidewalks and associated railings are the key elements of the US 60 Bridge that represent its significance and therefore are its character-defining features.

The remainder of this report is organized to present a description of the bridge and its existing conditions, identify the proposed project's purpose and need, and discuss the analysis of three primary avoidance alternatives. The three primary alternatives under consideration in this document are:

1. Do nothing;

2. Rehabilitate the historic bridge for continued vehicular service for two-way traffic; and

3. Construct a structure on new location without adversely affecting the historic bridge's integrity.

---

[1] Federal Highway Administration, Office of Planning, Environment, and Realty, Project Development and Environmental Review, "Section 4(f) Policy Paper," 20 July 2012, http://www.environment.fhwa.dot.gov/4f/4fpolicy.pdf (accessed 20 December 2013).

[2] Federal Highway Administration and Oklahoma Department of Transportation, "Design Support for Section 4(f) Analysis for Historic Bridges," 25 March 2013 (updated).

[3] National Register of Historic Places, Horse Creek Bridge, Afton, Ottawa County, Oklahoma. National Register #95000040.

Alternative 3 identified above is subdivided into three options:

- Option A – Retain the historic bridge in vehicular service as half of a one-way couplet.

- Option B1 – Retain the historic bridge as a monument with a new bridge constructed on an offset highway alignment.

- Option B2 – Retain the historic bridge as a non-motorized vehicle/pedestrian/bicycle facility with a new bridge constructed on an offset highway alignment.

The American Association of State Highway and Transportation Officials (AASHTO)'s *A Policy on Geometric Design of Highways and Streets 2011* (AASHTO Green Book) was used to complete the alternatives analysis in accordance with FHWA and ODOT guidelines for the Design Support for Section 4(f) Analysis for Historic Bridges.

2. Existing Conditions

This section addresses the existing condition of the US 60 Bridge, including a description of the structure and its setting. Two primary considerations in this section for the US 60 Bridge are structural deficiency and functional obsolescence. A discussion of the bridge's current sufficiency rating, which is determined during each bridge inspection, is also presented to provide a framework for understanding the bridge's structural deficiency and functional obsolescence. The latest ODOT Bridge Inspection Report, based on an inspection performed on April 6, 2015, is included in Appendix A.

A. Description

The US 60 Bridge over Horse Creek is located in ODOT Division 8, in the northeast area of the city of Afton, Ottawa County, Oklahoma, 2.6 miles north of the Delaware County Line (see Appendix B for a project location map). Residential and commercial properties are located to the west of the bridge on both sides of US 60.

The US 60 Bridge over Horse Creek is a three-span structure with an overall length of approximately 143 feet, as measured from the back of the abutments. The bridge consists of one 60-foot-long and two 40-foot-long steel I-beam spans, with a cast-in-place reinforced-concrete deck providing a 24-foot clear roadway for two lanes of traffic and two 5-foot-wide sidewalks, one on each side of the roadway. The bridge has reinforced-concrete railings on each side of the sidewalks, for a total of four railings. The bridge is skewed at a 45-degree angle with the waterway.

The steel I-beam spans are supported on two cast-in-place reinforced-concrete abutments (each with two cast-in-place reinforced-concrete wingwalls) and on two cast-in-place reinforced-concrete piers with concrete web walls between concrete columns. The foundations for the abutments and piers are supported on limestone bedrock. See Appendix C for photographs of the bridge and Appendix D for select original plans for this bridge.

The bridge was originally designed for an AASHTO H 20 (20-ton truck) live load. The bridge is not load posted/weight restricted. The bridge inspection report (April 2015) indicates that this bridge was last load rated on August 1, 2006, using the Load Factor (LF)-Ton inventory rating method. The results of that rating indicate a Posting of 5: At/Above Legal Loads.

US 60 at the project site is classified as a rural minor arterial highway. The highway is not on the National Highway System and is not part of a national truck route. The 2016 average annual daily traffic (AADT) on the bridge is 7,000 vehicles; the projected 2036 AADT is 11,200 vehicles. The truck percentage as a measure of AADT is approximately 23 percent. The posted speed limit at the bridge location is 35 miles per hour (mph) and increases to 45 mph east of the bridge. There have been several crashes at this bridge in recent years, as evidenced by repairs to three sections of the concrete bridge railings. These crashes appear to have been single vehicle collisions with the concrete railings, as documented in ODOT's Collision Analysis Report for the period January 2004 to December 2006.

Several items impact the hydraulics of Horse Creek. An active railroad bridge is located approximately 650 feet upstream (north) of the existing bridge. In addition, there are remnants of the old Route 66 Bridge and abandoned highway fill to the north of the existing bridge. The old concrete west abutment remains surrounded with vegetation. Portions of two concrete pier foundations remain in the waterway. These old substructure remnants and highway fill appear to partially obstruct the Horse Creek waterway flow.

B. Current bridge sufficiency rating

The bridge's current sufficiency rating is 29.9 out of a possible 100 points. The sufficiency rating measures a bridge's capability to remain in vehicular service, based on a mathematical formula incorporating condition ratings, load capacity, roadway and structure geometrics, traffic counts, presence of suitable detour routes, and other bridge inspection factors. A bridge with a sufficiency rating of 80 or less is eligible for federal bridge rehabilitation funding. A bridge with a sufficiency rating of 50 or less is eligible for federal bridge replacement funding.

The bridge is structurally deficient (SD) and functionally obsolete (FO) with the following National Bridge Inventory (NBI) ratings on a scale of 9 = Excellent Condition to 0 = Failed Condition as shown in Table 1, in accordance with the current Bridge Inspection Report (April 2015) (see Appendix A). This report will be referred to herein after as "Bridge Inspection Report."

Table 1. US 60 Bridge over Horse Creek NBI ratings

Item	Current Rating (April 2015)
NBI Item 58 (Deck)	3 = Serious
NBI Item 59 (Superstructure)	4 = Poor
NBI Item 60 (Substructure)	5 = Fair
NBI Item 61 (Channel)	7 = Minor Damage
Overall Sufficiency Rating	29.9 (SD, FO)

C. Structural deficiencies and condition

Bridges are considered structurally deficient if significant load-carrying elements are found to be in poor condition due to deterioration and/or damage. Structural deficiency is numerically defined as a bridge component (deck, superstructure, or substructure) having an NBI general condition rating of 4 (poor condition) or less. The concrete deck for this bridge has a rating of 3, and the superstructure has a rating of 4.[4] Based on the Bridge Inspection Report and field verification, the structural deficiencies and conditions are listed below according to NBI item, along with the condition state for individual elements.[5]

[4] According to the *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*, "Rating 3 - Serious Condition" means that structural elements show loss of section, deterioration, spalling or scour having seriously affected primary structural components. Local failures are possible.

[5] NBI element-level inspection condition state for individual components of a bridge are defined as follows: 1 = Good; 2 = Fair; 3 = Poor; 4 = Severe; and 5 = (undefined, but is critical or imminent failure).

- NBI Item 36A-Bridge Rail, Item 36B-Rail Transition, Item 36C-Approach Rail, and Item 36D-Approach Rail Ends: These items rate as 0-Substandard. The concrete railings between the roadway and the sidewalks do meet current crash rating test level (TL) standards.[6] The concrete railings on the outside of the sidewalks do not meet current geometric and safety requirements for overall height and for minimum clear opening dimensions between elements of the railing. There is no approach railing to the bridge, nor are there any approach railing ends.

- NBI Item 58 – Deck (3, serious condition): The entire reinforced-concrete deck is rated in Condition State 3 – Poor. The concrete deck has many cracks, patched areas, spalls, and impending potholes with exposed reinforcing steel bars. Joints in the concrete deck have completely failed and are allowing water and debris to drip on to the steel beams and steel diaphragms below the joints. The deck was observed to be pumping or bouncing on the steel beams when traffic passed over. This is because the concrete deck is not physically attached to the steel beams. The reinforced-concrete sidewalks are in fair condition without any potholes or spalled areas. The longitudinal joints between the sidewalks and the bridge railings are unsealed, allowing water to drip on the steel beams below.

- NBI Item 59 – Superstructure (4, poor condition): The steel beams that support the roadway concrete deck and concrete sidewalks are in Condition State 2 – Fair. The paint system has failed in approximately 25 percent of the surface area of the steel beams, primarily at the ends over the bearings. Minor deterioration of the steel was observed at the ends of the beams; several of the beams have supplemental steel sections welded to them on the bottom flanges at the ends. Steel diaphragms between the beams over the piers and abutments have failed. Many of the steel diaphragms have completely deteriorated with total loss of section; several of the most deteriorated diaphragms have been removed. Steel bearings for the beams have complete paint failure and moderate loss of section.

- NBI Item 60 – Substructure (5, fair condition): The reinforced-concrete piers and abutments are in Condition State 2 – Fair. The west abutment and east abutment have minor spalls and cracks with exposed reinforcing steel; several of the cracks have efflorescence. Other than very minor spalling on top of the concrete caps, the reinforced-concrete piers did not exhibit structural deficiencies.

- NBI Item 61 – Channel and Channel Protection (7 = minor damage): The north embankment for the west abutment is protected with riprap consisting of chunks of concrete and large segments of asphalt. This protection appears to be stable, with only a few chunks dislodged and resting in the waterway. The north embankment of the east abutment is protected with segments of asphalt and layers of crushed asphalt. This protection appears to be stable. Plans for the original bridge construction indicate that stone riprap was provided at each of these locations.

[6] TL 3 for speeds less than 50 mph with approach guardrail or TL 4 for speeds less than 50 mph without approach guardrail.

- NBI Item 71 – Waterway Adequacy (7, above minimum): The bridge crosses over Horse Creek at a 45-degree skew angle. The westerly portion of the river channel under the westerly span of the bridge has filled itself in over the years, and is currently a blockage to the full hydraulic opening through the bridge. The main water channel passes under the center span of the bridge for low flow events. At the time of the site visit, water was flowing only in the channel under the center span, and this was after a moderate rain event the night before. A hydraulic analysis and summary for this bridge was completed assuming a waterway opening equivalent to that which existed when the bridge was originally constructed (see Appendix E). The hydraulic analysis indicated that this bridge is able to pass the 100 year flood frequency event without overtopping the roadway. The hydraulic summary also indicates that the roadway would overtop during a 255-year frequency event.

- NBI Item 72 – Approach Roadway (8, equals desirable criteria): The asphalt roadway approaches at each end of the bridge are in good condition. The shoulders are not paved.

- NBI Item 113 – Scour Rating (8, stable above footing): The foundations of the substructure units were not visible during the field visit. Original design plans indicate that foundations are supported on bedrock.

D. Functionally obsolete

Bridges are considered functionally obsolete when the deck geometry, load carrying capacity (comparison of the original design load to the current legal loads), clearance, or approach roadway alignment do not meet current design criteria. In general, functionally obsolete means that the bridge was built to standards that are no longer used today.

This bridge, designed for an AASHTO H-20 (20-ton truck) live load, meets current load criteria. However, this bridge is considered functionally obsolete because its clear roadway width and approach roadway width do not meet current criteria for the current and projected AADT.

The bridge‘s clear roadway width of 24 feet does not meet current criteria. The bridge has two 12-foot-wide lanes with no outside shoulders. Current roadway design standards outline that the minimum clear roadway width across a bridge with two-way traffic is 40 feet (two 12-foot traffic lanes and two 8-foot shoulders) for an arterial functional class and an AADT greater than 2,000 vehicles per day.

The width of the roadway at each end of the bridge is also substandard. Current roadway design standards are for two 12-foot-wide traffic lanes with 8-foot-wide shoulders at each end of the bridge for a roadway with an arterial functional classification. The horizontal alignment and vertical profile geometry of the roadway approaches at each end of the bridge are acceptable. West of the bridge, US 60 passes through Afton on a tangent alignment with a posted speed limit of 35 mph. East of the bridge, US 60 has a horizontal curve with a posted speed limit of 45 mph.

3. Purpose and Need

The project need describes the transportation deficiency. It is the foundation of the entire decision-making process. The need provides information to support the purpose and explains why the project is needed.

The need for the project is as follows:

- The existing bridge over Horse Creek is structurally deficient.
- The existing bridge is functionally obsolete and is of substandard width.
- The existing bridge rails do not meet full-scale crash criteria.

The project purpose defines the problem to be solved. Defining the purpose is necessary to determine the range of alternatives that will be considered.

The purpose of this project is as follows:

- Provide a structurally sound bridge over Horse Creek.
- Preserve Historic Route 66 and the Route 66 National Scenic Byway as a tourist destination in Oklahoma.

THIS PAGE INTENTIONALLY LEFT BLANK

4. Alternative Analysis

This section addresses the alternatives that are required to be considered for the Programmatic Section 4(f) Evaluation for Historic Bridges. Each alternative is assessed for its ability to meet project purpose and need, and to avoid effects to the character-defining features that give the bridge its historic significance.

A. Alternative 1 – Do nothing

Alternative 1 would leave the existing structure in place, without bypass, rehabilitation, or replacement. Under this alternative, there would be no use of the Section 4(f) property since character-defining features that make the bridge significant would not be removed or substantially altered.

Previous cyclical or routine maintenance activities have been minimal and limited to activities like annual water-washing of the bridge deck and sidewalks. The bridge is currently on a 24-month inspection schedule. Condition-based maintenance activities have included repairing damaged concrete railing sections due to vehicular impact.

Under this alternative the bridge would be left in place and the structural and functional deficiencies discussed earlier in this evaluation would remain unresolved and potentially lead to unacceptable safety hazards for the traveling public. Efforts to correct the structural deficiencies of the bridge are beyond what is considered routine maintenance. No increased costs associated with routine maintenance or inspections are anticipated under this alternative. Routine maintenance would continue at existing levels and inspections would continue according to their current frequency.

With this alternative, the bridge will continue to deteriorate and may need to be load posted at some time. Such load posting would require heavy trucks to use alternate routes.

The “Do Nothing” alternative would avoid use of the historic bridge as a Section 4(f) property and have the least impact on the historic integrity of the bridge, at least in the short term. However, if left untreated, the existing structural deficiencies will worsen and develop into more significant defects. The existing functional inadequacies related to roadway width and substandard non-crash tested railings would also remain unaddressed. This alternative would not meet the project purpose and need because it would not provide a structurally sound bridge. It does not correct the structurally deficient and functionally obsolete bridge. In the near term, this alternative would meet the project purpose to preserve Historic Route 66 and the Route 66 National Scenic Byway as a tourist destination in Oklahoma. However, in the long term, the lack of rehabilitation and maintenance of the historic bridge would result in its continued deterioration and could lead to eventual failure. Failure and removal of the bridge would remove a historic element from Route 66.

B. Alternative 2 – Rehabilitation

This alternative would rehabilitate the existing bridge to be in conformance with current design standards and to continue vehicular service for two-way traffic. This alternative would leave the existing bridge in place and continue to allow two-way traffic on the structure. The structure would be widened on both

sides to meet current roadway design criteria: a 24-foot-wide roadway with 8-foot shoulders on each side, for a clear roadway width of 40 feet, with or without sidewalks.

To rehabilitate the structure for continued vehicular use, the following work would need to be undertaken:

- Construct temporary bypass roadway (shoofly) with culvert pipes on the south side of the existing road.
- Detour traffic to the temporary bypass roadway (shoofly).
- Remove the four lines of concrete railings, two lines on each side of the roadway.
- Remove both concrete sidewalks.
- Remove the existing, original, 8-inch, non-composite, cast-in-place, reinforced-concrete deck.
- Remove the two exterior steel beams that support the outer edges of the sidewalks.
- Remove steel diaphragms.
- Remove the two reinforced-concrete wingwalls at each abutment.
- Modify each abutment to match the desired bridge beam and deck geometry.
- Modify top of wingwalls to match revised bridge deck geometry.
- Modify top of each pier to match the desired bridge beam geometry.
- Remove, clean, and paint, then reinstall, existing bearings at ends of existing six interior steel beams.
- Clean and paint the existing steel beams. This operation will require containment of material and old paint from the cleaning and painting operations.
- Add two lines of steel beams, one line each side of the bridge, with new bearings. These new beams would be fully painted before shipment to the project site. These new steel beams would also have stud shear connectors that would project into the new concrete deck.
- Erect new steel diaphragms between steel beams, and connect with high-strength bolts.
- Weld new stud shear connectors to the top flanges of the existing steel beams so that the new concrete deck will act compositely with the steel beams.

- Construct new cast-in-place reinforced-concrete deck with epoxy coated rebars. This would include construction of sealed expansion joints over the substructure units.

- Construct new crash-tested concrete railings (Texas Type T66 or ODOT Std TR4-2) on the outside edges of the bridge to meet TL 3 standard. The railing can be matched in material but no standard crash-tested railing matches the historic railing in appearance.

- Patch spalled areas of the faces of both abutments.

- Dredge the creek channel under the westerly span of the bridge and restore the waterway opening through the entire bridge to its originally constructed condition.

- Add supplemental stone riprap on the north side of the west abutment and the north side of the east abutment.

- Construct new roadway segments on each side of the bridge, and transition to match the existing roadway.

- Construct approach guardrail with transitions according to current design standards on each end of the bridge.

- Paint pavement markings (lane line striping) on the bridge and the roadway approaches.

- Switch traffic back to the original roadway, and remove the temporary bypass.

The estimated cost of this alternative is $2,440,347. The estimated cost includes the following:

- Right-of-way acquisition and utility relocation costs: $312,900.

- Roadway costs, including temporary shoofly detour: $1,174,860.

- Bridge rehabilitation costs: $952,587.[7]

This alternative would remedy most of the existing functional and structural deficiencies in the bridge's substructure and superstructure. The rehabilitation would accomplish the following:

- Remedy the deterioration in the concrete deck and deck expansion joints.

- Alleviate the deteriorated condition of the steel beams, bearings, and diaphragms.

[7] The rehabilitation costs do not include a sidewalk as part of the widening and assume an ODOT Std TR4-2 railing.

- Resolve the deteriorated condition of the paint system.
- Provide a crash-tested railing that meets current crash testing test level TL 3(TL) criteria.
- Improve the waterway opening and hydraulics through the bridge to nearly its original condition.
- Correct deficiencies leading to functional obsolescence by widening the bridge to current roadway standards.

The hydraulic analysis performed (see Appendix E) indicates that the existing bridge can pass the 255-year storm event without overtopping the roadway. This analysis is based on the assumption that the westerly portion of the water channel is dredged to provide the waterway opening similar to that when the bridge was constructed. After the rehabilitation is completed, this bridge is expected to continue to serve in its present capacity for 25 to 30 years or longer with proper maintenance, stabilization, and preservation activities.

This rehabilitation alternative would meet the project purpose and need to provide a structurally sound bridge since it will correct the structurally deficient and functionally obsolete bridge and provide new railings that meet full-scale crash criteria. This alternative would also meet the project purpose to preserve Historic Route 66 and the Route 66 National Scenic Byway as a tourist destination in Oklahoma. This alternative does impact character-defining features and remove historic fabric of the bridge, including the removal of four original concrete railings and the elimination of the sidewalks. These changes to the bridge may decrease this bridge's appeal as a particular tourist destination; however, changes to one structure along the approximately 400-mile corridor would not diminish the ability of the overall route to serve as a tourist destination. This alternative would not avoid the use of the bridge as a Section 4(f) property since the rehabilitation would diminish the structure's historic integrity.

C. Alternative 3 – Build on new location without using historic bridge

Alternative 3 involves the construction of a new bridge and various options for the historic bridge. For the three options in Alternative 3, consideration of the location of the new bridge included an assessment of local constraints. Engineers working on preliminary design options for a new bridge assessed the orientation of a new bridge on both the north (upstream) and south (downstream) sides of the historic bridge. This analysis determined that constructing a new bridge on the south side would result in greater impacts to wetlands and private property; a new bridge located north of the existing structure would minimize these impacts. Also, a new bridge located north of the existing structure would provide better geometric alignment of the highway at the curve at the east end of the project, and minimize right-of-way acquisition at both the west and east ends of the project. (Preliminary plans are included in Appendix F.)

The new bridge and roadway relocation would require approximately 1.47 acres of additional right-of-way. This is estimated to result in impacts to 11 properties: seven properties would be infringed upon (acquiring property) and an additional four properties would be affected (temporary construction easements).

With the construction of a new bridge, a hydraulic analyses would need to be conducted with both bridges in place, to determine the adequacy of the waterway opening through both bridges. This analysis would be based on the assumption that the westerly portion of the water channel through the existing bridge is dredged to provide the waterway opening similar to that when the bridge was constructed. Such hydraulic analysis is beyond the scope of this report.

(1) Option A – Retain the historic bridge in vehicular service as one half of a one-way couplet

Alternative 3, Option A consists of constructing a new bridge adjacent to the historic bridge and using each structure to carry one lane of one-way traffic plus shoulders in a single direction. The centerline of the new US 60 alignment would be 50 feet north of the existing centerline, resulting in a clearance of approximately 10 feet between the edges of the bridges. The width of the new bridge would be constructed to accommodate one 24-foot-wide traffic lane plus two 8-foot shoulders, for a total clear roadway width of 40 feet. If necessary in the future, the new bridge could carry two-way traffic with two 12-foot traffic lanes with 8-foot shoulders, should the historic bridge be taken out of service. Under this alternative, the historic bridge would be left in place and would carry one lane of one-way traffic in the opposite direction.

Rehabilitation of the existing bridge as half of a one-way couplet would require the following repairs:

- Construct a new bridge to the north of the existing bridge, located so there would be 2 feet clear distance between the outside edge of the new bridge and the outside edge of the existing bridge. The new bridge would be 240 feet long, with spans of 70, 100, and 70 feet, and have Type IV precast prestressed concrete girders with a cast-in-place reinforced-concrete deck. New cast-in-place reinforced-concrete abutments and piers would be constructed for the new bridge substructure. This new bridge would have a 40-foot clear roadway width and crash-tested barrier railings on each side, without sidewalks. Traffic would continue to operate on the existing bridge while the new bridge is constructed. This bridge would be designed as described above to accommodate two lanes of traffic with shoulders in the future, should the existing bridge need to be removed.

- Construct new US 60 roadway approaches on each side of the new bridge, with roadway width of 24 feet for two 12-foot traffic lanes, plus 8-foot shoulders on each side. Tie this new road to the existing road on each side of the bridge, using 45 mph as the design criteria for geometric alignment.

- Construct signage and pavement markings for the roadway split on approaches at each end of the bridges.

- Switch two-way US 60 traffic to the new bridge after the new roadway approaches are constructed.

- Perform the following work on the existing bridge; the bridge would retain its existing width, but the sidewalks and railings would be removed, and a wider roadway deck would be constructed. The clear roadway width would be approximately 36 feet, which is wide enough for one 12-foot traffic lane plus 8-foot shoulders on each side, plus an allowance for extra width to accommodate the steel I-beam framing:

    - Remove the four lines of concrete railings, two lines on each side of the roadway.

    - Remove both concrete sidewalks.

    - Remove the existing, original, 8-inch, non-composite, reinforced-concrete deck.

    - Remove the two exterior steel beams that support the outer edges of the sidewalks. Also remove all bearings for these steel beams.

    - Remove all steel diaphragms.

    - Remove the north reinforced-concrete wingwall at each abutment; retain the south wingwalls.

    - Modify each abutment to receive one new line of exterior steel beams on each side of the bridge, and revise geometry to match new deck.

    - Modify top of existing concrete wingwalls on the south side of each abutment; construct a concrete closure wall at each abutment between the existing bridge and the new bridge.

    - Modify each pier cap to receive one new line of exterior steel beams on each side of the bridge.

    - Remove, clean, and paint, then reinstall, existing bearings at ends of existing six interior steel beams.

    - Clean and paint the existing steel beams. This operation will require containment of material and old paint from the cleaning and painting operations.

    - Add two lines of steel beams, one line each side of the bridge, with new bearings. These new beams would be fully painted before shipment to the

project site. These new steel beams would also have stud shear connectors which would project into the new concrete deck.

- Erect new steel diaphragms between all steel beams, and connect with high-strength bolts.
- Weld stud shear connectors to the top flanges of the existing steel beams so the new concrete deck will act compositely with the steel beams.
- Construct new cast-in-placed reinforced-concrete deck with epoxy coated rebars. This would include construction of sealed expansion joints over the substructure units.
- Construct new crash-tested concrete railings (Texas Type T66 or ODOT Std TR4-2) on the outside edges of the bridge to meet TL 3 standard. The railing can be matched in material but no standard crash-tested railing matches the historic railing in appearance.
- Patch spalled areas of the faces of both abutments.
- Dredge the creek channel under the westerly span of the bridge and restore the waterway opening through the entire bridge to its originally constructed condition.
- Reconstruct US 60 roadway approaches at each end of the bridge.
- Construct approach guardrail with transitions according to current design standards.
- Paint pavement markings (lane line striping) on the bridge and the roadway approaches.
- Switch eastbound US 60 traffic back to the original roadway, and keep westbound US 60 traffic on the new bridge.

The total cost for this alternative is estimated at $4,891,438 and includes the following:

- Right-of-way acquisition and utility relocation costs: $1,300,000.
- Roadway costs: $1,110,660.
- Bridge rehabilitation costs: $955,155.[8]
- New bridge costs: $1,525,623.

[8] The rehabilitation costs do not include a sidewalk as part of the widening and assume an ODOT Std TR4-2 railing.

With the construction of a new vehicular bridge, this alternative meets the project's purpose and need to provide a structurally sound bridge.[9] Rehabilitation of the historic bridge as a one-way couplet also addresses the purpose and need to provide a structurally sound bridge since it will correct the structurally deficient and functionally obsolete bridge and provide new railings that meet full-scale crash criteria. After the rehabilitation is completed, this bridge is expected to continue to serve similar to its present capacity for 25 to 30 years or longer with proper maintenance, stabilization, and preservation activities.

This alternative would also meet the project purpose to preserve Historic Route 66 and the Route 66 National Scenic Byway as a tourist destination in Oklahoma. This alternative impacts character-defining features and removes historic fabric of the bridge, including the four original concrete railings and the elimination of the sidewalks. These changes may decrease this bridge's appeal as a particular tourist destination; however, changes to one structure along the approximately 400-mile corridor would not diminish the ability of the overall route to serve as a tourist destination. This alternative would not avoid the use of the bridge as a Section 4(f) property since the rehabilitation of the bridge as a one-way couplet would impact the structure's historic integrity.

(2) Option B1 – Retain the historic bridge as a monument

This alternative would construct a new structure that would carry two-way traffic parallel to the existing bridge. The new structure and associated US 60 roadway realignment would be as described in Alternative 3, Option A above, but would carry two-way traffic rather than one-way traffic. The new structure would meet current design criteria with a clear roadway width of 40 feet and would require additional right-of-way costs and utility relocation costs as described for Option A. The historic bridge would remain in use until the construction of the new bridge is complete. Once the new bridge is open, traffic would be diverted onto the new bridge and the historic bridge would be left in place as a monument. The road at each end of the historic bridge would be obliterated with the grade restored to its original condition. The bridge ends would also be barricaded to prevent access by traffic, non-motorized vehicles, pedestrians, and bicyclists. Rehabilitation work would be limited to removing the north wingwalls at each abutment, constructing a concrete closure wall between the existing bridge and the new bridge, resealing the joints in the existing concrete deck, and dredging the creek channel under the westerly span of the bridge to its originally constructed condition. Under this alternative, periodic inspection of the historic bridge would be required to monitor the bridge's condition, as is currently done on a bi-annual basis.

The total cost of constructing a new bridge and leaving the historic bridge in place as a monument is estimated at $3,962,805, which is broken down as follows:

- Right-of-Way Acquisition and Utility Relocation Costs: $1,300,000.
- Roadway Costs: $1,027,200.

[9] Construction of the new bridge would require additional hydraulic studies to determine potential impacts to the river, in terms of hydraulic capacity with two bridges in place.

- Bridge Rehabilitation Costs: $109,982.

- New Bridge Costs: $1,525,623.

With the construction of a new vehicular bridge, this alternative meets the project purpose and need to provide a structurally sound bridge.[10] However, in the long term the lack of rehabilitation and maintenance of the historic bridge may equate to an adverse effect to its historic integrity since the superstructure elements and substructure would likely continue to deteriorate and could lead to eventual failure. It is estimated that this bridge could serve as a monument for 30 to 40 years or longer with proper maintenance and preservation activities.

This alternative would also meet the project purpose to preserve Historic Route 66 and the Route 66 National Scenic Byway as a tourist destination in Oklahoma. The bridge would remain in place as a monument adjacent to the new bridge allowing it to continue to serve as a visible element of the history of Route 66. However, in the long term the lack of rehabilitation and maintenance of the historic bridge would result in its continued deterioration and could lead to eventual failure. Failure and removal of the bridge would remove a historic element from Route 66. The construction of a new bridge next to the historic bridge would not diminish the integrity of the overall route as a tourist destination.

This alternative does not impact the bridge's character-defining features and does not remove historic fabric. This alternative avoids use of the bridge as a Section 4(f) property since its historic integrity would be retained.

(3) Option B2 – Retain the historic bridge as a non-motorized vehicle/pedestrian/ bicycle facility

This alternative would construct a new structure of the same type described in Alternative 3, Option B1 above, that would handle both directions of traffic and would be located parallel to, and upstream (north) of, the existing bridge. The new structure would meet current design criteria with a clear roadway width of 40 feet and would require additional right-of-way acquisition costs and utility relocation costs as described for Alternative 3, Option A. The historic bridge would remain in use during construction of the new bridge. Once the new bridge was opened, traffic would be diverted to the new bridge and the historic bridge would be rehabilitated and left in place for pedestrians, bicyclists, and non-motorized vehicles. The existing roadway approaches at each end of the historic bridge would be retained to accommodate pedestrians and bicyclists. A barrier would be constructed at each end of the historic bridge to allow pedestrians and bicyclists through but prevent vehicular access to the bridge.

As a non-motorized vehicle/pedestrian/bicycle bridge, the historic bridge would not carry vehicular traffic. The bridge would need to be load rated for the desired current pedestrian live loading of 95 pounds per square foot of bridge deck area, with appropriate reduction factors based on the

[10] Construction of the new bridge would require additional hydraulic studies to determine potential impacts to the river, in terms of hydraulic capacity with two bridges in place.

area of the deck. It is expected that the historic bridge would have sufficient strength to handle this pedestrian live loading, although some rehabilitation work would be necessary, including:

- Patch spalled concrete in bridge deck, estimated at 40 percent of the total deck surface. Overlay entire bridge deck with a 2-inch-thick, non-shrink, concrete overlay. This work includes replacing all of the deck expansion joints between the spans with new sealed expansion joints.

- Replace all steel diaphragms between the existing steel beams with new, painted steel diaphragms connected with high-strength bolts.

- Clean and paint entire steel superstructure. This includes all steel beams and bearings.

- Remove wingwalls at north side of each abutment, and construct a concrete closure wall between the existing bridge and the new bridge.

- Patch spalled concrete surfaces in the faces of the abutments and wingwalls.

- Dredge the creek channel under the westerly span of the bridge and restore the waterway opening through the entire bridge to its originally constructed condition.

The existing four lines of bridge railings would remain in place without modification. The railings adjacent to the roadway do not meet current crash impact load standards. The exterior railings on the outside edges of the sidewalk do not meet current criteria for height and maximum clear openings. The top of the top railing is 39.5 inches above the sidewalk surface; current criteria is 42-inch-high railings. The clear opening between the two lines of horizontal railings is approximately 8 inches. Current criteria outlines that openings must not allow a 4-inch-diameter sphere to pass through the lower portion of a railing and a 6-inch-diameter sphere to pass through the upper portion of the railing. Since no work is being proposed to the existing railings for this lower use option for the bridge, the railings do not need to be modified to meet current standards.

The total cost of constructing a new bridge and leaving the historic bridge in place as a non-motorized vehicle/pedestrian/bicycle bridge is estimated at $4,548,083, which is broken down as follows:

- Right-of-way acquisition and utility relocation costs: $1,300,000.

- Roadway costs: $1,091,400.

- Bridge rehabilitation costs: $631,060.

- New bridge costs: $1,525,623.

With the construction of a new vehicular bridge, this alternative meets the project purpose and need to provide a structurally sound bridge.[11] Rehabilitation of the historic bridge for pedestrians, bicycles, and non-motorized vehicles addresses the need to correct a structurally deficient and functionally obsolete bridge. While this bridge is located on the outskirts of Afton, there is generally no need to provide pedestrian, bicycle, or non-motorized vehicle access across Horse Creek, and there are no trails in the vicinity with which to connect.

This alternative would also meet the project purpose to preserve Historic Route 66 and the Route 66 National Scenic Byway as a tourist destination in Oklahoma. The bridge would remain in place for pedestrians, bicycles, and non-motorized vehicles, allowing it to continue as a visible element of the history of Route 66. The construction of a new bridge next to the historic bridge would not would not diminish the integrity of the overall route as a tourist destination.

This alternative does not impact the bridge's character-defining features and does not remove historic fabric. This alternative avoids use of the bridge as a Section 4(f) property since its historic integrity would be retained. It is estimated that this bridge could function as a non-motorized pedestrian/bicycle facility for 30 to 40 years or longer with proper periodic maintenance, stabilization, and preservation activities.

[11] Construction of the new bridge would require additional hydraulic studies to determine potential impacts to the river, in terms of hydraulic capacity with two bridges in place.

THIS PAGE INTENTIONALLY LEFT BLANK

5. Summary of Findings

Table 2 summarizes the analysis of three primary alternatives (Alternative 3 subdivided into three options). Detailed cost estimates for each alternative, except the No Build alternative, are also included below. ODOT and the FHWA will use this analysis to assess the feasibility and prudence of avoidance alternatives.

THIS PAGE INTENTIONALLY LEFT BLANK

Table 2. Summary of alternative analysis

Avoidance Alternative	Meets Need and Purpose for the Project?	Costs			Preliminary understanding of Social, Economic. Environmental Impacts?	Section 4ff) use?
		Construction ($)	ROW & Utility Relocation Costs ($)	Total cost ($)		
1. No-Build.	No, does not address structural deficiencies or functional inadequacies and does not provide a structurally sound bridge.	NA.	NA	NA	None	NA
2. Rehabilitation Alternative for continued 2-way vehicle use.	Yes, rehabilitation addresses structural and functional inadequacies and provides a structurally sound bridge. Also preserves Historic Route 66 and the Route 66 National Scenic Byway as a tourist destination in Oklahoma.	$2,127,447	$312,900	$2,440,347	None	Yes, this alternative impacts character-defining features and removes historic fabric of the bridge, including the removal of four original concrete railings and the elimination of the sidewalks. This alternative would not avoid the use of the bridge as a Section 4(f) property since the rehabilitation would impact the structure's historic integrity. Design life of 25-30 years.
3A. Retain historic bridge in vehicular service as one half of one-way couplet; construct new bridge parallel to existing bridge with two lanes of traffic and shoulders.	Yes, addresses structural and functional inadequacies of historic bridge and paired with a new bridge provides a structurally sound bridge. Also preserves Historic Route 66 and the Route 66 National Scenic Byway as a tourist destination in Oklahoma.	$3,591,438	$1,300,000	$4,891,438	Construction of a new bridge is expected to pose impacts to private property, wetlands, endangered species, and utilities.	Yes, this alternative impacts character-defining features and removes historic fabric of the bridge, including the four original concrete railings and the elimination of the sidewalks. This alternative would not avoid the use of the bridge as a Section 4(f) property since the rehabilitation of the bridge as a one-way couplet would impact the structure's historic integrity. Design life of 25-30 years.
3B1. Retain historic bridge as a monument; construct new bridge parallel to existing bridge with two lanes of traffic and shoulders.	Yes, with new structure a structurally sound bridge is provided. Also preserves Historic Route 66 and the Route 66 National Scenic Byway as a tourist destination in Oklahoma.	$2,662,805	$1,300,000	$3,962,805	Construction of a new bridge is expected to pose impacts to private property, wetlands, endangered species, and utilities.	No, this alternative does not impact the bridge's character-defining features and does not remove historic fabric. This alternative avoids the use of the bridge as a Section 4(f) property since its historic integrity would be retained. With this alternative, the lack of rehabilitation and maintenance of the historic bridge may equate to an adverse effect to its historic integrity since the superstructure elements and substructure would likely continue to deteriorate and could lead to eventual failure. Design life of 30-40 years.
3B2. Retain historic bridge as a non-motorized pedestrian or bicycle facility; construct new bridge parallel to existing bridge with two lanes of traffic and shoulders.	Yes, with new structure a structurally sound bridge is provided. Structural deficiencies and functional inadequacies of historic bridge would be addressed in rehabilitation for non-motorized use. Also preserves Historic Route 66 and the Route 66 National Scenic Byway as a tourist destination in Oklahoma.	$3,248,083	$1,300,000	$4,548,083	Construction of a new bridge is expected pose impacts to private property, wetlands, endangered species and utilities.	No, this alternative does not impact the bridge's character-defining features and does not remove historic fabric. This alternative avoids use of the bridge as a Section 4(f) property since its historic integrity would be retained. Design life of 30-40 years.

THIS PAGE INTENTIONALLY LEFT BLANK

Design Support Report for Programmatic Section 4(f) Alternatives Analysis

United States (US) Highway 60 Bridge Over Horse Creek

Ottawa County, Oklahoma

Project Number SSP-2991(079)EC

NBI Bridge No.: 05017

Structure No.: 5806 0256X

Prepared for the Federal Highway Administration

And

Oklahoma Department of Transportation

August 2016

Opinions of Probable Construction Costs

The opinions of probable construction costs provided herein are presented in third quarter 2016 dollars. These costs were developed by using data previously prepared by others, such as preliminary plans for a proposed new bridge and associated roadway work, bridge inspection reports and hydraulic analysis reports, and site investigations conducted by Mead & Hunt. They were developed without a detailed hands-on bridge inspection or completion of preliminary design for the rehabilitation of the existing historic bridge for the alternatives considered. The estimated costs represent an opinion based on related experience and background knowledge of historic unit prices and comparable work performed on other structures. The opinions of cost are intended to provide a programming level of estimated cost. These costs will require refinement and may require adjustments as further analysis is completed in determining the course of action for future improvements to the structure. A 20% contingency and 7% mobilization allowance have been included in the cost estimates. No administrative or engineering costs have been included.

Darrell J. Berry, PE

Oklahoma PE 26371

8/26/2016

Date

ALTERNATIVE 2-REHABILITATION OF EXISTING BRIDGE

August 26, 2016

ITEM NO.	ITEM	UNIT	ESTIMATED QUANTITIES AND COST QUANTITY	UNIT COST	TOTAL ESTIMATE
RIGHT-OF-WAY ACQUISITION & UTILITY RELOCATION COSTS					
1	RIGHT-OF-WAY ACQUISITION COSTS	LUMP SUM	1	$75,900	$75,900
2	UTILITY RELOCATION COSTS	LUMP SUM	1	$237,000	$237,000
				ESTIMATED ROW & UTILITY COSTS	**$312,900**
ROADWAY COSTS					
	MOBILIZATION @ 7%	LUMP SUM	1	$76,860	$76,860
1	TEMPORARY DETOUR (SHOOFLY TO SOUTH) WITH TEMPORARY BRIDGE	LUMP SUM	1	$500,000	$500,000
2	APPROACH ROADWAY WORK FOR TRANSITIONS EACH END OF EXISTING BRIDGE	LUMP SUM	1	$400,000	$400,000
2	GUARDRAIL ON ROADWAY APPROACHES TO BRIDGE, 4 QUADRANTS	LUMP SUM	1	$15,000	$15,000
	20% CONTINGENCY	LUMP SUM	1	$183,000	$183,000
				ESTIMATED ROADWAY COSTS	**$1,174,860**
BRIDGE REHABILITATION COSTS					
	MOBILIZATION @ 7%	LUMP SUM	1	$62,319	$62,319
1	DEMOLITION OF RAILINGS, SIDEWALKS, DECK, 2 LINES OF BEAMS, ALL STEEL DIAPHRAG	LUMP SUM	1	$75,000	$75,000
2	NEW STRUCTURAL STEEL BEAMS, STUD SHEAR CONNECTORS, DIAPHRAGMS, BOLTS	LB	43,000	$3	$129,000
3	STUD SHEAR CONNECTORS WELDED TO EXISTING STEEL BEAMS	EACH	1,692	$5	$8,460
4	CLEAN AND PAINT EXISTING STEEL BEAMS & BEARINGS (INCL CONTAINMENT)	LUMP SUM	1	$250,000	$250,000
5	CAST-IN-PLACE REINFORCED CONCRETE DECK WITH EPOXY COATED REBARS	CY	155	$1,200	$186,000
6	NEW OK STD. TR 4-2 RAILING	LF	290	$125	$36,250
7	MODIFY BEARING SEATS ON PIERS AND ABUTMENTS	LUMP SUM	1	$10,000	$10,000
8	PATCH SPALLED CONCRETE AND EPOXY INJECT CRACKS FOR ABUTMENTS & WINGS	LUMP SUM	1	$25,000	$25,000
9	DREDGE CREEK CHANNEL	LUMP SUM	1	$15,000	$15,000
10	ADD LARGE STONE RIPRAP NORTH OF EACH ABUTMENT	CY	100	$50	$5,000
11	4-INCH EPOXY PAINT LINES, BRIDGE AND ROADWAY	LF	2180	$1	$2,180
	20% CONTINGENCY	LUMP SUM	1	$148,378	$148,378
				ESTIMATED BRIDGE REHABILITATION COSTS	**$952,587**
NEW BRIDGE COSTS					
	NO NEW BRIDGE COSTS				
				ESTIMATED NEW BRIDGE COSTS	**$0**
				ALTERNATIVE TOTAL COSTS	**$2,440,347**

ALTERNATIVE 3 OPTION A-RETAIN HISTORIC BRIDGE IN VEHICULAR SERVICE AS ONE HALF OF A ONE-WAY COUPLET; CONSTRUCT NEW BRIDGE PARALLEL TO EXISTING BRIDGE

August 26, 2016

			ESTIMATED QUANTITIES AND COST		
ITEM NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL ESTIMATE
RIGHT-OF-WAY ACQUISITION & UTILITY RELOCATION COSTS					
1	RIGHT-OF WAY ACQUISITION COSTS	LUMP SUM	1	$1,000,000	$1,000,000
2	UTILITY RELOCATION COSTS	LUMP SUM	1	$300,000	$300,000
				ESTIMATED ROW & UTILITY COSTS	**$1,300,000**
ROADWAY COSTS					
	MOBILIZATION @ 7%	LUMP SUM	1	$72,660	$72,660
1	EARTHWORK FOR NEW ROAD AND APPROCHES FOR EXISTING ROAD AT BRIDGE	LUMP SUM	1	$350,000	$350,000
2	2-LANE ROADWAY WITH SHOULDERS ON NEW ALIGNMENT & RECONSTRUCT APPROACH ROADWAYS TO EXISTING BRIDGE	LUMP SUM	1	$500,000	$500,000
3	INSTALL GUARDRAIL ON ROADWAY APPROACHES TO EXISTING BRIDGE, 4 QUADRANTS	LUMP SUM	1	$15,000	$15,000
	20% CONTINGENCY	LUMP SUM	1	$173,000	$173,000
				ESTIMATED ROADWAY COSTS	**$1,110,660**
BRIDGE REHABILITATION COSTS					
	MOBILIZATION @ 7%	LUMP SUM	1	$62,487	$62,487
1	DEMOLITION OF RAILINGS, SIDEWALKS, DECK, 2 LINES OF BEAMS & ALL STEEL DIAPHRAGMS, & 2 WINGWALLS	LUMP SUM	1	$80,000	$80,000
2	NEW STRUCTURAL STEEL BEAMS, STUD SHEAR CONNECTORS, DIAPHRAGMS, BOLTS	LB	43000	$3	$129,000
3	STUD SHEAR CONNECTORS WELDED TO EXISTING STEEL BEAMS	EACH	1692	$5	$8,460
4	CLEAN AND PAINT EXISTING STEEL BEAMS & BEARINGS (INCL CONTAINMENT)	LUMP SUM	1	$250,000	$250,000
5	CAST-IN-PLACE REINFORCED CONCRETE DECK WITH EPOXY COATED REBARS	CY	140	$1,200	$168,000
6	NEW OK STD. TR 4-2 RAILING	LF	290	$125	$36,250
7	MODIFY BEARING SEATS ON PIERS AND ABUTMENTS	LUMP SUM	1	$10,000	$10,000
8	PATCH SPALLED CONCRETE AND EPOXY INJECT CRACKS FOR ABUTMENTS & WINGS	LUMP SUM	1	$25,000	$25,000
9	CONSTRUCT CONCRETE CLOSURE WALLS AT EACH ABUTMENT	EACH	2	$10,000	$20,000
10	DREDGE CREEK CHANNEL	LUMP SUM	1	$15,000	$15,000
11	4-INCH EPOXY PAINT LINES, EXISTING BRIDGE AND EXISTING ROADWAY	LF	2180	$1	$2,180
	20% CONTINGENCY	LUMP SUM	1	$148,778	$148,778
				ESTIMATED BRIDGE REHABILITATION COSTS	**$955,155**
NEW BRIDGE COSTS					
	MOBILIZATION @ 7%	LUMP SUM	1	$99,807	$99,807
1	3 SPAN (70-100-70) TYPE IV PRECAST PRESTRESSED CONCRETE GIRDER BRIDGE	SQ FT	10332	$115	$1,188,180
	20% CONTINGENCY	LUMP SUM	1	$237,636	$237,636
				ESTIMATED NEW BRIDGE COSTS	**$1,525,623**
				ALTERNATIVE TOTAL COSTS	**$4,891,438**

ALTERNATIVE 3 OPTION B1-RETAIN HISTORIC BRIDGE AS A MONUMENT; CONSTRUCT NEW BRIDGE PARALLEL TO EXISTING BRIDGE WITH 2-LANES OF TRAFFIC

August 26, 2016

			ESTIMATED QUANTITIES AND COST		
ITEM NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL ESTIMATE
RIGHT-OF-WAY ACQUISITION & UTILITY RELOCATION COSTS					
1	RIGHT-OF-WAY ACQUISITION COSTS	LUMP SUM	1	$1,000,000	$1,000,000
2	UTILITY RELOCATION COSTS	LUMP SUM	1	$300,000	$300,000
				ESTIMATED ROW & UTILITY COSTS	**$1,300,000**
ROADWAY COSTS					
	MOBILIZATION @ 7%	LUMP SUM	1	$67,200	$67,200
1	EARTHWORK FOR NEW ROAD	LUMP SUM	1	$350,000	$350,000
2	2-LANE ROADWAY WITH SHOULDERS ON NEW ALIGNMENT	LUMP SUM	1	$450,000	$450,000
	20% CONTINGENCY	LUMP SUM	1	$160,000	$160,000
				ESTIMATED ROADWAY COSTS	**$1,027,200**
BRIDGE REHABILITATION COSTS					
	MOBILIZATION @ 7%	LUMP SUM	1	$6,062	$6,062
1	OBLITERATE OLD ROAD PAVEMENT EACH END OF BRIDGE	LUMP SUM	1	$30,000	$30,000
2	CONSTRUCT PERMANENT BARRICADES EACH END OF BRIDGE	EA	2	$2,500	$5,000
3	REMOVE NORTH WINGWALLS AT EACH ABUTMENT	LUMP SUM	1	$15,000	$15,000
4	CONSTRUCT CONCRETE CLOSURE WALLS AT EACH ABUTMENT	EACH	2	$10,000	$20,000
5	RESEAL JOINTS IN EXISTING BRIDGE DECK	LF	160	$10	$1,600
6	DREDGE CREEK CHANNEL	LUMP SUM	1	$15,000	$15,000
	20% CONTINGENCY	LUMP SUM	1	$17,320	$17,320
				ESTIMATED BRIDGE REHABILITATION COSTS	**$109,982**
NEW BRIDGE COSTS					
	MOBILIZATION @ 7%	LUMP SUM	1	$99,807	$99,807
1	3 SPAN (70-100-70) TYPE IV PRECAST PRESTRESSED CONCRETE GIRDER BRIDGE	SQ FT	10332	$115	$1,188,180
	20% CONTINGENCY	LUMP SUM	1	$237,636	$237,636
				ESTIMATED NEW BRIDGE COSTS	**$1,525,623**
				ALTERNATIVE TOTAL COSTS	**$3,962,805**

ALTERNATIVE 3 OPTION B2-RETAIN HISTORIC BRIDGE AS A NON-MOTORIZED PEDESTRIAN OR BICYCLE FACILITY; CONSTRUCT NEW BRIDGE PARALLEL TO EXISTING BRIDGE WITH 2-LANES OF TRAFFIC

August 26, 2016

			ESTIMATED QUANTITIES AND COST		
ITEM NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL ESTIMATE
RIGHT-OF-WAY ACQUISITION & UTILITY RELOCATION COSTS					
1	RIGHT-OF-WAY ACQUISITION COSTS	LUMP SUM	1	$1,000,000	$1,000,000
2	UTILITY RELOCATION COSTS	LUMP SUM	1	$300,000	$300,000
				ESTIMATED ROW & UTILITY COSTS	**$1,300,000**
ROADWAY COSTS					
	MOBILIZATION @ 7%	LUMP SUM	1	$71,400	$71,400
1	EARTHWORK FOR NEW ROAD	LUMP SUM	1	$350,000	$350,000
2	2-LANE ROADWAY WITH SHOULDERS ON NEW ALIGNMENT & MODIFY EXISTING ROAD AS A TRAIL TO EXISTING BRIDGE	LUMP SUM	1	$500,000	$500,000
	20% CONTINGENCY	LUMP SUM	1	$170,000	$170,000
				ESTIMATED ROADWAY COSTS	**$1,091,400**
BRIDGE REHABILITATION COSTS					
	MOBILIZATION @ 7%	LUMP SUM	1	$41,284	$41,284
1	PATCH SPALLED CONCRETE IN BRIDGE DECK	SQ FT	1344	$20	$26,880
2	CONSTRUCT NEW 2-INCH CONCRETE OVERLAY	SQ FT	3360	$20	$67,200
3	CONSTRUCT NEW DECK EXPANSION JOINTS	EACH	4	$10,000	$40,000
4	REMOVE AND REPLACE ALL STEEL DIAPHRAGMS WITH PAINTED STEEL MEMBERS	LB	9600	$3	$28,800
5	CLEAN AND PAINT EXISTING STEEL BEAMS & BEARINGS (INCL CONTAINMENT)	LUMP SUM	1	$250,000	$250,000
6	REMOVE NORTH WINGWALLS AT EACH ABUTMENT	LUMP SUM	1	$15,000	$15,000
7	CONSTRUCT CONCRETE CLOSURE WALLS AT EACH ABUTMENT	EACH	2	$10,000	$20,000
8	PATCH SPALLED CONCRETE AND EPOXY INJECT CRACKS FOR ABUTMENTS & WINGS	LUMP SUM	1	$25,000	$25,000
9	DREDGE CREEK CHANNEL	LUMP SUM	1	$15,000	$15,000
10	CONSTRUCT CONCRETE FILLED BOLLARDS AT EACH END OF BRIDGE	EACH	12	$300	$3,600
	20% CONTINGENCY	LUMP SUM	1	$98,296	$98,296
				ESTIMATED BRIDGE REHABILITATION COSTS	**$631,060**
NEW BRIDGE COSTS					
	MOBILIZATION @ 7%	LUMP SUM	1	$99,807	$99,807
1	3 SPAN (70-100-70) TYPE IV PRECAST PRESTRESSED CONCRETE GIRDER BRIDGE	SQ FT	10332	$115	$1,188,180
	20% CONTINGENCY	LUMP SUM	1	$237,636	$237,636
				ESTIMATED NEW BRIDGE COSTS	**$1,525,623**
				ALTERNATIVE TOTAL COSTS	**$4,548,083**

THIS PAGE INTENTIONALLY LEFT BLANK

Mead & Hunt, Inc.

Job No. _____ Sheet 1 of 5
Job Name _____
Task _____
Calculated by DJB Date 5/5/16
Checked by GAR Date 6/22/16
Backchecked DJB 6/28/16
Updated DJB 8/26/16

US60 Horse Creek Bridge

Cost estimates:

→ Cost estimates use 20% contingency, and 7.0% Mobilization

per ODOT 4/25/16:
programmed project costs: only
- Construction: $1,733,154
- Right-of-way: $75,905
- Utilities: $237,000

TOTAL: $2,046,059, say $2,046,000

(does not include design engineering or construction engineering, nor ODOT administrative costs)

Assumptions:
1) Remove existing bridge
2) Construct new bridge on exist. alig.
3) Temporary detour road w/ ~~large~~ ~~culvert pipes~~ temporary bridge

⇒ **Note: Benham Estimate 8/19/16 Construction = $3,141,853, provided backup calculations**

New bridge per Leidos plans:
length = 245' (spans 73'-100'-73')
width = 42'
Type IV P.C. Beams w/ 40' clear roadway, skew 45° RF, TR4 concrete Rail

effective unit cost w/ 20% contingency and 7% mobilization:
$115/SF × 1.20 × 1.07 = $147.66

⇒ Approx. bridge cost:
246' × 42' = 10,332 □' × $115/□' = $1,188,180
× $120/□ = $1,240,000

WisDOT Bridge Manual: end of 2015: $145/□' ?! use this w/ 20% contingency — compares well

---

Per Benham (Leidos) Preliminary Design Report Oct. 12, 2010:

Option 3: New bridge and roadway construction on offset alignment to the north, full 6% superelevation across the Bridge
1.47 AC; 7 properties infringed; 4 properties affected

R/W Acquisitions: $977,200
Utility Relocations: $298,700
Roadway: $270,000
Earthwork: $306,880
Bridge: $1,751,600 (302' × 42' × $138/□')
Detour (shoofly): $260,400

Total = $3,864,780

maybe high, even from Oct. 2010

Mead & Hunt

Mead & Hunt, Inc.

Job No. _____ Sheet 2 of 5

Job Name _____

Task _____

Calculated by DJB Date 5/5/16

Checked by GAR Date 6/22/16

Backchecked DJB 6/28/16

Updated DJB 8/26/16

Alternative 2- Rehabilitation of existing bridge

Existing bridge is 143' long, 24' clear roadway, two-5'-0" sidewalks, 4 lines of concrete railing, total width out-to-out is 38'-0"

per Preliminary Plan and Field Review Meeting March 2016 plans by Leidos: (and from programmed costs)

R/W Acquisitions: $75,900 (includes temp. constr. easements)

Utility Relocations: $237,000

Subtotal: $312,900

Temporary Detour (shoofly) = $260,400 (2010), round to $350,000; → based on Behhan 8/2016 (2016) estimate, use $500,000, to include Temp. bridge

Roadway Work for Transitions at each end of bridge, allow: $170,000, round to $215,000

(includes guardrail) 150'×4 = 600'×$25 = 15,000

earthwork: , allow = $100,000 (include)

Subtotal = $~~315,000~~

Demolition of 4 bridge railings, concrete sidewalks, bridge deck, 2 lines of steel beams, allow - - - - - - - $75,000

2 lines of steel beams, plus diaphragms & bolts

(W27×94) 2 × (40'+40') × 94#/' = 15,040#

(W36×150) 2 × 60' × 150#/' = 18,000#

(C15×33.9) 6×4×5' × 33.9#/' = 4,100#

6×2×8.5' × 33.9#/' = 3,500#

Misc. Allow = 2,000#

9,600#

Total = 42,640# use 43,000# × $3.00/# = $129,000

for unit price, include fabricated steel, welded stud shear connectors, primed and fully painted. Includes bearings + anchor bolts, and erection — use $3.00/lb.

Mead & Hunt
Mead & Hunt, Inc.

Job No. _____ Sheet 3 of 5
Job Name _____
Task _____
Calculated by DJB Date 5/5/16
Checked by GAR Date 6/22/16
Back-checked DJB 6/28/16
Updated DJB 8/26/16

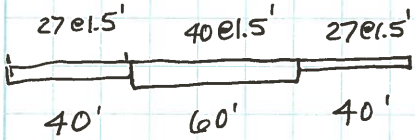
→ Reinforced concrete deck, 8-inches thick, with epoxy coated rebars:

$\frac{145' \times 42' \times 0.667'}{27} = 150.4\ CY$,

round to 155 CY to include fillets above beams × #1,200 = #186,000

Use #1,200/C.Y. to include formwork and epoxy coated rebars; also includes expansion joints

→ Stud shear connectors add to existing 6 lines of steel I-beams, welded, 3 per row



$6 \times (27+40+27) \times 3 = 1{,}692$ ea. @ #3.50 = #8,500
(at the site) → +1.50
#5.00 ea.

→ Clean and paint existing steel beams and bearings (near white finish); includes containment + environmental protection 1 LS = #250,000

→ New OK Std. TR4-2 Railing:
145' × 2 = 290 LF @ #125/LF = #36,200

→ Modify bearing seats on piers and abutments for new lines of beams. 1 LS = #10,000

→ Patch spalled concrete on abutments, and seal cracks w/epoxy injection: 1 LS = #25,000

→ Dredge creek channel, esp. under west span: 1 LS = #15,000

→ Add stone riprap north of ea. abutment
2 × 50 CY = 100 CY × #50/CY = #5,000

375 SY × 0.5 = 187

→ Pavement marking (striping):

4 inch epoxy double yellow centerline, white edge lines:
$4 \times (200' + 145' + 200') = 2,180\ LF \times \$1.00/LF = \$2,180$

Alternative 3 - Option A (new bridge on northerly alignment)

- ROW Acquisition costs:
  2010 Report had $977,200 → use $1,000,000

- Utility Relocation Costs:
  2010 Report had $298,700 → use $300,000

- Earthwork for New Road:
  2010 Report had $306,880 → use $350,000

- 2-Lane Roadway w/Shoulders:
  2010 Report had $270,000 → use ~~$285,000~~ use $500,000, updated to match Behan 8/2016 estimate data

- Guardrail at approaches to existing bridge:
  $150' \times 4\ quads. = 600\ LF \times \$25.00 = \$15,000$

- Demolition: railings, sidewalks, decks, 2 lines of beams, plus 2 wingwalls → use $80,000
  ($5,000 more than Alt. 2)

- New structural steel (see Alt. 2): $43,000\ \# \times \$3.00/\# = \$129,000$
- Stud shear connectors welded to existing beams (see Alt. 2): $1,692\ ea. \times \$5 = \$8,460$

- Clean & paint existing steel (see Alt. 2) → $250,000

- Cast-in-place reinforced concrete deck:
  $\frac{145' \times 38' \times 0.667'}{27} = 136.1\ CY$, round to 140 CY @ $1,200 = $168,000

→ New OK Std. TR4-2 Rail (see Alt.2) 290 LF × $125 = $36,250

→ Modify bearing seats on piers & abutments for new lines of beams (see Alt.2) Allow LS = $10,000

- Patch spalled concrete on abutments, and seal cracks w/epoxy injection (see Alt.2) Allow LS = $25,000

- Construct concrete closure walls at each abutment between new & existing bridge: 2 Ea. @ $10,000 = $20,000

- Dredge Channel (see Alt.2) Allow LS = $15,000
- Pavement marking (see Alt.2) 2,180 LF × $1.00/LF = $2,180

- New bridge: 10,332 SF × ~~$100~~ 115/SF = ~~$1,033,200~~ $1,188,180 (see Sheet 1 of 5)

Alternative 3 - Option B-1 - Monument

→ Items same as Alt. 3 - Option A, except as follows:

- Obliterate old road pavement ea. end of bridge: Allow LS = $30,000
- Construct permanent barricades at ends: 2 Ea × $2,500 = $5,000
- Remove north wingwalls @ ea. abutment: Allow LS = $15,000
- Reseal (not replace) joints in deck: 40' × 4 = 160 LF × $10 = $1,600

Alternative 3 - Option B-2 - Ped/Bike Bridge

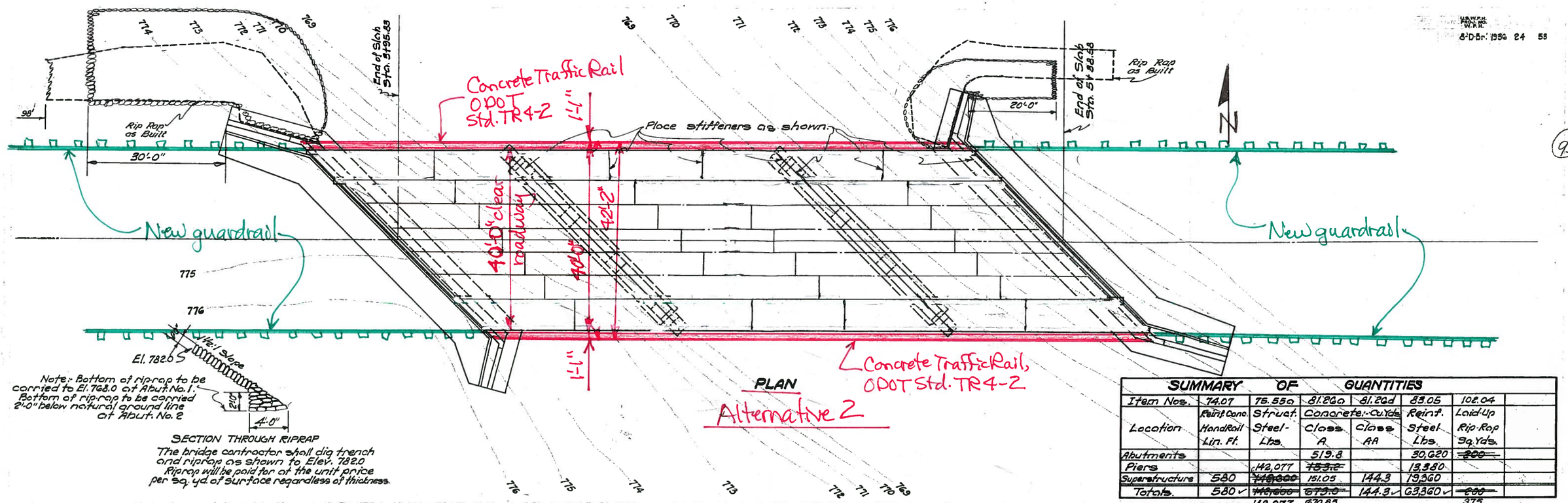
→ Items same as Alt. 3 - Option A, except as follows:

- Patch spalled concrete in bridge deck: 40% × (140' × 24') = 3,360 SF × 1,344 SF × $20 = $26,880
- Construct 2-Inch Concrete Overlay: 3,360 SF × $20 = $67,200
- Construct new deck expansion joints: 4 Ea × $10,000 = $40,000
- Remove and replace steel diaphragms (see Alt.2): 9,600 lb × $3.00 = $28,800
- Construct concrete filled bollards at each end of bridge: 2 × 6 = 12 Ea × $300 = $3,600

THIS PAGE INTENTIONALLY LEFT BLANK

U.S.W.P.H. PROJ. NO. W.P.H. 8 D-8 Br. 1936 24 55

95



Note: Bottom of riprap to be carried to El. 768.0 at Abut. No. 1. Bottom of riprap to be carried 2'-0" below natural ground line at Abut. No. 2

SECTION THROUGH RIPRAP

The bridge contractor shall dig trench and riprap as shown to Elev. 782.0 Riprap will be paid for at the unit price per sq. yd. of surface regardless of thickness.

PLAN

Alternative 2

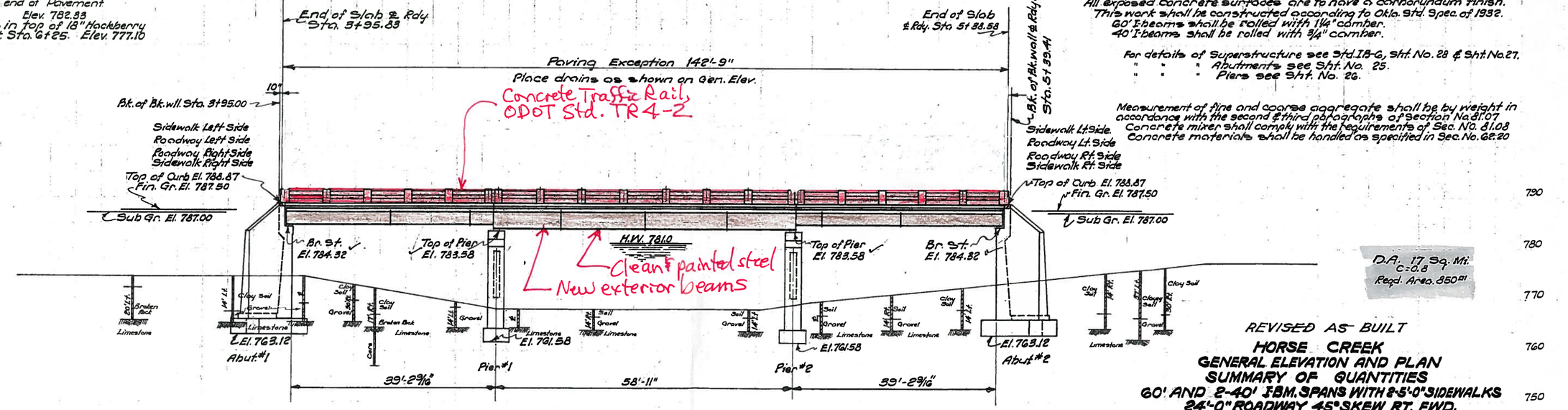
SUMMARY OF QUANTITIES							
Item Nos.	74.07	76.55a	81.26a	81.26d	83.05	102.04	
Location	Paint Conc. Hand Rail Lin. Ft.	Struct. Steel-Lbs.	Concrete-Cu Yds. Class A	Class AA	Reinf. Steel Lbs.	Laid-Up Rip-Rap Sq. Yds.	
Abutments			519.8		30,620	~~200~~	
Piers		142,077	~~153.2~~		19,380		
Superstructure	580	~~116,280~~	151.05	144.3	19,360		
Totals	580 ✓	~~142,077~~ 116,280	~~673.0~~ 670.85	144.3 ✓	69,360 ✓	~~200~~ 375	

All exposed concrete surfaces are to have a carborundum finish. This work shall be constructed according to Okla. Std. Spec. of 1932. 60' I-beams shall be rolled with 1¼" camber. 40' I-beams shall be rolled with ¾" camber.

For details of Superstructure see Std. IB-G, Sht. No. 28 & Sht. No. 27.
" " " Abutments see Sht. No. 25.
" " " Piers see Sht. No. 26.

Measurement of fine and coarse aggregate shall be by weight in accordance with the second & third paragraphs of Section No. 81.07. Concrete mixer shall comply with the requirements of Sec. No. 81.08. Concrete materials shall be handled as specified in Sec. No. 82.20

B.M. Center of end of Pavement Sta. 0+00 Elev. 782.83
B.M. 2 spikes in top of 18" Hackberry stump 65' Rt. Sta. 6+25. Elev. 777.10



GENERAL ELEVATION
Scale 1" = 10'-0"

D.A. 17 Sq. Mi.
C = 0.8
Reqd. Area 850 Sq. Ft.

REVISED AS-BUILT

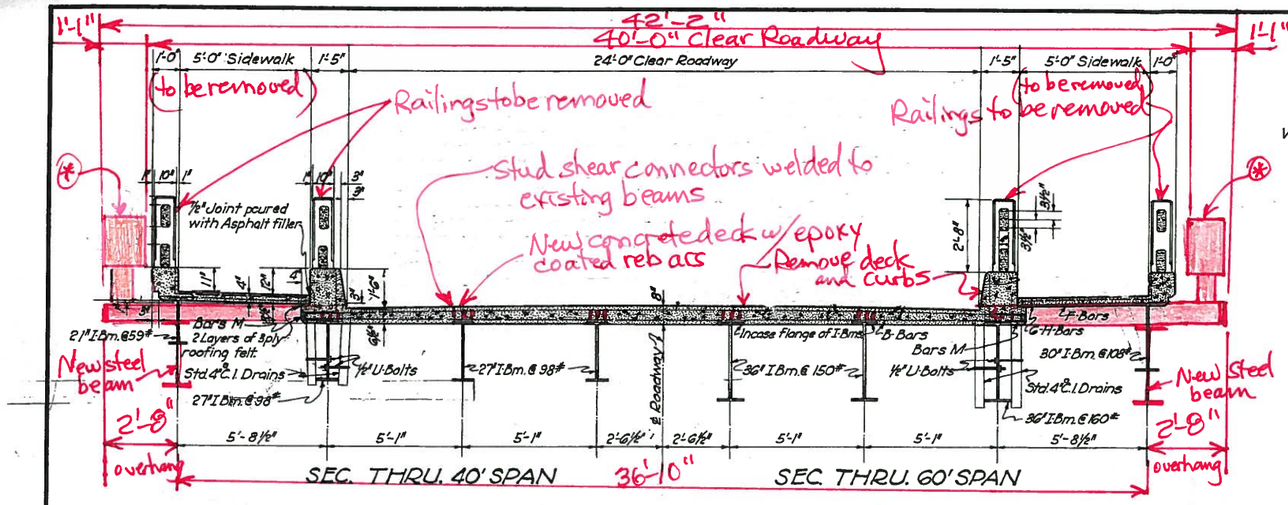
HORSE CREEK
GENERAL ELEVATION AND PLAN
SUMMARY OF QUANTITIES
60' AND 2-40' I.B.M. SPANS WITH 2-5'-0" SIDEWALKS
24'-0" ROADWAY 45° SKEW RT. FWD.
℄ STA. 4 + 67.21
U.S.W.P.H. PROJ. NO. W.P.H. 8 SEC. "D-8 Br."

✓ DJB 5/6/16

Drawn by G.M.
Checked by J.L.F.
Soundings by Hedrick

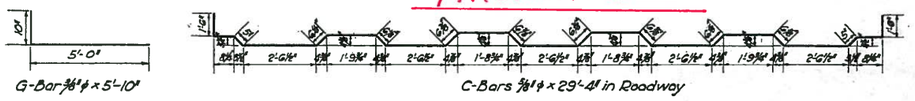
6-1935

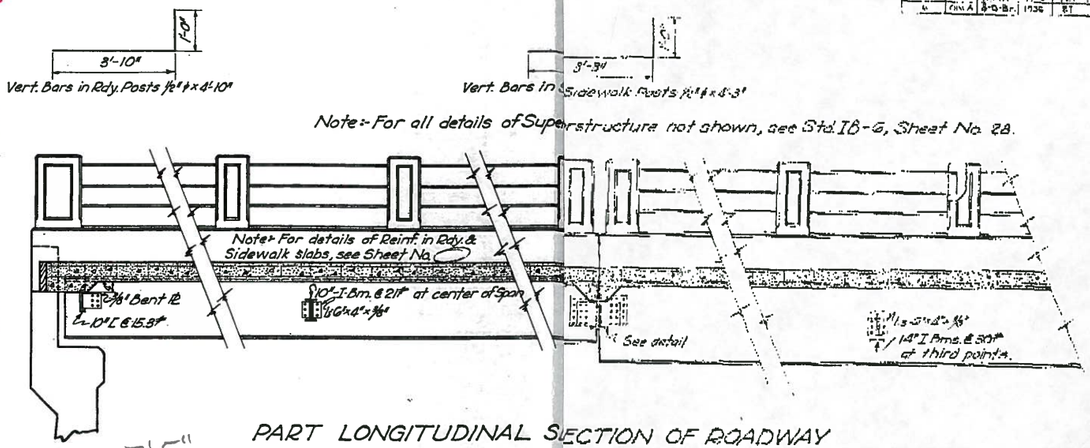
24



Typical Section
Alternate 2

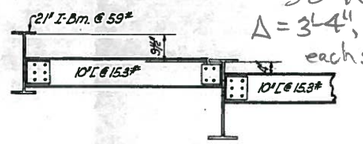
℗ Concrete traffic rail, ODOT Std. TR 4-2



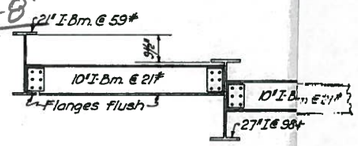


PART LONGITUDINAL SECTION OF ROADWAY

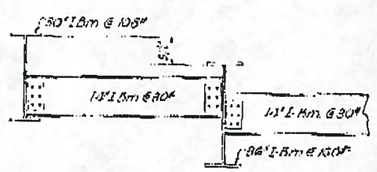
7'-5"
24'-0"
7'-5"
38'-10" vs. 42'-2"
Δ = 3'-4", or 1'-8" each side



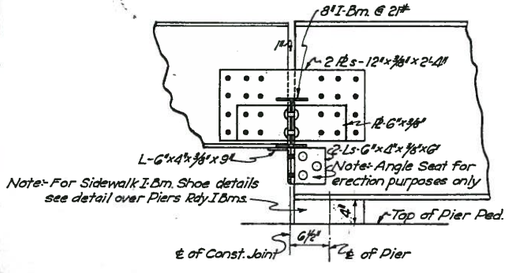
DETAILS OF STIFFENERS AT ABUT.



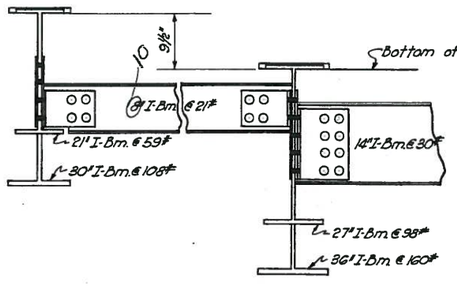
DETAILS OF INT. STIFFENERS - 40' SPANS



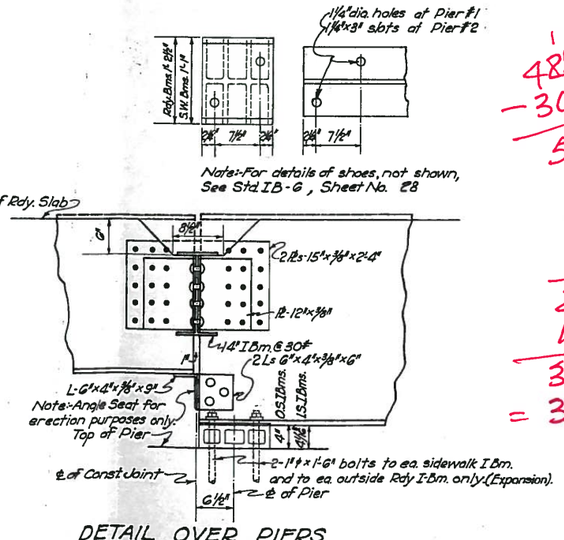
DETAILS OF INT. STIFFENERS - 60' SPANS



DETAIL OVER PIERS SIDEWALK I-BMS.



DETAIL OF STIFFNERS OVER PIERS



DETAIL OVER PIERS ROADWAY I-BMS.

Note: All beams shall be anchored at fixed pier with 2-1" ϕ anchor bolts set a minimum of 1'-0" into concrete.

DJB 5/16/16

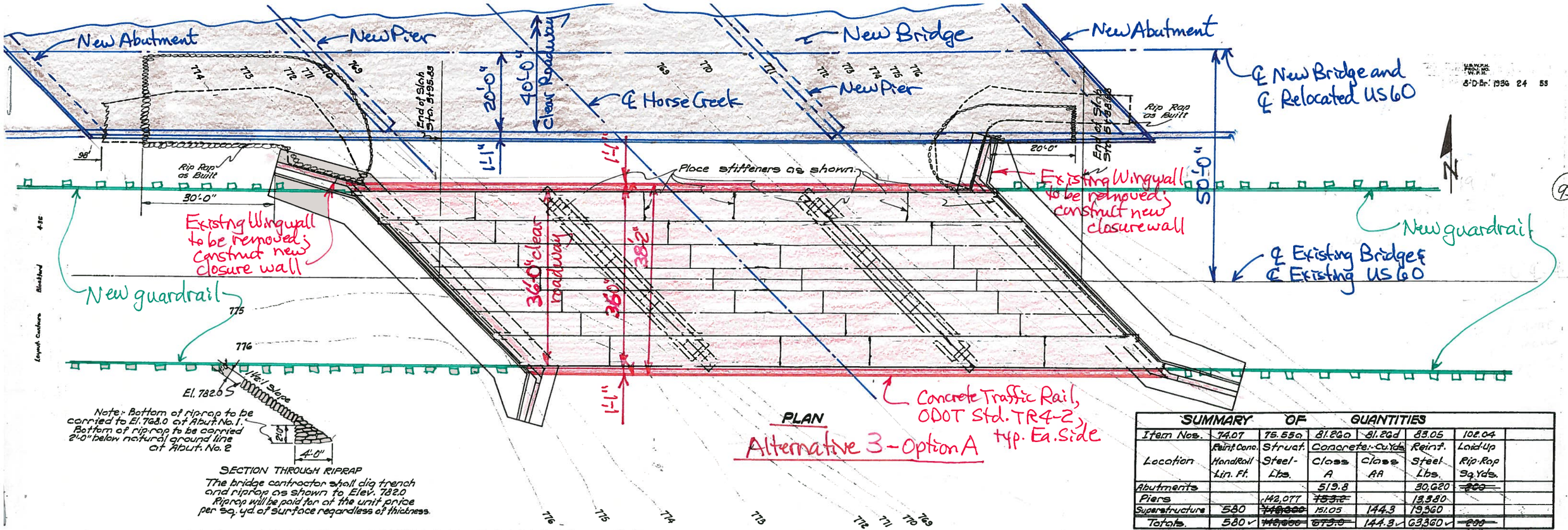
48'-2"
- 36'-10"
5'-4" ÷ 2 = 2'-8" overhang

5'-1"
x 5
25'-5"
10'-17" = 2 x 5'-8 1/2"
35'-22"
= 36'-10"

58 06-02.56-X

HORSE CREEK
DETAILS OF SUPERSTRUCTURE
1-60' & 2-40' I-BM. SPANS
24'-0" ROADWAY & 2-5'-0" SIDEWALKS
SKEWED 45° RIGHT FWD.
℄ STA. = 4+67.21
U.S.W.P.H. PROJ. NO. W.P.H. 8-SEC. "D-BR."

Detailed & Traced by Marsh J.L.F.
Checked
May 1935



Note:- Bottom of rip-rap to be carried to El. 768.0 at Abut. No. 1. Bottom of rip-rap to be carried 2'-0" below natural ground line at Abut. No. 2

SECTION THROUGH RIPRAP

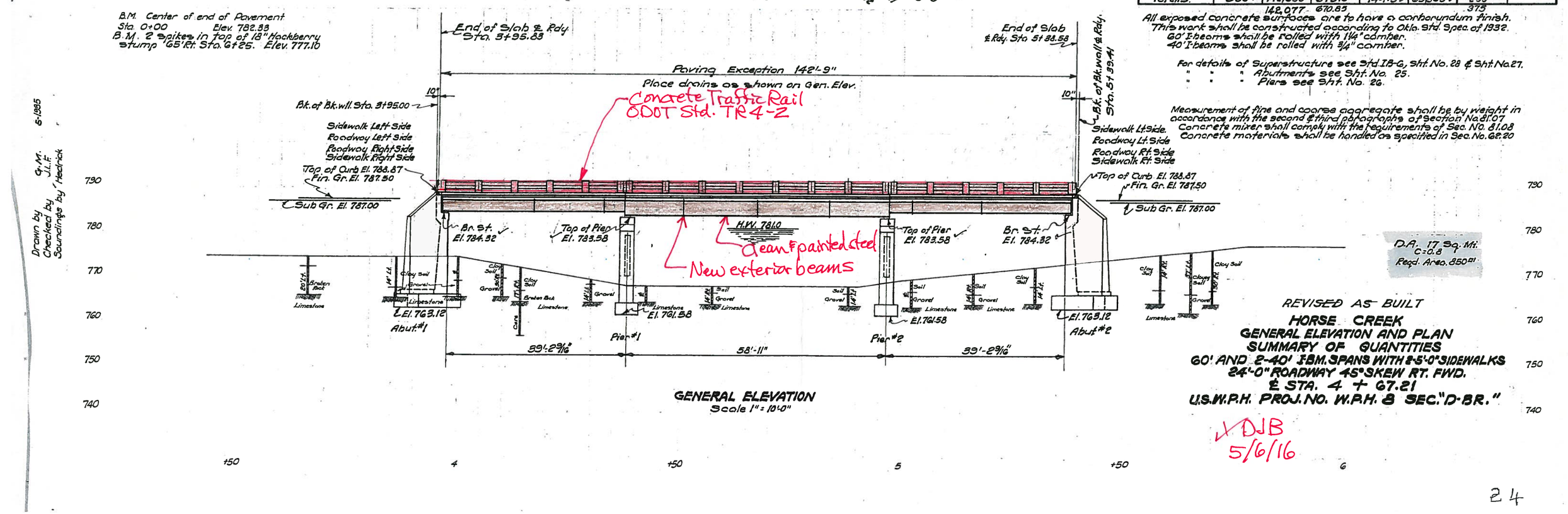
The bridge contractor shall dig trench and riprap as shown to Elev. 782.0 Riprap will be paid for at the unit price per sq. yd. of surface regardless of thickness.

SUMMARY OF QUANTITIES						
Item Nos.	74.07	75.55a	81.26a	81.26d	83.05	102.04
Location	Reinf. Conc. Hand Rail Lin. Ft.	Struct. Steel - Lbs.	Concrete:- Cu. Yds. Class A	Class AA	Reinf. Steel Lbs.	Laid-Up Rip-Rap Sq. Yds.
Abutments			519.8		30,620 ~~200~~	
Piers		142,077	~~753.2~~		13,380	
Superstructure	580	~~718,000~~	151.05	144.3	19,360	
Totals	580 ✓	~~860,000~~ 142,077	~~671.0~~ 670.85	144.3 ✓	63,360 ✓ 375	~~200~~

All exposed concrete surfaces are to have a carborundum finish.
This work shall be constructed according to Okla. Std. Spec. of 1932.
60' I-beams shall be rolled with 1¼" camber.
40' I-beams shall be rolled with ¾" camber.

For details of Superstructure see Std. IB-6, Sht. No. 28 & Sht. No. 27.
" " " Abutments see Sht. No. 25.
" " " Piers see Sht. No. 26.

Measurement of fine and coarse aggregate shall be by weight in accordance with the second & third paragraphs of Section No. 81.07. Concrete mixer shall comply with the requirements of Sec. No. 81.08. Concrete materials shall be handled as specified in Sec. No. 82.20



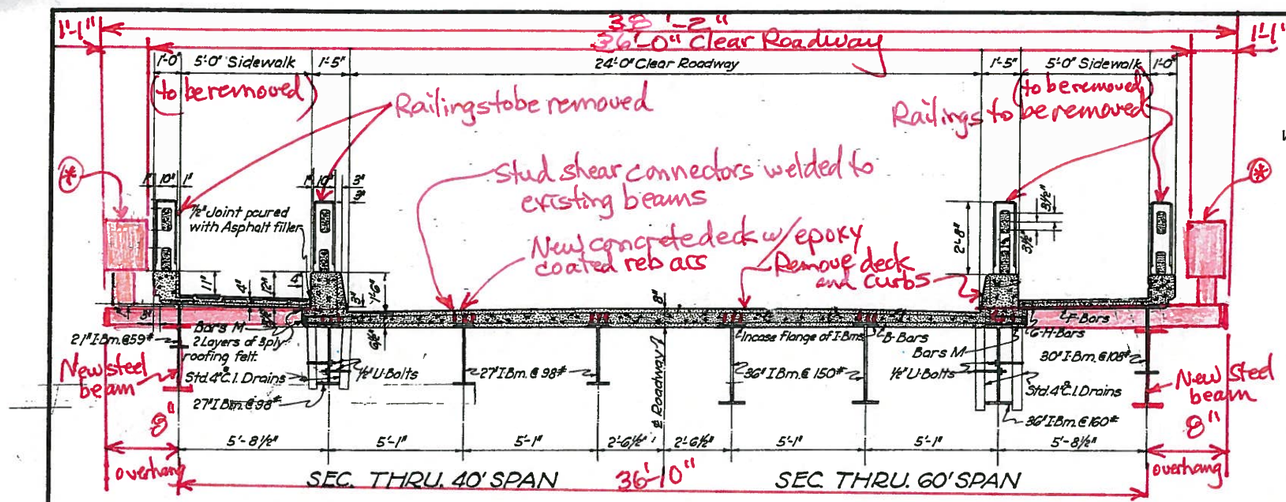
GENERAL ELEVATION
Scale 1" = 10'-0"

REVISED AS-BUILT
HORSE CREEK
GENERAL ELEVATION AND PLAN
SUMMARY OF QUANTITIES
60' AND 2-40' I.B.M. SPANS WITH 2-5'-0" SIDEWALKS
24'-0" ROADWAY 45° SKEW RT. FWD.
℄ STA. 4 + 67.21
U.S.W.P.H. PROJ. NO. W.P.H. 8 SEC. "D-BR."

✓ DJB 5/6/16

Drawn by G.M.
Checked by J.L.F.
Soundings by Hedrick
6-1935

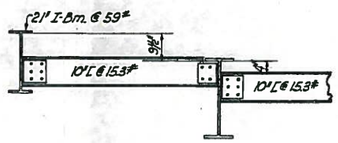
24



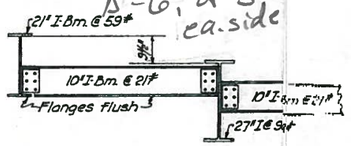
Typical Section

Alternative 3 - Option A

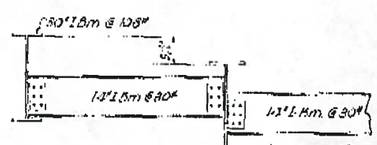
℗ Concrete traffic rail, ODOT Std. TR 4-2



DETAILS OF STIFFENERS AT ABUT.

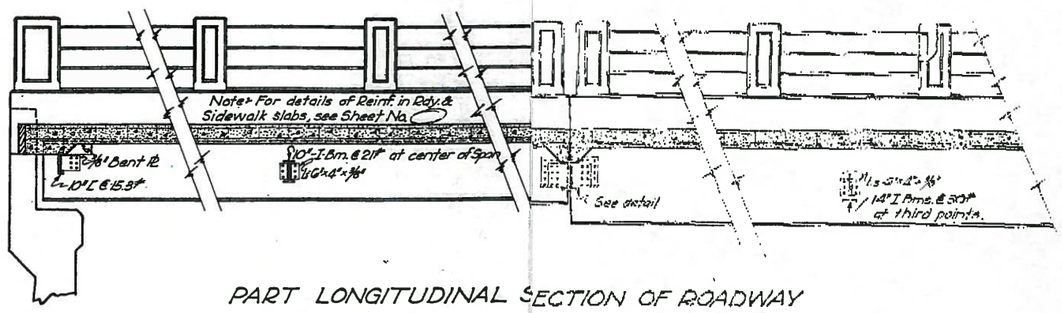


DETAILS OF INT. STIFFENERS - 40' SPANS



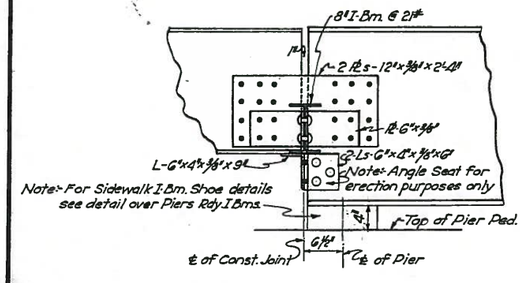
DETAILS OF INT. STIFFENERS - 60' SPANS

Note:- For all details of Superstructure not shown, see Std. IB-G, Sheet No. 28.

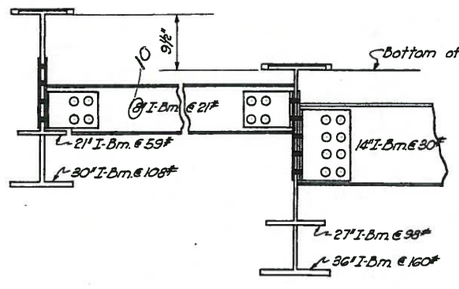


PART LONGITUDINAL SECTION OF ROADWAY

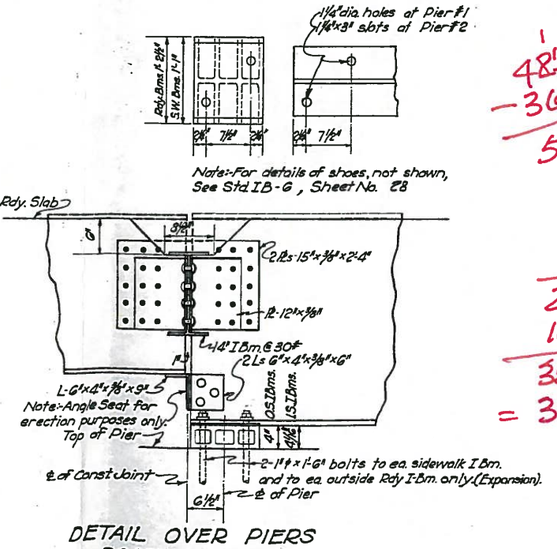
5'-5"
5'-0"
5'-5"
-10" vs 38'-2"
Δ = 6", or 3" ea. side



DETAIL OVER PIERS SIDEWALK I-BMS.



DETAIL OF STIFFNERS OVER PIERS



DETAIL OVER PIERS ROADWAY I-BMS.

Note: All beams shall be anchored at fixed pier with 2-1¼ϕ anchor bolts set a minimum of 1'-0" into concrete.

DJB 5/6/16

1 14
48'-2"
-36'-10"
5'-4" ÷ 2 = 2'-8" overhang

5'-1"
x 5
25'-5"
10'-17" = 2 x 5'-8½"
35'-22"
= 36'-10"

58 06-02.56-X

HORSE CREEK
DETAILS OF SUPERSTRUCTURE
1-60' & 2-40' I-BM. SPANS
24'-0" ROADWAY & 2-5'-0" SIDEWALKS
SKEWED 45° RIGHT FWD.
℄ STA. = 4+67.21
U.S.W.P.H. PROJ. NO. W.P.H. 8-SEC. "D-BR."

Detailed & Traced By Marsh May 1985
Checked J.L.F.

Works Cited

Federal Highway Administration and Oklahoma Department of Transportation. "Design Support for Section 4(f) Analysis for Historic Bridges." 25 March 2013 (updated). Available at http://www.environment.fhwa.dot.gov/4f/4fpolicy.pdf.

Federal Highway Administration, Office of Planning, Environment, and Realty, Project Development and Environmental Review. "Section 4(f) Policy Paper." 20 July 2012. Available at http://www.environment.fhwa.dot.gov/4f/4fpolicy.pdf.

Federal Highway Administration. *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*, Report No. FHWA-PD-96-001. December 1995.

National Register of Historic Places, Horse Creek Bridge, Afton, Ottawa County, Oklahoma. National Register #95000040.

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix A. Oklahoma Department of Transportation Bridge Inspection Report (April 6, 2015)

THIS PAGE INTENTIONALLY LEFT BLANK

OKLAHOMA DEPARTMENT OF TRANSPORTATION - Bridge Inspection Report

NBI No.: **05017** Structure No.: 5806 0256 X Local ID:-1 Suff. Rating: 29.9 SD Health Index : 59.7

IDENTIFICATION

Description:
40'-60'-40' I-BM. SPANS WITH 2-5' SIDEWALKS SK. 45 DEG.

1. State: Oklahoma
2. SHD District: Division 8
3. County Code: OTTAWA
4. Place Code: AFTON

Admin. Area: Unknown

5. Inventory Route (Route On Structure) : 1 - 2 - 1 - 00060 - 0
6. Feature Intersected: HORSE CREEK
7. Facility Carried: U.S. 60 U.S. 60
9. Location: 2.6 MI N DELAWARE
11. Mile Post: 2.559 mi
13. LRS Inv. Route./ Subroute.: 5806 0000 02
16. Latitude: 36 41 48.73
17. Longitude: 094 57 24.04
98. Border Br. Code: Unknown (P) % Resp. : 0
99. Border Br. #: Unknown

STRUCTURE TYPE AND MATERIALS

43. Main Span Material and Design Type
Steel Stringer/Girder
44. Approach Span Material and Design Type
Unknown (NBI) Unknown (P)
45. No. of Spans Main Unit: 3
46. No. of Approach Spans: 0
107. Deck Type: 1 Concrete-Cast-in-Place
108A. Wearing Surface: 1 Monolithic Concrete
108B. Membrane: 8 Unknown
108C. Deck Protection: 8 Unknown

AGE AND SERVICE

27. Year Built: 1936
106. Year Reconstructed: Unknown
28A. Lanes on: 2
28B. Lanes Under: 0
19. Detour Length: 19.9 mi
29. ADT: 6500
30. Year of ADT: 2013
109. Truck ADT %: 16
42A. Type of Service on: 5 Highway-pedestrian
42B. Type of Service under: 5 Waterway

GEOMETRIC DATA

10. Inv. Rte. Min. Vert. Clr.: 328.1 ft
32. Approach Roadway Width (W/ Shoulders): 24.0 ft
Deck Area: 5,575.7 sq. ft
33. Median: 0 No median
34. Skew: 45
35. Structure Flared: 0 No flare
47. Inv. Rte. Total Horiz. Clr.: 24.0 ft
48. Length Maximum Span: 60.0 ft
49. Structure Length: 143.0 ft
50A. Curb/Sdwlk Wdth L: 5.0 ft
50B. Curb/Sidewalk Width R: 5.0 ft
51. Width Curb to Curb: 24.0 ft
52. Width Out to Out: 39.0 ft
53. Minimum Vertical Clearance Over Bridge: 328.1 ft
54A/54B. Min. Vert. Underclearance : N Feature not hwy or RR 0.0 ft

	N/E			S/W		
Meas.	-1	-1	-1	-1	-1	-1
Post.	DO NOT U	DO NOT U	DO NOT U	DO NOT U	DO NOT U	DO NOT U

55A/55B. Minimum Lateral Undrclearance R: N Feature not hwy or RR 0.0 ft
56. Minimum Lateral Undrclearance L: 0.0 ft

INSPECTION

Type	Insp Req.	Insp Done	Freq:	Insp. Date:	Next Insp.:
NBI:		Y	24	4/6/2015	4/6/2017
FC Freq.:	N	N	NA	**NA**	**NA**
UW Freq.:	N	N	NA	**NA**	**NA**
OS Freq.:	N	N	NA	**NA**	**NA**

CLASSIFICATION

12. Base Hwy Network : On Base Network
20. Toll Facility: 3 On free road
21. Custodian: 01 State Highway Agency
22. Owner: 01 State Highway Agency
26. Functional Class: 06 Rural Minor Arteri
37. Historical Sig.: 1 Br on Natl Reg Hist Pl
100. Defense Highway: 0 Not a STRAHNET h
101. Parallel Structure: No || bridge exists
102. Dir. of Traffic: 2 2-way traffic
103. Temp. Structure: Not Applicable (P)
104. Highway System: 0 Not on NHS
105. Fed. Land Hwy 0 N/A (NBI)
110. National Truck Network: 0 Not part of na
112. NBIS Length: Long Enough

CONDITION

58. Deck: 3 Serious
59. Super.: 4 Poor
60. Sub.: 5 Fair
62. Culvert: N N/A (NBI)
61. Channel/Channel Protection: 7 Minor Damage

Flowline Notes:
Flowline/ high water = 24ft. Channel under ctr span.

LOAD RATING AND POSTING

31. Design Load: 4 M 18 (H 20)
41. Posting status: A Open, no restriction
63. Op. Rating Method: 1 LF Load Factor-Ton
Alt. Op. Rating Meth.: 1 LF Load Factor-To

64. Operating Rating (H / HS / 3-3):	35.2	49.6	78.6
66. Inventory Rating (H / HS / 3-3) :	21.0	29.8	47.1

65. Inv. Rating Method: 1 LF Load Factor-Ton
Alt. Inv. Rating Meth.: 1 LF Load Factor-To
70. Posting: 5 At/Above Legal Loads
Date Rated : 8/1/2006

PROPOSED IMPROVEMENTS

94. Bridge Cost: $1,089,056
75. Type of Work: 31 Repl-Load Capacity
95. Roadway Cost: $1,796,942
76. Lgth. of Improvment: 247.1 ft
96. Total Cost: $3,049,356
114. Future ADT: 10400
97. Year of Cost Est.: 2009
115. Year of Future ADT: 2033

NAVIGATION DATA

38. Navigation Control: Permit Not Required
39. Vertical Clearance: 0.0 ft
40. Horizontal Clearance: 0.0 ft
111. Pier Protection: 1 Not Required
116. Lift Bridge Vert. Clear.: 0.0 ft

APPRAISAL

36A. Bridge Rail: 0 Substandard
36C. Approach Rail: 0 Substandard
36B. Transition: 0 Substandard
36D. Approach Rail Ends: 0 Substandard
67. Str. Evaluation: 4 Minimum Tolerable
68. Deck Geometry: 2 Intolerable - Replace
69. Underclearance, Vertical and Horizontal: N Not applicable (NBI)
71. Waterway Adequacy: 7 Above Minimum
72. Approach Alignment: 8 Equal Desirable Crit
113. Scour Critical: 8 Stable Above Footing

200c. Temperature: 60
200d. Weather: CLOUDY
201. Structural Steel ASTM Desig.: -1 -1
202. Waterproof Membrane : -1
Date Installed : 1/1/1901
203. Type Exp. Dev. : Pourable
-
204. Type of Handrail: Concrete Post and Rails
205. Material and Quantity : 710.0
208. Type of Abutment : Cantilever
Type of Foundation : Natural Foundation Matl.
209. Type of Pier / Found.: 4 Yes
Concrete Piling
210. Foundation Elev. -1.0 7616.0
-1.0 -1.0 -1.0
211. Wear. Surf. Prot. System : None
Date Installed : 1/1/1901
213. Utilities Attached : -1
-1 -1 -1
-1 -1 -1

214a. Posted Weight Limit: NR
b. Posted Speed Limit : 35
c. Narrow/One Lane Bridge sign : N
d. Vertical Clearance Sign: NO
Advanced Warning Sign : NO
Min. Measured Clearance : -1
Max. Measured Clearance : -1
e. Navigation Lights : _
Working/Not Working : _
215. Overpass : C - US Highway
221. Substructure Cond. (U/W) : -
222. Fill over RCB: 0
223. Appr. Slab/Rdwy Cond.: Satisfactory
224. Critical Feature Type: -1
225. Paint Type : Red Lead Ready
Overcoat : 9
226. Date Painted: 2000
227. Paint Coloring: Red
233. Deck Forming: Conventional Forming
236. Deck Cleaning : -1
238. School Bus Rte: Current and Desired Route
240. Appr. Roadway Type: Asphalt/Bituminous

243. Girder Spacing/Number : -1.0 / -1
244. Span Lengths :
40 -1 -1
60 -1 -1
40 -1
245. Girder Depth : -1.000
246. Type of Overlay : _
246. Overlay Thickness : -1.0
246. Overlay Date : 1/1/1901
246. Overlay Depth Changed > 1"? _
247. Protective Systems : 1: _
2: _ 3: _
4: _ 5: _
248. No. of Field Splices w/ Corrosion : -1
249. Scour Crit. POA exists?: No
250. Culvert Headwall Dist.: -1.0
254. Thru Truss Type : _
256. Chan. Profile Up/Down Stream?: Up
257a. OkiePROS Auto. Truck Routing Yes
258. Plans w/ found. are in file at ODOT
259. Scour Eval. is in file at ODOT
263. Interchange at Intersection N
264. Interstate Milepoint -1.00

OKLAHOMA DEPARTMENT OF TRANSPORTATION - Bridge Inspection Report

Suff. Rating: 29.9 SD

Health Index : 59.7

NBI No.: **05017** Structure No.: 5806 0256 X Local ID:-1

Inspection Date: 4/6/2015 Reported By: UFD8003

Invoice No.: -1 Inspected With: -1

Agency :

Structure / Inspection Notes

FX:SEVERAL DIAPHRAGMS SEVERE SECTION LOSS & SEVERAL COMPLETELY DETERIATED.

Elm.	Env.	Description	Un.	Qty.	Qty.St. 1	% 1	Qty.St. 2	% 2	Qty.St. 3	% 3	Qty.St. 4	% 4	Qty.St. 5	% 5
12	4	Reinforced Concrete Deck	(SF)	3,432	0	0 %	0	0 %	3,432	100 %	0	0 %	0	0 %
107	4	Steel Open Girder Beam	(LF)	771	0	0 %	771	100 %	0	0 %	0	0 %	0	0 %
205	4	Reinforced Conc Column or Pile Extension	(EA)	8	0	0 %	8	100 %	0	0 %	0	0 %	0	0 %
210	4	Reinforced Conc Pier Wall	(LF)	79	0	0 %	79	100 %	0	0 %	0	0 %	0	0 %
215	4	Reinforced Conc Abutment	(LF)	112	0	0 %	108	96 %	4	4 %	0	0 %	0	0 %
234	4	Reinforced Conc Cap	(LF)	112	0	0 %	110	98 %	2	2 %	0	0 %	0	0 %
301	4	Pourable Joint Seal	(LF)	187	0	0 %	0	0 %	0	0 %	187	100 %	0	0 %
311	4	Moveable Bearing (roller, sliding, etc.)	(EA)	14	0	0 %	12	86 %	0	0 %	2	14 %	0	0 %
313	4	Fixed Bearing	(EA)	14	0	0 %	11	79 %	0	0 %	3	21 %	0	0 %
515	4	Steel (Superstructure) Protective Coating	(SF)	3,362	0	0 %	3,362	100 %	0	0 %	0	0 %	0	0 %
859	4	Soffit of Concrete Decks and Slabs	(EA)	1	0	0 %	0	0 %	1	100 %	0	0 %	0	0 %
865	4	Steel Open Girder/Beam End (5 Ft.)	(LF)	210	0	0 %	60	29 %	150	71 %	0	0 %	0	0 %
958	4	Concrete Cracking	(EA)	1	0	0 %	1	100 %	0	0 %	0	0 %	0	0 %
963	4	Steel Section Loss	(EA)	1	0	0 %	1	100 %	0	0 %	0	0 %	0	0 %

Additional Elements

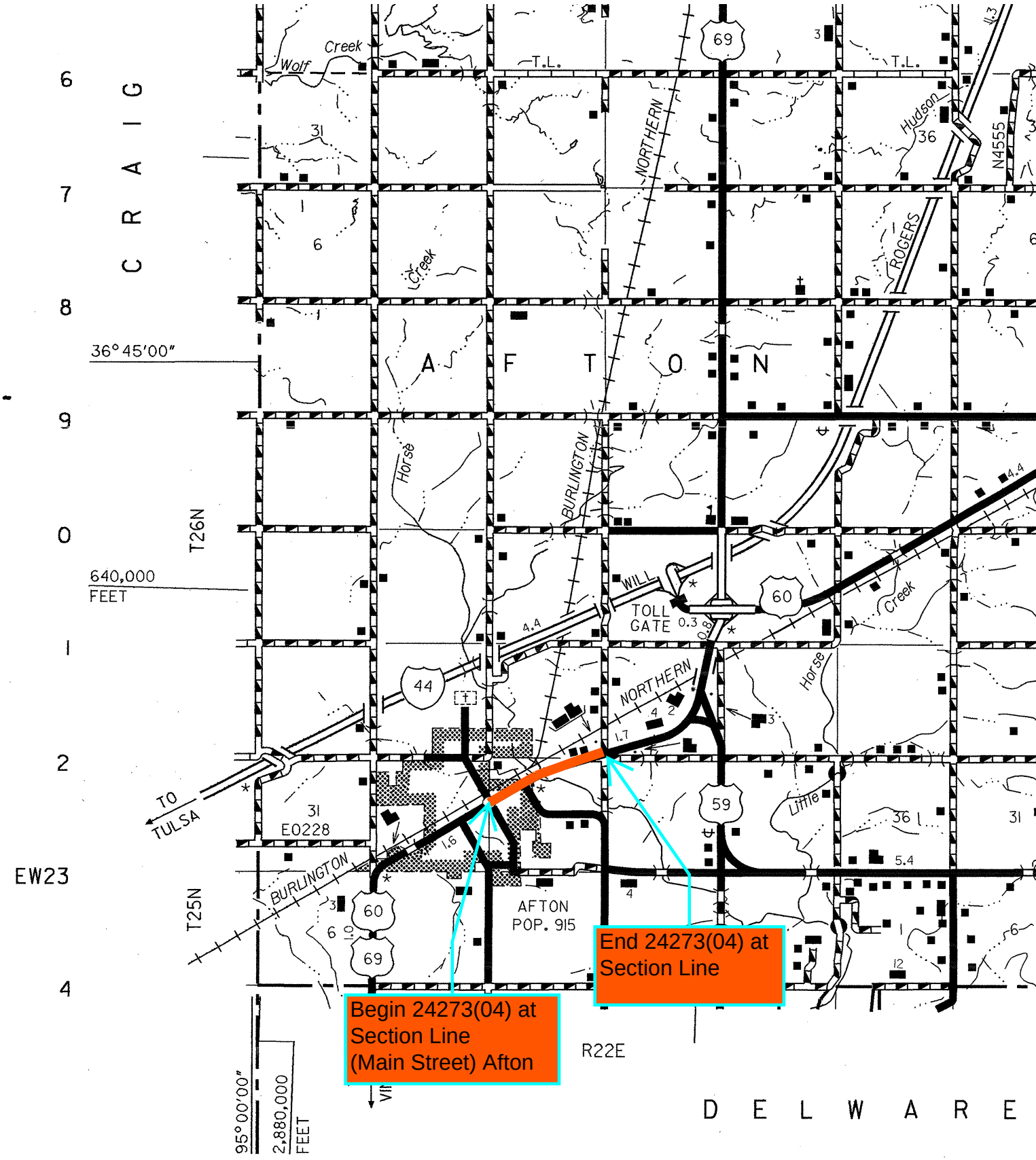
Elem.	Element Notes (Include Size and Location of Deterioration
12	FX:Several Patched areas,spalls & Impending potholes w/ exposed rebar.Note:Deck makes chatter noise upon Impact.
107	< none >
205	< none >
210	< none >
215	FX:E.ABUT. MODERATE DIAG.CRACKS W/EFFLORESCENCE S.E.COR. AND W.ABUT SPALLS W/ EXPOSED REBAR & CRACKS W/ EFFLOR.
234	< none >
301	PX:Exp.Jts.have failed sidewalk areas,others failing.
311	FX: BEARINGS HAVE MODERATE to HEAVY CORROSSION.
313	FX: BEARINGS HAVE MODERATE to HEAVY CORROSSION.
515	FX:PAINT FAILED @ BM.ENDS.
859	FX:SOFFIT FALSEWORK,SEVERAL SPALLS REBAR EXPOSED,CRACKS WITH EFFLOR.THROUGHOUT.
865	FX: BEAM ENDS HAVE MODERATE SECTION LOSS. NOTE: ENDS HAVE WELDED ANGLES.
958	FX:MOD.DECK CRACKS.
963	PX: SECTION LOSS AT BEAM ENDS AND BEARINGS.

Channel Profile

	Baseline	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Distance	0	70.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Profile		24.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Event		Flowline	_	_	_	_	_	_	_	_	_	_	_	_	_	_

Appendix B. Project Location Map

THIS PAGE INTENTIONALLY LEFT BLANK



Project Location Map
US 60 Bridge over Horse Creek

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix C. Photographs (April 2016)

THIS PAGE INTENTIONALLY LEFT BLANK

Photo 1. US 60 west roadway approach to the bridge, looking east.

Photo 2. South side of bridge; note sanitary sewer manhole and drainage swale.

Photo 3. South side of Span 2 and Pier 2; unknown vertical pipe attached to bridge.

Photo 4. East abutment, south wingwall, cracking and spalling with efflorescence.

Photo 5. Underside of bridge deck at west abutment; note severely deteriorated steel diaphragm, spalled concrete deck with exposed rebar, and failed deck joint.

Photo 6. Underside of bridge deck at Pier 1; note severely deteriorated steel diaphragm, spalled concrete deck with exposed rebar, and failed deck joint.

Photo 7. West end of bridge, south side at end of sidewalk, showing concrete railings.

Photo 8. Condition of bridge deck, looking east from west end of bridge; note patched concrete, potholes, and failed deck joints.

Photo 9. Failed joint between bridge deck and roadway at west end of bridge.

Photo 10. Horse Creek waterway channel under westerly span of bridge; note sediment and soil buildup, reducing waterway opening.

Photo 11. View looking upstream (north) of Horse Creek from north side of bridge.

Photo 12. Repaired concrete bridge railing; note color and texture of repaired section compared to original railing.

Photo 13. Repaired concrete railing post; note color and texture of repaired post compared to original post.

Photo 14. Underside of bridge deck at east abutment; note plywood used to form underside of concrete patch in deck; also note supplemental steel support under steel diaphragm.

Photo 15. US 60 east roadway approach to the bridge, looking west.

Photo 16. Condition of bridge deck at east abutment, south side; note patched and potholed concrete and failed deck joint.

Photo 17. View looking downstream (south) of Horse Creek from south side of bridge.

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix D. 1935 Design Plans for U.S. Highway 60 and Horse Creek Bridge (Select Sheets)

THIS PAGE INTENTIONALLY LEFT BLANK

CHIEF DRAFTSM.	LOCATING ENG'R.	BRIDGE ENG'R.	DIVISION ENG'R.	B. P. R.
DMcK 8/24/35	HSE	HEW	AOW	JSL

FED. ROAD DIST. NO.	STATE	U.S.W.P. PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
6	OKLA.	W.P.H. 8 D.	1936	1	53

REVISED AS BUILT Aug- 1936

GRADE CROSSINGS 1
GRADE CROSSINGS ELIMINATED 1
BY SEPARATION: OVERPASS 1
BY SEPARATION: UNDERPASS 0
BY RELOCATION 0
GRADE CROSSINGS REMAINING 0

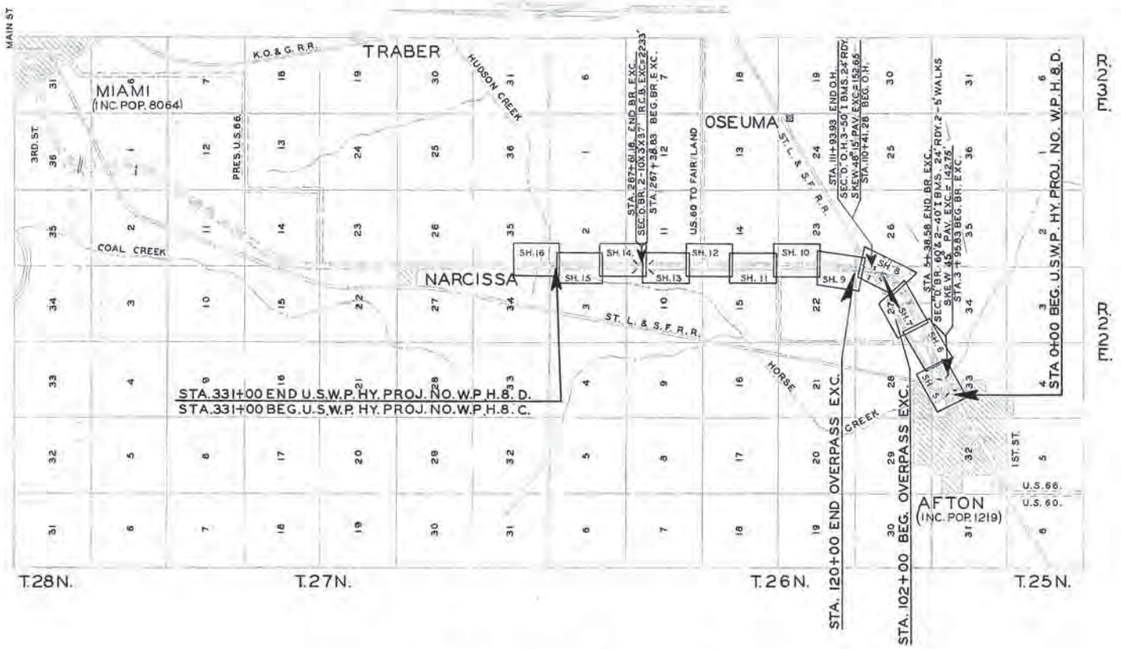
STATE OF OKLAHOMA
DEPARTMENT OF HIGHWAYS

PLAN AND PROFILE OF PROPOSED
STATE HIGHWAY
U.S. WORKS PROGRAM HY. PROJ. NO. W.P.H. 8 D (1936)
U.S. HIGHWAY NO. 66.

58-02 & 06

OTTAWA COUNTY

INDEX OF SHEETS



SCALES

PLAN 1"=100'
PROFILE HOR. 1"=100'
PROFILE VER. 1"=10'
CROSS SECTIONS 1"=5'
LAYOUT MAP 1"= 5000'

CONVENTIONAL SIGNS

- Proposed Road
- Railroads
- Range & Township Lines
- Section Lines
- Quarter Section Lines
- Fences
- Base Line
- Right-of-Way Lines
- Ground Lines
- Grade Line
- Travelled Roads
- Culverts & Bridges
- Telephone & Telegraph
- Power Lines
- Buildings
- Unloading Points
- Oil Wells

ROADWAY LENGTH ____ 31134.92 FT. ___ 5.896 MI.
BRIDGE LENGTH ____ 165.08 FT. ___ 0.031 MI.
PROJECT LENGTH ____ 5.927 MI.

EXCEPTIONS STA. 102+00 TO STA. 120+00 (OVERPASS) 1800 FT.
EQUATIONS - NONE.

W. P. H. SPECIAL PROVISIONS GOVERN
STATE STANDARD SPECIFICATIONS GOVERN APPROVED DEC. 1932

EXAMINED AND APPROVED
This ____ Day of ____ 1935
DIVISION ENGINEER

EXAMINED AND APPROVED
This ____ Day of ____ 1935
ENGINEER OF DESIGN

EXAMINED AND APPROVED
This ____ Day of ____ 1935
STATE HIGHWAY ENGINEER

EXAMINED AND APPROVED
This ____ Day of ____ 1935
CHAIRMAN
STATE HIGHWAY COMMISSION

RECOMMENDED FOR APPROVAL
This ____ Day of ____ 1935
SENIOR HIGHWAY ENGINEER
BUREAU OF PUBLIC ROADS

RECOMMENDED FOR APPROVAL
This ____ Day of ____ 1935
DISTRICT ENGINEER
BUREAU OF PUBLIC ROADS

RECOMMENDED FOR APPROVAL
CHIEF ENGINEER
BUREAU OF PUBLIC ROADS

APPROVED
CHIEF OF BUREAU OF PUBLIC ROADS

Chapman

FED. ROAD DIST. NO.	STATE	U.S.W.P. PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
6	OKLA.	W.P.H.8-D.	1936	4	53

Revised as Built Aug-1936

SUMMARY SHEET

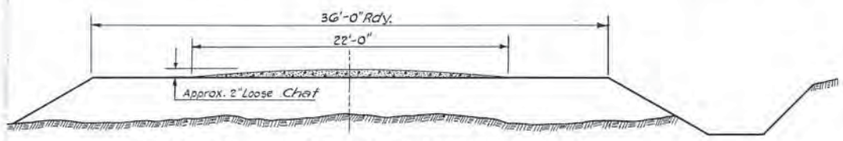
U.S. WORKS PROGRAM HIGHWAY PROJ. NO. W.P.H. 8 D.

SUMMARY OF GRADING QUANTITIES

P. & P. Sheet No.	Station	To Station	Embankment +10% C.Y.	Excavation C.Y. Class A.	Class B.	Class C.	Wire Cable Guard Rail Lin. Ft.	Ponding & Jetting C.Y.	Overhaul Sta. Yds.	4' Lip Curb Lin. Ft.	Lip Curb Drains Class AA Conc. C.Y.	Reinf. Steel Lbs.	12" Corr. Pipe L.F.	Additional Vertical Feet of Manhole Vert. Ft.	4' Diam. Manholes with Ft. of Cover Each	Remove Asph. Top and Conc. Base S.Y.
5	0+00 ~	26+00	33,640.2	33,640.2												
6	26+00 ~	36+00	7,496.6	7,496.6												
7	56+00 ~	102+00	12,754.5	12,754.5												
8	Sec. 'D' Overpass	Exception														
9	120+00 ~	146+00	5,378.9	5,378.9												
10	146+00 ~	176+00	9,207.9	9,207.9												
11	176+00 ~	206+00	9,655.4	9,655.4												
12	206+00 ~	236+00	7,627.7	7,627.7												
13	236+00 ~	266+00	6,461.8	5,933.3	315.2	134										
14	266+00 ~	296+00	7,753.5	7,753.5												
15-16	296+00 ~	331+00	8,052.3	6,760.7	954.1	337.5										
	Total Sec. 'D' Rdy.		108,030.3	106,210.4	1469.1	350.8								18.5	2	16,568.0

SUMMARY OF STRUCTURES OVER 20'

Structure No.	P. & P. Sheet No.	£ Station	Description	Design	Design Sheet No.	Reinf. Conc. Hand Rail Lin. Ft.	Structural Steel Lbs.	Concrete C.Y. Class 'A'	Class 'A' Pier Base	Class 'AA'	Reinforcing Steel Lbs.	Laid Up Rip-Rap Sq. Yds.
1	5	4+67½	60' & 2-40' I-Bm. Spans With 2-5'-0" Sidewalks 24' Rdy. 45° Skew R.F. Fwd.	I8.-G	24 & 26 21-28	580	142,077	670.85		144.3	63,360	356.4
23	14	267+50	2-10×3×37' Rdy. R.C.B.	B.C.5A2	21			82.57			7987	
			Total Sec. 'D' Bridges			580	142,077	753.42		144.3	71,347	356.4



TYPICAL CHAT SECTION 36'-0" RDY.

CONSTRUCTION NOTE

The grade shall be bladed to a uniform surface conforming to the typical section shown on the plans and the existing grade line prior to placing Chat.

The approved Chat Material shall then be deposited on the road at the uniform rate of nine & one half (9½) Cu. Yds. per station, and bladed over the proposed grade to conform to the proposed Chat Section.

(On the completion of the Chat Surfacing, the entire project shall be bladed to conform to the proposed cross section prior to final acceptance)

Chat Material shall be measured by the Cu. Yd. in the Vehicle, at the point where it is to be dumped on the Road.

SUMMARY OF DRAINAGE STRUCTURES

Structure No.	P. & P. Sht. No.	£ Station	Description	Design	Design Sheet No.	Class 'A' Concrete C.Y.	Reinf. Steel Lbs.	R.C. Pipe 15"	18"	Lin. Ft. 24"	30"	D.A. Acres	C.	Remarks
—	5	4+67½	Sec. 'D' Bridge									1154 Mi.	0.8	In Place
2	5	10+00	3×3×55' Rdy. R.C.B.	BC.6	23	9.03	1695					14	0.8	" "
3	5-6	25+40	15"×15' Rdy. R.C.P.-S.D. Lt. No Hdwls.	C.P.2	18			15						" "
4	6	39+07	30"×38'-4" Rdy. R.C.P. 45° Wings	C.P.2	18	2.77	62				40	10	0.6	" "
5	6	39+75	4×2×36' Rdy. R.C.B.	BC.5z	20	15.08	1361					30	0.6	" "
6	7	59+75	2-8×3×36' " "	BC.5A2	22	68.59	6356					226	0.8	" "
7	7	82+70	2×2×41' " "	BC.5z	20	11.19	987					11	0.6	" "
8	9	139+06	18"×78' Rdy. R.C.P.-S.D. Rt. No Hdwls.	C.P.2	18				18					" "
9	10	156+00	6×2×40' Rdy. R.C.B.	B.C.5z	20	23.62	2170					60	0.6	" "
10	10	172+65	3×2×140' Rdy. R.C.B.-S.D. Lt.	B.C.5	19	34.39	3401					15	0.6	" "
11	10	172+65	24"×26'-4" " R.C.P.-S.D. Rt. 90° W.	C.P.2	18	4.38	52			28		Small	0.6	" "
12	11	185+65	5×4×36' Rdy. R.C.B.	B.C.5	19	25.15	2003					115	0.6	" "
13	11	188+50	Extend 28' Rt. Bc., 12' Lt.	B.C.5A	21	38.10	3297					530	0.6	" "
14	11	193+50	18"×21' Rdy. R.C.P.-S.D. Lt. No Hdwls.	C.P.2	18				21					" "
15	12	208+22	4×3×36' Rdy. R.C.B.	B.C.5z	20	18.30	1572					45	0.6	" "
16	12	208+88	30" ×20' R.C.P.-S.D. Rt. No Hdwls.	C.P.2	18						20			" "
17	12	223+16	6×3×30' Rdy. R.C.B.	B.C.5	19	33.78	3181					130	0.6	" "
18	12	225+78	3×2×30' Rdy. R.C.B.-S.D. Lt.	B.C.5	19	9.97	874					20	0.8	" "
19	13	243+81	15"×21' R.C.P.-S.D. Lt. No Hdwls.	C.P.2	18			21						" "
20	13	254+08	15"×21' " S.D. Rt. " " "		18			21						" "
21	13	256+66	18"×21' " S.D. Lt. " " "		18				21					" "
22	13	260+	10×3×39½' Rdy. R.C.B.	B.C.5z	20	47.23	4551					190	0.6	" "
23	14	267+50	Sec. 'D' Bridge									310	0.8	" "
24	14	270+13	Divert											" "
25	14	272+68	Divert											" "
26	14	278+56	18"×31'-4" Rdy. R.C.P.-S.D. Rt. 90° W.	C.P.2	18	2.98	42		33			3	0.8	" "
27	14	278+56	3×2×30' Rdy. R.C.B.-S.D. Lt.	B.C.5	19	9.97	874					20	0.6	" "
28	15	311+45	15"×21' R.C.P.-S.D. Rt. No Hdwls.	C.P.2	18			21						" "
29	15	304+50	15"×21' " " Lt. " "	"	18			21						" "
30	15	319+80	2-8×3×36' Rdy. R.C.B.	B.C.5A2	22	68.77	6073					250	0.8	" "
31	15	323+90	15"×21' Rdy. R.C.P.-S.D. Lt. No Hdwls.	C.P.2	18			21						In Place
			Total Sec. 'D' Rdy.			430.30	38,551	120	93	28	60			

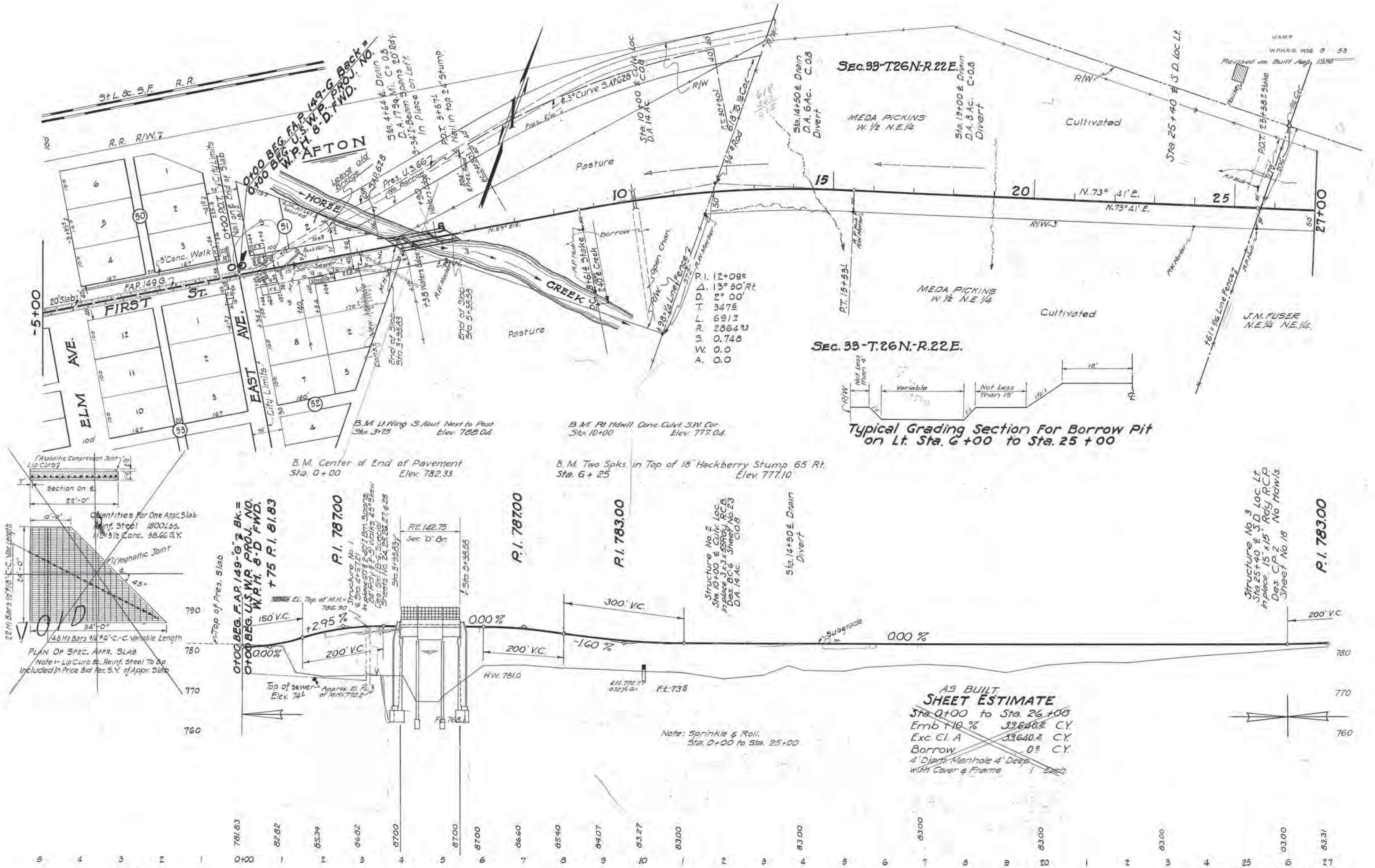
SUMMARY OF PAY QUANTITIES

Section	Unit	Excavation C.Y. Class 'A'	Class 'B'	Class 'C'	*Rolling Hours	△Sprinkling 1000 Gal.	Surfacing S.Y. R.C. Paving	Reinf. Conc. Appr. Slab	4" Lip Curb L.F.	Reinf. Conc. Hand Rail L.F.	Struct. Steel Lbs.	Concrete C.Y. Class 'A'	Class 'A' Pier Base	Class 'AA'	Reinf. Steel Lbs.	Reinf. Conc. Pipe L.F. 15"	18"	24"	30"	12" Corr. Iron Pipe L.F.	Laid Up Rip-Rap S.Y.	Wire Cable Guard Rail Lin. Ft.	Monuments Each	†Removal of Asph. Top and Conc. Base Sq. Yds.	Additional Vertical Feet of Manhole Vert. Ft.	4' Diam. Manhole 4' deep with Fr. & Cover Each	Chat Surfacing C.Y.
Item	No	10.14a	10.14b	10.14c.	10.14e	10.14f.	Spec.	Spec.	Spec.	74.07	75.55a	81.26a	81.26aa	81.26d	83.05	84.15a	84.15b	84.15c	84.15d	85.25				Spec.	Spec.	Spec.	Spec.
D.	1	106,210.4	1469.1	350.8	729.	412.5						430.30			38,551	120	93	28	60		102.04	106.0 Ga	108.04	16,568.0	18.5	2	◉3059.9
Rdy.	2																						1				
D.	1									580	142,077	753.42		144.3	71,347						356.4						2.1
Bridge	2																										

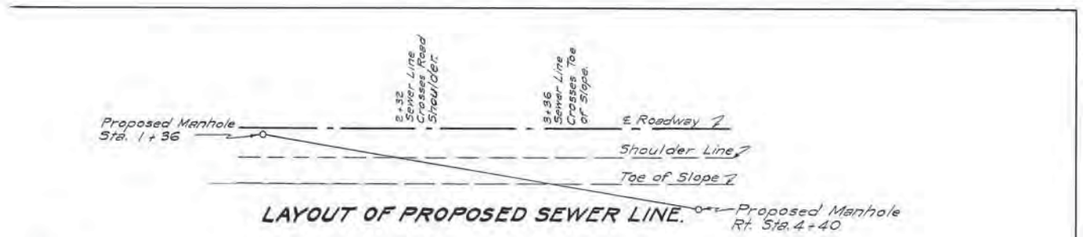
*Based on 20 hrs. per 1000 C.Y. of Embankment
△Based on 30 Gal. per C.Y. of Embankment

†Old Paving removed shall be piled neatly at places designated by the Resident Engineer along the right of way and shall remain the property of the State.

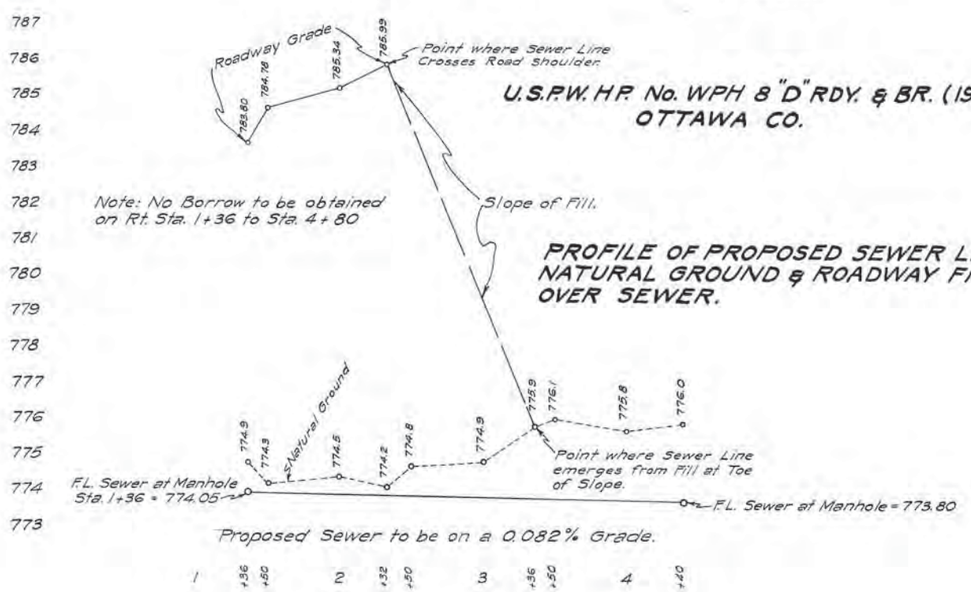
◉Based on 2" Loose Chat
And Includes 83 C.Y. For Intersection



Revised as Built Aug. 1936
St. L. & S.F. R.R.
R.R. R/W
0+00 BEG. F.A.P. 149-G Back = 0+00 BEG. U.S.W.P. PROJ. NO. W.P.H. 8-D FWD.
AFTON
SEC. 33-T.26N.-R.22E.
MEDA PICKINS W. 1/2 N.E. 1/4
Cultivated
Pasture
HORSE
CREEK
FIRST ST.
EAST AVE.
ELM AVE.
F.A.P. 149 G.
N.73° 41' E.
P.I. 12+08
Δ. 13° 30' Rt.
D. 2° 00'
T. 347
L. 691
R. 2864.93
S. 0.748
W. 0.0
A. 0.0
J.M. FUSER N.E. 1/4 N.E. 1/4
Typical Grading Section For Borrow Pit on Lt. Sta. 6+00 to Sta. 25+00
B.M. Lt. Wing S. Abut. Next to Post Sta. 3+75 Elev. 788.04
B.M. Rt. Hdwl. Conc. Culvt. S.W. Cor. Sta. 10+00 Elev. 777.04
B.M. Center of End of Pavement Sta. 0+00 Elev. 782.33
B.M. Two Spks. in Top of 18" Hackberry Stump 65' Rt. Sta. 6+25 Elev. 777.10
PLAN OF SPEC. APPR. SLAB
Note: Lip Curb & Reinf. Steel To Be Included In Price Bid Per S.Y. of Appr. Slab
Quantities For One Appr. Slab
Reinf. Steel 1800 Lbs.
1:2:3 1/2 Conc. 58.66 S.Y.
P.I. 787.00
P.I. 787.00
P.I. 783.00
P.I. 783.00
150' V.C.
200' V.C.
300' V.C.
200' V.C.
200' V.C.
+2.95 %
0.00 %
-1.60 %
0.00 %
H.W. 781.0
Note: Sprinkle & Roll. Sta. 0+00 to Sta. 25+00
AS BUILT
SHEET ESTIMATE
Sta. 0+00 to Sta. 26+00
Emb +10 % 33640.2 C.Y.
Exc. Cl. A 33640.2 C.Y.
Borrow 0 C.Y.
4' Diam. Manhole 4' Deep with Cover & Frame 1 Each



LAYOUT OF PROPOSED SEWER LINE.



U.S.W.P.
W.P.H.&D. 1936 G 53
Revised as built Aug. 1936

SEC. 28-T.26N.-R.22E.

SEC. 27-T.26N.-R.22E.

Cultivated

LENA CHANEY
S.½ S.E.¼ S.E.¼

M.A. PAINTER.
S.½ S.W.¼.

Cultivated

Sta. 25+58± Stake
¼ Cor.
P.O.T.
Pres. U.S. 66-16' Slab
R/W
Cultivated
P.O.T. 31+78±
P.O.T. 32+60± Pavement Sec. Ln.
Sta. 33+60± Drain
D.A. 1 Ac. C. 1st Divert.
P.O.T. 33+70± Stake in Fence.
Sta. 39+10± Drain
D.A. 10 Ac. C=0.6
P.O.T. 40+00
Sta. 39+75± Drain
D.A. 30 Ac. C=0.6
Sta. 52+70± Drain
D.A. 26 Ac. C=0.8
Divert.
P.O.T. 55+61±
+60=⅛ Line
R/W
25+00
30
35
40
45
N. 73° 41' E.
50
55
57+00
80'
50'
+80 Sec. Line
+60=⅛ Line
Sta. 25+40 ± S.D. Loc. Lt.
Nothing in Place
50' Arch in Place
Δ 30° 15'
R = 193.16
T. = 193.96
L = 300.8
D 30° 7'
36' Arch in Place.
Sec. Cor.
649' to ⅛ Cor.
Dam

J.M. FUSER.
N.E.¼ N.E.¼

Cultivated

M.A. PAINTER
S.½ S.W.¼.

SEC. 33-T.26N.-R.22E.

SEC. 34-T.26N.-R.22E.

B.M. "X" on S. Hd. Wl. of Culv. 175' Rt. Sta. 38 + 70 Elev. 790.63

B.M. S.W. Cor. S. Hdwl. 30" R.C.P. Sta. 39+75 Elev. 790.57

Structure No. 3
Sta. 25+40 ± S.D. Loc. Lt.
Replace 15" x ___ R.C.P.
Des. C.P.2 No Hdws.
Sheet No. 18

Structure No. 4
Sta. 39+10 ± Drain
Replace 30" x 38" Adpy. R.C.P.
Des. C.P.2 Sheet No. 18
D.A. 10 Ac. C.=0.6
45° Wings

Structure No. 5
Sta. 39+75 ± Drain
Replace 4'x2'x.370 Bdy. R.C.B.
Des. B.C.52 Sheet No. 20
D.A. 30 Ac. C=0.6

AS BUILT
SHEET ESTIMATE
Sta. 26+00 to Sta. 56+00

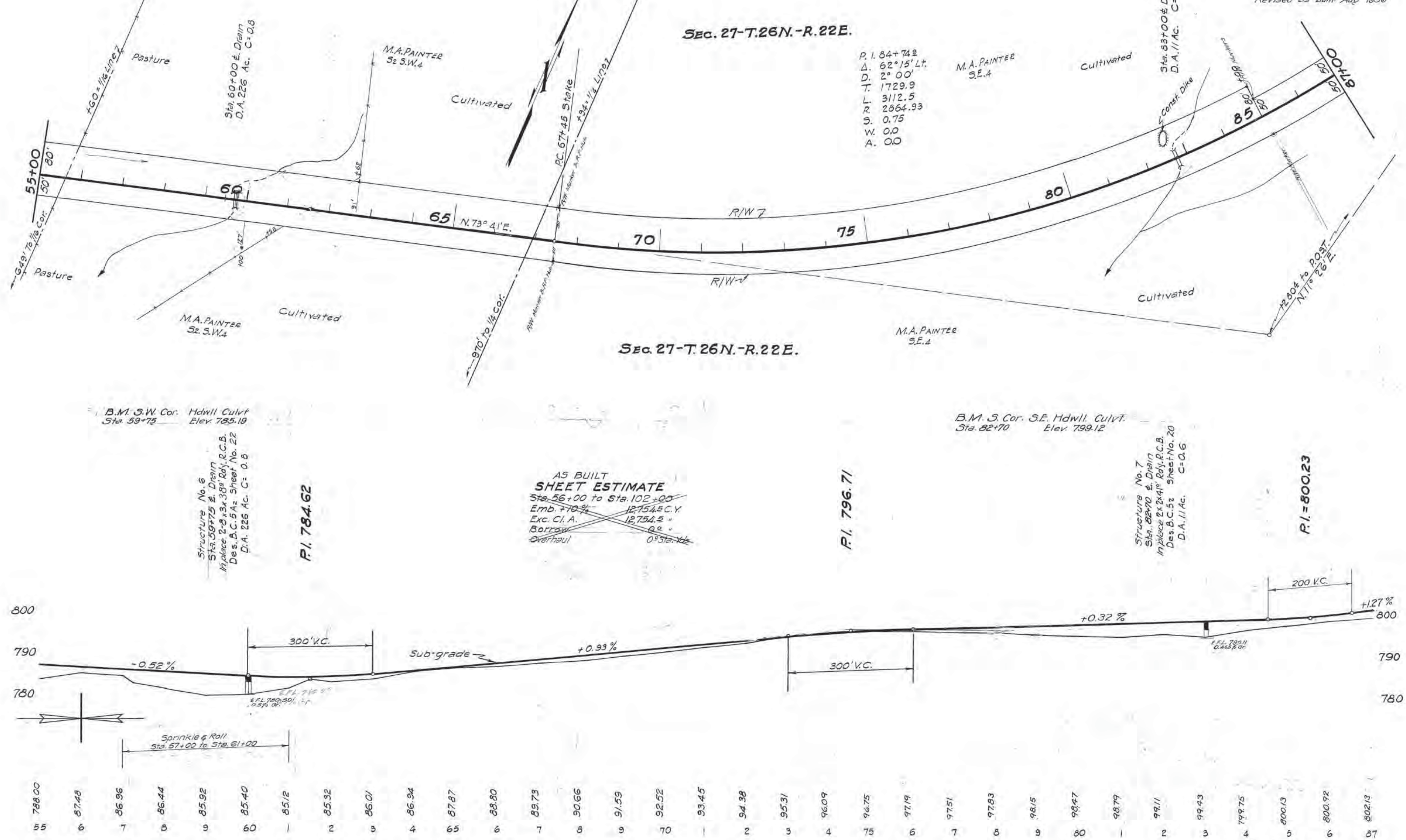
Emb. +	7496.6 C.Y.
Exc. Cl. A.	7496.6 "
Borrow	0.0 "
Over Haul	0.0 Sta. Yds.
Remove Pres. Slab	S.Y.

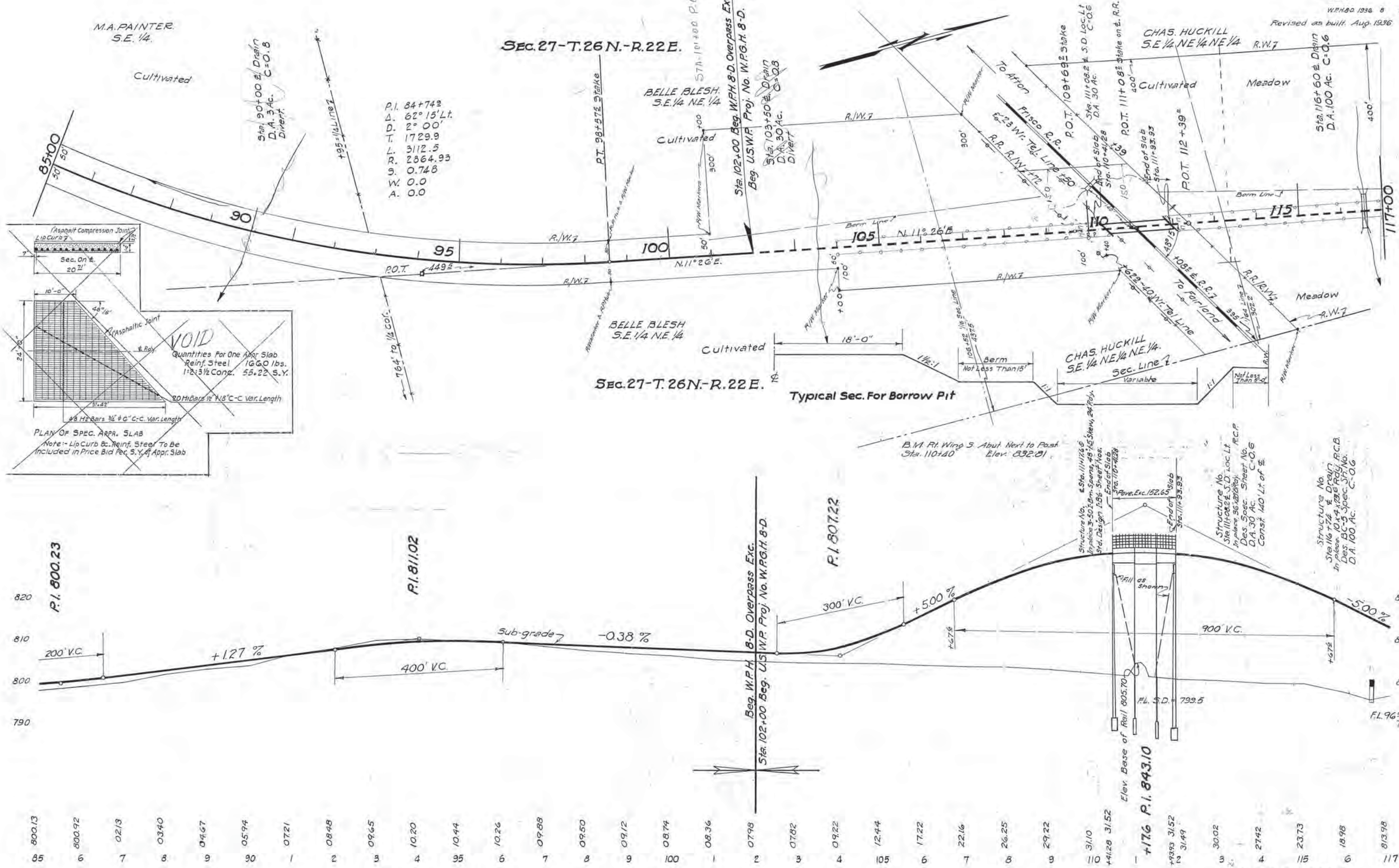
P.I. 783.00
P.I. 787.88
P.I. 793.20

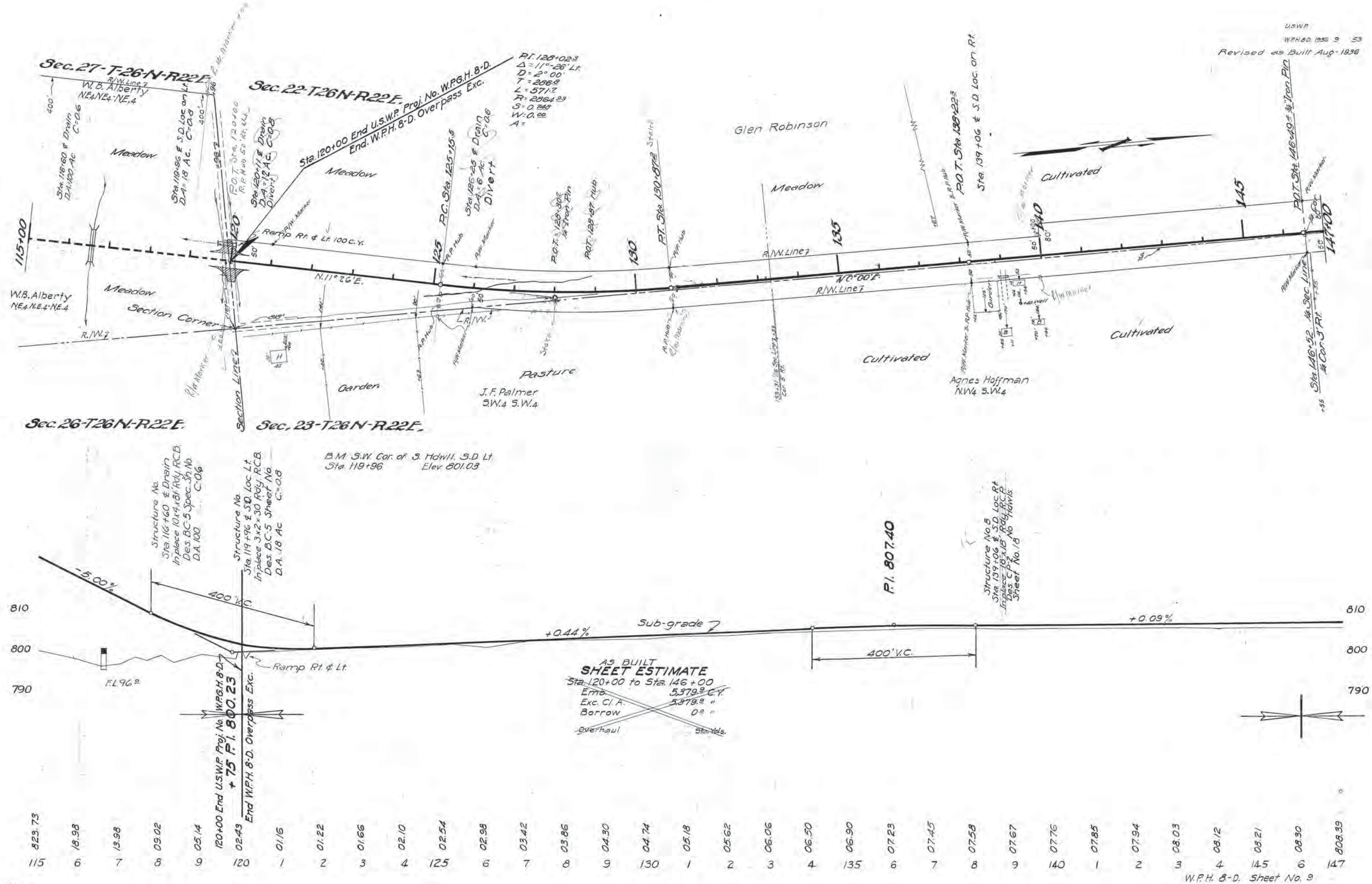
800
790
780

200' V.C.
300' V.C.
400' V.C.
0.0%
+1.22%
+0.38%
-0.52%
Sub-grade
℄ F.L. 87.36 10 ft. Gr.
℄ F.L. 87.68 1.52 ft. Gr.

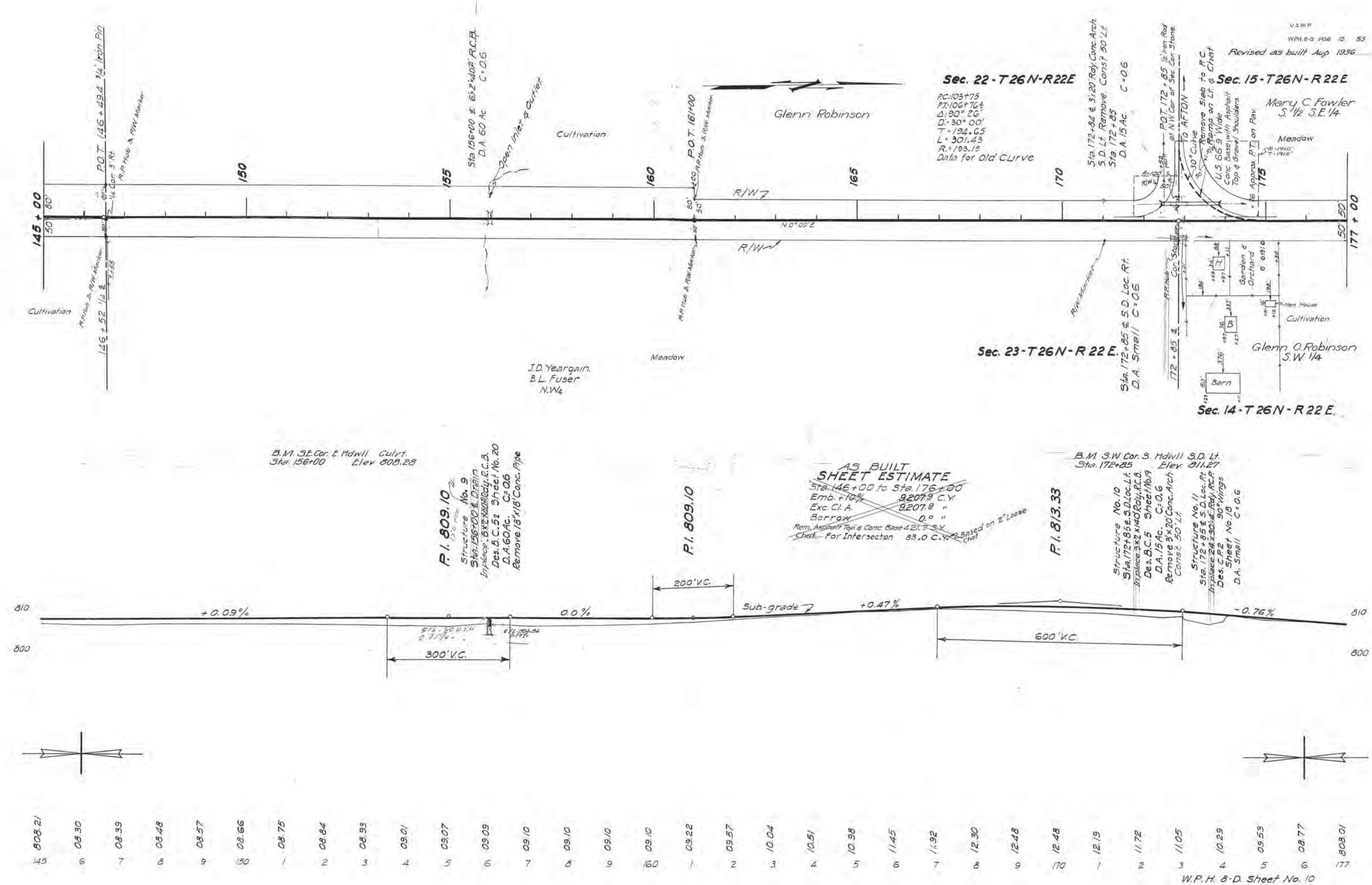
783.00	83.00	83.31	84.22	85.44	86.62	87.74	88.22	88.64	89.02	89.40	89.78	90.16	90.54	90.92	91.30	91.68	92.06	92.44	92.72	92.75	92.57	92.16	91.64	91.12	90.60	90.08	89.56	89.04	88.52	88.00	87.48	786.96
25	6	7	8	9	30	—	2	3	4	35	6	7	8	9	40	—	2	3	4	45	6	7	8	9	50	1	2	3	4	55	6	57


SEC. 27-T.26N.-R.22E.
P.I. 84+74.2
Δ. 62°15' Lt.
D. 2° 00'
T. 1729.9
L. 3112.5
R. 2864.93
S. 0.75
W. 0.0
A. 0.0
M.A. PAINTER S.E.4
Cultivated
Sta. 83+00 ℄ Drain D.A. 11 Ac. C=0.6
Const. Dike
87+00
85
80
75
70
65
60
55+00
N.73° 41'E.
R/W
PC. 67+45 Stake
+94 = 1/4 Line
M.A. PAINTER S2 S.W.4
Cultivated
Sta. 60+00 ℄ Drain D.A. 226 Ac. C=0.8
+60 = 1/16 Line
Pasture
649' To 1/16 Cor.
Pasture
M.A. PAINTER S2 S.W.4
Cultivated
970' to 1/4 Cor.
+2.80 to P.O.S.T. N.11° 26'E.
Cultivated
M.A. PAINTER S.E.4
SEC. 27-T.26N.-R.22E.
B.M. S.W. Cor. Hdwll Culvt Sta. 59+75 Elev. 785.19
B.M. S. Cor. S.E. Hdwll. Culvt. Sta. 82+70 Elev. 799.12
Structure No. 6 Sta. 59+75 ℄ Drain Inplace 2-8x3x38' Rdy. R.C.B. Des. B.C.5 A2 Sheet No. 22 D.A. 226 Ac. C=0.8
P.I. 784.62
AS BUILT
SHEET ESTIMATE
Sta. 56+00 to Sta. 102+00
Emb. +10% 12,754.5 C.Y.
Exc. Cl. A. 12,754.5
Borrow 0
Overhaul 0 Sta. Yds.
P.I. 796.71
Structure No. 7 Sta. 82+70 ℄ Drain Inplace 2x2x41' Rdy. R.C.B. Des. B.C.52 Sheet No. 20 D.A. 11 Ac. C=0.6
P.I. = 800.23
200 V.C.
+1.27 %
800
+0.32 %
790
780
-0.52 %
300' V.C.
Sub-grade
+0.93 %
300' V.C.
Sprinkle & Roll Sta. 57+00 to Sta. 61+00
788.00 87.48 86.96 86.44 85.92 85.40 85.12 85.32 86.01 86.94 87.87 88.80 89.73 90.66 91.59 92.52 93.45 94.38 95.31 96.09 96.75 97.19 97.51 97.83 98.15 98.47 98.79 99.11 99.43 799.75 800.13 800.92 802.13
55 6 7 8 9 60 1 2 3 4 65 6 7 8 9 70 1 2 3 4 75 6 7 8 9 80 1 2 3 4 5 6 87


M.A. PAINTER
S.E. 1/4.
Cultivated
SEC. 27-T.26 N.-R.22 E.
BELLE BLESH
S.E. 1/4 N.E. 1/4
CHAS. HUCKILL
S.E. 1/4 NE 1/4 NE 1/4
Meadow
P.I. 84+742
Δ. 62° 15' Lt.
D. 2° 00'
T. 1729.9
L. 3112.5
R. 2864.93
S. 0.748
W. 0.0
A. 0.0
Sta. 90+00 ℄ Drain D.A. 3 Ac. C=0.8 Divert.
P.T. 98+57± Stake
Sta. 102+00 Beg. W.P.H. 8-D. Overpass Exc.
Beg. U.S.W.P. Proj. No. W.P.G.H. 8-D.
Sta. 103+50 ℄ Drain D.A. 30 Ac. C=0.8 Divert.
To Afton
Frisco R.R.
P.O.T. 109+69± Stake
Sta. 111+08.2 ℄ S.D. Loc. Lt. D.A. 30 Ac. C=0.6
P.O.T. 111+08± Stake on ℄ R.R.
P.O.T. 112+39±
Sta. 116+60 ℄ Drain D.A. 100 Ac. C=0.6
N. 11° 26' E.
R/W.
Berm Line
To Fairland
Cultivated
SEC. 27-T. 26 N.-R. 22 E.
Typical Sec. For Borrow Pit
18'-0"
Berm Not Less Than 15'
Sec. Line
Variable
PLAN OF SPEC. APPR. SLAB
Note:- Lip Curb & Reinf. Steel To Be Included in Price Bid Per S.Y. of Appr. Slab
VOID
Quantities For One Appr. Slab
Reinf. Steel 1660 lbs.
1:2:3 1/2 Conc. 55.22 S.Y.
B.M. Rt. Wing S. Abut Next to Post
Sta. 110+40 Elev. 832.81
P.I. 800.23
P.I. 811.02
P.I. 807.22
200' V.C.
+1.27 %
400' V.C.
Sub-grade
-0.38 %
300' V.C.
+5.00 %
900' V.C.
-5.00 %
Elev. Base of Rail 805.70
F.L. S.D. 799.5
P.I. 843.10
F.L. 96.0
800.13 800.92 02.13 03.40 04.67 05.94 07.21 08.48 09.65 10.20 10.44 10.26 09.88 09.50 09.12 08.74 08.36 07.98 07.82 09.22 12.44 17.22 22.16 26.25 29.22 31.10 31.52 31.52 31.49 30.02 27.42 23.73 18.98 813.98
85 6 7 8 9 90 1 2 3 4 95 6 7 8 9 100 1 2 3 4 105 6 7 8 9 110 1 2 3 4 115 6 117

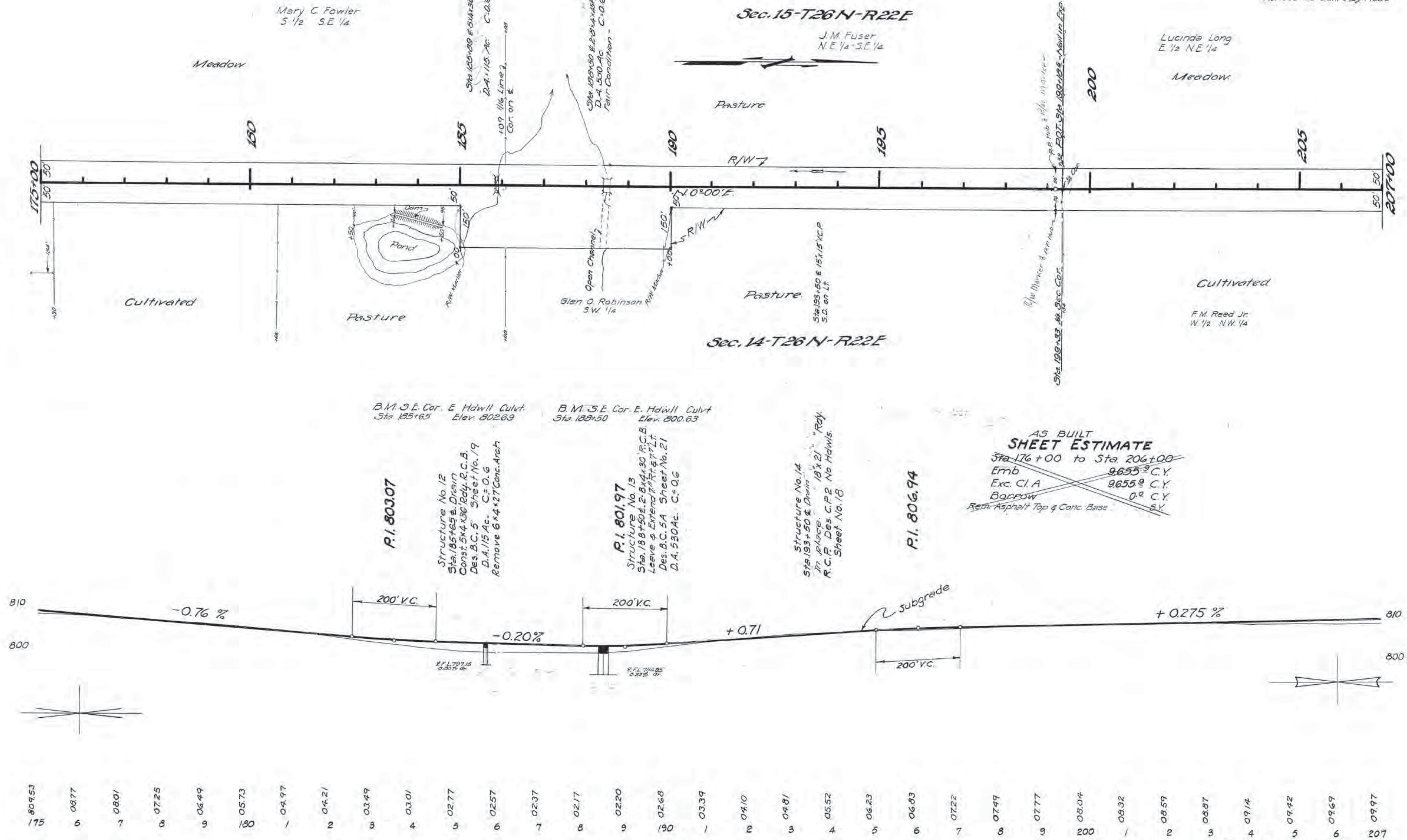


U.S.W.P.
W.P.H.8D. 1936 9 53
Revised as Built Aug-1936
Sec. 27-T-26-N-R22E.
Sec. 22-T26N-R22E.
Sec. 26-T26N-R22E.
Sec. 23-T26N-R22E.
W. B. Alberty
NE4 NE4 NE4
Sta. 120+00 End U.S.W.P. Proj. No. W.P.G.H. 8-D.
End W.P.H. 8-D. Overpass Exc.
P.I. 128+02.3
Δ = 11°-26' Lt.
D = 2° 00'
T = 286.9
L = 571.7
R = 2864.93
Glen Robinson
Meadow
Cultivated
Pasture
Garden
Section Corner
Section Line
R/W. Line
N. 11° 26' E.
N. 0° 00' E.
P.C. Sta. 125+15.5
P.T. Sta. 130+87.2
P.O.T. Sta. 139+22.3
P.O.T. Sta. 146+49 ¾" Iron Pin
Sta. 146+52 ¼ Sec. Line
Ramp Rt. & Lt. 100 C.Y.
J. F. Palmer
SW.4 S.W.4
Agnes Hoffman
N.W.4 S.W.4
115+00
120
125
130
135
140
145
147+00
B.M. S.W. Cor. of S. Hdwll. S.D. Lt.
Sta. 119+96 Elev. 801.03
Structure No.
Sta. 116+60 ℄ Drain
Inplace 10x4x81 Rdy. R.C.B.
Des. B.C.5 Spec. Sh. No.
D.A. 100 C=0.6
Structure No.
Sta. 119+96 ℄ S.D. Loc. Lt.
Inplace 3x2x30 Rdy. R.C.B.
Des. B.C.5 Sheet No.
D.A. 18 Ac C=0.8
P.I. 807.40
Structure No. 5
Sta. 139+06 ℄ S.D. Loc. Rt.
Inplace 18x18 Rdy. R.C.P.
Des. C.P.2 No Hdwls.
Sheet No. 18
-5.00%
400' V.C.
+0.44%
Sub-grade
+0.09%
400' V.C.
Ramp Rt. & Lt.
F.L. 96.0
120+00 End U.S.W.P. Proj. No. W.P.G.H. 8-D
+75 P.I. 800.23
End W.P.H. 8-D. Overpass Exc.
AS BUILT
SHEET ESTIMATE
Sta. 120+00 to Sta. 146+00
Emb. 5379.0 C.Y.
Exc. Cl. A. 5379.0 "
Borrow 0.0 "
Overhaul Sta. Yds.
810
800
790
823.73 18.98 13.98 09.02 05.14 02.43 01.16 01.22 01.66 02.10 02.54 02.98 03.42 03.86 04.30 04.74 05.18 05.62 06.06 06.50 06.90 07.23 07.45 07.58 07.67 07.76 07.85 07.94 08.03 08.12 08.21 08.30 808.39
115 6 7 8 9 120 1 2 3 4 125 6 7 8 9 130 1 2 3 4 135 6 7 8 9 140 1 2 3 4 145 6 147
W.P.H. 8-D. Sheet No. 9



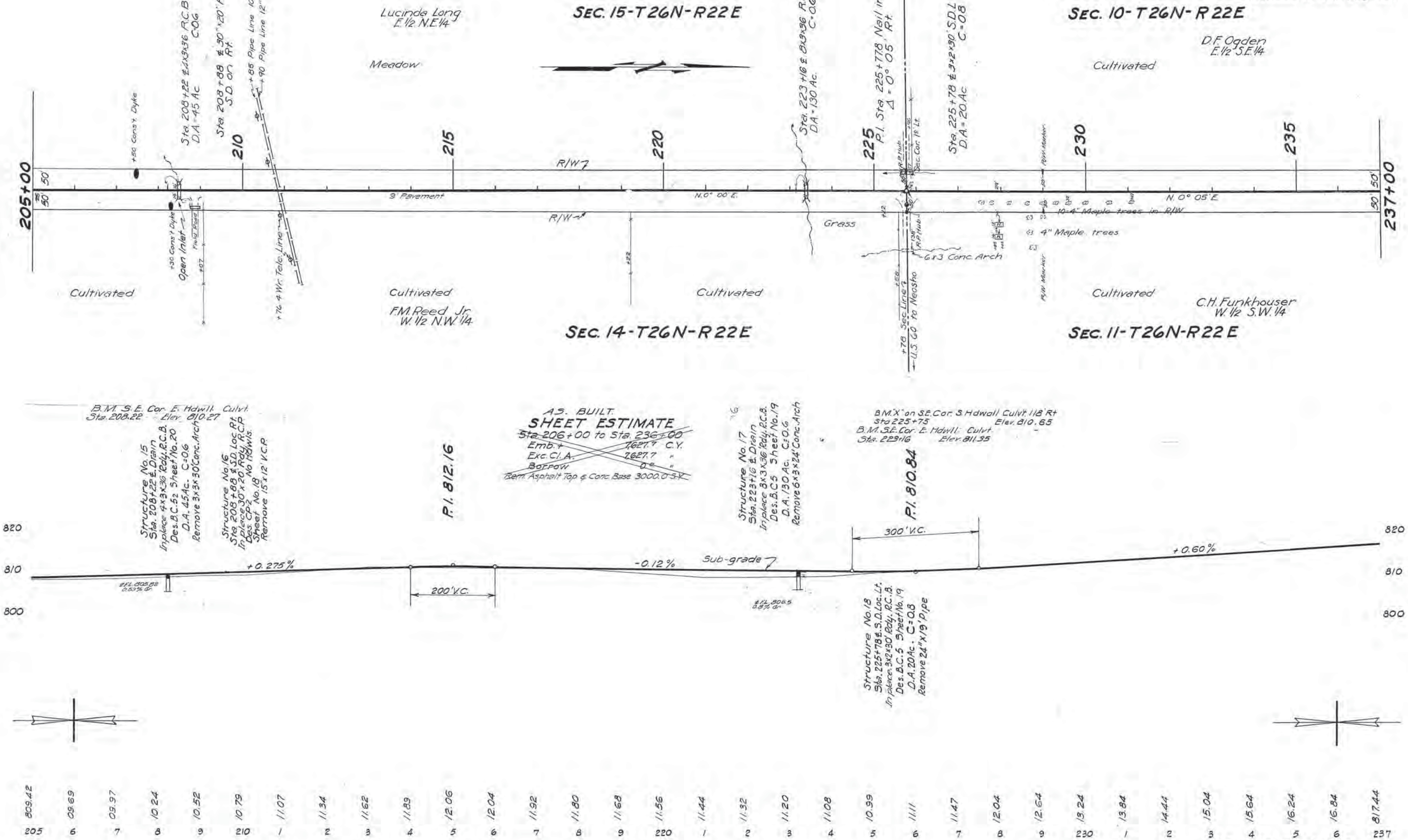
U.S.W.P.
WPH.8-D 1936 10 53
Revised as built Aug 1936
Sec. 22 - T 26 N - R 22 E
Sec. 15 - T 26 N - R 22 E
Sec. 23 - T 26 N - R 22 E.
Sec. 14 - T 26 N - R 22 E.
P.O.T. 146 + 49.4 3/4" Iron Pin
1/4 Cor. 3' Rt.
R.P. Hub & R/W Marker
146 + 52 1/4 ℄
Sta. 156+00 ℄ 6'x 2'x 40' R.C.B.
D.A. 60 Ac. C = 0.6
Open Inlet & Outlet
Cultivation
P.O.T. 161+00
R.P. Hub & R/W Marker
Glenn Robinson
P.C. 103+75
P.T. 106+76.4
Δ: 90° 26'
D: 30° 00'
T = 194.65
L = 301.43
R = 193.19
Data for Old Curve
Sta. 172 + 84 ℄ 3'x 20' Rdy. Conc. Arch
S.D. Lt. Remove. Const 50' Lt.
Sta. 172 + 85
D.A. 15 Ac. C = 0.6
P.O.T. 172 + 85 1/2" Iron Rod at N.W. Cor. of Sec. Cor. Stone
To AFTON
30° Curve
Remove Slab to P.C.
Remain on Lt. & Chat
U.S. 66 9' Wide Conc. Base with Asphalt Top & Gravel Shoulders
16 Approx. P.T. on Pav.
Mary C. Fowler
S. 1/2 S.E. 1/4
Meadow
R/W
N 0° 00' E
R/W Marker
Sta. 172 + 85 ℄ S.D. Loc. Rt.
D.A. Small C = 0.6
172 + 85 ℄
Cor. Stone
Garden & Orchard
Hen House
Cultivation
Glenn O. Robinson
S.W. 1/4
Barn
J.D. Yeargain.
B.L. Fuser
N.W.4
Meadow
145 + 00
177 + 00
150
155
160
165
170
175
B.M. S.E. Cor. E. Hdwll Culvt.
Sta. 156+00 Elev. 808.28
P.I. 809.10
Structure No. 9
Sta. 156+00 ℄ Drain
Inplace: 6'x 2'x 40' Rdy. R.C.B.
Des. B.C. 52 Sheet No. 20
D.A. 60 Ac. C = 0.6
Remove 18"x 18' Conc. Pipe
P.I. 809.10
AS BUILT
SHEET ESTIMATE
Sta. 146 + 00 to Sta. 176 + 00
Emb. + 10% 9207.9 C.Y.
Exc. Cl. A. 9207.9 "
Borrow 0.0 "
Rem. Asphalt Top & Conc. Base 421.7 S.Y.
Chat For Intersection 83.0 C.Y. Based on 2" Loose Chat
P.I. 813.33
B.M. S.W. Cor. S. Hdwll S.D. Lt.
Sta. 172+85 Elev. 811.27
Structure No. 10
Sta. 172+85 ℄ S.D. Loc. Lt.
Inplace 3'x 20' x 40' Rdy. R.C.B.
Des. B.C. 5 Sheet No. 19
D.A. 15 Ac. C = 0.6
Remove 3'x 20' Conc. Arch
Const. 50' Lt.
Structure No. 11
Sta. 172 + 85 ℄ S.D. Loc. Rt.
Inplace 2'x 30' Rdy. R.C.P.
Des. C.P. 2 90° Wings
Sheet No. 18
D.A. Small C = 0.6
200' V.C.
Sub-grade
+0.09%
0.0%
+0.47%
-0.76%
300' V.C.
600' V.C.
810
800
808.21 08.30 08.39 08.48 08.57 08.66 08.75 08.84 08.93 09.01 09.07 09.09 09.10 09.10 09.10 09.10 09.22 09.57 10.04 10.51 10.98 11.45 11.92 12.30 12.48 12.48 12.19 11.72 11.05 10.29 09.53 08.77 808.01
145 6 7 8 9 150 1 2 3 4 5 6 7 8 9 160 1 2 3 4 5 6 7 8 9 170 1 2 3 4 5 6 177
W.P.H. 8-D. Sheet No. 10

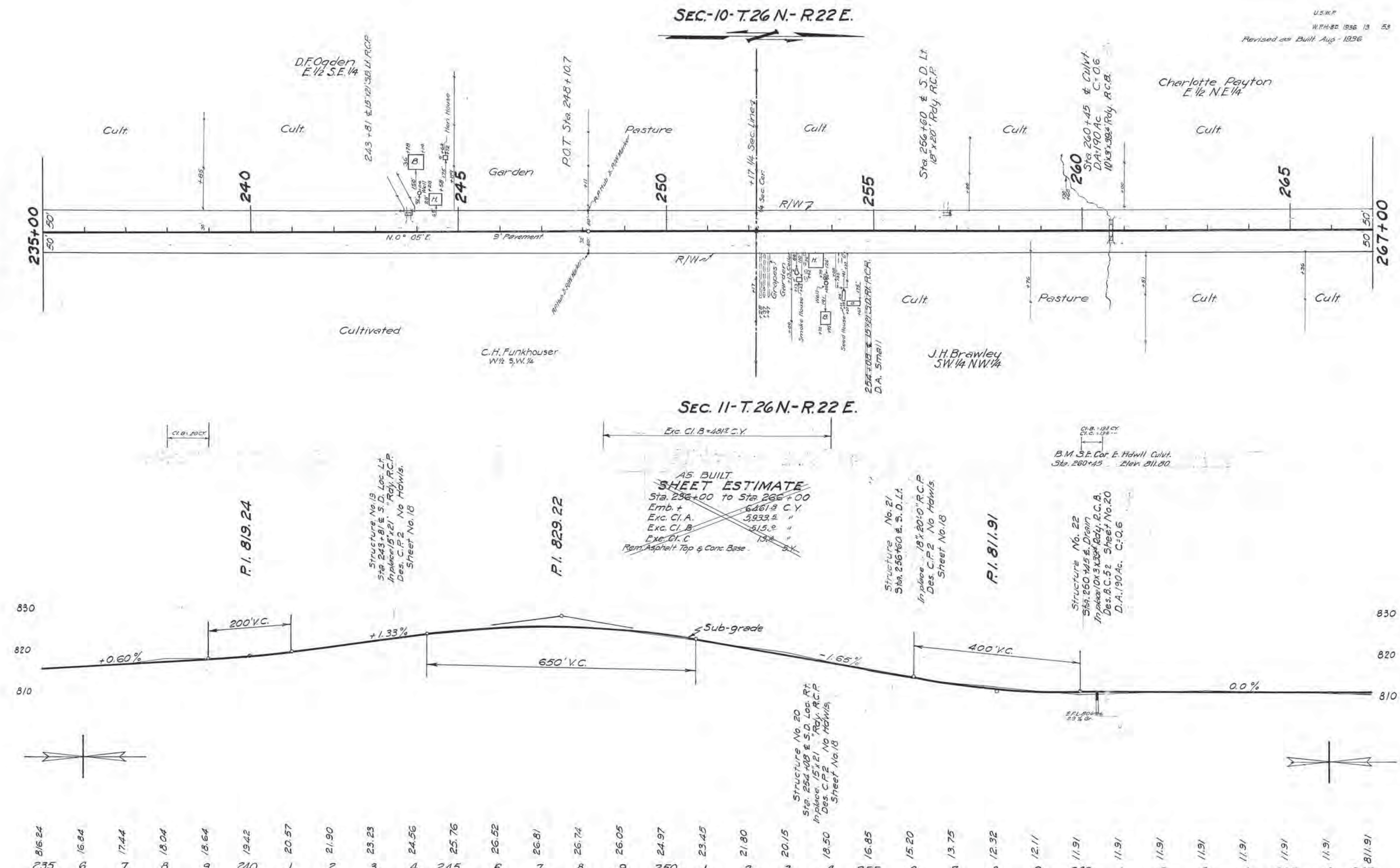
U.S.W.P.
W.P.H.8-D 1936 11 53
Revised as Built Aug. 1936



W.P.H. 8-D. Sheet No 11

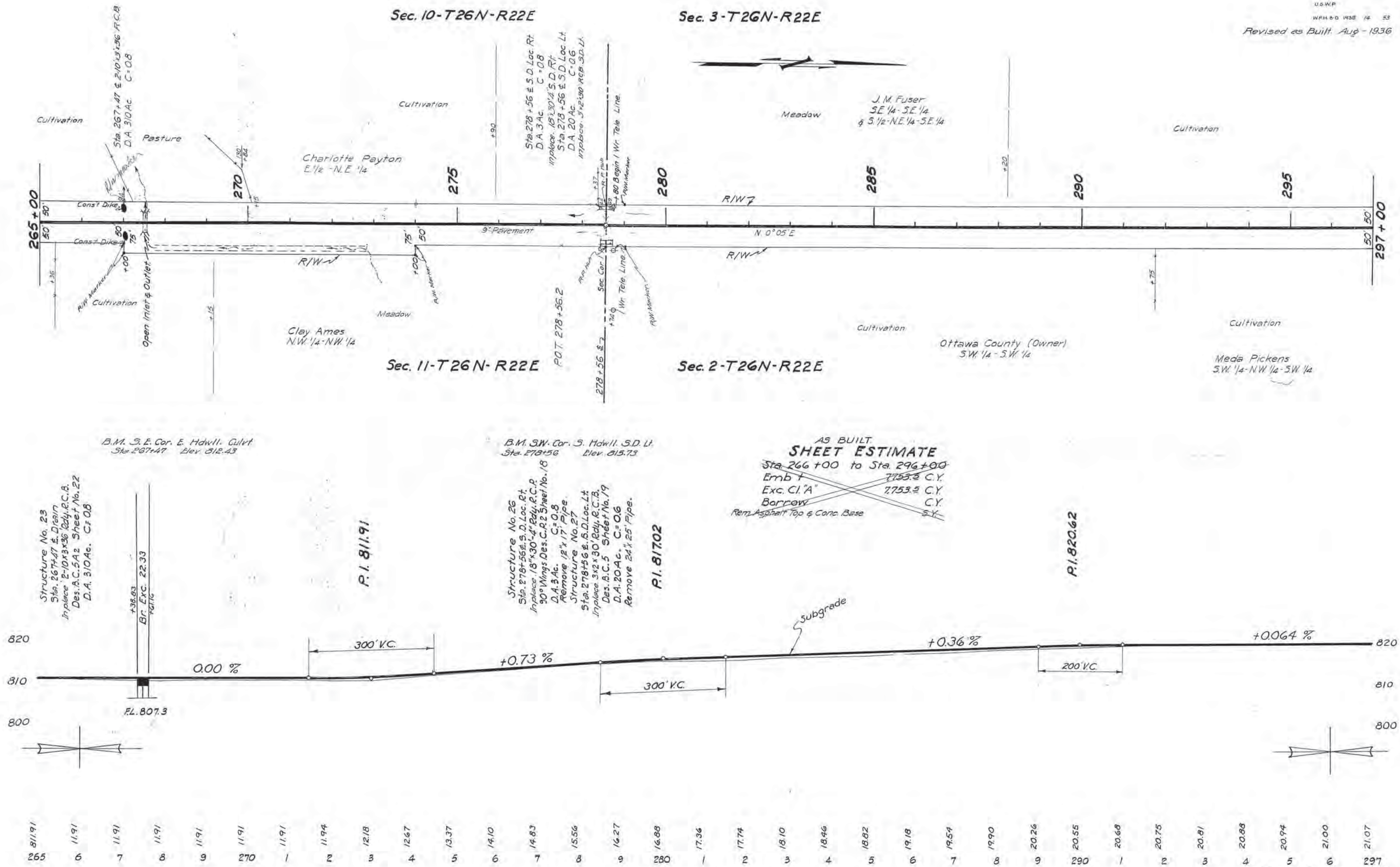
Revised as Built Aug- 1936

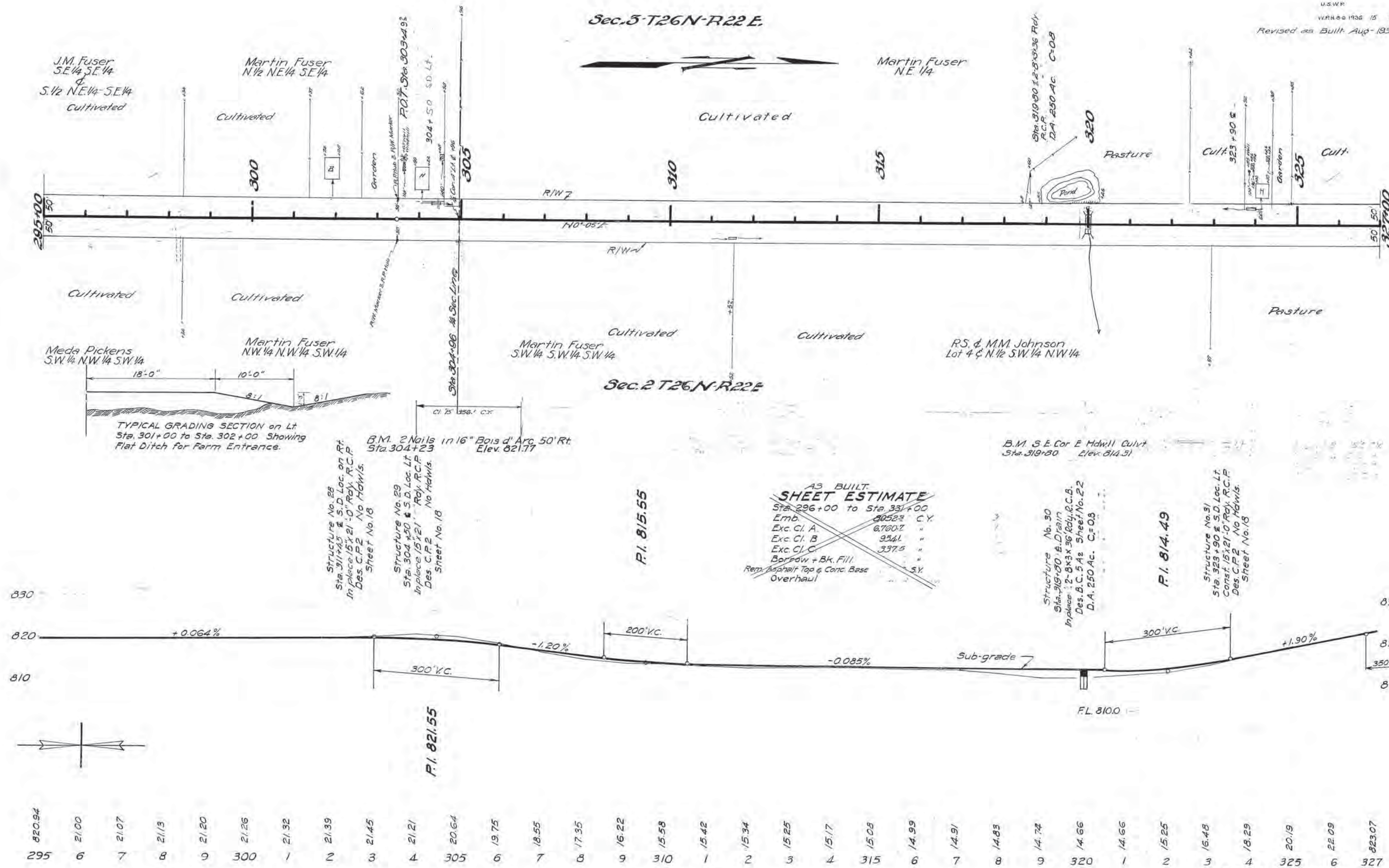




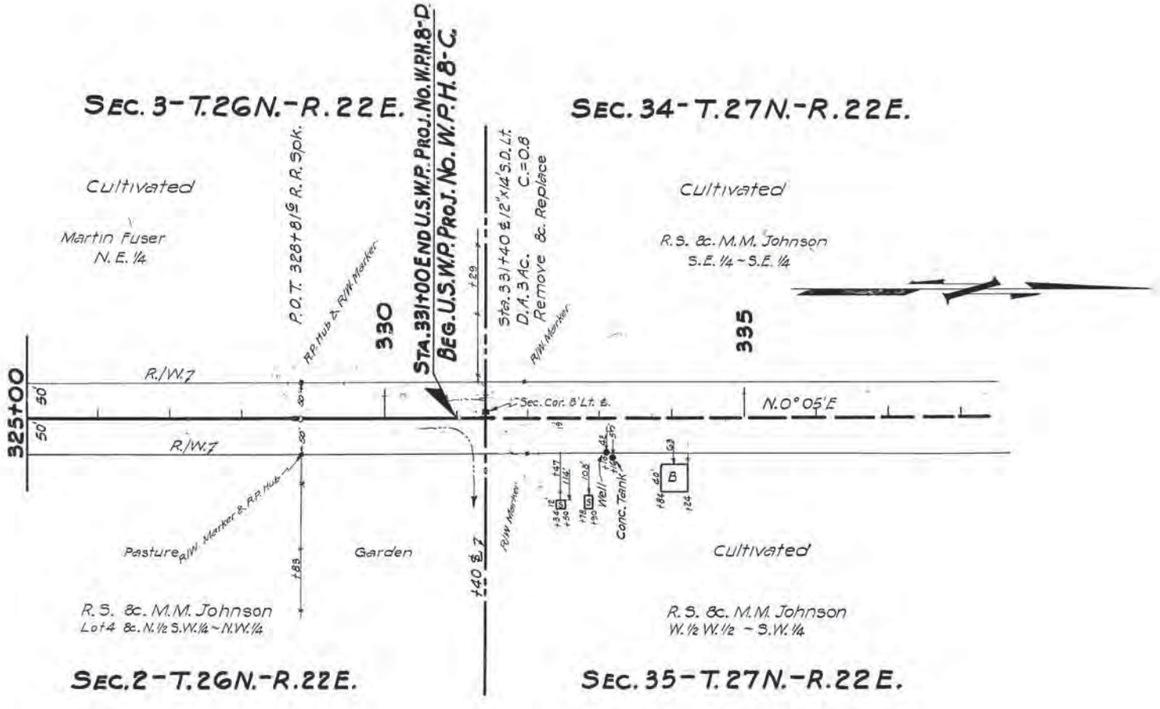
W.P.H. 8-D. Sheet No. 13

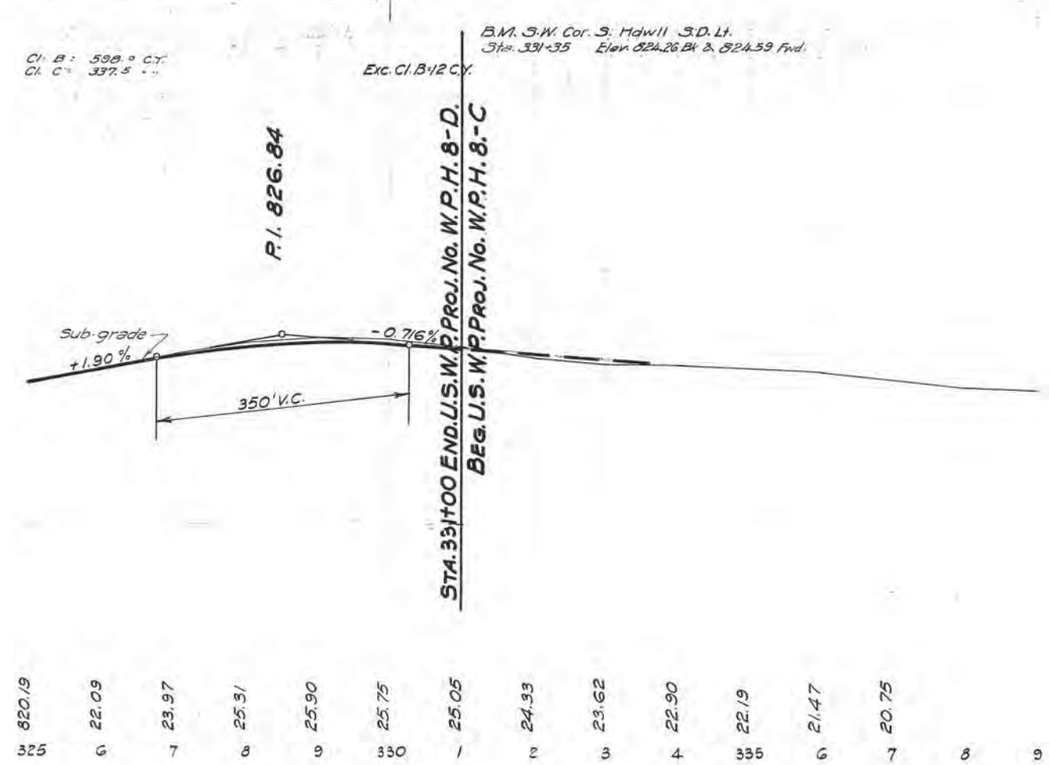
U.S.W.P.
W.P.H. 8-D 1935 14 53
Revised as Built Aug - 1936




Sec. 3-T26N-R22E.
J.M. Fuser
S.E.1/4 S.E.1/4
&
S.1/2 N.E.1/4-S.E.1/4
Cultivated
Martin Fuser
N.1/2 NE1/4 S.E.1/4
Cultivated
Garden
P.O.T. Sta. 303+49.2
304+50 S.D. Lt.
Martin Fuser
N.E.1/4
Cultivated
Sta. 319+80 1-2-8'x3'x36' Rdy. R.C.B. D.A. 250 Ac. C=0.8
Pasture
Pond
Cult.
323+90 ¢
Garden
Cult.
295+00
300
305
310
315
320
325
327+00
R/W
N0°-05'E.
R/W
Cultivated
Cultivated
Sta. 304+96 1/4 Sec. Line
Cultivated
Cultivated
Pasture
Meda Pickens
S.W.1/4 N.W.1/4 S.W.1/4
Martin Fuser
N.W.1/4 N.W.1/4 S.W.1/4
Martin Fuser
S.W.1/4 S.W.1/4 S.W.1/4
R.S. & M.M. Johnson
Lot 4 & N.1/2 S.W.1/4 N.W.1/4
Sec. 2 T26N-R22E
18'-0"
10'-0"
8:1
8:1
TYPICAL GRADING SECTION on Lt.
Sta. 301+00 to Sta. 302+00 Showing
Flat Ditch for Farm Entrance.
Cl. "B" 358.1 C.Y.
B.M. 2 Nails in 16" Bois d'Arc 50' Rt.
Sta. 304+23 Elev. 821.77
B.M. S.E. Cor E Hdwll Culvt
Sta. 319+80 Elev. 814.31
Structure No. 28
Sta. 311+45 ¢ S.D. Loc. on Rt.
Inplace 15"x21'-0" Rdy. R.C.P.
Des. C.P.2 No Hdwls.
Sheet No. 18
Structure No. 29
Sta. 304+50 ¢ S.D. Loc. Lt.
Inplace 15"x21' Rdy. R.C.P.
Des. C.P.2 No Hdwls.
Sheet No. 18
P.I. 815.55
AS BUILT
SHEET ESTIMATE
Sta. 296+00 to Sta. 331+00
Emb. 8052.3 C.Y.
Exc. Cl. A. 6760.7 "
Exc. Cl. B 954.1 "
Exc. Cl. C 337.5 "
Borrow + Bk. Fill "
Rem. Asphalt Top & Conc. Base S.Y.
Overhaul
Structure No. 30
Sta. 319+80 ¢ Drain
Inplace 1-2-8'x3'x36' Rdy. R.C.B.
Des. B.C. 5 Ae Sheet No. 22
D.A. 250 Ac. C=0.8
P.I. 814.49
Structure No. 31
Sta. 323+90 ¢ S.D. Loc. Lt.
Const. 15"x21'-0" Rdy. R.C.P.
Des. C.P.2 No Hdwls.
Sheet No. 18
830
820
810
+0.064%
300' V.C.
-1.20%
200' V.C.
-0.085%
Sub-grade
300' V.C.
+1.90%
350' V.C.
F.L. 810.0
P.I. 821.55
820.94
21.00
21.07
21.13
21.20
21.26
21.32
21.39
21.45
21.21
20.64
19.75
18.55
17.35
16.22
15.58
15.42
15.34
15.25
15.17
15.08
14.99
14.91
14.83
14.74
14.66
14.66
15.25
16.48
18.29
20.19
22.09
823.07
295
6
7
8
9
300
1
2
3
4
305
6
7
8
9
310
1
2
3
4
315
6
7
8
9
320
1
2
3
4
325
6
327

U.S.W.P.
W.P.H. 8-D 1936 16 58
Revised as Built Aug- 1936

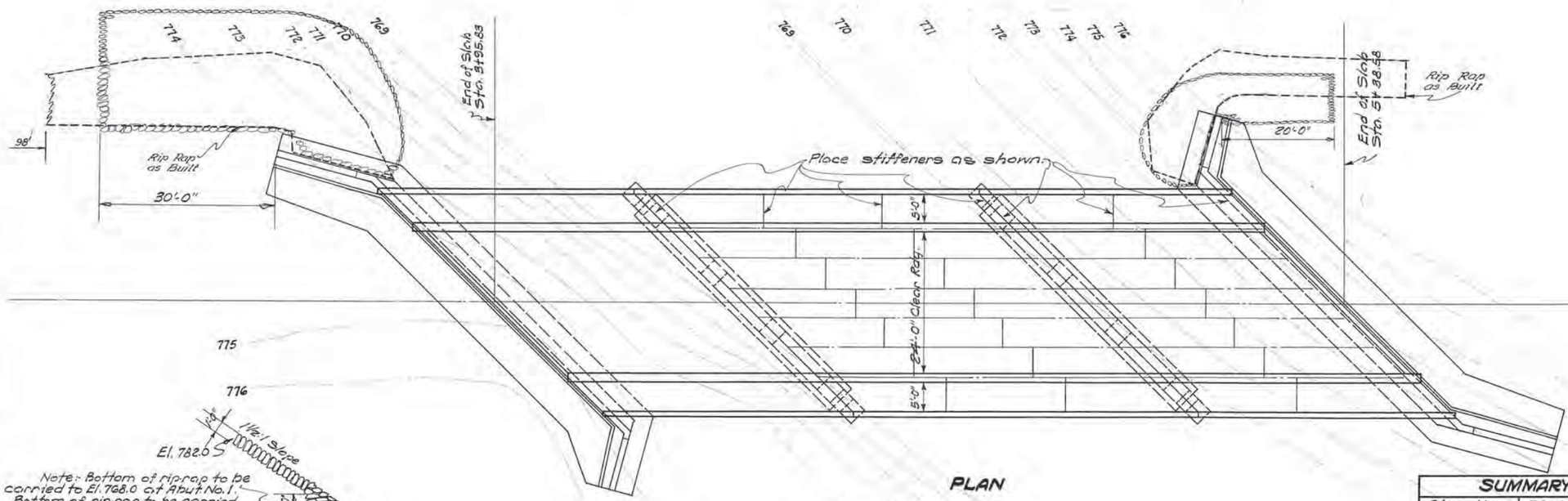




W.P.H. 8-D. Sheet No. 16

U.S.W.P.H. PROJ. NO. W.P.H. 8 D Br. 1936 24 58

95



PLAN

Note:- Bottom of rip-rap to be carried to El. 768.0 at Abut. No. 1. Bottom of rip-rap to be carried 2'-0" below natural ground line at Abut. No. 2

SECTION THROUGH RIPRAP

The bridge contractor shall dig trench and riprap as shown to Elev. 782.0 Riprap will be paid for at the unit price per sq. yd. of surface regardless of thickness.

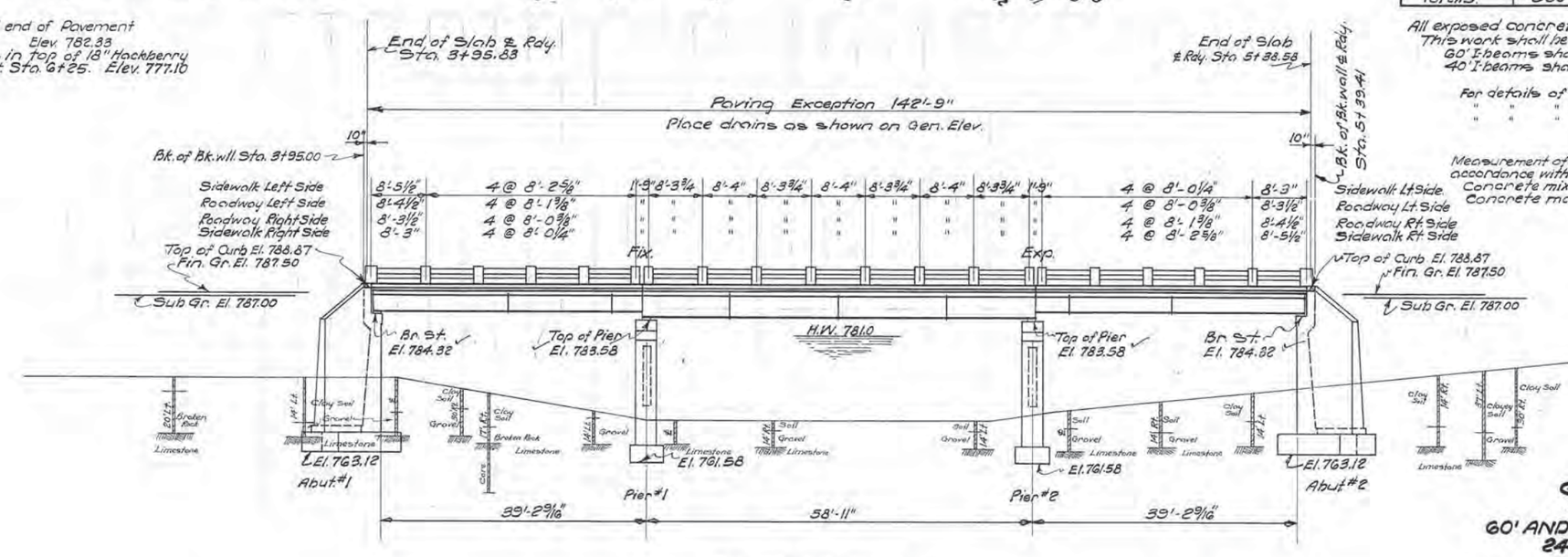
SUMMARY OF QUANTITIES							
Item Nos.	74.07	75.55a	81.26a	81.26d	83.05	102.04	
Location	Reinf. Conc. Hand Rail Lin. Ft.	Struct. Steel - Lbs.	Concrete:- Cu. Yds. Class A	Class AA	Reinf. Steel Lbs.	Laid-Up Rip-Rap Sq. Yds.	
Abutments			519.8		30,620	~~200~~	
Piers		142,077	~~153.2~~		13,380		
Superstructure	580	~~148,000~~	151.05	144.3	19,360		
Totals.	580 ✓	~~148,000~~ 142,077	~~673.0~~ 670.85	144.3 ✓	63,360 ✓	~~200~~ 375	

All exposed concrete surfaces are to have a carborundum finish.
This work shall be constructed according to Okla. Std. Spec. of 1932.
60' I-beams shall be rolled with 1¼" camber.
40' I-beams shall be rolled with ¾" camber.

For details of Superstructure see Std. IB-G, Sht. No. 28 & Sht. No. 27.
" " " Abutments see Sht. No. 25.
" " " Piers see Sht. No. 26.

Measurement of fine and coarse aggregate shall be by weight in accordance with the second & third paragraphs of Section No. 81.07 Concrete mixer shall comply with the requirements of Sec. No. 81.08 Concrete materials shall be handled as specified in Sec. No. 82.20

B.M. Center of end of Pavement
Sta. 0+00 Elev. 782.33
B.M. 2 spikes in top of 18" Hackberry stump 65' Rt. Sta. 6+25. Elev. 777.10



GENERAL ELEVATION
Scale 1" = 10'-0"

REVISED AS BUILT

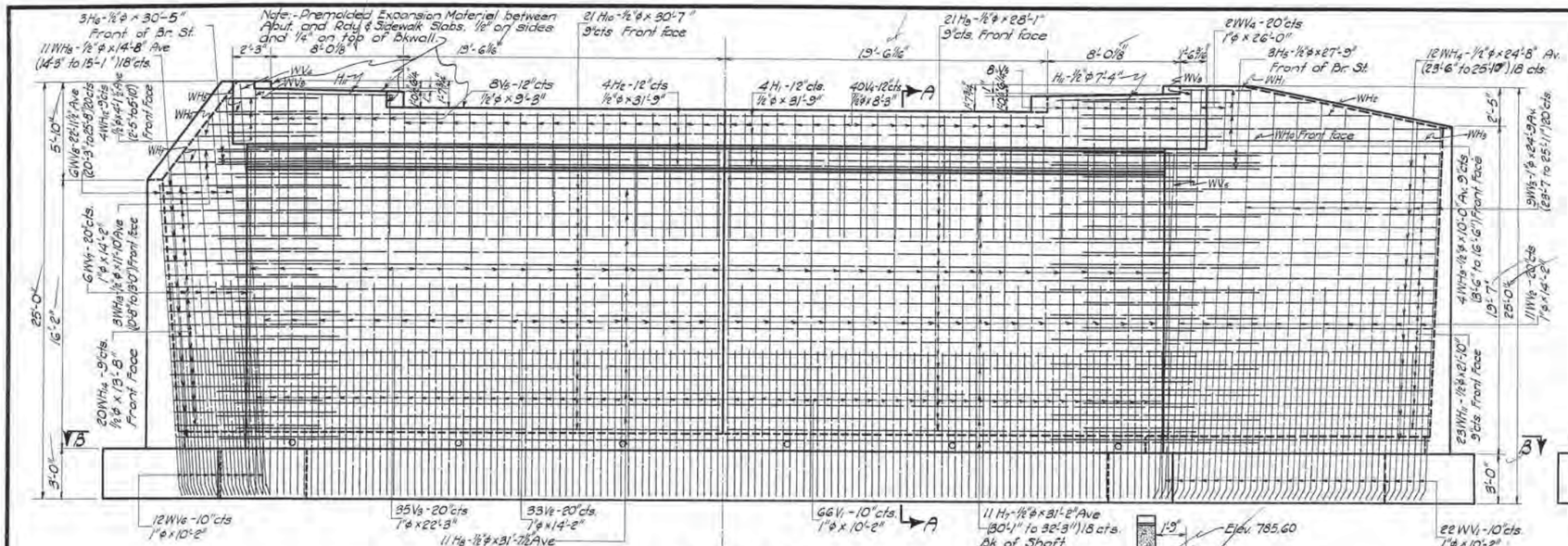
HORSE CREEK
GENERAL ELEVATION AND PLAN
SUMMARY OF QUANTITIES
60' AND 2-40' I-BM. SPANS WITH 2-5'-0" SIDEWALKS
24'-0" ROADWAY 45° SKEW RT. FWD.
℄ STA. 4 + 67.21
U.S.W.P.H. PROJ. NO. W.P.H. 8 SEC. "D-BR."

Drawn by G.M.
Checked by J.L.F
Soundings by Hedrick
5-1935

Layout Cochran Blackford 4-35

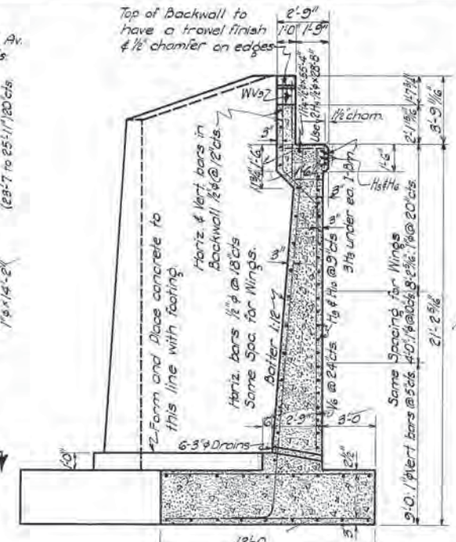
24

FED. ROAD DIST. NO.	STATE	U.S.W.P.H. PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
6	OKLA	W.P.H. 8 D.B.R.	1936	25	53

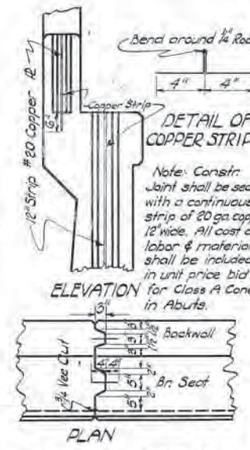


FRONT ELEVATION

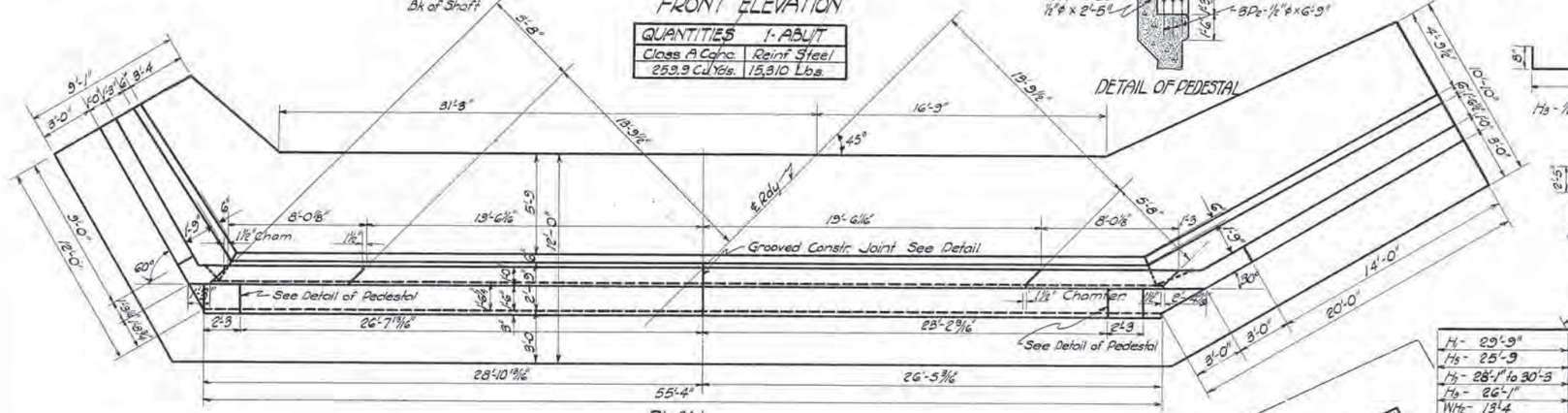
QUANTITIES	1 ABUT
Class A Conc.	Reinf Steel
259.9 Cu Yds.	15,310 Lbs.

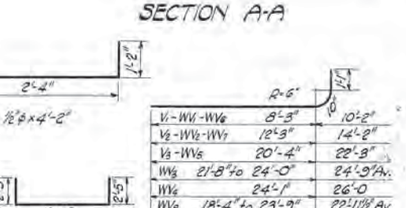


SECTION A-A

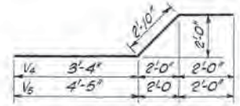


DETAIL OF GROOVED CONSTRUCTION JOINT





V1 - W1 - W6	8'-3"	R-6"	10'-2"
V2 - W2 - W7	12'-3"		14'-2"
V3 - W5	20'-4"		22'-3"
W4	21'-8" to 24'-0"		24'-9" Av.
W4	24'-1"		26'-0
W8	18'-4" to 23'-3"		22'-11½" Av.



V4 - ½"ø x 8'-2"
V5 - ½"ø x 9'-3"

SECTION B-B

Note: Concrete in the footings of abutments shall be poured against the rock foundation. The quantity of Class A Conc. in the abutment footings paid for shall be the amount within the neat lines of the concrete as shown on the plans.

BAR LIST - 1 ABUT				
Mark	No	Size	Form	Length
F1	232	½"ø	Str	11'-8
F2	36	"	"	29'-11"
WF1	82	"	"	10'-7"
WF2	16	"	"	20'-4"
WF3	30	"	"	8'-10"
WF4	24	"	"	5'-0"
WF5	8	"	"	13'-4"
WF6	6	"	"	7'-2"
V1	66	1" ø	Bnt	10'-2
V2	33	"	"	14'-2"
V3	85	"	"	22'-3
V4	40	½"ø	"	8'-2"
V5	16	"	"	9'-3
WV1	22	1" ø	"	10'-2"
WV2	11	"	"	14'-2"
WV3	9	"	"	24'-9" Av.
WV4	9	"	"	26'-0"
WV5	1	"	"	22'-3"
WV6	12	"	"	10'-2"
WV7	6	"	"	14'-2"
WV8	6	"	"	22'-11½" Av.
WV9	2	½"ø	Str	5'-7"
H1	4	½"ø	Bnt	31'-9"
H2	4	"	"	31'-9"
H3	18	"	"	4'-2"
H4	2	"	Str	28'-8"
H5	8	"	Bnt	27'-9"
H6	8	"	"	30'-5"
H7	11	"	"	31'-8" Av.
H8	11	"	"	31'-7⅞" Av.
H9	21	"	"	28'-1"
H10	21	"	"	30'-6"
WH1	1	"	Str	4'-6"
WH2	1	"	Bnt	15'-4
WH3	1	"	"	20'-2"
WH4	12	"	"	24'-8" Av.
WH5	1	"	"	5'-11"
WH6	1	"	"	8'-3"
WH7	1	"	"	12'-5"
WH8	11	"	"	14'-8" Av.
WH9	4	"	Str	10'-0" Av.
WH10	1	"	"	13'-10"
WH11	23	"	Bnt	21'-10"
WH12	4	"	Str	4'-1⅞" Av.
WH13	3	"	Bnt	11'-0" Av.
WH14	20	"	"	13'-8"
H11	2	"	Str	7'-4"
WV10	7	"	"	13'-8½" Av.
WV11	2	"	"	20'-8"
WV12	5	"	"	17'-7" Av.
V6	31	"	"	16'-11"
P1	8	"	"	2'-5"
P2	6	"	Bnt	6'-9"

Built as Designed - Checked August 6, 1936

HORSE CREEK

DETAILS OF ABUTMENTS

60' & 2-40' I-BM SPANS WITH 2-5'-0" SIDWALKS

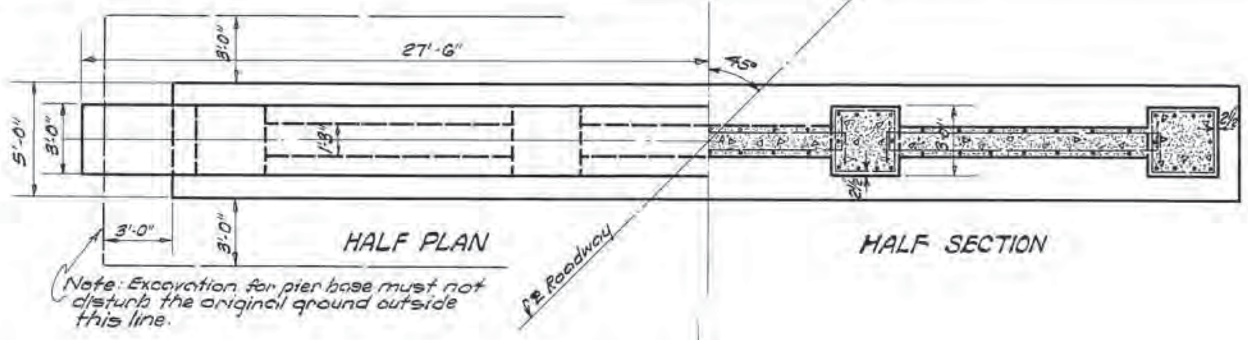
24' ROADWAY 45° SKEW RT. FWD.

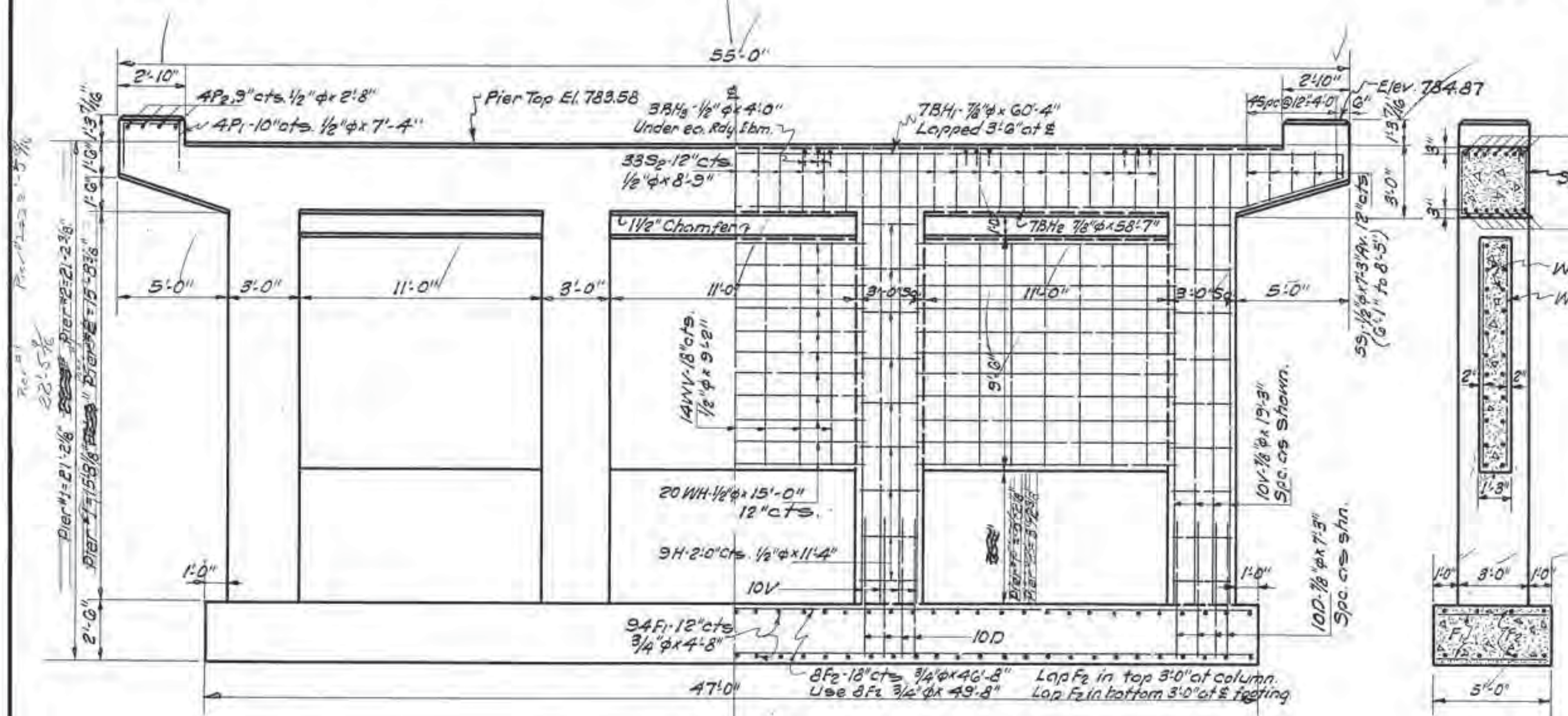
℄ STA. 4+67.21

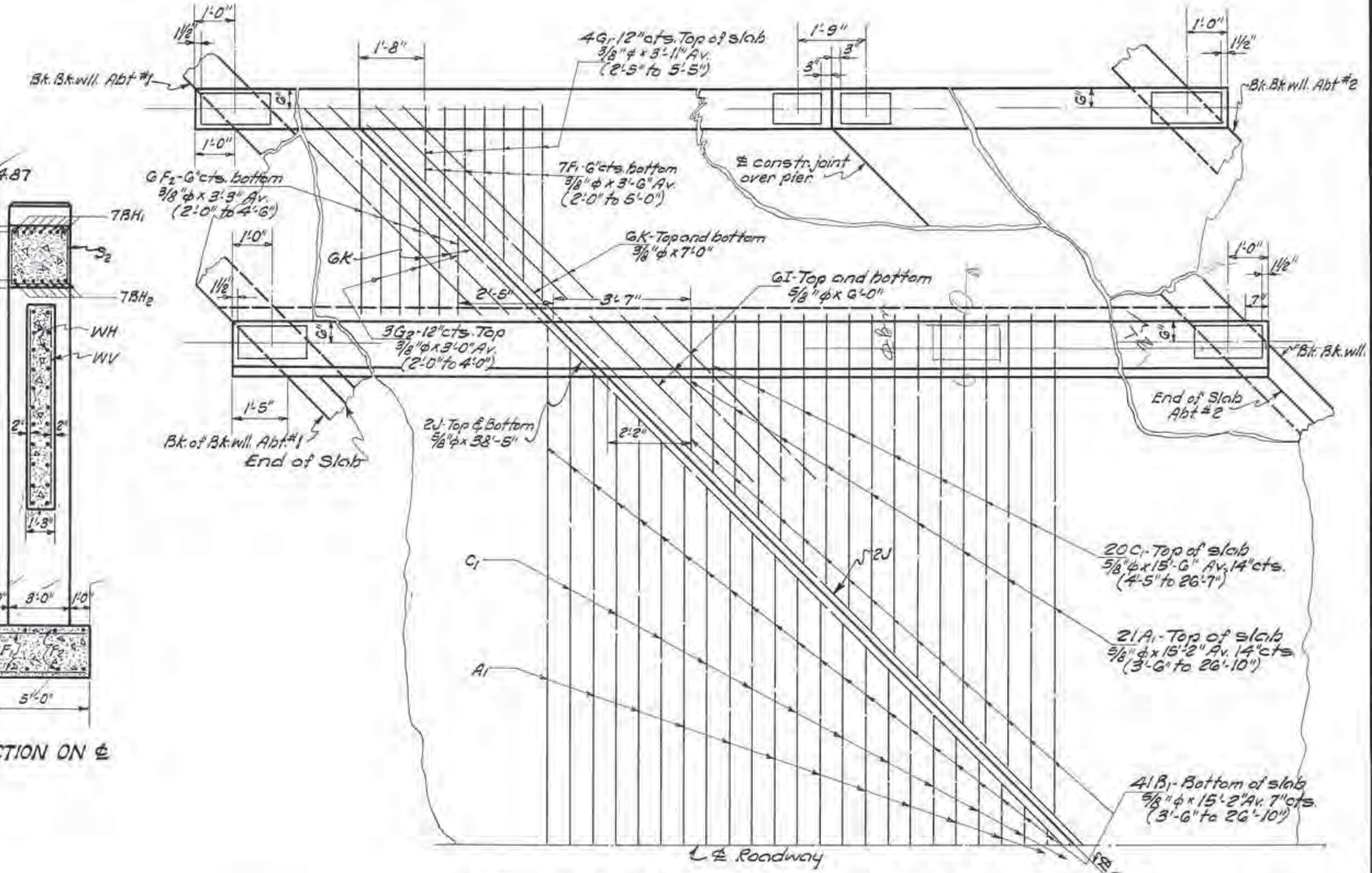
U.S.W.P.H. PROJ. NO. W.P.H. 8 SEC. (D) B.R.

Drawn by Forbis May 1935
Traced by Blackford May 1935
Checked by Zwick

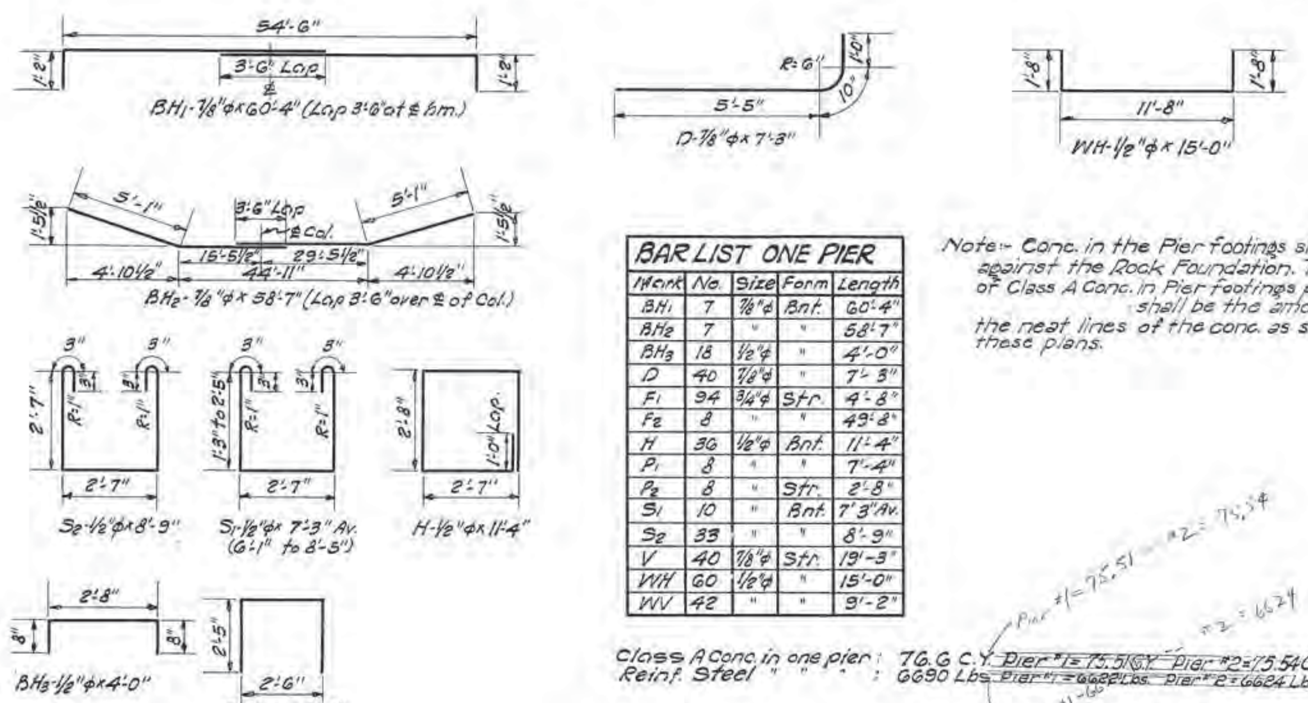
FED. ROAD DIST. NO.	STATE	U.S.W.P.H. PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
6	Okla.	W.P.H. 8 (D) BR.	1936	26	53







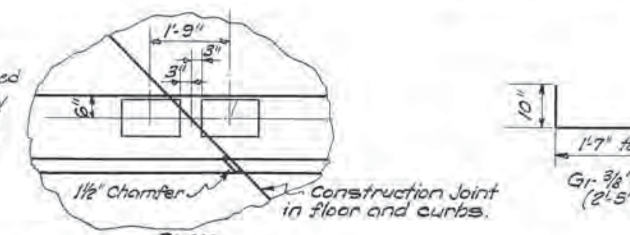
DETAIL OF CURB AND SPECIAL ROADWAY STEEL



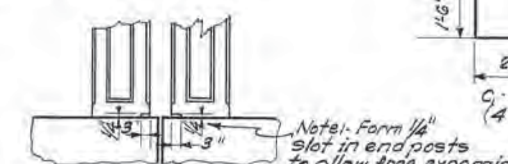
BAR LIST ONE PIER				
Mark	No.	Size	Form	Length
BH1	7	7/8"φ	Bnt.	60'-4"
BH2	7	"	"	58'-7"
BH3	18	1/2"φ	"	4'-0"
D	40	7/8"φ	"	7'-3"
F1	94	3/4"φ	Str.	4'-8"
F2	8	"	"	49'-8"
H	36	1/2"φ	Bnt.	11'-4"
P1	8	"	"	7'-4"
P2	8	"	Str.	2'-8"
S1	10	"	Bnt.	7' 3" Av.
S2	33	"	"	8'-9"
V	40	7/8"φ	Str.	19'-3"
WH	60	1/2"φ	"	15'-0"
WV	42	"	"	9'-2"

Class A Conc. in one pier : 76.6 C.Y. ~~Pier #1 = 75.51 C.Y. Pier #2 = 75.54 C.Y.~~
Reinf. Steel " " " : 6690 Lbs. ~~Pier #1 = 6682 Lbs. Pier #2 = 6624 Lbs.~~

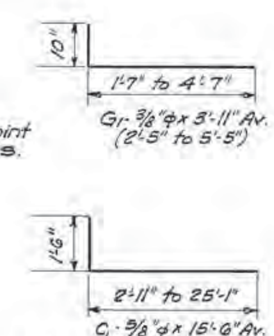
Note:- Conc. in the Pier footings shall be poured against the Rock Foundation. The quantity of Class A Conc. in Pier footings paid for shall be the amount within the neat lines of the conc. as shown on these plans.



PLAN
RDY. CURB OVER PIER



ELEVATION
RDY. CURB OVER PIER

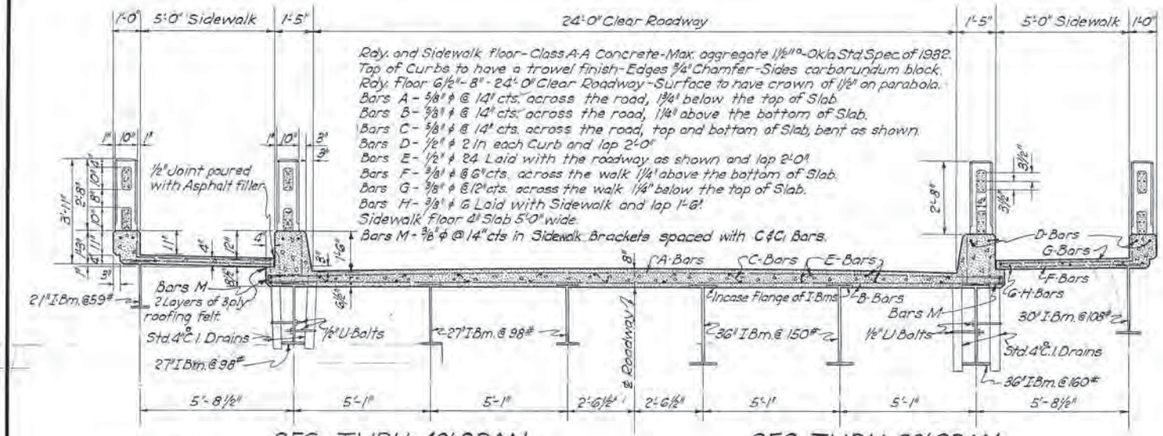


~~Revised as Built August 6, 1936~~

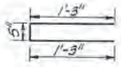
HORSE CREEK
DETAILS OF PIER AND RDY. STEEL
60' & 2-40' I-BM. SPANS WITH 2-5'-0" SIDEWALKS
24'-0" ROADWAY 45° SKEW RT. FWD.
℄ STA. 4+67.21
U.S.W.P.H. PROJ. NO. W.P.H. 8 SEC. (D) BR.

Detailed By W.C.Z. 5-35
Traced By G.M. 5-35
Chkd " J.L.F. 5-35

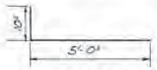
FED. ROAD DIST. NO.	STATE	U.S.W.P.P. PROJ. NO. W. P. H.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
6	OKLA.	8-D-BR.	1936	27	55



SEC. THRU. 40' SPAN SEC. THRU. 60' SPAN

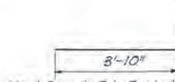


Bars M - ⅜" ϕ x 2'-11"

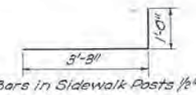


G-Bar ⅜" ϕ x 5'-10"

C-Bars ⅝" ϕ x 29'-4" in Roadway

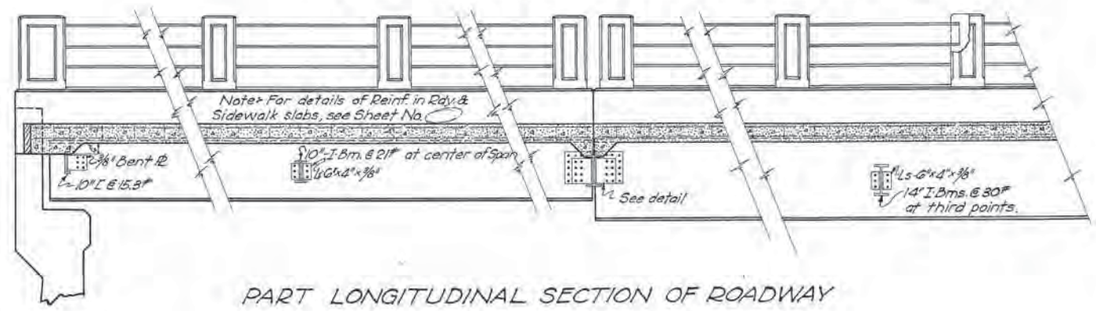


Vert. Bars in Rdy. Posts ½" ϕ x 4'-10"

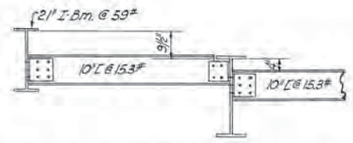


Vert. Bars in Sidewalk Posts ⅝" ϕ x 4'-3"

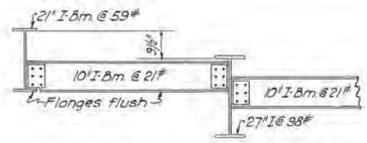
Note:- For all details of Superstructure not shown, see Std. IB-G, Sheet No. 28.



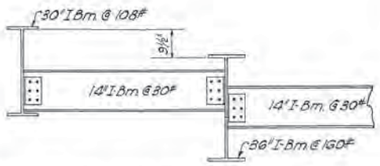
PART LONGITUDINAL SECTION OF ROADWAY



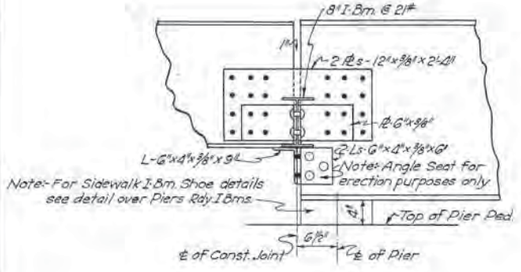
DETAILS OF STIFFENERS AT ABUT.



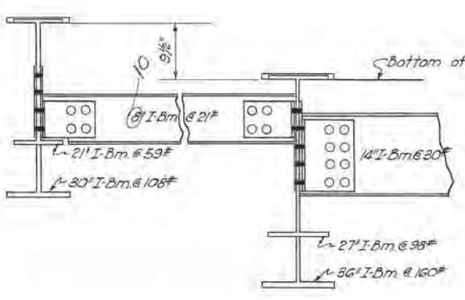
DETAILS OF INT. STIFFENERS - 40' SPANS



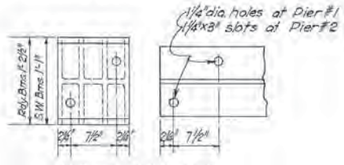
DETAILS OF INT. STIFFENERS - 60' SPANS



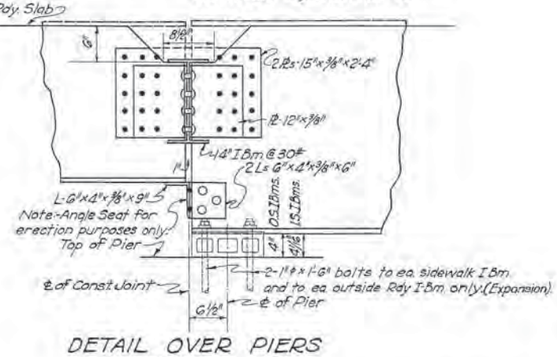
DETAIL OVER PIERS SIDEWALK I-BMS.



DETAIL OF STIFFNERS OVER PIERS



Note:- For details of shoes, not shown, See Std. IB-G, Sheet No. 28



DETAIL OVER PIERS ROADWAY I-BMS.

Note: All beams shall be anchored at fixed pier with 2-1" ϕ anchor bolts set a minimum of 1'-0" into concrete.

HORSE CREEK
DETAILS OF SUPERSTRUCTURE
1-60' & 2-40' I-BM. SPANS
24'-0" ROADWAY & 2-5'-0" SIDEWALKS
SKEWED 45° RIGHT FWD.
℄ STA. = 4+67.21
U. S. W. P. H. PROJ. NO. W. P. H. 8-SEC. "D-BR."

Detailed & Traced By Marsh May 1935
Checked J.L.F.

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix E. Hydraulic Analysis, 2016

THIS PAGE INTENTIONALLY LEFT BLANK

March 2016, KLE

	Ottawa	County
Project No.	BRFY-158B(119)	
JP #	24273(04)	

US 60 over Horse Creek

NBIS # 05017

Hydraulic Summary

Total Drainage Area =	22.70	sq. mi
Controlled Drainage Area =	0.00	sq. mi
Effective Drainage Area =	22.70	sq. mi

Existing Structure:	42'-60'-42' I Beams, Skewed 45°	L =	142	ft	Low Bm Elev =	781.10
C/L Station	344+94	$Q_{OT} \approx Q$	255		$Rdwy_{OT}$ Elev =	780.82
NBIS #	05017				$Rdwy_{OT}$ Sta =	339+36
Proposed Structure:	70'-100'-70' Type IV PC Beam, Skewed 45°	L =	245.5	ft/ft	Low Bm Elev =	780.00
C/L Station	344+94	$Q_{OT} \approx Q$	OT>Q500		$Rdwy_{OT}$ Elev =	780.82
					$Rdwy_{OT}$ Sta =	339+36
Detour Structure:	3-108" RCPs	Slope =	0.003	ft/ft	Inlet Elev =	765.45
C/L Station	2346+11	$Q_{OT} \approx Q$	2.25		$Detour_{OT}$ Elev =	775.72
					$Detour_{OT}$ Sta =	2345+89

Freq.	Q (cfs)	CHW (ft)	V (fps)	Contraction Scour (ft)	Pier Scour (ft)	Total Scour (ft)
2	1700	773.90	3.94			
5	3150	775.55	5.79			
10	4470	776.62	7.26			
25	6590	778.18	9.10			
50	8300	779.40	11.16			
100	15100	780.60	13.44	2.97	32.89	35.86
Rdwy OT > Q500	3040	783.02	8.19	11.77	18.01	29.78
Detour OT = 2.25	1820	775.72	10.23			

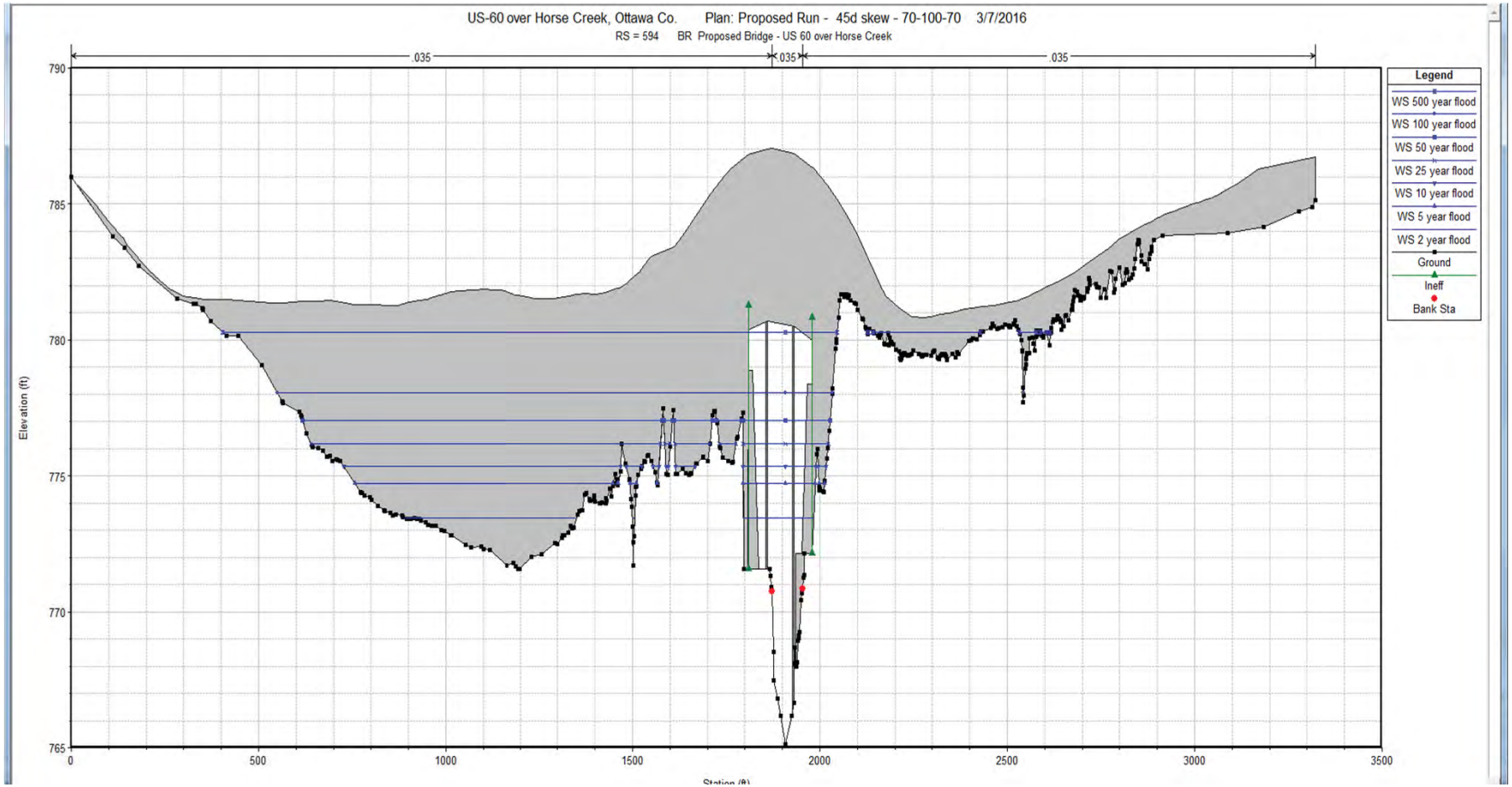
Notes:

1. According to the Geotechnical Engineering Report, the depth to bedrock is 10.58 feet. Therefore, the scour will probably not extend as deep as predicted.

Hydraulic Design is in compliance with "Federal-Aid Policy Guide 23 CFR 650, Subpart A"

LICENSED PROFESSIONAL ENGINEER
Kristi Erickson
25821
OKLAHOMA

Kristi Erickson
03/07/2016


US-60 over Horse Creek, Ottawa Co.
Plan: Proposed Run - 45d skew - 70-100-70 3/7/2016
RS = 594 BR Proposed Bridge - US 60 over Horse Creek
.035
.035
.035
Legend
WS 500 year flood
WS 100 year flood
WS 50 year flood
WS 25 year flood
WS 10 year flood
WS 5 year flood
WS 2 year flood
Ground
Ineff
Bank Sta
Elevation (ft)
790
785
780
775
770
765
0
500
1000
1500
2000
2500
3000
3500

Date	February 2016
Engineer	KLE
Revisions	1. Revised Proposed 103'-100'-103' Span Bridge, Skewed 45°

County	Ottawa
JP#	24273(04)
Highway	US 60
Crossing	Horse Creek

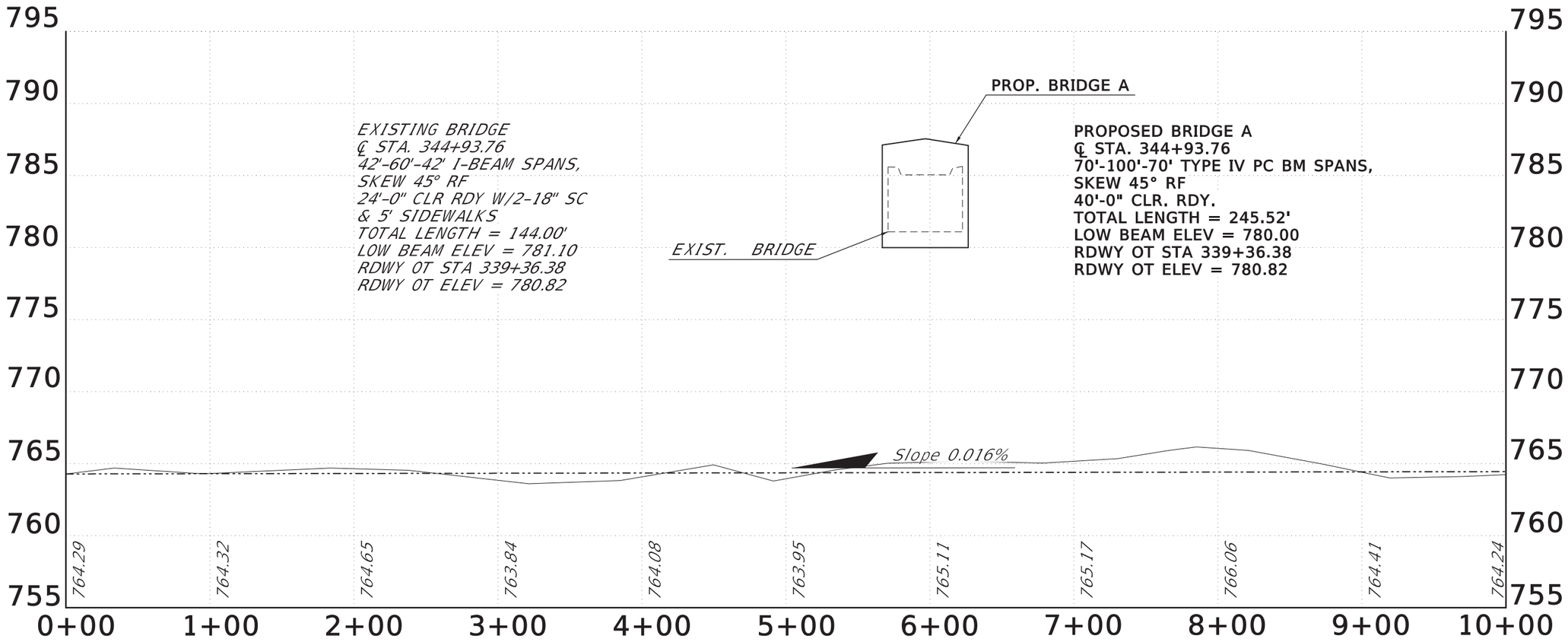
DA: 22.7 SQ MI

		NBIS #	05017											
Discharges (CFS)		Computed Water Surface Elevations (FT)									Velocity (FPS)			
		Open Channel	Exist : 42'-60'-42' I Beams, Skewed 45°		Backwater	Prop: 70'-100'-70' Type IV PC Beam, Skewed 45°		Backwater			Backwater	Open Channel	Existing	Prop	
			Low Beam (ft)	781.10		Low Beam (ft) = or FL in =	780.00		Low Beam (ft) = or FL in =						
Q2 =	1,700	773.72	773.90		0.18	773.90		0.18			N/A	3.07	4.85	3.94	
Q5 =	3,150	775.30	775.75		0.45	775.55		0.25			N/A	4.39	7.06	5.79	
Q10 =	4,470	776.29	777.00		0.71	776.62		0.33			N/A	5.59	9.16	7.26	
Q25 =	6,590	777.63	778.92		1.29	778.18		0.55			N/A	7.52	11.41	9.10	
Q50 =	8,300	778.70	780.40		1.70	779.40		0.70			N/A	9.10	13.79	11.16	
Q100 =	10,000	779.67	781.73		2.06	780.60		0.93			N/A	10.66	14.84	13.44	
Q500 =	15,100	782.29	784.94		2.65	783.02		0.73			N/A	13.86	15.38	8.19	
			Overtopping Elev (ft) =	780.82		Overtopping Elev (ft) =	780.82		Overtopping Elev (ft) =						
			Overtopping Q (cfs) ≈	11,975		Overtopping Q (cfs) ≈	OT>Q500		Overtopping Q (cfs) ≈						
			Overtopping Freq (yr) ≈	255		Overtopping Freq (yr) ≈	OT>Q500		Overtopping Freq (yr) ≈						

THIS PAGE INTENTIONALLY LEFT BLANK

Typical Flowline Profile

Horse Creek Flowline



3/9/2016

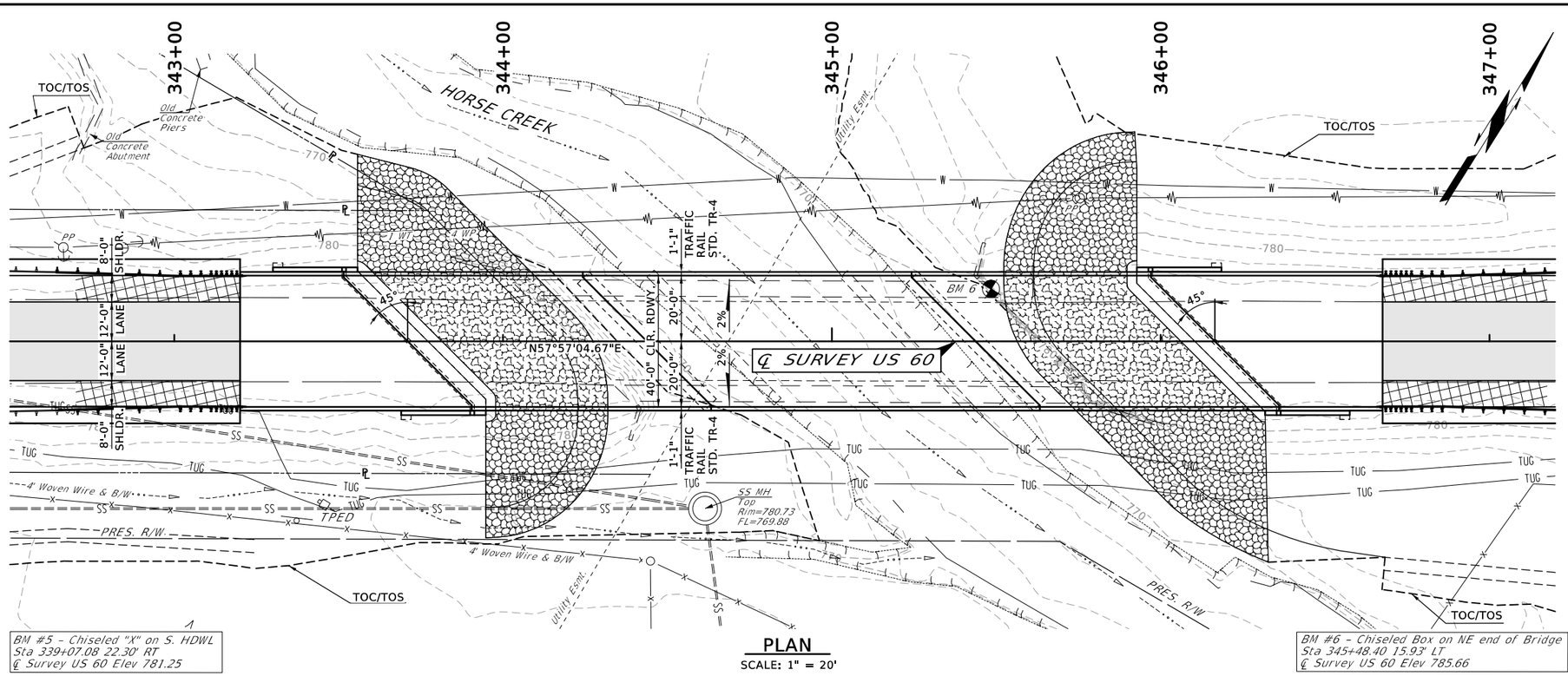
3:26:21 PM

P:\ECI\650-TUL\CIV\406I0I0000.000THorseCrk\20_DESGN\40_CAD\Dgn\US_60\H\24273(04)_H_Gen_Plan_Elev_Br_A_01.dgn

OKLAHOMA DEPARTMENT OF TRANSPORTATION

PRELIMINARY PLANS

$$$$DATE$$$

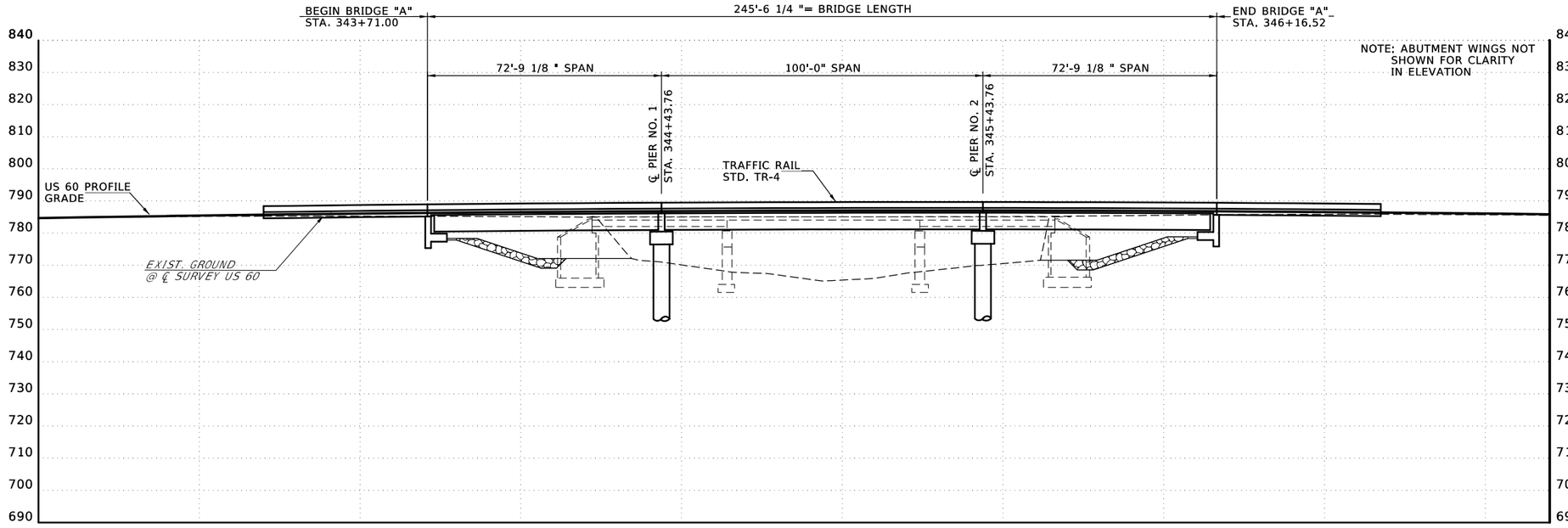


BM #5 - Chiseled "X" on S. HDWL
Sta 339+07.08 22.30' RT
℄ Survey US 60 Elev 781.25

BM #6 - Chiseled Box on NE end of Bridge
Sta 345+48.40 15.93' LT
℄ Survey US 60 Elev 785.66

PLAN

SCALE: 1" = 20'



ELEVATION

SCALE HORIZ, 1" = 20'
VERT, 1" = 20'

DESIGN DATA

LOADING: HL-93 OR OKLAHOMA OVERLOAD TRUCK
20 PSF FUTURE WEARING SURFACE.
5 PSF STAY-IN-PLACE FORMS.

LFD OPERATING RATING HS-XX.X

DESIGN: AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS 5TH EDITION, EXCEPT FOR BEARING PADS WHICH SATISFY AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 16TH EDITION WITH 1996 INTERIMS, USING HL-93 LIVE LOADING.

MATERIAL: CONCRETE:

CLASS AA	f'c = 4,000 PSI
CLASS A	f'c = 3,000 PSI
REINFORCING STEEL:	Fy = 60,000 PSI
STRUCTURAL STEEL:	Fy = 36,000 PSI

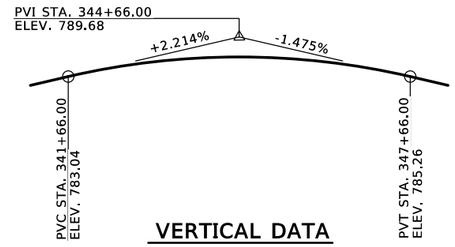
FOUNDATION DESIGN:

ABUTMENTS (HP12X53 PILING):

FACTORED PILE REACTION	= XX.X TONS/PILE

PIER (DRILLED SHAFTS):

DIRECT LOAD (SERVICE I)	= XXX.X TONS/SHAFT
DIRECT LOAD (STRENGTH I)	= XXX.X TONS/SHAFT
FRICTION CAPACITY (XX.X TSF)	= XXX.X TONS/SHAFT
END BEARING CAPACITY (XX.X TSF)	= XXX.X TONS/SHAFT
TOTAL CAPACITY	= XXX.X TONS/SHAFT



VERTICAL DATA

DESIGN	SAK	01/16
DRAWN	BEW	01/16
CHECKED		01/16
APPROVED	SOT	01/16
SQUAD	LEIDOS	

OKLAHOMA DEPARTMENT OF TRANSPORTATION

US 60 OVER HORSE CREEK — BRIDGE "A"

GENERAL PLAN AND ELEVATION

CONST. 70'-100'-70' W/ IV P.C. BEAMS SPANS WITH CONCRETE RAIL (TR-4) WITH 40'-0" CL. RDY. SKEW 45°RF AT ℄ US 60 SURVEY STATION 344+93.76

COUNTY OTTAWA HIGHWAY US-60 STATE JOB NO. 24273(04) SHEET NO. XXX

3/9/2016

3:17:57 PM

P:\EC\N650-TUL\CIV\406I0I0000_0D0THorseCrk\20_DESGN\40_CAD\Dgn\US_60\HY\24273(04)_H_Plan_Profile_US60_0I.dgn

SEC. 33, T26N, R22E

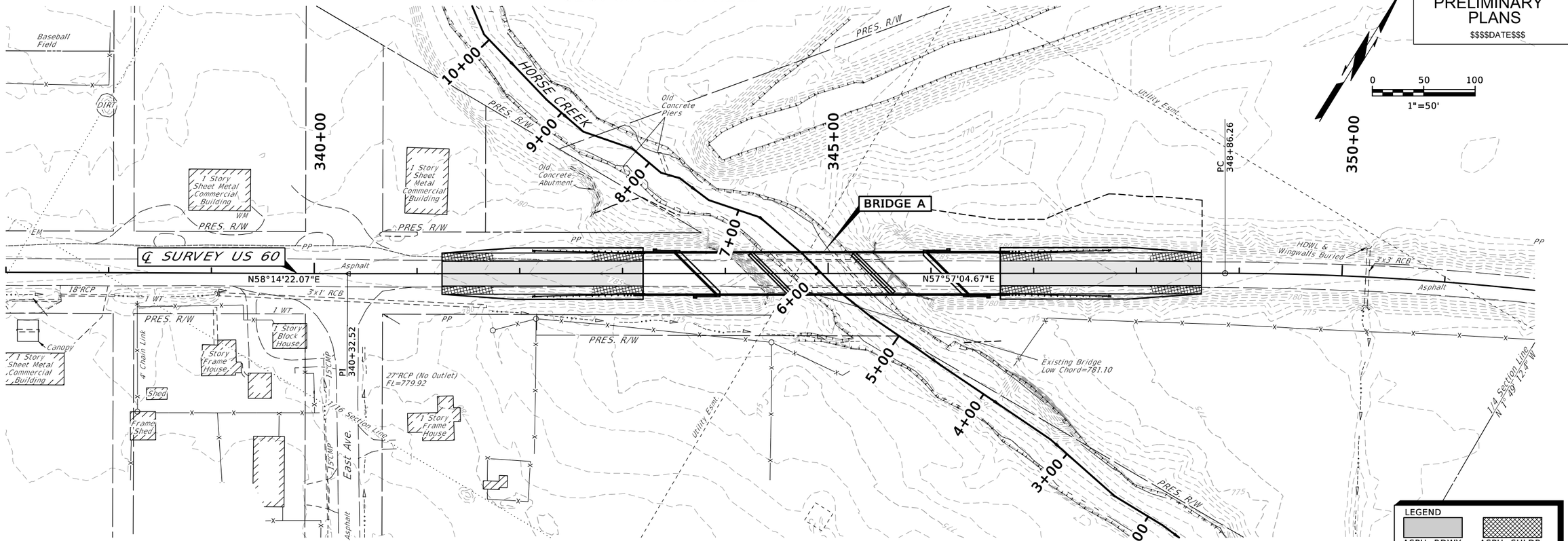
OKLAHOMA DEPARTMENT OF TRANSPORTATION

PRELIMINARY PLANS

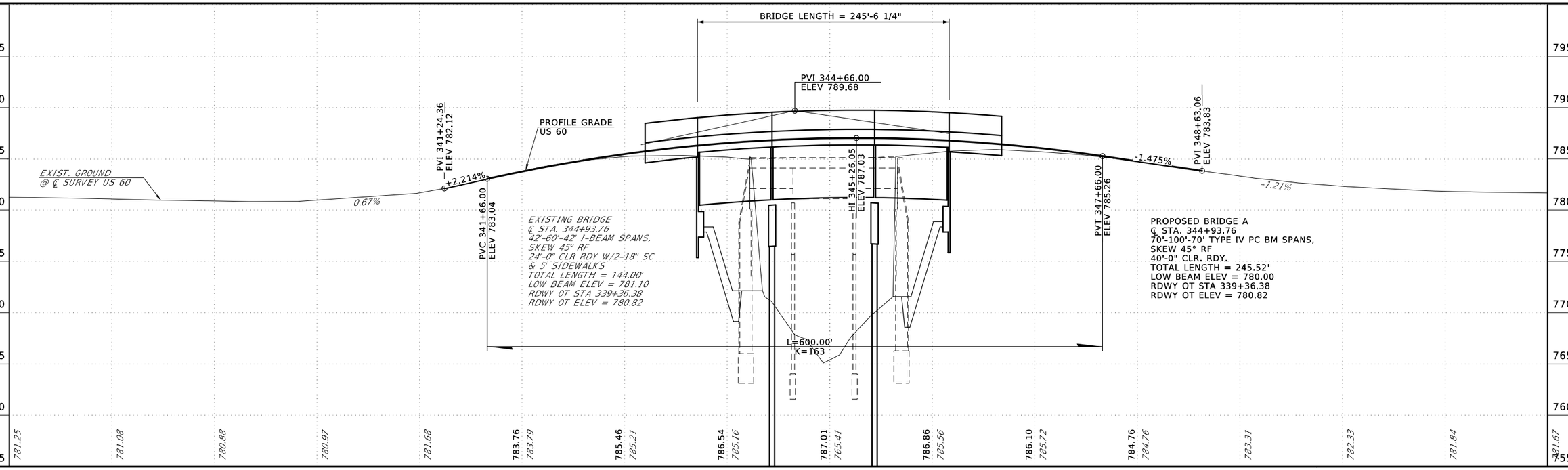
$$$$DATE$$$

0 50 100

1"=50'



US 60 over Horse Creek



COUNTY OTTAWA HIGHWAY US-60 STATE JOB NO. 24273(04) SHEET NO.

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix F. Preliminary Plans for Bridge and Approaches, US 60 Over Horse Creek, 2016 (Select Sheets)

THIS PAGE INTENTIONALLY LEFT BLANK

3/24/2016

P.E. NO : 24752(04) P:\ECN\650-TUL\CIV\40600\0000_0DOTHorseCrk\20_DESGN\40_CAD\Dgn\US_60\G\24273041_G_TitleSheet.dgn 12:06:57 PM

OKLAHOMA DEPARTMENT OF TRANSPORTATION

Preliminary Plan Field Review Meeting
MARCH 2016

STATE OF OKLAHOMA
DEPARTMENT OF TRANSPORTATION

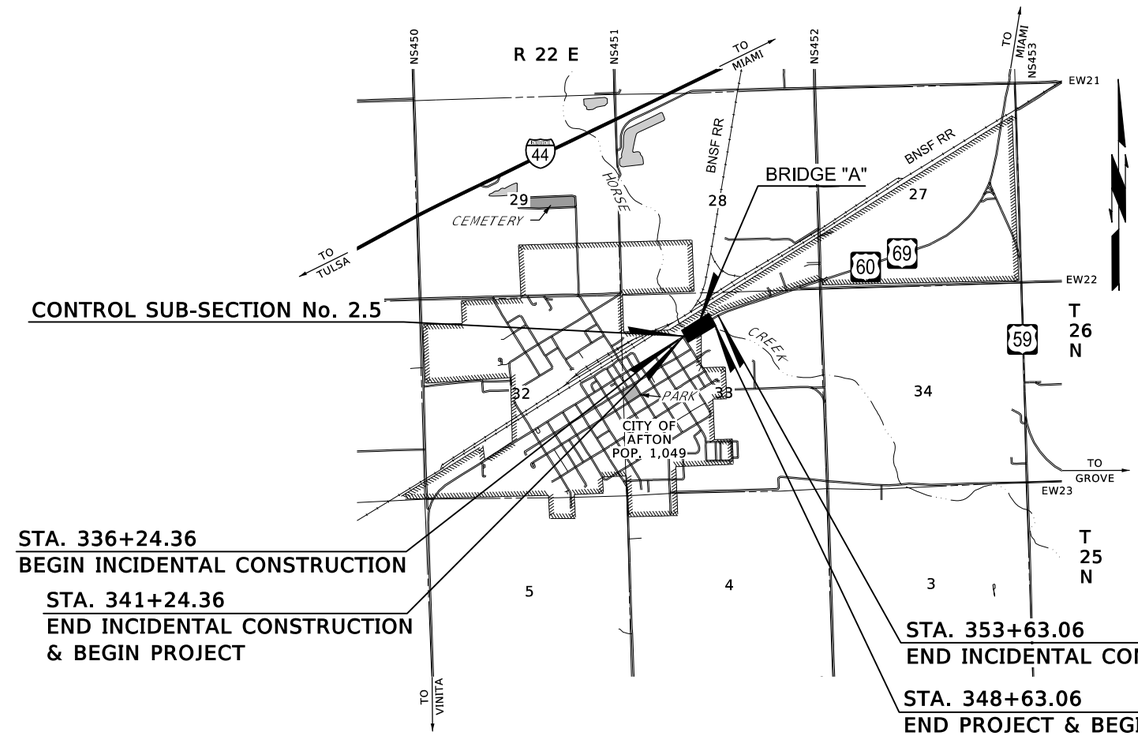
PLAN OF PROPOSED
UNITED STATES HIGHWAY
PROJECT NO. BRFY-158B(119)
BRIDGE AND APPROACHES
US 60 OVER HORSE CREEK
OTTAWA COUNTY
CONTROL SECTION 60-58-06
STATE JOB NO. 24273(04)
BRIDGE A LOCATION NO. 5806 0256X EXISTING NBI NO. 05017, NEW NBI NO. ?

FOR SURVEY CONTROL DATA,
SEE SURVEY DATA SHEETS

INDEX OF SHEETS

DESIGN DATA

AADT 2016	7,000
AADT 2036	11,200
K (DHV / ADT-TWO WAY)	10%
D (DIRECTIONAL DIST.)	55%
T (% OF DHV)	18%
T (% OF AADT)	23%
T_3 OVERLOADS (AXLES)	16%
20-YR FLEX ESALs	13.9 MIL
US 60	V=45 MPH
US 60 DETOUR	V=25 MPH



CONTROL SUB-SECTION No. 2.5

STA. 336+24.36
BEGIN INCIDENTAL CONSTRUCTION

STA. 341+24.36
END INCIDENTAL CONSTRUCTION
& BEGIN PROJECT

STA. 353+63.06
END INCIDENTAL CONSTRUCTION

STA. 348+63.06
END PROJECT & BEGIN
INCIDENTAL CONSTRUCTION

THE FOLLOWING ODOT STANDARDS WILL BE REQUIRED

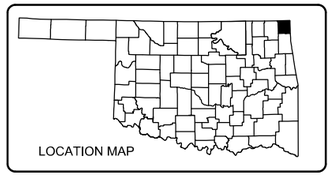
ROADWAY TRAFFIC SIGNING TRAFFIC CONTROL TRAFFIC SAFETY BRIDGE DESIGN

(TO BE ADDED AT LATER DATE)

SCALES 1"
PLAN 1" = 50'
PROFILE HOR. 1" = 50'
VER. 1" = 5'
LAYOUT MAP 1" = 2000'

CONVENTIONAL SYMBOLS

- PROPOSED ROAD
- RAILROADS
- RANGE & TOWNSHIP
- SECTION LINES
- QUARTER SECTION LINES
- FENCES
- GROUND LINE
- EXISTING ROADS
- BASE LINE
- GRADE LINES
- TELEPHONE & TELEGRAPH
- POWER LINES
- BUILDINGS
- OILWELL
- DRAINAGE STRUCTURES - IN PLACE
- DRAINAGE STRUCTURES - NEW
- PRES.R/W — RIGHT-OF-WAY LINES - EXISTING
- R/W — RIGHT-OF-WAY LINES - NEW
- CONTROLLED ACCESS
- R/W — RIGHT-OF-WAY FENCE



BEGIN STA. 343+71.00
LENGTH = 245'-6 1/4" BRIDGE "A"
END STA. 346+16.52

NOTE: PROJECT LENGTH BASED ON ℄ SURVEY STATIONING.

ROADWAY LENGTH	493.18	FT.	0.093	MI.
BRIDGE LENGTH	245.52	FT.	0.046	MI.
PROJECT LENGTH			0.139	MI.

EQUATIONS : NONE
EXCEPTIONS : NONE

2009 OKLAHOMA STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION-ENGLISH GOVERN, APPROVED BY THE U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, JANUARY 4, 2010.

CERTIFICATE OF AUTHORIZATION NO. 3722 P.E., L.S. RENEWAL DATE 6-30-17

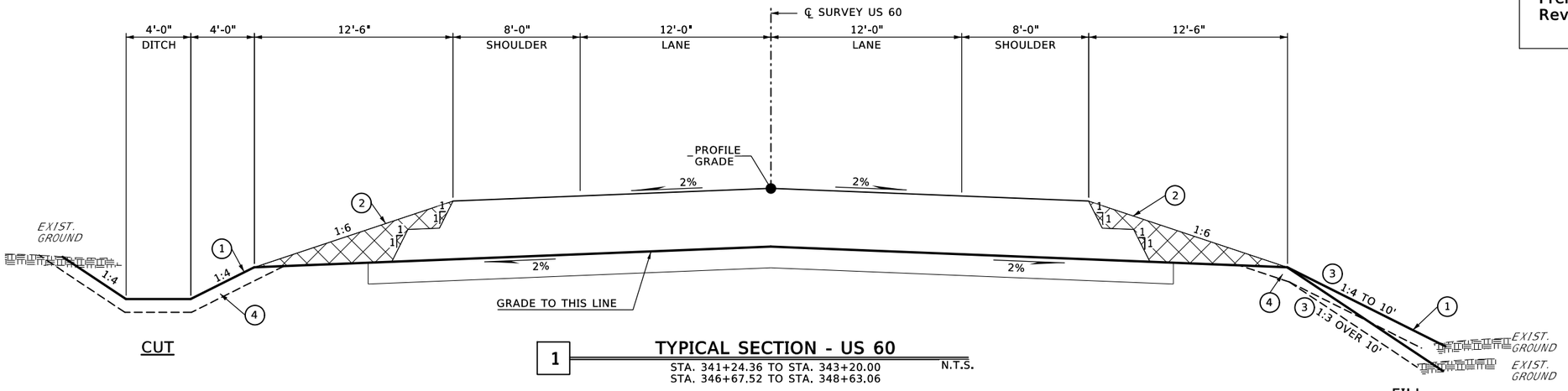
leidos
Leidos Engineering , LLC
One West Third Street, Suite 200
Tulsa, Oklahoma 74103
(918) 492-1600

Shannon A. Koeninger, P.E.
OK P.E. NO. 20481
PROJECT ENGINEER
DATE :

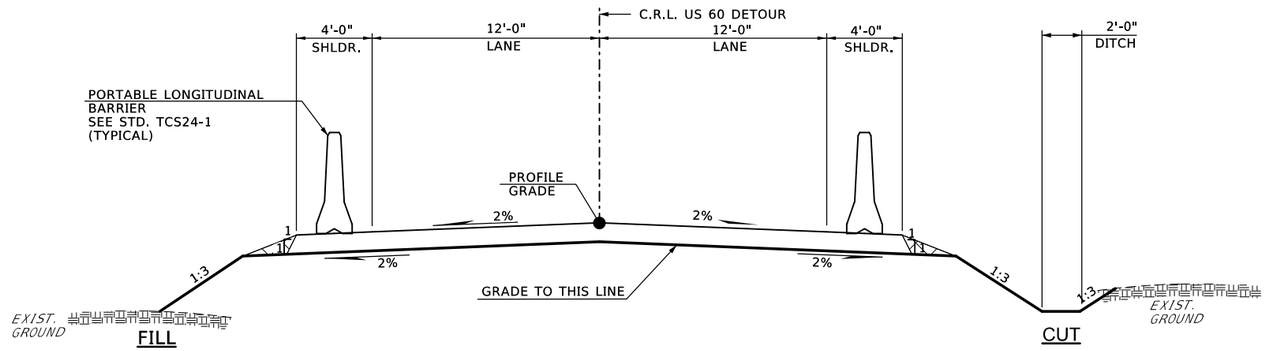
REGISTERED PROFESSIONAL ENGINEER — SHANNON A. KOENINGER 20481 — OKLAHOMA

OKLAHOMA DEPARTMENT OF TRANSPORTATION	DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION
DATE APPROVED	DATE APPROVED
BY	BY
CHIEF ENGINEER	DIVISION ADMINISTRATOR

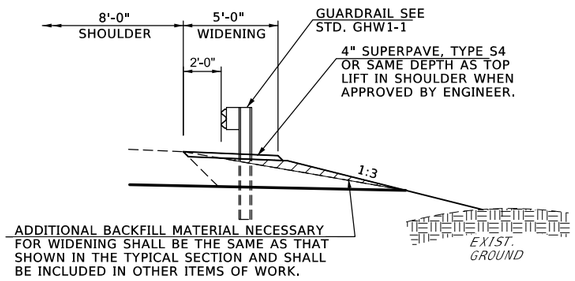
SWO 4509(1) PROJECT NO. BRFY-158B(119)
COUNTY OTTAWA HIGHWAY US-60 SHEET NO. 1



1 TYPICAL SECTION - US 60
STA. 341+24.36 TO STA. 343+20.00
STA. 346+67.52 TO STA. 348+63.06
N.T.S.



2 TYPICAL SECTION - DETOUR
STA. 2340+65.00 TO STA. 2349+46.52
N.T.S.



GUARDRAIL DETAIL

STA. 342+14.35 TO STA. 342+20.60 RT.
STA. 342+14.35 TO STA. 342+20.60 LT.(OPPOSITE HAND)
STA. 346+66.92 TO STA. 347+73.17 RT.
STA. 346+66.92 TO STA. 347+73.17 LT.(OPPOSITE HAND)

1. PERMANENT SLOPE PROTECTION
   REFER TO DETAIL SHEET 5 .
2. TO BE BACKFILLED & COMPACTED AS PART OF THE FINISHING OPERATIONS. COST TO BE INCLUDED IN TBSC TYPE E.
3. FILL SLOPE DEPTHS ARE DEFINED FROM EDGE OF SHOULDER.
4. TOPSOIL NOTE :
   THE CONTRACTOR SHALL STRIP ALL OF THE AVAILABLE TOPSOIL,STOCKPILE IT AND PLACE IT BACK ON THE SECTION IN ACCORDANCE WITH SECTION 205 OF THE STANDARD SPECIFICATIONS. RESERVED TOPSOIL SHALL BE SPREAD FIRST ON THE COMPLETE SLOPES OF THE CUT SECTIONS AND THE REMAINDER ON COMPLETED FILL SLOPES OR OTHER PRIORITY AREAS LOCATED BY THE ENGINEER. ALL ADDITIONAL COSTS ASSOCIATED WITH OPERATION SHALL BE INCLUDED IN THE PAY ITEMS FOR SALVAGED TOPSOIL, LUMP SUM.

   THE GRADING LINE AS SHOWN ON THE TYPICAL AND CROSS SECTIONS IS TO TOP OF THE SOIL. EARTHWORK QUANTITIES WERE NOT ADJUSTED FOR SALVAGE AND TOPSOIL QUANTITY IS INCLUDED IN THE SUMMARIZED EARTHWORK.

DESIGN			OKLAHOMA DEPARTMENT OF TRANSPORTATION
DRAWN			
CHECKED			**TYPICAL SECTIONS**
APPROVED			
SQUAD			

COUNTY OTTAWA HIGHWAY US-60 STATE JOB NO. 24273(04) SHEET NO. 2

3/24/2016 12:07:00 PM
P:\EC\1650-TUL\CIV\406010000_ODOTHorseCrk\20_DESGN\40_CAD\Dgn\US_60\C\24273(04)_C_Typ_Sect_01.dgn

3/24/2016

12:07:01 PM

P:\ECI\1650-TUL\GIV\406I0000_ODOTHorseCrk\20_DESGN\40_CAD\Dgn\US_60\C\24273(04)_C_SMP_01.dgn

OKLAHOMA DEPARTMENT OF TRANSPORTATION

Preliminary Plan Field Review Meeting
MARCH 2016

STORM WATER MANAGEMENT PLAN

SITE DESCRIPTION

PROJECT LIMITS: THE EXTENTS OF IMPROVEMENTS TO US 60 FROM 92' NORTHEAST OF SOUTHEAST AVENUE TO 3,086' SOUTHWEST OF SOUTH 520 ROAD IN AFTON, OK.

PROJECT DESCRIPTION:
DRAINAGE, GRADING, SURFACING, STRIPING, CONSTRUCTION TRAFFIC CONTROL AND BRIDGE.

SUGGESTED SEQUENCE OF EROSION CONTROL ACTIVITIES:

1) PRIOR TO INITIATING SOIL DISTURBING ACTIVITIES, THE CONTRACTOR WILL INSTALL ALL PERIMETER TEMPORARY SEDIMENT CONTROLS SPECIFIED.
2) STRIP, STOCKPILE AND STABILIZE TOPSOIL.
3) CLEAR AND GRUB ONLY IN NECESSARY AREAS, PRESERVING AS MUCH NATIVE VEGETATION AS POSSIBLE.
4) INSTALL,MAINTAIN AND/OR MOVE TEMPORARY SEDIMENT ITEMS WITH CONSTRUCTION OPERATIONS AS PRACTICAL.
5) IF DIRECTED BY THE ENGINEER, PLANT TEMPORARY SEEDING.
6) REPLACE SALVAGED TOPSOIL AND DEVICES WHEN AN ACCEPTABLE VEGETATIVE COVER (AT LEAST 70%) HAS BEEN ATTAINED.
7) AS SITE CONDITIONS WARRANT, THE CONTRACTOR MAY CHOOSE TO MODIFY THE TYPE OR ARRANGEMENT OF SPECIFIED PRACTICES TO IMPROVE THEIR EFFECTIVENESS AS APPROVED BY THE ENGINEER.
8) THE CONTRACTOR WILL MAINTAIN A LOG OF THE DATES OF MAJOR SOIL DISTURBANCE ACTIVITIES, AND ALSO THE DATES OF INSTALLATION OF EROSION CONTROL MEASURES.

SOIL TYPE: LIGHTNING SILT LOAM, PARSONS SILT LOAM

AREA TO BE DISTURBED: 2.68 ACRES

OFFSITE AREA TO BE DISTURBED: (FOR CONTRACTOR USE)

MAXIMUM ACRES TO BE DISTURBED AT ANY ONE TIME: (FOR CONTRACTOR USE)

LATITUDE & LONGITUDE OF CENTER OF PROJECT: 36° 41' 49" N ; 94° 57' 24" W

NAME OF RECEIVING WATERS: HORSE CREEK

SENSITIVE WATERS OR WATERSHEDS: YES [ ] NO [X]

303(d) IMPAIRED WATERS: YES [X] NO [ ]

NOTE:
THIS SHEET SHOULD BE USED IN CONJUNCTION WITH A DRAINAGE MAP THAT ILLUSTRATES THE DRAINAGE PATTERNS/PATHWAYS AND RECEIVING WATERS FOR THIS PROJECT. THIS SHEET SHOULD ALSO BE USED WITH THE EROSION CONTROL SUMMARIES, PAY ITEMS, & NOTES.

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES:

- [X] TEMPORARY SEEDING
- [X] PERMANENT SODDING, SPRIGGING OR SEEDING
- [X] VEGETATIVE MULCHING
- [ ] SOIL RETENTION BLANKET
- [X] PRESERVATION OF EXISTING VEGETATION

NOTE: TEMPORARY EROSION CONTROL METHODS MUST BE USED ON ALL DISTURBED AREAS WHERE CONSTRUCTION ACTIVITIES HAVE CEASED FOR OVER 14 DAYS. METHODS USED WILL BE AS SHOWN ON PLANS, OR AS DIRECTED BY THE ENGINEER.

STRUCTURAL PRACTICES:

- [X] STABILIZED CONSTRUCTION EXIT
- [X] TEMPORARY SILT FENCE
- [X] TEMPORARY SILT DIKES
- [ ] TEMPORARY FIBER LOG
- [ ] DIVERSION, INTERCEPTOR OR PERIMETER DIKES
- [ ] DIVERSION, INTERCEPTOR OR PERIMETER SWALES
- [ ] ROCK FILTER DAMS
- [ ] TEMPORARY SLOPE DRAIN
- [ ] PAVED DITCH W/ DITCH LINER PROTECTION
- [ ] TEMPORARY DIVERSION CHANNELS
- [ ] TEMPORARY SEDIMENT BASINS
- [ ] TEMPORARY SEDIMENT TRAPS
- [X] TEMPORARY SEDIMENT FILTERS
- [X] TEMPORARY SEDIMENT REMOVAL
- [X] RIP RAP
- [ ] INLET SEDIMENT FILTER
- [ ] TEMPORARY BRUSH SEDIMENT BARRIERS
- [ ] SANDBAG BERMS
- [ ] TEMPORARY STREAM CROSSINGS

OFFSITE VEHICLE TRACKING:

- [X] HAUL ROADS DAMPENED FOR DUST CONTROL
- [X] LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- [X] EXCESS DIRT ON ROAD REMOVED DAILY

NOTES:

NO DISTURBED AREA TO ONE PROJECT OUTFALL EXCEEDS 5 ACRES.

THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR THE FOLLOWING:

MAINTENANCE AND INSPECTION:
ALL EROSION AND SEDIMENT CONTROLS WILL BE MAINTAINED IN GOOD WORKING ORDER FROM THE BEGINNING OF CONSTRUCTION UNTIL AN ACCEPTABLE VEGETATIVE COVER IS ESTABLISHED. INSPECTION BY THE CONTRACTOR AND ANY NECESSARY REPAIRS SHALL BE PERFORMED ONCE EVERY 7 CALENDAR DAYS AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN 0.5 INCH AS RECORDED BY A NON-FREEZING RAIN GAUGE TO BE LOCATED ON SITE. POTENTIALLY ERODIBLE AREAS, DRAINAGEWAYS, MATERIAL STORAGE, STRUCTURAL DEVICES, CONSTRUCTION ENTRANCES AND EXITS ALONG WITH EROSION AND SEDIMENT CONTROL LOCATIONS ARE EXAMPLES OF SITES THAT NEED TO BE INSPECTED.

WASTE MATERIALS:
PROPER MANAGEMENT AND DISPOSAL OF CONSTRUCTION WASTE MATERIAL IS REQUIRED BY THE CONTRACTOR. MATERIALS INCLUDE STOCKPILES, SURPLUS, DEBRIS AND ALL OTHER BY-PRODUCTS FROM THE CONSTRUCTION PROCESS. PRACTICES INCLUDE DISPOSAL, PROPER MATERIALS HANDLING, SPILL PREVENTION AND CLEANUP MEASURES. CONTROLS AND PRACTICES SHALL MEET THE REQUIREMENTS OF ALL FEDERAL, STATE AND LOCAL AGENCIES.

HAZARDOUS MATERIALS:
PROPER MANAGEMENT AND DISPOSAL OF HAZARDOUS WASTE MATERIALS IS REQUIRED. THE CONTRACTOR IS RESPONSIBLE FOR FOLLOWING MANUFACTURER'S RECOMMENDATIONS, STATE AND FEDERAL REGULATIONS TO ENSURE CORRECT HANDLING, DISPOSAL, SPILL PREVENTION AND CLEANUP MEASURES. EXAMPLES INCLUDE BUT ARE NOT LIMITED TO: PAINTS, ACIDS, CLEANING SOLVENTS, CHEMICAL ADDITIVES, CONCRETE CURING COMPOUNDS AND CONTAMINATED SOILS.

GENERAL NOTES:
A STORM WATER POLLUTION PREVENTION PLAN (SWPPP) IS REQUIRED TO COMPLY WITH THE OKLAHOMA POLLUTION DISCHARGE ELIMINATION SYSTEM (OPDES) REGULATIONS. THIS PLAN IS INITIATED DURING THE DESIGN PHASE, CONFIRMED IN THE PRE-WORK MEETINGS AND AVAILABLE ON THE JOB SITE ALONG WITH COPIES OF THE NOTICE OF INTENT (NOI) FORM AND PERMIT CERTIFICATE THAT HAVE BEEN FILED WITH THE OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY (ODEQ). THE PLAN MUST BE KEPT CURRENT WITH UP-TO-DATE AMENDMENTS DURING THE PROGRESSION OF THE PROJECT. ALL CONTRACTOR OFF-SITE OPERATIONS ASSOCIATED WITH THE PROJECT MUST BE DOCUMENTED IN THE SWPPP, I.E., BORROW PITS, WORK ROADS, DISPOSAL SITES, ASPHALT/CONCRETE PLANTS, ETC. THE BASIC GOAL OF STORM WATER MANAGEMENT IS TO IMPROVE WATER QUALITY BY REDUCING POLLUTANTS IN STORM WATER DISCHARGES. RUNOFF FROM CONSTRUCTION SITES HAS A POTENTIAL FOR POLLUTION DUE TO EXPOSED SOILS AND THE PRESENCE OF HAZARDOUS MATERIALS USED IN THE CONSTRUCTION PROCESS. THE PREVENTION OF SOIL EROSION, CONTAINMENT OF HAZARDOUS MATERIALS AND/OR THE INTERCEPTION OF THESE POLLUTANTS BEFORE LEAVING THE CONSTRUCTION SITE ARE THE BEST PRACTICES FOR CONTROLLING STORM WATER POLLUTION.

THE FOLLOWING SECTIONS OF THE 2009 ODOT STANDARD SPECIFICATIONS SHOULD BE NOTED:

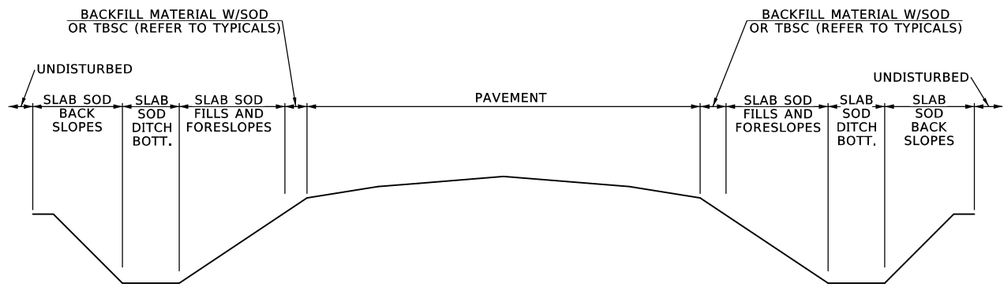
103.05	BONDING REQUIREMENTS
104.10	FINAL CLEANING UP
104.12	CONTRACTOR'S RESPONSIBILITY FOR WORK
104.13	ENVIRONMENTAL PROTECTION
106.08	STORAGE AND HANDLING OF MATERIAL
107.01	LAWS, RULES AND REGULATIONS TO BE OBSERVED
107.20	STORM WATER MANAGEMENT
220	MANAGEMENT OF EROSION, SEDIMENTATION AND STORM WATER POLLUTION PREVENTION AND CONTROL
221	TEMPORARY SEDIMENT CONTROL

IN ADDITION:
"ODEQ GENERAL PERMIT (OKR10) FOR STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES WITHIN THE STATE OF OKLAHOMA." ODEQ, WATER QUALITY DIVISION, SEPTEMBER 13, 2012.

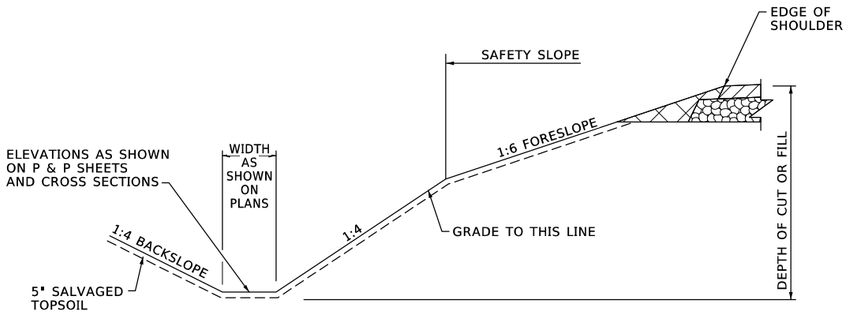
DESIGN			OKLAHOMA DEPARTMENT OF TRANSPORTATION
DRAWN			
CHECKED			**STORM WATER MANAGEMENT PLAN**
APPROVED			
SQUAD			

COUNTY OTTAWA HIGHWAY US-60 STATE JOB NO. 24273(04) SHEET NO. 3

REVISED 04 /24 /2014

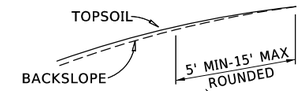


PERMANENT SLOPE PROTECTION



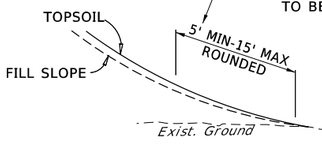
SPECIAL ROADWAY DITCH

(FILL)



TOP OF CUT ROUNDING

INTERSECTION OF CUT AND/OR FILL SLOPES WITH GROUND LINE TO BE ROUNDED AS PART OF FINISHING OPERATIONS. ROUNDING SHALL BE 5' MIN. FOR SMALLER CUTS AND FILLS TO 15' MAX. FOR LARGER CUTS AND FILLS OR AS DESIGNATED BY THE ENGINEER. COST OF ROUNDING TO BE INCLUDED IN PRICE BID FOR OTHER ITEMS OF WORK.



TOE OF SLOPE ROUNDING

ROUNDING DETAIL

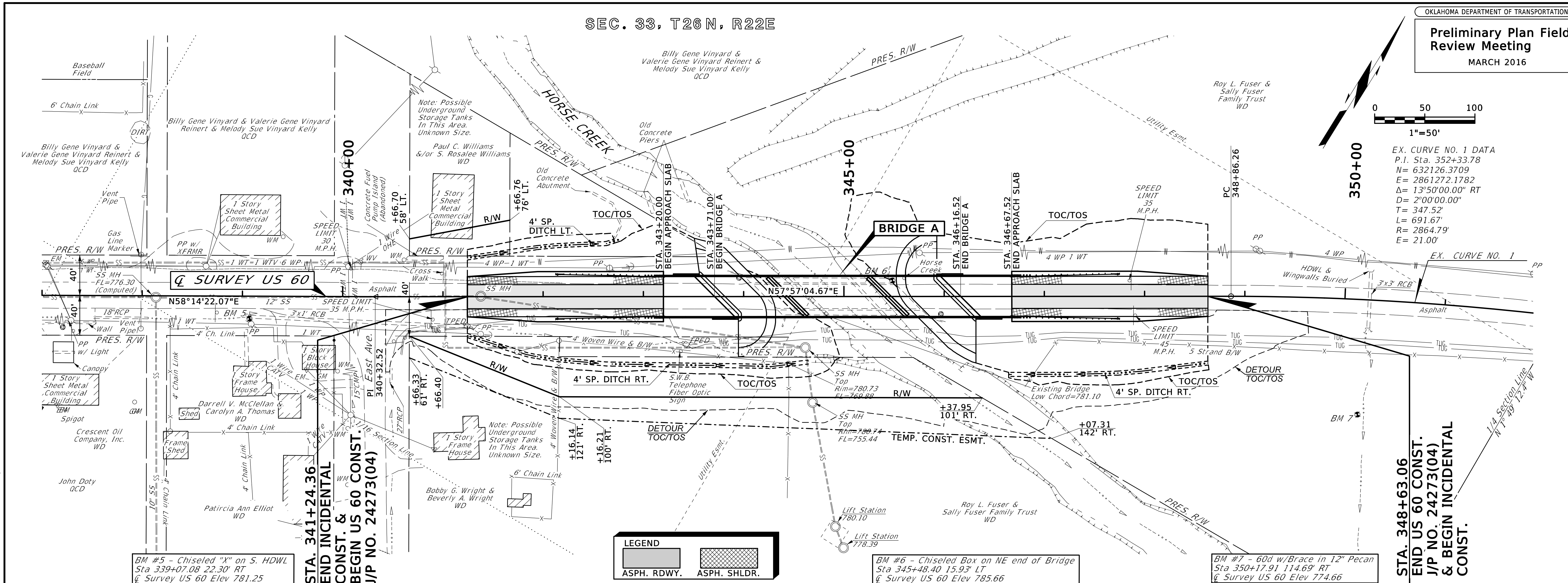
N.T.S.

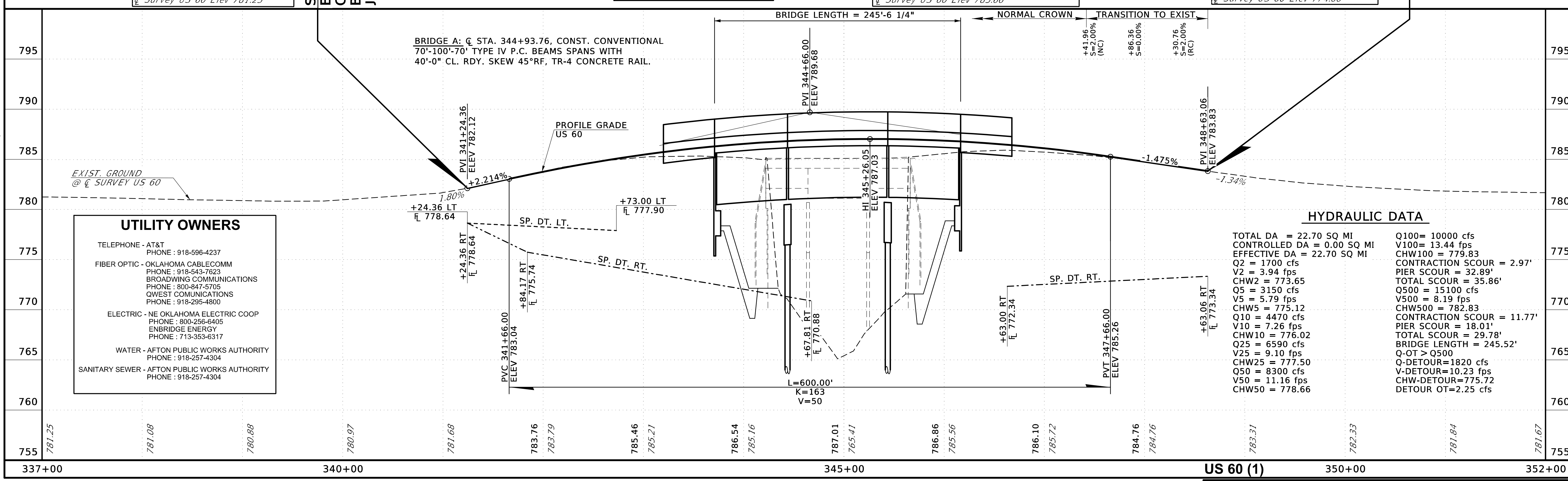
DESIGN			OKLAHOMA DEPARTMENT OF TRANSPORTATION
DRAWN			
CHECKED			**MISCELLANEOUS DETAILS**
APPROVED			
SQUAD			
COUNTY OTTAWA	HIGHWAY US-60	STATE JOB NO. 24273(04)	SHEET NO. 4

OKLAHOMA DEPARTMENT OF TRANSPORTATION

Preliminary Plan Field Review Meeting

MARCH 2016





BRIDGE A: ℄ STA. 344+93.76, CONST. CONVENTIONAL 70'-100'-70' TYPE IV P.C. BEAMS SPANS WITH 40'-0" CL. RDY. SKEW 45°RF, TR-4 CONCRETE RAIL.

UTILITY OWNERS

TELEPHONE - AT&T
PHONE : 918-596-4237

FIBER OPTIC - OKLAHOMA CABLECOMM
PHONE : 918-543-7623
BROADWING COMMUNICATIONS
PHONE : 800-847-5705
QWEST COMUNICATIONS
PHONE : 918-295-4800

ELECTRIC - NE OKLAHOMA ELECTRIC COOP
PHONE : 800-256-6405
ENBRIDGE ENERGY
PHONE : 713-353-6317

WATER - AFTON PUBLIC WORKS AUTHORITY
PHONE : 918-257-4304

SANITARY SEWER - AFTON PUBLIC WORKS AUTHORITY
PHONE : 918-257-4304

HYDRAULIC DATA

TOTAL DA = 22.70 SQ MI
CONTROLLED DA = 0.00 SQ MI
EFFECTIVE DA = 22.70 SQ MI
Q2 = 1700 cfs
V2 = 3.94 fps
CHW2 = 773.65
Q5 = 3150 cfs
V5 = 5.79 fps
CHW5 = 775.12
Q10 = 4470 cfs
V10 = 7.26 fps
CHW10 = 776.02
Q25 = 6590 cfs
V25 = 9.10 fps
CHW25 = 777.50
Q50 = 8300 cfs
V50 = 11.16 fps
CHW50 = 778.66

Q100= 10000 cfs
V100= 13.44 fps
CHW100 = 779.83
CONTRACTION SCOUR = 2.97'
PIER SCOUR = 32.89'
TOTAL SCOUR = 35.86'
Q500 = 15100 cfs
V500 = 8.19 fps
CHW500 = 782.83
CONTRACTION SCOUR = 11.77'
PIER SCOUR = 18.01'
TOTAL SCOUR = 29.78'
BRIDGE LENGTH = 245.52'
Q-OT > Q500
Q-DETOUR=1820 cfs
V-DETOUR=10.23 fps
CHW-DETOUR=775.72
DETOUR OT=2.25 cfs

COUNTY OTTAWA HIGHWAY US-60 STATE JOB NO. 24273(04) SHEET NO. 5

3/24/2016 12:07:04 PM P:\ECIN650-TUL\CIV\406101000_ODOTHorseCrk\20_DESGN\40_CAD\Dgn\US_60\C\24273(04)_C_Plan_Profile_US60_01.dgn

3/24/2016 12:07:06 PM P:\EC\N650-TUL\CIV\406I0I0000_0D0THorseCrk\20_DESGN\40_CAD\Dgn\US_60\C\24273(04)_C_Plan_Profile_Detour_0I.dgn

OKLAHOMA DEPARTMENT OF TRANSPORTATION

Preliminary Plan Field Revlew Meetlng

MARCH 2016

SEC. 33, T26N, R22E

1"=50'

CURVE DATA NO. D-1
P.I. STA. 2340+57.87
N= 631503.3834
E= 2860274.8455
Δ= 36°31'23.17" RT.
D= 28°56'14.14"
T= 65.33'
L= 126.21'
R= 198.00'
E= 10.50'
V= 25 MPH
S= NC

CURVE DATA NO. D-2
P.I. STA. 2341+84.36
N= 631492.8960
E= 2860405.3701
Δ= 36°38'32.77" LT.
D= 28°56'14.14"
T= 65.56'
L= 126.63'
R= 198.00'
E= 10.57'
V= 25 MPH
S= NC

CURVE DATA NO. D-3
P.I. STA. 2348+31.80
N= 631838.8444
E= 2860957.9576
Δ= 35°59'56.23" LT.
D= 28°56'14.14"
T= 64.33'
L= 124.40'
R= 198.00'
E= 10.19'
V= 25 MPH
S= NC

CURVE DATA NO. D-4
P.I. STA. 2349+59.91
N= 631961.6138
E= 2861007.4409
Δ= 37°41'46.20" RT.
D= 28°56'14.14"
T= 67.59'
L= 130.27'
R= 198.00'
E= 11.22'
V= 25 MPH
S= NC

EX. CURVE NO. 1 DATA
P.I. Sta. 352+33.78
N= 632126.3709
E= 2861272.1782
Δ= 13°50'00.00" RT
D= 2°00'00.00"
T= 347.52'
L= 691.67'
R= 2864.79'
E= 21.00'

C.R.L. US 60 DETOUR

℄ SURVEY US 60

CURVE NO. D-1 · CURVE NO. D-2 · CURVE NO. D-3 · CURVE NO. D-4 · EX. CURVE NO. 1

PC STA. 2339+92.53 C.R.L. US 60 DETOUR =STA. 339+92.53 ℄ SURVEY US 60

PC STA. 2350+22.59 C.R.L. US 60 DETOUR =STA. 349+89.56 ℄ SURVEY US 60

N58°14'22.07"E · N57°57'04.67"E

2' SP. DITCH LT. · 2' SP. DITCH RT. · TOC/TOS

PRES. R/W · R/W · TEMP. CONST. ESMT.

Billy Gene Vinyard & Valerie Gene Vinyard Reinert & Melody Sue Vinyard Kelly QCD

Baseball Field · 6' Chain Link · DIRT · Vent Pipe · Gas Line Marker · Billy Gene Vinyard & Valerie Gene Vinyard Reinert & Melody Sue Vinyard Kelly QCD

Note: Possible Underground Storage Tanks In This Area. Unknown Size.

Concrete Fuel Pump Island (Abandoned) · Paul C. Williams &/or S. Rosalee Williams WD

1 Story Sheet Metal Commercial Building · PP w/ XFRMR · SS MH -FL=776.30 (Computed) · SPEED LIMIT 30 M.P.H.

HORSE CREEK · Old Concrete Piers · Old Concrete Abutment · Horse Creek · Approx. Force Main Location From Plans For Job No. AFS02 Dated Feb 1985 by M.H.E., Co.

BM 5 · BM 6' · BM 7

18" RCP · 3'x1' RCB · 3'x3' RCB · Wall Pipe · Vent · 4' Ch. Link · 4' Chain Link · PP w/ Light · Canopy · 1 Story Sheet Metal Commercial Building · Spigot · Crescent Oil Company, Inc. WD · Darrell V. McClellan & Carolyn A. Thomas WD · Shed · Frame Shed · John Doty QCD · Patricia Ann Elliot WD · 1 Story Block House · Street Sign · 1 Story Frame House · East Ave. · 15" CMP · 27"RCP (No Outlet) FL=779.92 · S.W.B. Telephone Fiber Optic Sign · 1 Wire Cable TV · 1/16 Sect. Line · Bobby G. Wright & Beverly A. Wright WD · 6' Chain Link · 4" Woven Wire & B/W · Utility Esmt.

Existing Bridge Low Chord=781.10 · 55 MH Top Rim=780.73 FL=769.88 · 55 MH Top Rim=780.74 FL=755.44 · 5 Strand B/W · SPEED LIMIT45 M.P.H. · 4 WP 1 WT · 4 WP · HDWL & Wingwalls Buried · Asphalt · 12' · 4' · 78'

Lift Station 780.10 · Lift Station 778.39 · Roy L. Fuser & Sally Fuser Family Trust WD · Roy L. Fuser & Sally Fuser Family Trust WD · Utility Esmt.

PI 2340+32.52 · PT 2341+18.79 · PC 2341+18.75 · PT 2342+45.42 · PI 2341+84.36 · PC 2347+67.47 · PI 2348+08.13 · PT 2348+91.67 · PC 2348+92.32 · PT 2349+55.91

1/4 Section Line N 1/4 49 12.4" W

LEGEND: ASPH. RDWY. · ASPH. SHLDR.

BM #5 – Chiseled "X" on S. HDWL Sta 339+07.08 22.30' RT ℄ Survey US 60 Elev 781.25

BM #6 – Chiseled Box on NE end of Bridge Sta 345+48.40 15.93' LT ℄ Survey US 60 Elev 785.66

BM #7 – 60d w/Brace in 12" Pecan Sta 350+17.91 114.69' RT ℄ Survey US 60 Elev 774.66

STA. 2340+65.00 BEGIN US 60 DETOUR CONST. J/P NO. 24273(04)

STA. 2349+46.52 END US 60 DETOUR CONST. J/P NO. 24273(04)

EXIST. GROUND @ C.R.L. US 60 DETOUR

PROFILE GRADE US 60 DETOUR

PVI 2340+65.00 ELEV 780.87 · PVC 2342+79.34 ELEV 778.41 · PVT 2344+79.34 LO 2344+79.34 ELEV 777.27 · PVC 2345+46.52 LO 2345+46.52 ELEV 777.27 · PVI 2348+46.52 ELEV 782.00 · PVI 2343+79.34 ELEV 777.27 · PVI 2346+46.52 ELEV 777.27 · PVRC 2347+46.52 ELEV 779.63 · PVT 2349+46.52 ELEV 782.47

L=200.00' K=175 V=60 · L=200.00' K=85 V=40 · L=200.00' K=106 V=55

-1.144% · +0.000% · 2.363% · 2.363% · 0.474%

+72.00 LT ℄ 780.30 · +85.10 RT ℄ 779.74 · +89.10 LT ℄ 775.84 · +99.47 RT ℄ 776.25 · +19.79 RT ℄ 773.71 · +34.55 LT ℄ 773.37 · +00.00 RT ℄ 773.24 · +04.50 LT ℄ 772.57 · +01.82 LT ℄ 771.66 · +17.33 RT ℄ 772.94 · +87.80 RT ℄ 770.51 · +17.81 RT ℄ 769.18 · +55.04 LT ℄ 772.54 · +24.44 LT ℄ 773.43 · +31.00 LT ℄ 775.06

SP. DT. RT · SP. DT. LT.

T1 STA 2346+10.25 CONST. TEMP. 3-108"x130' LG. RCP XD SKEW 35° ℄ IN 765.14 ℄ OUT 763.87

HYDRAULIC DATA

TOTAL DA = 22.70 SQ MI	Q100= 10000 cfs
CONTROLLED DA = 0.00 SQ MI	V100= 13.44 fps
EFFECTIVE DA = 22.70 SQ MI	CHW100 = 779.83
Q2 = 1700 cfs	CONTRACTION SCOUR = 2.97'
V2 = 3.94 fps	PIER SCOUR = 32.89'
CHW2 = 773.65	TOTAL SCOUR = 35.86'
Q5 = 3150 cfs	Q500 = 15100 cfs
V5 = 5.79 fps	V500 = 8.19 fps
CHW5 = 775.12	CHW500 = 782.83
Q10 = 4470 cfs	CONTRACTION SCOUR = 11.77'
V10 = 7.26 fps	PIER SCOUR = 18.01'
CHW10 = 776.02	TOTAL SCOUR = 29.78'
Q25 = 6590 cfs	BRIDGE LENGTH = 245.52'
V25 = 9.10 fps	Q-OT > Q500
CHW25 = 777.50	Q-DETOUR=1820 cfs
Q50 = 8300 cfs	V-DETOUR=10.23 fps
V50 = 11.16 fps	CHW-DETOUR=775.72
CHW50 = 778.66	DETOUR OT=2.25 cfs

795 · 790 · 785 · 780 · 775 · 770 · 765 · 760 · 755

781.25 · 781.08 · 780.88 · 780.97 · 780.47 · 780.51 · 779.32 · 777.09 · 778.19 · 775.25 · 777.45 · 774.02 · 777.27 · 773.50 · 777.44 · 765.12 · 778.66 · 773.98 · 780.76 · 775.30 · 782.15 · 775.30 · 782.58 · 781.84

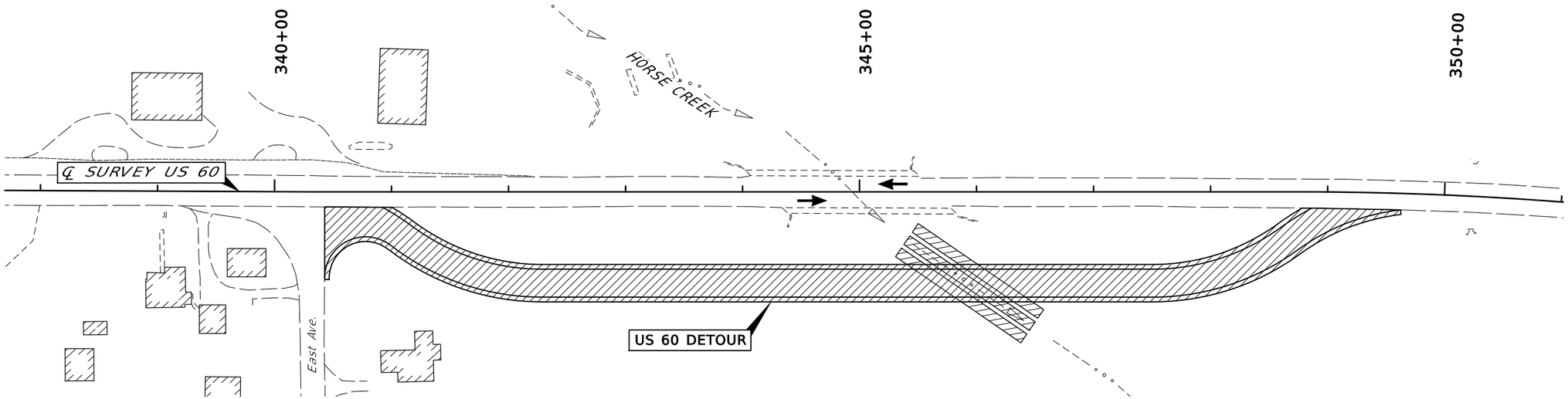
2337+00 · 2340+00 · 2345+00 · 2350+00 · 2352+00

US 60 (2)

COUNTY OTTAWA HIGHWAY US-60 STATE JOB NO. 24273(04) SHEET NO. 6

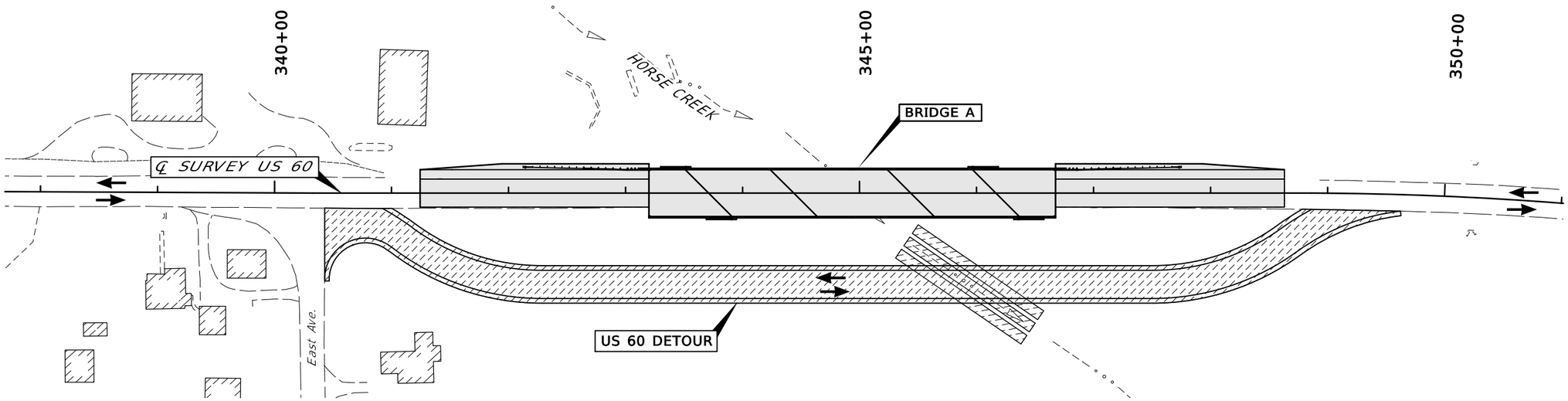
OKLAHOMA DEPARTMENT OF TRANSPORTATION

Preliminary Plan Field Review Meeting
MARCH 2016



PHASE 1

PHASE 1		
ITEM	**CONSTRUCTION**	**TRAFFIC**
US 60	No construction	On existing US 60
Detour	Construct	
Bridge A	No construction	



PHASE 2

PHASE 2		
ITEM	**CONSTRUCTION**	**TRAFFIC**
US 60	Sta. 341+24.36 to Sta. 348+63.06 except south shoulder, guardrail widening and foreslope	On Detour, existing US 60
Detour	No construction	
Bridge A	Construct	

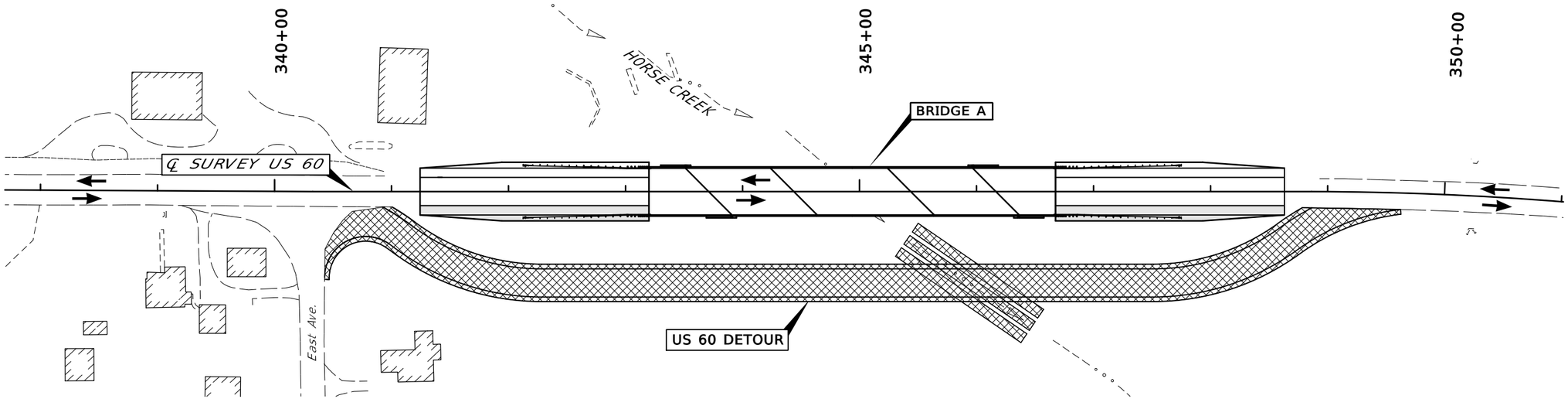
LEGEND

- CONSTRUCTION
- TEMPORARY CONSTRUCTION
- COMPLETED CONSTRUCTION
- COMPLETED TEMPORARY CONSTRUCTION
- TEMPORARY CONSTRUCTION REMOVAL

DESIGN			OKLAHOMA DEPARTMENT OF TRANSPORTATION
DRAWN			**SUGGESTED CONSTRUCTION SEQUENCE (1)**
CHECKED			
APPROVED			
SQUAD			

COUNTY OTTAWA HIGHWAY US-60 STATE JOB NO. 24273(04) SHEET NO. 7

3/24/2016 12:07:08 PM
P:\ECIV\650-TUL\CIV\406I0I0000_0D0THorseCrk\20_DESGN\40_CAD\Dgn\US_60\C\24273(04)_C_Const_Seq_01.dgn



PHASE 3

PHASE 3		
ITEM	**CONSTRUCTION**	**TRAFFIC**
US 60	Construct South shoulder, guardrail widening and foreslope	On proposed US 60
Detour	Remove	
Bridge A	No construction	

LEGEND

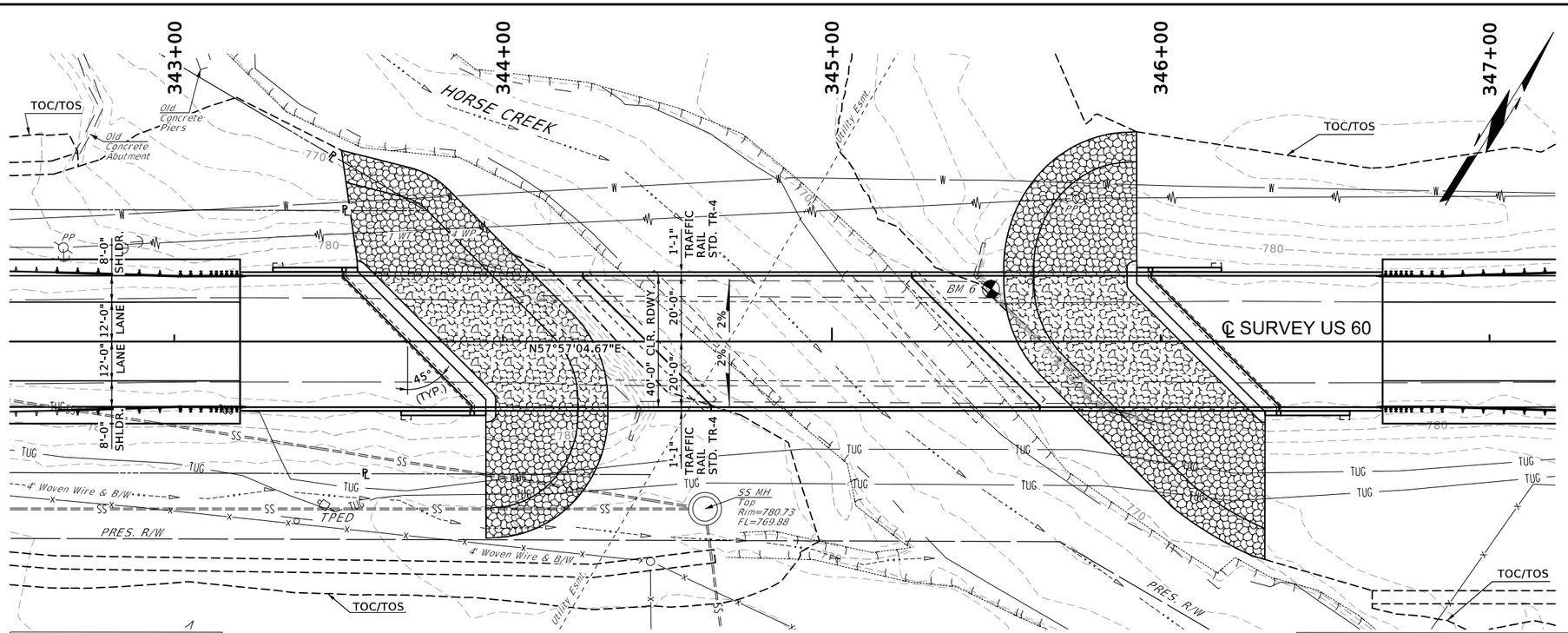
- CONSTRUCTION
- TEMPORARY CONSTRUCTION
- COMPLETED CONSTRUCTION
- COMPLETED TEMPORARY CONSTRUCTION
- TEMPORARY CONSTRUCTION REMOVAL

DESIGN			OKLAHOMA DEPARTMENT OF TRANSPORTATION
DRAWN			**SUGGESTED CONSTRUCTION SEQUENCE (2)**
CHECKED			
APPROVED			
SQUAD			

COUNTY OTTAWA HIGHWAY US-60 STATE JOB NO. 24273(04) SHEET NO. 8

OKLAHOMA DEPARTMENT OF TRANSPORTATION

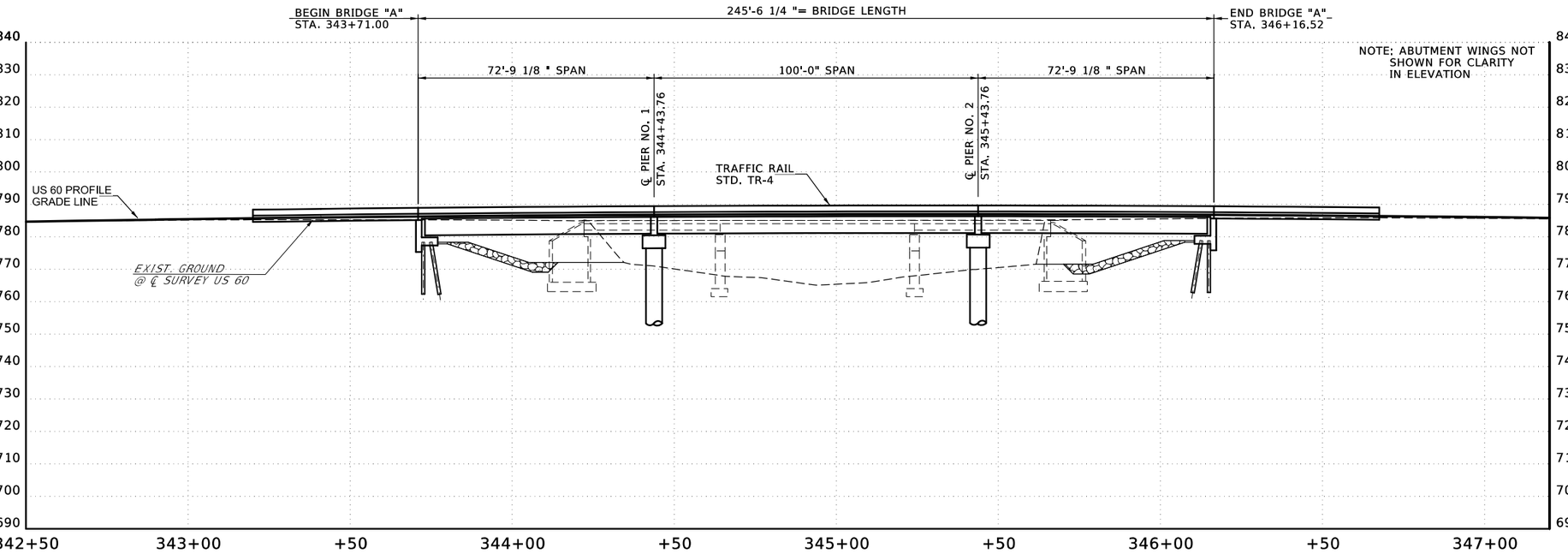
Preliminary Plan Field Review Meeting
MARCH 2016



BM #5 - Chiseled "X" on S. HDWL
Sta 339+07.08 22.30' RT
℄ Survey US 60 Elev 781.25

BM #6 - Chiseled Box on NE end of Bridge
Sta 345+48.40 15.93' LT
℄ Survey US 60 Elev 785.66

PLAN
SCALE: 1" = 20'



ELEVATION
SCALE HORIZ, 1" = 20'
VERT, 1" = 20'

DESIGN DATA

LOADING: HL-93 OR OKLAHOMA OVERLOAD TRUCK
20 PSF FUTURE WEARING SURFACE.

LRFR OPERATING RATING = XX.X

DESIGN: AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS 7TH EDITION, EXCEPT FOR BEARING PADS WHICH SATISFY AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 16TH EDITION WITH 1996 INTERIMS, USING HL-93 LIVE LOADING.

MATERIAL:

CONCRETE:	
CLASS AA	f'c = 4,000 PSI
CLASS A	f'c = 3,000 PSI
REINFORCING STEEL:	Fy = 60,000 PSI
STRUCTURAL STEEL:	Fy = 36,000 PSI
M270 (GRADE 50W)	Fy = 50,000 PSI

FOUNDATION DATA

ABUTMENTS (HP 12X53 PILING)

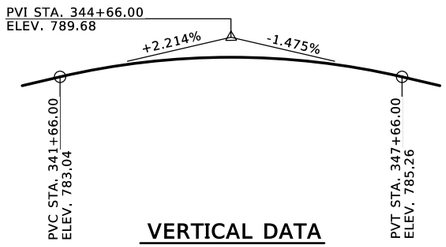
FACTORED PILE REACTION = XX.X TONS/PILE
THE LENGTH OF STEEL PILING SHOWN ON THE PLANS IS FOR ESTIMATING PURPOSES ONLY.

PIERS 1 AND 2 (XX" DRILLED SHAFTS)

MAX. FACTORED LOAD	= XXX T/SHAFT
FACTORED FRICTION RESISTANCE (9 TSF)	= XXX T/SHAFT
FACTORED BEARING RESISTANCE (60 TSF)	= XXX T/SHAFT
TOTAL FACTORED RESISTANCE	= XXXX T/SHAFT
BEARING RESISTANCE FACTOR	= X.X
FRICTION RESISTANCE FACTOR	= X.XX
FRICTION DEPTH OF ROCK NEGLECTED (FEET)	= X

HYDRAULIC DATA

TOTAL DA = 22.70 SQ MI	Q50 = 8300 cfs
CONTROLLED DA = 0.00 SQ MI	V50 = 11.16 fps
EFFECTIVE DA = 22.70 SQ MI	CHW50 = 778.66
Q2 = 1700 cfs	Q100= 10000 cfs
V2 = 3.94 fps	V100= 13.44 fps
CHW2 = 773.65	CHW100 = 779.83
Q5 = 3150 cfs	Q500 = 15100 cfs
V5 = 5.79 fps	V500 = 8.19 fps
CHW5 = 775.12	CHW500 = 782.83
Q10 = 4470 cfs	BRIDGE LENGTH = 245.52'
V10 = 7.26 fps	Q-OT > Q500
CHW10 = 776.02	Q-DETOUR=1820 cfs
Q25 = 6590 cfs	V-DETOUR=10.23 fps
V25 = 9.10 fps	CHW-DETOUR=775.72
CHW25 = 777.50	DETOUR OT=2.25 cfs



VERTICAL DATA

TO BE REMOVED EXISTING BRIDGE ℄ STA. 344+92.85
42'-60'-42' I BEAM SPANS
24' RDY. & 2-5.1' SIDEWALKS SKEW 44°30'00"

DESIGN	KSJ	01/16
DRAWN	WZB	01/16
CHECKED	STF	01/16
APPROVED	SAK	01/16
SQUAD	LEIDOS	

OKLAHOMA DEPARTMENT OF TRANSPORTATION

US 60 OVER HORSE CREEK BRIDGE "A"

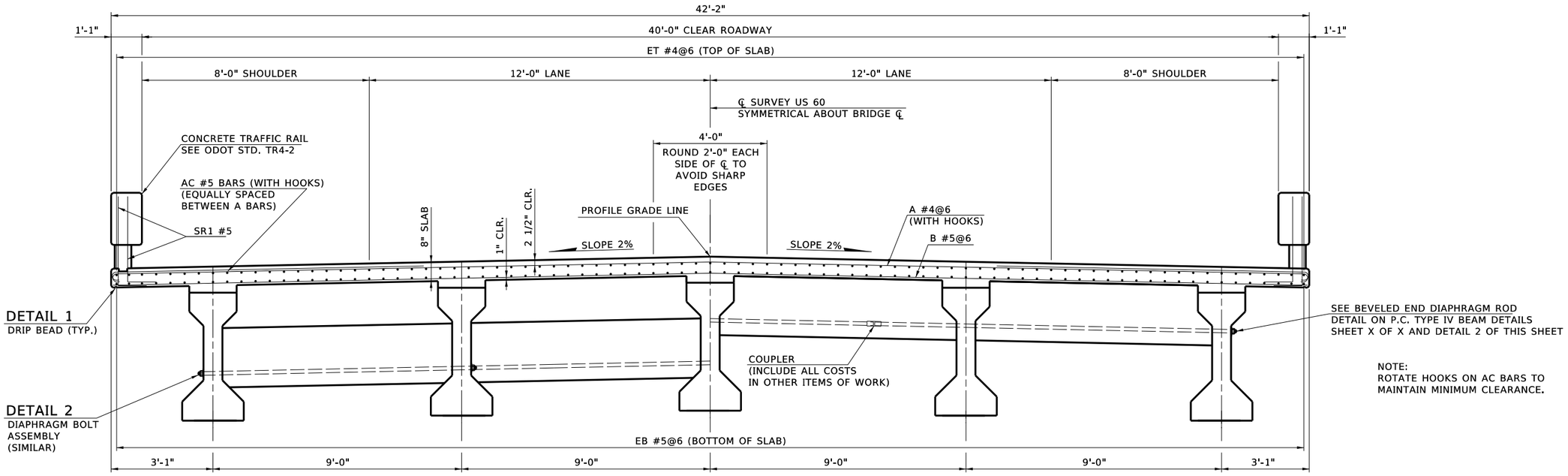
GENERAL PLAN AND ELEVATION

CONSTRUCT NEW 70'X100'X70' TYPE IV P.C. BEAM SPANS WITH CONCRETE RAIL (TR-4) WITH 40' CLEAR ROADWAY AT ℄ US 60 SURVEY STA. 344+93.76

COUNTY OTTAWA HIGHWAY US-60 STATE JOB NO. 24273(04) SHEET NO. 9

OKLAHOMA DEPARTMENT OF TRANSPORTATION

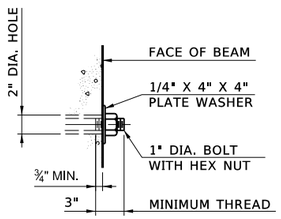
Preliminary Plan Field Review Meeting
MARCH 2016



HALF SECTION AT INTERMEDIATE DIAPHRAGMS

TYPICAL SECTION THRU STRUCTURE

HALF SECTION AT END DIAPHRAGMS

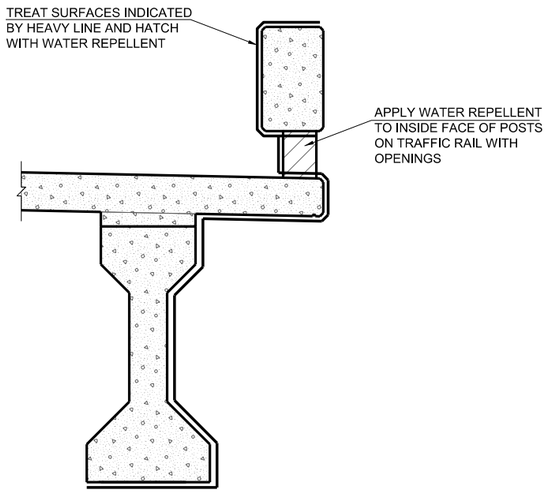


DETAIL 2

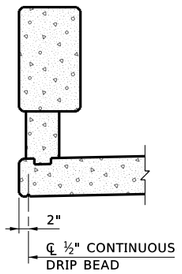
DIAPHRAGM BOLT NOTES

1. STRUCTURAL STEEL FOR DIAPHRAGM BOLTS AND PLATE WASHERS SHALL CONFORM TO AASHTO M270 (ASTM A709) GRADE 50W (WEATHERING STEEL, CHARPY V-NOTCH TESTING NOT REQUIRED). A #10 REINFORCING BAR CONFORMING TO AASHTO M31, GRADE 60, AND THREADED AT THE ENDS AS SHOWN MAY BE SUBSTITUTED FOR THE DIAPHRAGM BOLTS, AT NO ADDITIONAL COST TO THE DEPT. HEX NUTS SHALL CONFORM TO AASHTO M291 (ASTM A563).

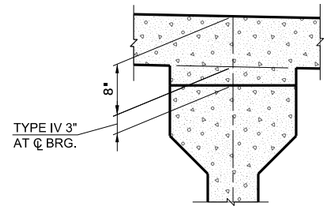
2. PAINT EXPOSED DIAPHRAGM BOLT, PLATE WASHER AND HEX NUT WITH TWO (2) COATS OF ZINC-RICH PAINT (6 MIL MINIMUM THICKNESS) AFTER ASSEMBLY. ALL COST OF DIAPHRAGM BOLT, PLATE WASHER AND HEX NUT TO BE INCLUDED IN CONTRACT UNIT PRICE FOR STRUCTURAL STEEL.



WATER REPELLENT TREATMENT DETAIL
SCALE: ½" = 1'-0"



DETAIL 1



BEAM HAUNCH DETAIL
SCALE: 1" = 1'-0"

NOTE:

PLAN QUANTITIES FOR CLASS AA CONCRETE INCLUDE BEAM HAUNCHES. THE HAUNCH HEIGHT SHOWN IS THE THEORETICAL HAUNCH HEIGHT AT THE CENTERLINE BEARING ONLY, MEASURED FROM THE BOTTOM OF THE DECK SLAB TO THE TOP OF THE BEAM, AND VARIES ACROSS THE SPAN. DETERMINE THE ACTUAL HAUNCH HEIGHT (ACCOUNTING FOR BEAM CAMBER, DEAD LOAD DEFLECTION AND ROADWAY GRADE) AFTER ERECTION OF THE BEAMS AND SUBMIT TO THE ENGINEER FOR APPROVAL. THE ENGINEER WILL NOT MEASURE DIFFERENCES BETWEEN THE THEORETICAL AND THE ACTUAL HAUNCH HEIGHT FOR PAYMENT.

DESIGN	KSJ	01/16
DRAWN	JT	01/16
CHECKED	STF	01/16
APPROVED	SAK	01/16
SQUAD	LEIDOS	

OKLAHOMA DEPARTMENT OF TRANSPORTATION

US 60 OVER HORSE CREEK — BRIDGE "A"

TYPICAL SECTION

COUNTY OTTAWA HIGHWAY US-60 STATE JOB NO. 24273(04) SHEET NO. 10