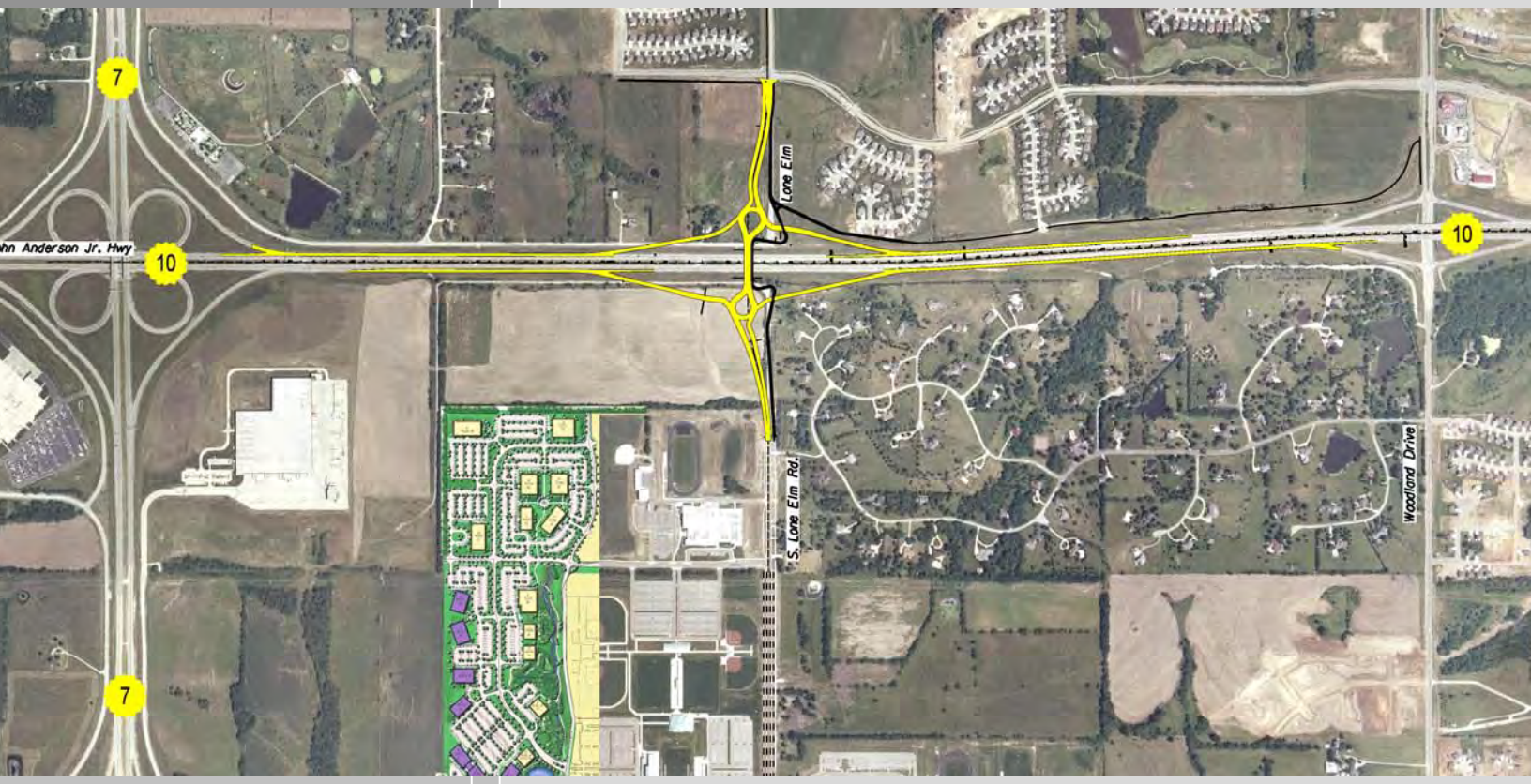
Burns & McDonnell
SINCE 1898

TranSystems

Supplemental Information for the K-10 Break-In-Access Study Lone Elm Interchange

June 1, 2009



KANSAS DEPARTMENT OF TRANSPORTATION

OLATHE KANSAS

Lenexa KANSAS

June 3, 2009

Mr. Steve Schooley
Transportation Manager
City of Lenexa, Kansas
12350 W. 87th Street Parkway
Lenexa, KS 66215

Transmittal Letter
K-10 Break-In-Access Study
Lone Elm Interchange

Dear Mr. Schooley:

Burns & McDonnell is pleased to submit the Final K-10 Break-In-Access Study report and the Supplemental Information for the K-10 Break-In-Access Study report for the Lone Elm Interchange. Thank you for selecting our firm to complete this report for the City of Lenexa.

Approval for the proposed K-10 Break-In-Access for the Lone Elm Interchange will be an important transportation infrastructure improvement to facilitate future developments planned in the City of Lenexa, the City of Olathe and western Johnson County. We have enjoyed working on this project with you. We look forward to completing the development of the aesthetic concepts for the Lone Elm gateway into Lenexa as well as presenting the proposed interchange concepts to local public officials and the public information process for this project.

Sincerely,

Kimberly D. Curry, P.E.
Project Manager

Enclosures: Break-In-Access Study and Supplemental Information for the Break-In-Access Study

cc: Steve King
Dave Schwartz
Melissa Caulfield
Jeff McKerrow

9400 Ward Parkway
Kansas City, Missouri 64114
Tel: 816-333-9400
Fax: 816-333-3690
http://www.burnsmcd.com

Supplemental Information for the K-10 Break-in-Access Report

Lone Elm Interchange

Prepared for

City of Lenexa, Kansas

Final Report
June 1, 2009

KDOT Project (K) 10-46 KA-0291-01

Burns & McDonnell Project 47634

Prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

With subconsultants

TranSystems
Kansas City, Missouri

INDEX

Supplemental Information for the K-10 Break-in-Access Report
Lone Elm Interchange
City of Lenexa, Kansas

KDOT Project (K)10-46 KA-0291-01
Burns & McDonnell Project No. 47634

Report Index

Table of Contents

List of Exhibits

List of Exhibits

List of Exhibits

Project Introduction

The primary purpose of this project is to obtain Break-in-Access (BIA) approval for a new interchange on K-10 at Lone Elm. The purpose of the proposed interchange is to provide access for development related growth in Lenexa, Olathe and other areas in western Jackson County as noted in the June 1, 2009 *Break-in-Access Report: K-10 Highway and Lone Elm Road, Lenexa, Kansas* (TranSystems Break-in-Access Report) prepared by TranSystems for the City of Lenexa, Kansas.

The proposed interchange location is located within the Cities of Lenexa (north of K-10) and Olathe (south of K-10) between the existing K-7 and Woodland Interchanges. Improvements to be included with this project are the extension of Lone Elm Road between Lenexa and Olathe, construction of a new grade separation structure on Lone Elm at K-10, and associated interchange ramps. Auxiliary lanes along K-10 between Woodland Road and Lone Elm and between Lone Elm and K-7 will also be constructed inclusive with the project.

The following items are addressed in the roadway evaluation report:

Project Location and Features
Design Standards
Traffic Forecasts and Accident Data
Typical Sections for K-10, Interchange Ramps and Lone Elm
Interchange Alternative Geometry (Horizontal and Vertical)
Bridge Options for Each Alternative
Drainage Impacts
Safety Evaluation
Coordination of Interchange with Future K-10 improvements
Cost/Benefit Review of Each Alternative
Recommendations

Preliminary BIA concept approval was received from the Kansas Department of Transportation (KDOT) on July 12, 2006 (Appendix A) based on their review of the *K-10 Interchanges Comprehensive Final Report* prepared jointly by HNTB and HDR for KDOT, the City of Lenexa and the City of Olathe. That report comprehensively addressed three interchanges along K-10 at Lone Elm, Clare Road and Prairie Star Parkway. This study is to provide additional analysis for the Lone Elm interchange as requested in the concept approval.

Project Location and Features

Project (K)10-46 KA-0291-01 includes the proposed interchange at K-10. The project will include the re-alignment and re-construction of Lone Elm from 101st Street to approximately 1500 feet south of K-10. In addition, auxiliary lanes will be included as warranted on K-10 between the K-7 interchange to the west and the Woodland interchange to the east. A project location map is included in Appendix B.

KDOT completed the project surveys, providing mapping from K-7 to Woodland along K-10

including coverage along Lone Elm from College Blvd in Olathe to 101st Street in Lenexa. The surveys established existing K-10 mainline, Lone Elm and Woodland alignments. Section corner information, drainage structure surveys, property ownerships and existing right-of-way information were included.

Access Policy Justification

There are three requirements for justification of a non-interstate new interchange as noted in the Kansas Department of Transportation document *Interchanges, Requests for New or Modified Access Points and Access Planning* dated December 1, 2005. The first criteria for non-interstate systems is to have no adverse impact on the safety and operations of the freeway facility based on an analysis of current and future traffic. The results of the traffic analysis indicate that the safety and operation of K-10 as indicated by the level of service (LOS) is not adversely impacted by the proposed Lone Elm interchange improvements for both current and future traffic volumes. The operational analysis is included on pages 8 through 25 of the TranSystems Break-in-Access Report.

The second criterion is that the proposed interchange should be consistent with local and regional land use and transportation plans. As noted in the TranSystems Break-in-Access Report, The City of Lenexa has coordinated local roadway improvements that will support the proposed Lone Elm Interchange through local capital improvement plans and the regional Transportation Improvement Program. The need for several new interchanges is recognized by several city and regional agencies. The proposed Lone Elm interchange is included in the City of Lenexa's Comprehensive Plan and Transportation Plan. In addition Lone Elm was identified as a possible future interchange in the *K-10 Transportation Study* completed in May 2005 by HDR and HNTB.

The final criteria to satisfy relates to the requirements for a corridor study when there is the potential for several new or modified interchanges in the region. As noted above, two studies were completed along the K-10 corridor identifying possible new and improved interchanges along the K-10 corridor.

New interchanges on the interstate system require eight justification criteria to be satisfied. Although K-10 is not an interstate system, all eight justification criteria required for an interstate system are justified in the TranSystems Break-in-Access Report.

Design Criteria

Design Criteria summaries were developed for each element of the proposed interchange alternative scenarios including K-10 existing, K-10 interim, K-10 future, Lone Elm and are located in Appendix C. The following items are included in each summary:

- Functional Classification.
- Control of Access.
- AADT.

- Design Speed.
- Clear Zone.
- Superelevation.
- Existing Typical Section.
- Lighting.
- Existing Roadway.

The following resources were referenced for developing design criteria:

- A Policy on Geometric Design of Highways and Streets (2004) (AASHTO)
- Roadside Design Guide, 3rd Edition 2006 (AASHTO)
- KDOT Road Design Manual (November, 2007)
- KDOT Standard Plans and Details
- City of Lenexa, Kansas Construction Documents
- City of Olathe, Kansas Technical Specifications and Standard Details
- Guide for the Development of Bicycle Facilities (1999)(AASHTO)

Typical Sections

The existing and proposed typical sections for each roadway are included in Appendix D. Three different typical sections were developed for K-10. The existing section indicating the current roadway is included with the Ultimate Future configuration and the Proposed Interim configuration. The proposed interim typical section includes improvements to be made at the time the interchange is initially constructed. The ultimate future configuration was evaluated to determine right-of-way impacts and compatibility with future improvement to K-10 and the K-7/K-10 interchange full build-out attributed in year 2030.

The ramp typical section is based on a standard Kansas Department of Transportation design with a 14-foot lane and 2-foot inside shoulder at a 1.6% cross slope and an 8-foot outside shoulder at a 4.2% cross slope. Additional turn lanes were added to the exit ramps approaching the ramp terminal intersections as determined by the traffic operation analysis.

The roadway design criteria of Lenexa and Olathe were reviewed as appropriate to develop a typical section for Lone Elm Road. Initially a sidewalk was included on one side with a shared-use path was included on the other side. Based on safety concerns for pedestrian and bicycle traffic at the ramp terminal intersections, the sidewalks and shared-use paths were combined to one shared use path on the east side. The median width will be varied as necessary to provide space for left turn lanes approaching 101st Street and the ramp terminal intersections. A common typical section will be used north of K-10 (Lenexa) and south of K-10 (Olathe).

Interchange Alternatives

Five interchange alternatives were reviewed as follows: (1) Diamond Interchange with Lone Elm over K-10: (2) Diamond Interchange with Lone Elm under K-10: (3) Tight Diamond

Interchange with Lone Elm over K-10: (4) Tight Diamond Interchange with Lone Elm under K-10: and (5) Single Point Urban Interchange with Lone Elm Over K-10. Specific impacts were evaluated for each alternative and included user impacts, adjacent property impacts, fiscal impacts of construction and long term maintenance impacts. Each alternative is addressed individually below.

In all cases it was assumed that there would not be any modifications to the K-10 profile. All interchanges were reviewed with an ultimate future K-10 comprised of four through lanes in each direction. Benefits and disadvantages for each interchange were developed included those with cost associated as well as aesthetic, right-of-way takings, house/structure impacts and impacts to other property characteristics.

Diamond Interchange – Lone Elm Over K-10

The first alternative reviewed was a traditional diamond interchange with Lone Elm carried over K-10. Figures indicating the alignments and profiles used in this evaluation are included for reference in Appendix E. Benefits for this alternative include:

- This option is the least expensive of the interchange concepts reviewed.
- No modifications are anticipated for the 42-inch water transmission line currently under construction by the City of Olathe.
- There may also be more aesthetic opportunity for K-10 traffic.
- This alternative may allow the use and modification of existing storm sewer and cross road structures in place.

There are also several disadvantages to this alternative as follows:

- This option has the most right-of-way impacts.
- Two homes would be severely impacted by fill spill slopes unless retaining walls are constructed which would save one house.
- Ramp embankment may be a less desirable visual element to the adjacent property owners.
- One pond will need to be eradicated.
- Contractor furnished material will be required.

Diamond Interchange – Lone Elm Under K-10

The second traditional diamond interchange alternative reviewed entailed a profile that carries Lone Elm under K-10 profile. Figures indicating the alignments and profiles used in this study are included in Appendix F. Benefits of this alternative include:

- Minimal visual impacts to the adjacent properties due to Lone Elm and Ramp embankments.
- No contractor furnished material would be needed.
- Use of a small retaining wall could save a pond at one property.

Numerous disadvantages to this option include:

- Anticipation of excessive waste excavation including rock. Limited geotechnical information from the Olathe waterline project indicates the presence of rock. Rock

excavation quantities were not estimated. It is expected that rock excavation and waste will be more expensive than soil and the opinion of cost for this alternative could be low.

- The location of the rock also limits the ability to modify the water transmission line across K-10 due to expensive construction techniques required to place the waterline in rock. A possible waterline realignment has been proposed which would increase the costs to Olathe.
- There was no significant improvement to the right-of-way takings for this alternative. Reconstruction of some existing Lone Elm storm sewer systems and cross road pipes would be needed due to excavation.
- This alternative was significantly more expensive than the Diamond Interchange for Lone Elm over K-10.

Tight Diamond Interchange – Lone Elm Over K-10

Benefits and disadvantages for this alternative are similar to the standard diamond interchange. The primary differences are the tight diamond requires less right-of-way and more retaining wall. Figures indicating the alignments and profiles used in this study are included in Appendix F. Benefits include:

- The tight diamond interchange with Lone Elm over K-10 is the second least expensive alternative.
- Modifications are anticipated for the waterline design/build project currently under design by the City of Olathe.
- There may also be more aesthetic opportunity for K-10 traffic.
- This alternative may allow the use and modification of existing storm sewer and cross road structures in place.
- This alternative requires the least amount of right-of-way.

There are also several disadvantages:

- One home would be impacted without the use of retaining walls, but could be saved with the use of a retaining wall.
- Ramp embankment may be a less desirable visual element to the adjacent property owners.
- One pond will need to be eradicated.
- Contractor furnished material will be required.
- More retaining wall would be required to construct the tight ramps adjacent to mainline K-10.

Tight Diamond Interchange – Lone Elm Under K-10

The second tight diamond interchange alternative reviewed was for a Lone Elm under K-10 profile. Figures indicating the alignment and profile information for this alternative are included in Appendix H. Benefits of this alternative include:

- Minimal visual impacts to the adjacent properties due to Lone Elm and Ramp embankments.
- No contractor furnished material would be needed.
- Use of a small retaining wall could save a pond at one property.

Disadvantages to this option include:

- Anticipation of excessive waste excavation including rock. Limited geotechnical information from the Olathe waterline project indicates the presence of rock. Rock excavation quantities were not estimated. It is expected that rock excavation and waste will be more expensive than soil and the opinion of cost for this alternative could be low.
- The location of the rock also limits the ability to modify the waterline across K-10 due to expensive construction techniques required to place the waterline in rock. A possible waterline realignment has been proposed which would increase the costs to Olathe.
- There was no significant improvement to the right-of-way takings for this alternative. Reconstruction of some existing Lone Elm storm sewer systems and cross road pipes would be needed due to excavation.
- This alternative was significantly more expensive than the Diamond Interchange for Lone Elm over K-10.

Single Point Urban Interchange – Lone Elm Over K-10

A single point urban interchange was reviewed based on recommendations made in the November 20, 2006 *K-10 Interchanges Comprehensive Final Report* prepared by HNTB and HDR for KDOT and the Cities of Lenexa and Olathe, Kansas. For this interchange only the Lone Elm over K-10 profile was reviewed. The main benefit of this alternative is that it would require less right-of-way than the other alternatives. It was determined during the traffic study as noted in the *Break-in-Access Report K-10 Highway and Lone Elm Road* prepared for the City of Lenexa, Kansas dated June 1, 2009 that a single point urban interchange was not warranted at this location due to traffic needs. Figures indicating the alignment and profile information for this alternative are included in Appendix I.

This alternative is significantly more expensive than the other alternatives. Primary contributing factors to the cost are:

- The amount of contractor furnished material may be increased over the other Lone Elm over K-10 options, due to additional height of embankment needed to accommodate the bridge structure for a single point interchange.
- Up to two houses would be impacted by this alternative.
- One pond would be impacted without the use of a protective retaining wall.
- A substantial amount of retaining wall structures would be needed for this alternative.

Property and Right-of-Way Considerations

All interchange alternatives were evaluated for impacts to adjacent properties. General impacts are similar for each alternative. Variations would include the amount of area needed for right-of-way at each property impacted. In a few cases some structural features would be impacted. Impacts will be discussed by quadrant regions of the interchange.

Northwest Quadrant (Lenexa)

There are several houses north of K-10 in the northwest quadrant of the Lone Elm interchange. One house is directly impacted due to construction of Ramp A. The existing K-10 frontage road will be eliminated within the limits of the interchange and auxiliary lane construction. Other properties are impacted indirectly through the loss of access. Use of retaining walls or other structural measures to minimize the impacts should be carefully considered with the future full build development in mind. Right-of-Way north along Lone Elm in this quadrant has been preserved for the re-alignment of Lone Elm to the west along the Stake Center LDS Church property.

Northeast Quadrant (Lenexa)

The Stoneview Subdivision is located in the northeast quadrant of the proposed Lone Elm interchange bounded by Lone Elm on the west, 101st Street on the north and K-10 on the south. Several lots in the subdivision will be impacted. Up to five lots with existing homes are impacted in the east phase of the subdivision. There are currently no houses on the west phase of the subdivision. Some grading has been completed in the west phase of the subdivision. Impacts to the Stoneview lots are increased due to the relocation of the bike/pedestrian trail to be constructed along the north K-10 right-of-way line and the east side of Lone Elm. Ramp and trail alignments, profiles and typical section elements will be reviewed as a part of the final design process to minimize the impacts where possible.

Southwest Quadrant (Olathe)

The southwest quadrant of the interchange is currently owned by the City of Olathe and is undeveloped. There are no existing structures in this area. The existing frontage road serves as access to a utility tower located between the Aldi distribution center and the proposed Kansas State Olathe Innovation Campus. Alternate access to the utility tower should be confirmed or provided due to the removal of the existing frontage road within the interchange area.

Southeast Quadrant (Olathe)

The construction of the proposed interchange impacts several properties in the Mill Creek Farm Subdivision. Tract number 48 as identified in the Kansas Department of Transportation Survey will require right-of-way across the corner tip and will lose one minor field entrance onto the existing Lone Elm Road. The property primary entrance is located on the interior subdivision road.

Tract number 49 requires right-of-way across the north half of the property fronting K-10. Property impacts also include probable loss of a pond and tree line along the existing K-10 right-of-way. The use of retaining walls, guard rail, embankment slope adjustments and ramp alignment modifications was evaluated to preserve the pond. Minimum criteria used in the evaluation of options to preserve the pond include maintaining a minimum 15-foot path around the pond. Retaining wall heights would vary up to 25 feet in height depending on the option. Some options may require retaining walls on both sides of the southeast ramp. Visual impacts of using retaining walls and guard rail to preserve the pond or other property features should also be considered.

Impacts to tract number 50 are minimal and would include right-of-way takings at the northwest corner of the lot and some impacts to a tree line along the existing right-of-way line and northwest property line. Ramp cross section elements could be reviewed to minimize impacts to this property.

Ramp Terminal Intersections

Both traditional ramp terminal intersections and roundabout intersections were evaluated for each diamond interchange alternative. The traditional ramp terminal intersections were assumed to be signalized. The eastbound and westbound K-10 exit ramps will require the addition of a right-turn lane at the Lone Elm terminal intersections. In addition the northbound and southbound Lone Elm approaches to the ramp terminal intersections would require the addition of right-turn lanes and median left-turn lanes at the K-10 entrance ramps.

The roundabout intersection types would require two lanes to serve the north-south Lone Elm movements. U-turn or left-turn movements from Lone Elm are not required at the exit ramp locations, therefore tear drop shaped roundabouts are recommended. Left-turn movements from the exit ramps onto Lone Elm and left turn movements from Lone Elm to the entrance ramps will only require a single lane at the roundabout.

Sidewalk and Shared-Use Paths

Initially, the sidewalk and shared-use paths were included on the Lone Elm typical section. During project discussion, it was agreed that pedestrian and bicycle traffic should be removed from the areas of the ramp terminal intersections for safety considerations.

The feasibility of grade separation structures along the ramps was reviewed. It was assumed that the structures would be comprises of a minimum 16-foot by 10-foot reinforced concrete box culvert structures. In order to meet current accessibility criteria, the path was placed on the east side of Lone Elm and recessed approximately 3.5 feet to minimize the vertical separation between the path on the bridge and the path at the ramp grade separation structures.

Lenexa is currently developing a federally funded Transportation Enhancement project (K)10-46 KA-0797-01 to construct a new pedestrian/bicycle path with landscaping and signing. The project extends from Woodland Road to Lone Elm Road and along Lone Elm north to 101st Street and west along the south side of 101st Street to Prairie Creek Road. This shared-use path will be contained within existing Kansas Department of Transportation and City of Lenexa right-of-way.

The construction of the shared-use path will require coordination with the construction of the new Olathe waterline. A portion of the shared-use path will be re-constructed with the proposed Lone Elm interchange. Right-of-way impacts are associated with the reconstruction of this shared-use path in the vicinity of the northeast ramp at the Lone Elm interchange.

There is an opportunity to provide grade separation structures for the shared-use path across

Lone Elm Road south of K-10 in Olathe and north of K-10 in Lenexa. This would provide pedestrian and bicycle access west of Lone Elm Road outside the roadway corridor. Figure O-7 indicates possible locations for grade separated multi-use path connections in Lenexa near Station 42+00 and Olathe near Station 58+00. The decision to use grade separation structures and the location of possible at-grade multi-use path connections to existing and future bicycle and pedestrian facilities will be coordinated with the respective cities.

Bridge Options

Several bridge options were developed for the Lone Elm over K-10 and K-10 over Lone Elm alternatives. Based on the span lengths required to accommodate proposed and future construction and the desire to minimize embankment height on Lone Elm, all bridge alternatives are assumed to be steel plate girder bridges. Use of retaining walls and placement of bridge supporting columns were varied to provide several alternative bridge configurations. Typical sections are included in Appendix J indicating the elevation view and bridge roadway section.

Initially, sidewalk on one side and a shared-use path on the other side were included on all bridge alternatives for the Lone Elm over K-10 alternative. After further review it was determined that pedestrian and bicycle traffic should be eliminated from the ramp terminal intersections for safety reasons. The recommended improvements include only a shared-use path on the east side of the Lone Elm bridge. The shared-use path may be recessed at an elevation below the driving deck to meet vertical profile requirements as noted above.

Several bridge options were reviewed for each alternative. In each case the most cost effective bridge option was selected for the comparative cost analysis. See Appendix I for a diagram of proposed bridge options used for the evaluation of alternatives.

Olathe Waterline Coordination

Coordination of the proposed Lone Elm improvements with the Olathe's 42-inch water transmission line currently under construction was considered in the evaluation of interchange alternatives. The proposed waterline was originally planned to be installed along the west side of Lone Elm Road within the existing right-of-way.

Impacts evaluated included the horizontal location of proposed roadway improvements for Lone Elm, K-10 and the associated interchange ramps. For each interchange type, two profile concepts were explored: Lone Elm over K-10 and Lone Elm under K-10. Waterline improvements across K-10 in the Lone Elm corridor are impacted by the height of roadway embankments, depth of excavation, location of paved areas and coordination with existing waterline and storm sewer appurtenances.

The proximity of rock to the existing ground surface was cost prohibitive for alternatives that carry Lone Elm under K-10. Following elimination of the Lone Elm under K-10 option, additional review of the impacts of the Lone Elm over K-10 with roundabout ramp terminal intersections was completed.

Upon further detailed evaluation, the height and extent of the finish grade for this alternative was significantly more than originally envisioned when initially conceived. Due to the recommendation and costs associated with additional pipe encasements for this option, a revised waterline alignment was suggested. The waterline would be relocated to the east side of Lone Elm just south of 101st Street and would run along the east side of existing Lone Elm to the northeast corner of the roundabout. The waterline then crosses Lone Elm to its originally proposed location. The original and modified waterline alignment is attached for reference in Appendix K. This option has several benefits including reduced waterline under pavement, reduced embankment over waterline and reduced steel pipe encasement.

Clear Zone Application

Clear zone requirements can be found in the design criteria noted in Appendix C. Clear zone applications for K-10 and the interchange ramps follow AASHTON and KDOT recommended dimensions for clear zones using 6:1 or flatter foreslopes for the appropriate design parameters relating to traffic volumes and design speed.

Several alternatives for the clear zone application along Lone Elm were reviewed. For the designated traffic and design speed, a clear zone of 20 to 22 feet would be required for 6:1 slopes or flatter. A clear zone of 24 to 28 feet would be required for 4:1 to 5:1 slopes. If 3:1 slopes are used, additional recovery area and right-of-way at the toe of slope may be required.

Several options were considered. Initially the typical section included a two-foot curb & gutter with a twelve-foot berm for green space, sidewalk and shared-use path and 3:1 foreslope. The clear zone for this application would require that a recovery area be protected at the toe of slope. The City of Lenexa would prefer to use no steeper than a 4:1 for embankment fill slopes. In addition, there was concern regarding the location of pedestrian and bicycle traffic crossing the ramp terminal intersections. The use of the twelve-foot berm with sidewalks and multi-use path along with the 3:1 embankment slope will no longer be considered. The conveyance of pedestrian and bicycle traffic across K-10 will be addressed under bridge options.

The width of the berm behind the curb & gutter could be narrowed to minimize the impacts due to embankment construction. Berm widths as narrow as two-feet were considered. Use of a narrower berm should consider protecting the back of curb from erosion effects, preventing vehicles from becoming high centered on the curb or berm, and providing a resting place outside the travelled way for a stopped vehicle.

A six-foot berm would be the narrowest berm that would provide a resting place outside the travelled say for a stopped vehicle and also prevent low riding vehicles from becoming high centered. Beyond the berm, 6:1 slopes for twelve feet could be considered to provide the narrowest clear zone possible at 20’. If 6:1 slopes are not used, a minimum clear zone of 24 feet should be provided free of obstacles.

Traffic Forecast

The traffic study report for the selected scenarios was prepared by TranSystems entitled *Break-in-Access Report: K-10 Highway and Lone Elm Road Lenexa, Kansas* dated June 1, 2009. As noted in the referenced report, capacity constraints on K-10 are related to mainline conditions and not as a result of the proposed interchange construction. The existing four-lane segment of K-10 is anticipated to exceed capacity between 2011 and 2013 based on projected traffic growth. The addition of one lane in each direction along K-10 will accommodate projected traffic volumes until approximately 2027 or 2028. The ultimate future eight-lane facility would provide adequate capacity to approximately 2040 based on the projected traffic growth trends. The impact projections on K-10 are independent of whether or not the proposed interchange is constructed.

An interim corridor improvement was suggested for the K-10/K-7 interchange which would provide interim improvements to the K-10 corridor prior to a full reconstruction of the K-7 interchange and braided ramp scenarios for the west ramps at Lone Elm. This improvement is identified as Scenario #3 in the Break-in-Access report referenced above. Improvements made with Scenario #3 include construction of CD roads along K-10 within the existing interchange area and reconstructing a portion of the interior loop ramps.

Fiscal Constraints

The proposed interchange meets the requirements of the most recent guidance on fiscal constraint. The project is fiscally constrained for both the Mid America Regional Council (MARC) Long Range Transportation Plan (LRTP) and the five-year Transportation Improvement Program (TIP). It has been assigned project number 224 under the LRTP. The estimated project cost based on the recommendations noted a the end of this report is $20,500,000 based on approval of this Break-in-Access Study.

Under the TIP program, the project is identified by TIP number 345055 and State number (K)10-46 KA-0291-01. This new construction project has been authorized for Preliminary Engineering (PE) and Right-of-Way (ROW) only.

Environmental Screening

Environmental screening was completed by the Environmental Services Section at the Kansas Department of Transportation. The initial screening report was completed September 2, 2008 and a screening area map and summary letter is attached in Appendix M. A Categorical Exclusion (CE) as defined under the National Environmental Protection Act of 1969 (NEPA) is anticipated for this project. Under current NEPA protocol, the FHWA will be able to act and approve the CE since it is included as a fiscally constrained project on the regional LRTP.

The preliminary environmental review included a review of the following items: Noise, Archeology, Cultural & Historical, Wetlands, Water Resources, Floodplains, Wildlife and

Hazardous Waste. Based on the preliminary review the following actions will be required. A traffic noise study will be required. An Activity II investigation will be required for Property #1 identified in a list of potential historic properties. If fill is placed in any jurisdictional waters, a US Army Corps of Engineers Section 404 permit will be required. If any bridges, culverts or channel changes are constructed on streams with drainage areas exceeding 240 acres, Dams, Stream Obstructions, and Channel Change permits will be required. If the project impacts suitable Redbelly snake or Smooth earth snake habitat a Kansas Department of Wildlife and Parks Action Permit would be required as well as required mitigation of designated critical habitat.

Signing Concepts

Conceptual freeway guide signing was developed for the K-10 corridor in the vicinity of the proposed Lone Elm Interchange. These guide signs were reviewed by KDOT staff and include revisions to several existing signs and the introduction of new signs between the I-435 and Cedar Creek Parkway interchanges. The majority of the new signs are overhead mounted on cantilever, butterfly or truss structures; however, no guide signs are currently proposed on the Lone Elm bridge over K-10. The conceptual signing plan is shown in Appendix N.

Aesthetic Concepts

Aesthetic concepts will be developed for this project for review and ultimate approval by the City of Lenexa. The goal of these concepts will be to provide engineered enhancements to the project that provide aesthetic benefit in a context sensitive environment. These engineered enhancements are intended to provide a more durable and cost effective visual treatments when considering long term impacts.

Durable aesthetic treatments are designed to serve engineering purposes in addition to meeting the aesthetic needs of a project. Therefore the treatments will be incorporated engineered elements, and not surface facades applied to project elements. Surface treatments tend to have a limited life and require more maintenance cost to preserve the visual aspects.

Public Involvement

A public involvement program will be completed for this project. Additional information will be provided following the completion of the public involvement activities.

Evaluation of Alternative Costs

Comparative construction costs for the selected alternatives were developed for key items including pavement, earthwork, drainage structures, storm sewer appurtenances, retaining walls, bridge costs and traffic signals. The related costs for each alternative considered only the

interchange. It was assumed that the cost for construction of auxiliary lanes would be similar for each alternative and therefore was not considered in the comparative analysis. A summary of items considered in the cost evaluation is included in Appendix O.

Using the diamond interchange with traditional signalized ramp terminal intersections as the base alternative, cost comparisons are presented as a percent increase or decrease.

Interchange Type	Lone Elm Profile	Ramp Terminal Intersection	Comparative Cost (Percent)
Diamond	Over K-10	Signalized	100 %
Diamond	Under K-10	Signalized	109 %
Tight Diamond	Over K-10	Signalized	106 %
Tight Diamond	Under K-10	Signalized	120 %
Single Point	Over K-10	Signalized	164 %
Diamond with Roundabouts	Over K-10	Roundabouts	95%

Following the initial review of the above interchange types, it was determined that the alternatives for the Lone Elm under K-10 profile would not be considered for further review. Roundabout intersections were not initially considered, but were suggested as the study progressed. Upon confirmation that the roundabouts met the desired operational characteristics, evaluation of the Lone Elm over K-10 with a diamond interchange and roundabout intersections was completed.

Diamond Interchange with Roundabout Ramp Terminal Intersections

The diamond interchange with Lone Elm over K-10 was also reviewed following a traffic analysis to verify adequate operational characteristics. Figures indicating alignment and profile information are included in Appendix P.

Roundabout ramp terminals provide several additional benefits in comparison with conventional intersections, predominantly by eliminating initial cost and maintenance of traffic signals. The roundabouts also provide unique opportunities for aesthetic enhancement. Overall cost for the diamond interchange with roundabout ramp terminal intersections is estimated to be approximately 95% of the cost of the same interchange with signalized intersections.

The height of fill for this interchange type will be increased over the length of the Lone Elm improvements to provide the recommended longitudinal approach slopes for the roundabouts. Other disadvantages would be similar to the diamond interchange with Lone Elm over K-10 and signalized ramp terminal intersections.

Additional cost analysis was completed for the diamond interchange with roundabout ramp terminal intersections to include the auxiliary lane construction from K-7 to Lone Elm and from Lone Elm to Woodland Road. The total project cost for this alternative is approximately thirteen million dollars. A summary of the supporting cost opinion is included in Appendix Q.

Recommendations

Based on the evaluation of the characteristics of the five interchange alternatives and one modification to the ramp terminal intersection treatment, the following recommendations are made for the design and construction of a new interchange at Lone Elm and K-10.

- A diamond interchange will be constructed at Lone Elm and K-10.
- Lone Elm would go over K-10.
- Roundabout intersections are proposed at the ramp terminals.
- Continuous auxiliary lanes will be constructed from the Woodland Road ramp gores to Lone Elm and from the K-10 ramp gores to Lone Elm.
- One multi-use pathway to be used by both pedestrian and bicycle traffic will be provided. The path will not cross ramp terminal intersections and will provide grade separated access across K-10.
- A proposed waterline being constructed by the City of Olathe will be located in the Lone Elm right-of-way.

The proposed interchange improvements meet the policy goals for a new access point as noted in the December 1, 2005 document: *Interchanges, Requests for New or Modified Access Points and Access Planning* included in the Kansas Department of Transportation Standard Operating Manual.

Appendix A

Break-In-Access Approval

KANSAS

DEPARTMENT OF TRANSPORTATION
DEB MILLER, SECRETARY

KATHLEEN SEBELIUS, GOVERNOR

TERRY HEIDNER, DIRECTOR

July 12, 2006

Mr. Ronald Norris, P.E.
Director of Public Works
12350 West 87th Street Parkway
Lenexa, KS 66215-2882

Dear Mr. Norris:

We have completed our review of the break-in-access study HNTB prepared on your behalf for the three new interchanges along K-10 Highway at Lone Elm Road, Clare Road and Prairie Star Parkway.

Lenexa and Olathe have worked closely with the Kansas Department of Transportation (KDOT) in preparing this break-in-access study over the last two years. We appreciate being included early and throughout the process. While this break-in-access study has been very complicated, your approach in including us early in the process has made our review of the request much easier. You have done everything we have asked in terms of analysis. The proposed interchange at Prairie Star Parkway is far enough away from other existing or proposed interchanges that it appears it will work, and we are giving conditional approval for that interchange pending any required environmental clearances. The rest of our comments apply only to the Lone Elm Road and Clare Road proposed interchanges.

Your analysis indicates the proposed overall concept (interchanges at Clare Road and Lone Elm Road and major improvements at existing K-7) will work. However, the American Association of State Highway and Transportation Officials (AASHTO) standards typically list desirable criteria and also minimum acceptable criteria for many highway features. The proposed Clare Road, K-7 and Lone Elm Road interchange complex has many features such as signing sight distance, weaving distances, etc. that meet only minimum acceptable criteria and some by only the slimmest of margins. This is not due to a poor design proposal, but is simply due to trying to locate too many interchanges too close together. Consequently we agree, based on the analysis, that the proposed overall concept may work, but we do have serious reservations about safety and efficiency related to driver decision making time and the ability of unfamiliar drivers to navigate the proposed interchange complex.

DIVISION OF PLANNING AND DEVELOPMENT
DWIGHT D. EISENHOWER STATE OFFICE BUILDING
700 S.W. HARRISON STREET, TOPEKA, KS 66603-3754
PUBLIC ACCESS AT NORTH ENTRANCE OF BUILDING
VOICE 785-296-2252 TTY 785-296-3585 FAX 785-296-7173 http://www.ksdot.org

As you know, the overall concept that we refer to includes major improvements to the K-10/K-7 interchange. KDOT does not have the funds to do this now and may not have them in a timeframe compatible with your desired schedule. Therefore, the next step is to analyze each interchange, Clare Road and Lone Elm Road, separately to see if it can work without the K-10/K-7 interchange improvements. If not, how much of the K-10/K-7 work would have to be done to make it work. We will consider each interchange individually following submission of the individual break-in-access reports, and then make a final determination as to whether we will approve the access breaks for Clare Road and Lone Elm Road.

To build two interchanges (Clare Road and Lone Elm Road) in such close proximity to a third interchange (K-7) and make it work is a very difficult engineering undertaking and will require a massive financial investment. We have to wonder about the benefit to cost ratio of such an investment as opposed to perhaps other alternatives that might yield slightly lower benefits but at a fraction of the cost. Certainly those are considerations for the cities to address as you move forward with your studies. We recognize the local desire for development opportunities along K-10 and the need for us to balance those local concerns with state transportation concerns. Thank you again for allowing us to work with you early in the process. We will make every effort to be timely, responsive and work toward an outcome we can all support.

If you have any questions, please feel free to call Chris Herrick at 785-296-3865 or Thomas Dow at 785-296-2552.

Sincerely,

Thomas C Dow for

Terry W. Heidner
Director of Planning and Development

DIVISION OF PLANNING AND DEVELOPMENT
DWIGHT D. EISENHOWER STATE OFFICE BUILDING
700 S.W. HARRISON STREET, TOPEKA, KS 66603-3754
PUBLIC ACCESS AT NORTH ENTRANCE OF BUILDING
VOICE 785-296-2252 TTY 785-296-3585 FAX 785-296-7173 http://www.ksdot.org

Lenexa
KANSAS

Department of Public Works
ACCREDITED AGENCY
A•P•W•A

May 24, 2006

Mr. Terry Heidner
Director of Transportation Planning
Kansas Department of Transportation
Eisenhower State Office Bldg.
700 SW Harrison Street
Topeka, Kansas 66603-3754

RE: BREAK-IN-ACCESS REQUEST for K-10 & LONE ELM ROAD,
K-10 & CLARE ROAD, and K-10 & PRAIRIE STAR PARKWAY

Dear Mr. Heidner,

The cities of Lenexa and Olathe are submitting a break-in-access request to the Kansas Department of Transportation for three new interchanges along K-10:

- K-10 at Lone Elm Road
- K-10 at Clare Road
- K-10 at Prairie Star Parkway

These three planned access points along K-10 are among the most important improvement projects for both of cities. The three new access points will help relieve traffic problems, improve access to community facilities and support economic development.

The Kansas Department of Transportation requires that a new access break provide the necessary documentation as required in Standard Operating Manual dated March 1, 1999. The Break-in-Access request submitted to KDOT on March 9, 2006 for the K-10 interchanges included the necessary engineering and operational analysis documenting that the proposed access breaks meet the eight requirements required by KDOT.

With this letter the City of Lenexa, in conjunction with a request from Olathe of the same under separate cover, requests KDOT approval for a break in access to K-10 at Lone Elm Road, Clare Road, and Prairie Star Parkway.

Thank you for your consideration of this request. If you have any questions or comments, please contact me as soon as possible.

Sincerely,

CITY OF LENEXA

Ronald Norris, P.E.
Director of Public Works

SRS/tlo

cc: Eric Wade, City Administrator
Rick Biery, Olathe Public Works Director
Tim Green, P.E., City Engineer
Steve Schooley, P.E., Transportation Manager

Letter to Terry Heidner 05-24-06 (2).doc

Appendix B

Location Map

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale

BY	DATE
REFERENCES NOTED	
REFERENCES CHECKED	

Drawn By : d_howard Plotted : 4/13/2009
File : ...\DGN\Exhibits\FigureB-1.dgn

KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM AT K-10
BREAK-IN-ACCESS STUDY
LOCATION MAP

FIGURE B-1

Appendix C

Design Criteria

K-10 Existing Mainline: Functional Classification = Rural Principal Arterial (Freeway)

Control of Access: Full

AADT: 45,700 (Existing); 49,800 (2012); 109,800 (2032)

Design Speed: 75 mph, Designated 70 mph on the plans.

Clear Zone: 34’

Superelevation: Table – 8% maximum; 2001Green Book, Page 161

Existing Typical Section:

PGL at inside edge of pavement

Median Width: 60’Existing (84’ CL to CL)

Lanes: 2 – 12’ lanes Each Direction

Shoulders: 10’ Outside & 6’ Inside

Cross Slopes: 1.6% Lanes, 4.2% Shoulders

Surfacing: Widening and/or Overlay TBD (To Be Determined)

Pavement Edge Wedge (Rock): TBD

Side Slopes: Fore = 6:1 for 21’ (24’ in Fill), Back = 4:1 or 3:1 for special conditions.

Ditch Width / Depth: 10’ / 3.5’

Minimum Ditch Slope: 0.3%, but 0.5% is preferred.

Bridge Width: 40’ Each Direction (Mainline Over)

Vertical Clearance: 16’ 4” on sideroads over and interchanges

Ramp Width: See Interchange Sideroads

Lighting: See Interchange Sideroads

Existing Roadway: N/A (New Construction)

K-10 Interim Mainline: Functional Classification = Rural Principal Arterial (Freeway)

Control of Access: Full

AADT: 45,700 (Existing); 49,800 (2012); 109,800 (2032)

Design Speed: 75 mph, Designated 70 mph on the plans.

Clear Zone: 34’

Superelevation: Table – 8% maximum; 2001Green Book, Page 161

Existing Typical Section:

PGL at inside edge of pavement

Median Width: 26’ with CSB median barrier

Lanes: 2 – 12’ lanes Each Direction

Shoulders: 10’ Outside & 13’ Inside (with Conc. Safety Barrier)

Cross Slopes: 1.6% Lanes, 4.2% Shoulders

Surfacing: Widening and/or Overlay TBD (To Be Determined)

Pavement Edge Wedge (Rock): TBD

Side Slopes: Fore = 6:1 for 21’ (24’ in Fill), Back = 4:1 or 3:1 for special conditions.

Ditch Width / Depth: 10’ / 3.5’

Minimum Ditch Slope: 0.3%, but 0.5% is preferred.

Bridge Width: 96.5’ (Mainline Over) or 2 @ 46.5’

Vertical Clearance: 16’ 4” on sideroads over and interchanges

Ramp Width: See Interchange Sideroads

Lighting: See Interchange Sideroads

Existing Roadway: N/A (New Construction)

K-10 Ultimate Mainline: Functional Classification = Rural Principal Arterial (Freeway)

Control of Access: Full

AADT: 45,700 (Existing); 49,800 (2012); 109,800 (2032)

Design Speed: 75 mph, Designated 70 mph on the plans.

Clear Zone: 34’

Superelevation: Table – 8% maximum; 2001Green Book, Page 161

Existing Typical Section:

PGL at inside edge of pavement

Median Width: 26’ with CSB median barrier

Lanes: 4 – 12’ lanes Each Direction

Shoulders: 10’ Outside & 13’ Inside (with Conc. Safety Barrier)

Cross Slopes: 1.6% Lanes, 4.2% Shoulders

Surfacing: Widening and/or Overlay TBD (To Be Determined)

Pavement Edge Wedge (Rock): TBD

Side Slopes: Fore = 6:1 for 21’ (24’ in Fill), Back = 4:1 or 3:1 for special conditions.

Ditch Width / Depth: 10’ / 3.5’

Minimum Ditch Slope: 0.3%, but 0.5% is preferred.

Bridge Width: 144.5’ (Mainline Over) or 2 @ 70.5’

Vertical Clearance: 16’ 4” on sideroads over and interchanges

Ramp Width: See Interchange Sideroads

Lighting: See Interchange Sideroads

Existing Roadway: N/A (New Construction)

K-10 Ramps: Functional Classification = Rural Principal Arterial (Freeway)

Control of Access: Full

AADT: Ramp A 3,000 (2012); 4,000 (2032)
Ramp B 3,000 (2012); 5,000 (2032)
Ramp C 6,000 (2012); 7,000 (2032)
Ramp D 7,000 (2012); 8,000 (2032)

Design Speed: 55 mph at Exit Ramp Gore, 50 mph at Entrance Ramp Gore

Clear Zone: 24'

Superelevation: Table – 8% maximum; 2001Green Book, Page 161

Typical Section:

PGL at outside edge of drive lane

Lanes: single lane – 14' lane, double lane – 2 @ 12' lanes

Shoulders: 8' Outside & 2' Inside

Cross Slopes: 1.6% Lanes, 4.2% Shoulders

Surfacing: TBD (To Be Determined)

Pavement Edge Wedge (Rock): TBD

Side Slopes: Fore = 6:1 for 18', Back = 4:1 or 3:1 for special conditions.

Ditch Width / Depth: 10' / 3'

Minimum Ditch Slope: 0.3%, but 0.5% is preferred.

Bridge Width: N/A

Vertical Clearance: 16' 4" on sideroads over and interchanges, 15' 4" on Sideroads

Lighting: See Interchange Sideroads

Existing Roadway: N/A (New Construction)

Lone Elm (Lenexa): Functional Classification = Rural Principal Arterial (Other)

Control of Access: Partial

AADT: 11,000 (2012) and 20,000 (Year 2032) North of K-10

Design Speed: 45 mph

Clear Zone: 20'-22'

Superelevation: Table – 4% maximum; 2004Green Book, No Super Preferred

Minimum Radius: 643'

Typical Section:

PGL at centerline of pavement

Lanes: 2 – 12'-1" lanes each direction

Median: 16' with no left turn lane, 28' with left turn lane

Shoulders: none

Cross Slopes: 1.6% Lanes, 4.2% Shoulders

Surfacing: TBD

Pavement Edge Wedge (Rock): N/A

Side Slopes: Fore = 4:1 behind sidewalk (or 3:1 for special conditions).

Ditch Width / Depth: v-ditch / 3' minimum depth

Minimum Ditch Slope: 0.3%, but 0.5% is preferred.

Bridge Width: 83.5' feet (w/o walkways)

Vertical Clearance: 16' 4" over/under K-10.

Ramp Width: See K-10 Ramps Criteria

Lighting: TBD

Existing Roadway: TBD

10-46 KA-0291-01
Lone Elm Interchange Break-In-Access Study
Design Criteria

Lone Elm (Olathe): Functional Classification = Rural Minor Arterial

Control of Access: Partial – by county regulations

AADT: 12,000 (2012) and 17,000 (Year 2032) South of K-10.

Design Speed: 45 mph

Clear Zone: 22’ (N/A with Urban (curb & gutter) section)

Superelevation: Table – 4% maximum; 2004Green Book, No super preferred.

Typical Section:

PGL at centerline of pavement

Lanes: 2 – 12’ lanes

Shoulders: 8’

Cross Slopes: 1.6% Lanes, 4.2% Shoulders

Surfacing: TBD

Pavement Edge Wedge (Rock): Yes

Side Slopes: Fore = 6:1 for 18’ (22’ in Fill), Back = 4:1 or 3:1 for special conditions.

Ditch Width / Depth: 10’ / 3’

Minimum Ditch Slope: 0.3%, but 0.5% is preferred.

Bridge Width: 83.5’ feet (Sideroad Over without sidewalks)

Vertical Clearance: 16’ 4”

Maximum Grade: 6%

Minimum Grade: 1%

Sidewalks: 5’ both sides with 8’ option on one side.

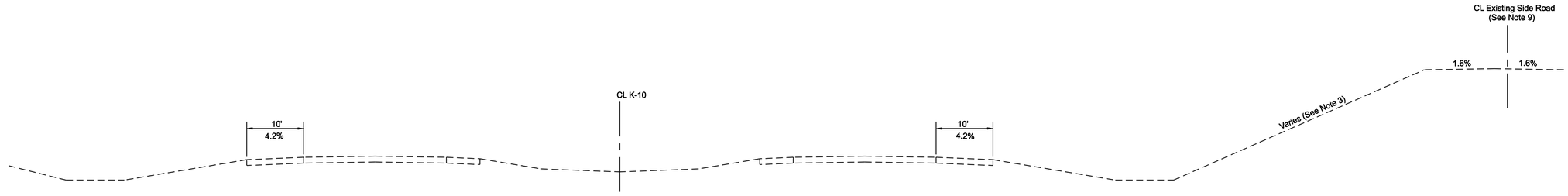
Lighting: TBD (vertical clearance could be an issue for landing strips.)

Appendix D

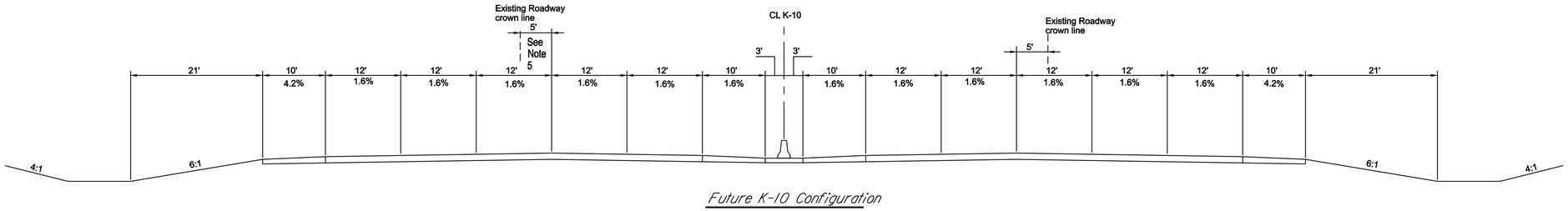
Typical Sections

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

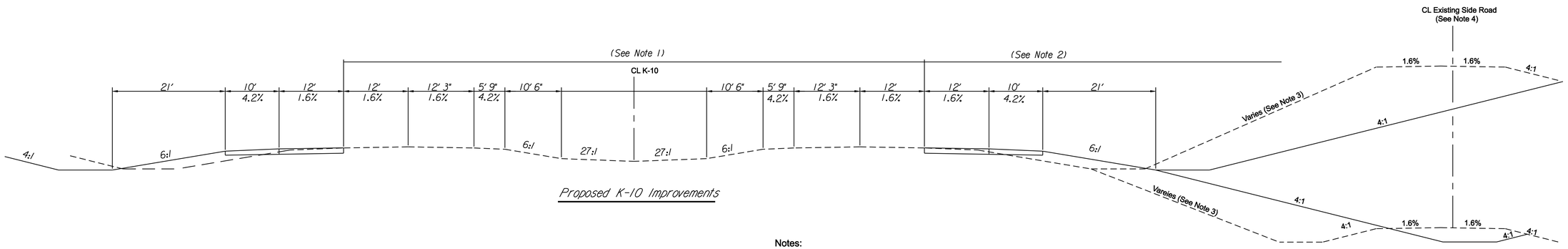
DATE	BY	
		REFERENCES NOTED
		REFERENCES CHECKED



Existing K-10 Improvements



Future K-10 Configuration



Proposed K-10 Improvements

Notes:

1. Existing Lane Configuration to be left in Place.

2. Proposed Auxilliary Lane, Shoulder and Safety Slopes.

3. Grade of existing side street with respect to grade of K-10 varies. Slopes between K-10 and existing sideroad are steeper than 3:1 in some cases.

4. Existing sideroad proposed to be removed. Existing grades will not permit auxilliary lane construction without the use of retaining walls or relocation. Eradication is consistent with adjacent developments.

5. Future K-10 typical section is shown based on the KDOT K-10 Corridor Study. Proposed construction associated with the Lone Elm Interchange (such as bridge construction) shall be designed to accomodate future K-10 improvements.

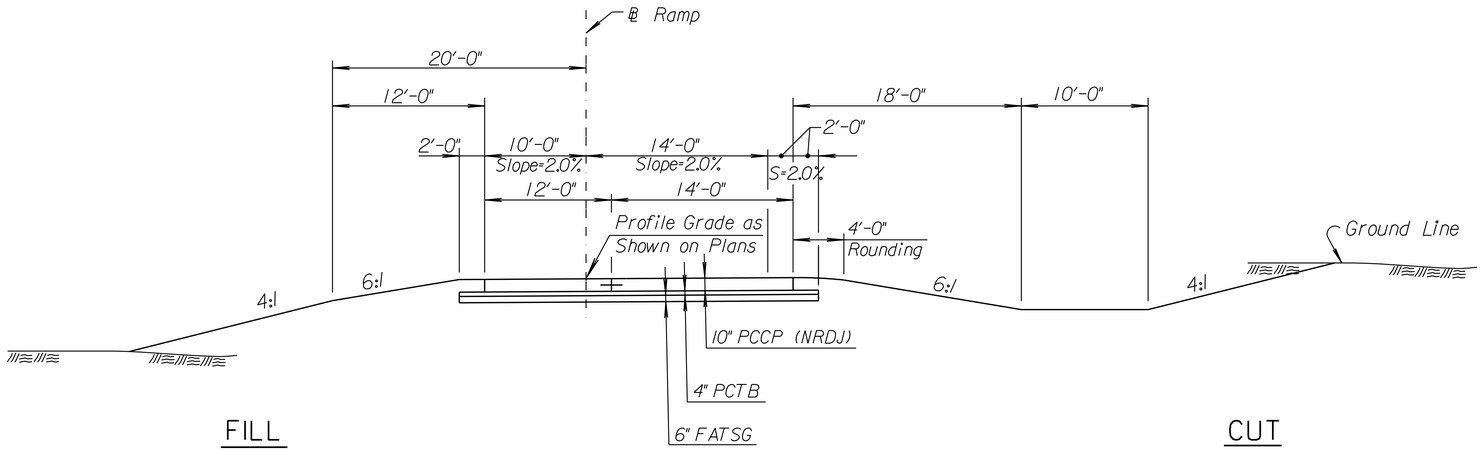
KANSAS DEPARTMENT OF TRANSPORTATION

TYPICAL SECTION
K-10 (PROPOSED & FUTURE)

FIGURE D-1

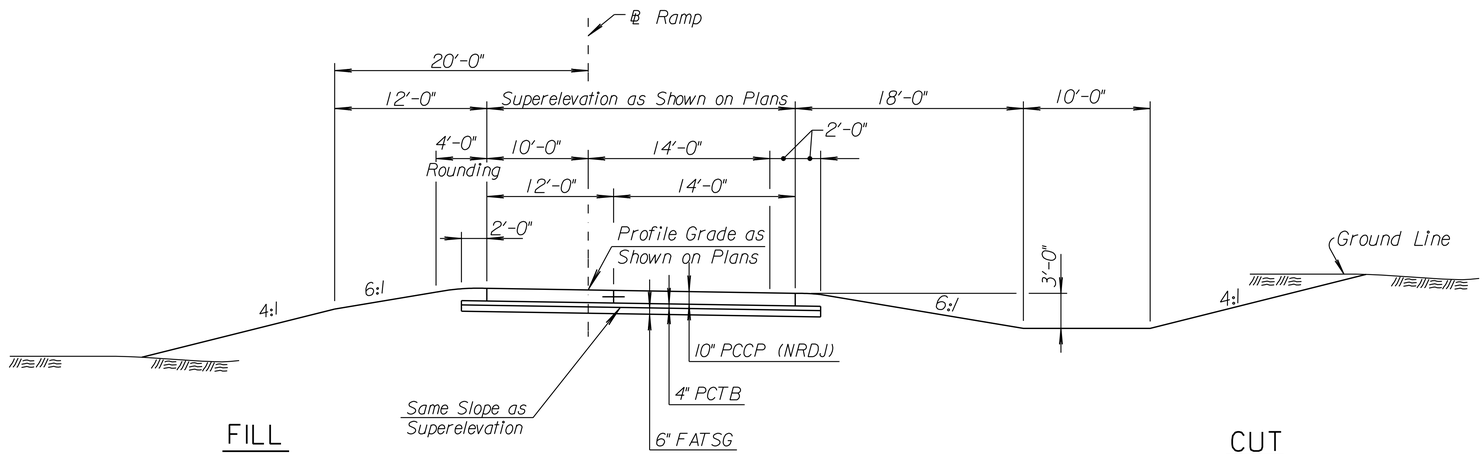
Drawn By : $$USERNAME$$ Plotted : $$$$$SYTIME$$$$$
File : $$$$DGNSPEC$$$$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total



TYPICAL RAMP SECTION

Not To Scale



RAMP SUPERELEVATION SECTION

Not To Scale

DATE	BY	REFERENCES NOTED
		REFERENCES CHECKED

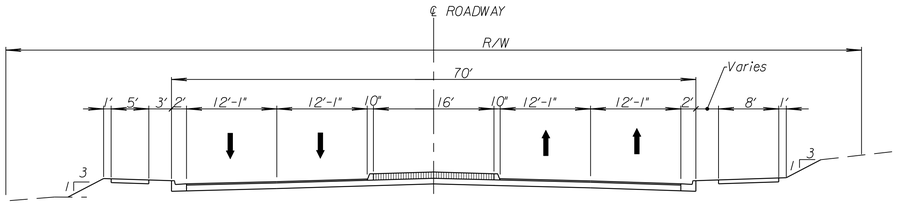
Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureD-2.dgn

KANSAS DEPARTMENT OF TRANSPORTATION

TYPICAL SECTION
RAMPS

FIGURE D-2

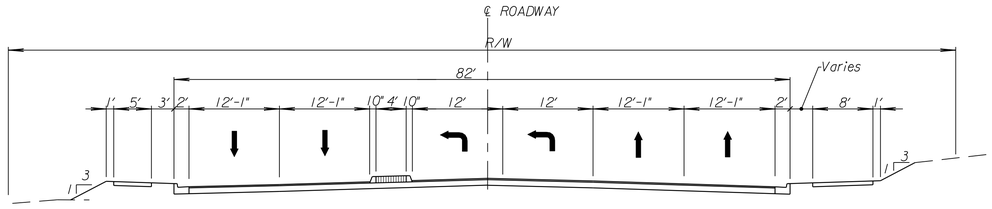
STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total



TYPICAL SECTION

Lone Elm

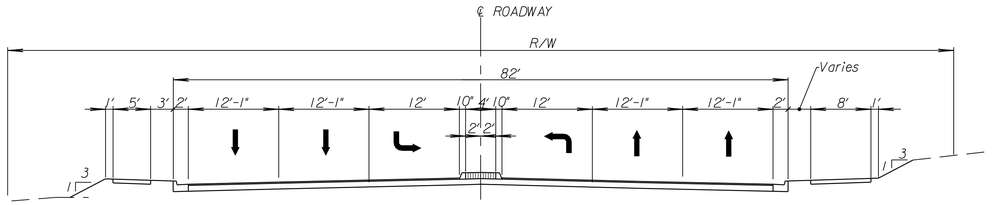
Sta. 35+89.14 to Sta. 50+00
(Lenexa)



TYPICAL SECTION

Lone Elm

Dual Left Turn Lanes



TYPICAL SECTION

Lone Elm

Opposing Left Turn Lanes

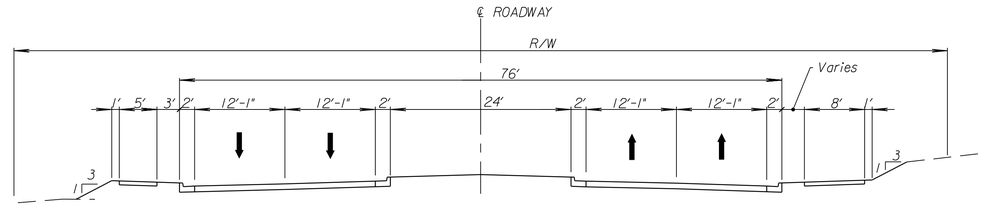
Notes:

1. Median Width shown to accomodate 2 opposing left turn lanes through interchange area.

2. Designer to coordinate Lone Elm R/W with City of Lenexa north of K-10 and City of Olathe south of K-10.

3. Width of green space to be coordinated with City Sidewalk and Multi-use Path plans.

4. Location and type of sidewalk or multi-use path shall be coordinated with existing and proposed paths.



TYPICAL SECTION

Lone Elm

Sta. 50+00 to Sta. 63+13.75
(Olathe)

REFERENCES NOTED	BY	DATE
REFERENCES CHECKED		

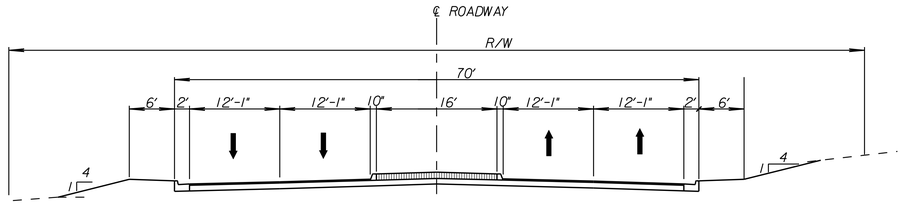
Drawn By : $$USERNAME$$ Plotted : $$$$$SYTIME$$$$$$
File : $$$$$$$$$$$$DGNSPEC$$$$$$$$$$$$

KANSAS DEPARTMENT OF TRANSPORTATION

PRELIMINARY
TYPICAL SECTIONS
LONE ELM

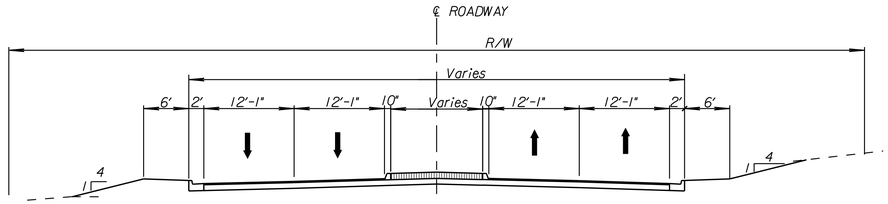
FIGURE D-3

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total



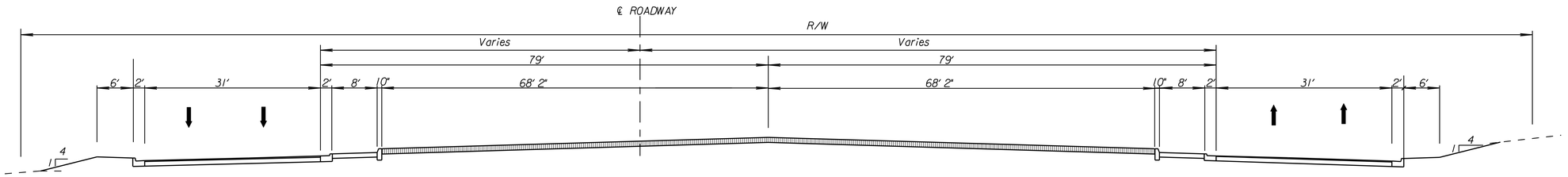
TYPICAL SECTION
Lone Elm

Standard Median



TYPICAL SECTION
Lone Elm

Varied Median



TYPICAL SECTION
Lone Elm

Roundabout

KANSAS DEPARTMENT OF TRANSPORTATION

FINAL CONCEPT
TYPICAL SECTIONS
LONE ELM

FIGURE D-4

DATE	BY	
		REFERENCES NOTED
		REFERENCES CHECKED

Drawn By : j_rockey Plotted : 1/2/2009
File : ...\DGN\Exhibits\FigureD-4.dgn

Appendix E

Diamond Interchange Lone Elm over K-10

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

BY	DATE
REFERENCES NOTED	
REFERENCES CHECKED	

Drawn By : dmeyrand Plotted :12/31/2008
File :...\dgn\exhibits\FigureE-1.dgn

KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
DIAMOND
INTERCHANGE LAYOUT

FIGURE E-1

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

BY	DATE
REFERENCES NOTED	
REFERENCES CHECKED	

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureE-2.dgn

Not To Scale

City of Lenexa, KS

City of Olathe, KS

Curve Data
P.I. Sta. 45+00.75 (Bk.)
Δ = 14° 00' 00" (LT)
D = 3° 06' 50"
R = 1,840.00'
T = 225.92'
L = 449.60'
E = 13.82'
SE = NC

Curve Data
P.I. Sta. 55+24.68 (Bk.)
Δ = 13° 35' 24" (LT)
D = 3° 06' 50"
R = 1,840.00'
T = 219.24'
L = 436.43'
E = 13.02'
SE = NC

Curve Data
P.I. Sta. 38+41.29 (Bk.)
Δ = 13° 59' 32" (RT)
D = 3° 06' 50"
R = 1,840.00'
T = 225.80'
L = 449.35'
E = 13.80'
SE = NC

Curve Data
P.I. Sta. 62+03.76 (Bk.)
Δ = 13° 35' 08" (RT)
D = 3° 06' 50"
R = 1,840.00'
T = 219.17'
L = 436.29'
E = 13.01'
SE = NC

Sta. 35+32.08 Begin Const.

Sta. 50+14.41 ℄ Lone Elm = Sta. 776+85.64 ℄ K-10

Sta. 63+36.19 Survey ℄

Profile Grade Proposed Improvements

Existing Ground @ ℄

+34.00 1,040.48 VPC
+06.00 1,047.13 VPT
+25.00 1,073.44 VPC
+40.00 P.I. El. = 1,078.33
+55.00 1,078.90 VPT
+15.00 1,079.20 VPC
+15.00 P.I. El. = 1,080.20
+15.00 1,079.20 VPT
+67.50 1,078.94 VPC
+00.00 P.I. El. = 1,078.28
+32.50 1,071.87 VPT
+00.00 1,039.58 VPC
+20.00 1,032.24 VPT
+20.00 P.I. El. = 1,039.23
+00.00 P.I. El. = 1,034.26

K = 76
372' V.C.

K = 73
220' V.C.

SSD = 403'
K = 61
230' V.C.

SSD = 1279'
K = 400
400' V.C.

SSD = 381'
K = 61
265' V.C.

+ 4.25%
- 0.67%
+ 0.50%
- 0.50%
- 4.84%
- 1.84%

KANSAS DEPARTMENT OF TRANSPORTATION
LONE ELM OVER K-10
PLAN AND PROFILE
STA. 36+73.63 TO STA. 63+36.19

FIGURE E-2

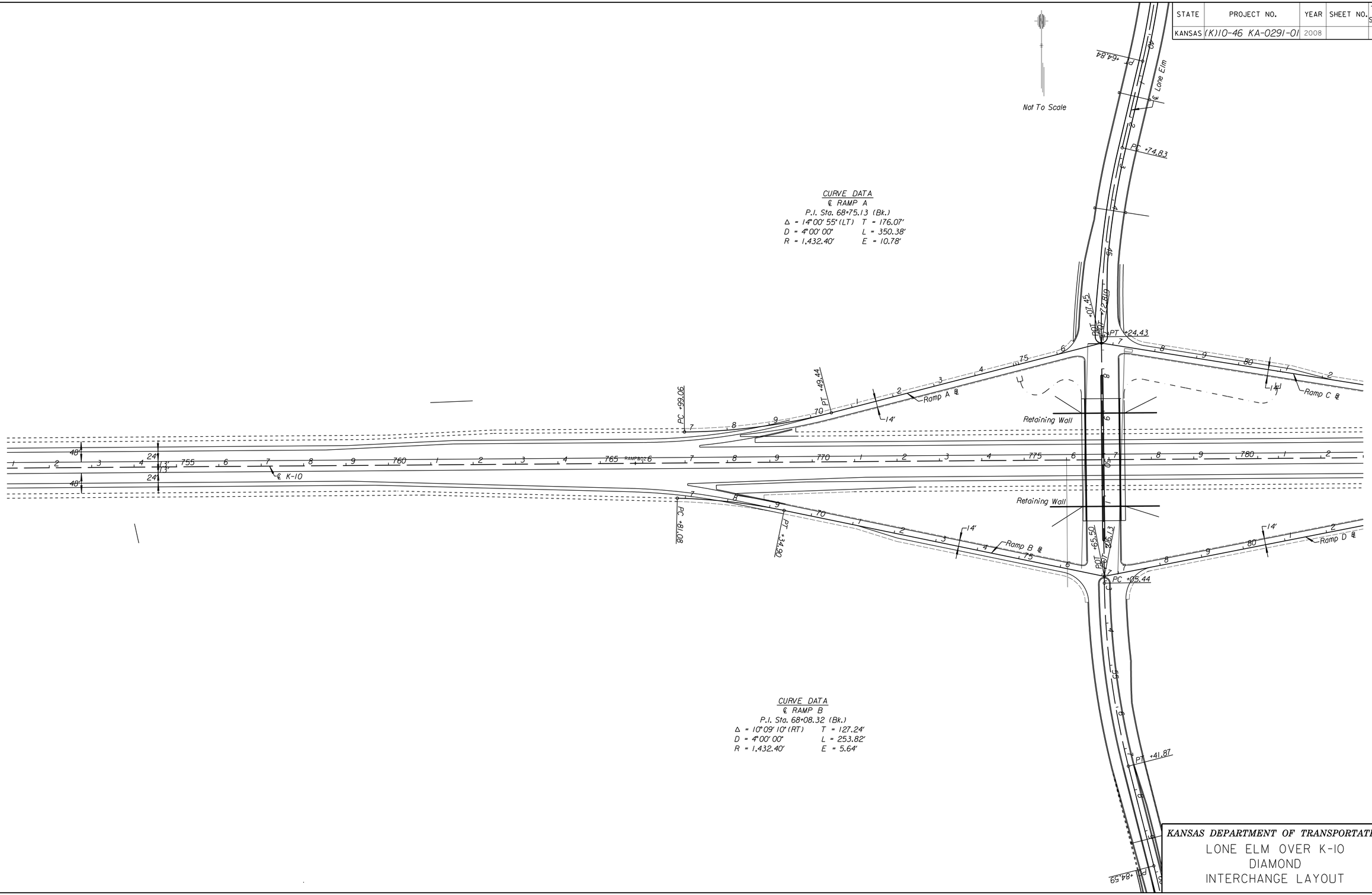
STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

BY	DATE
REFERENCES NOTED	
REFERENCES CHECKED	

Not To Scale

CURVE DATA
℄ RAMP A
P.I. Sta. 68+75.13 (Bk.)
Δ = 14°00' 55" (LT) T = 176.07'
D = 4°00' 00" L = 350.38'
R = 1,432.40' E = 10.78'

CURVE DATA
℄ RAMP B
P.I. Sta. 68+08.32 (Bk.)
Δ = 10°09' 10" (RT) T = 127.24'
D = 4°00' 00" L = 253.82'
R = 1,432.40' E = 5.64'



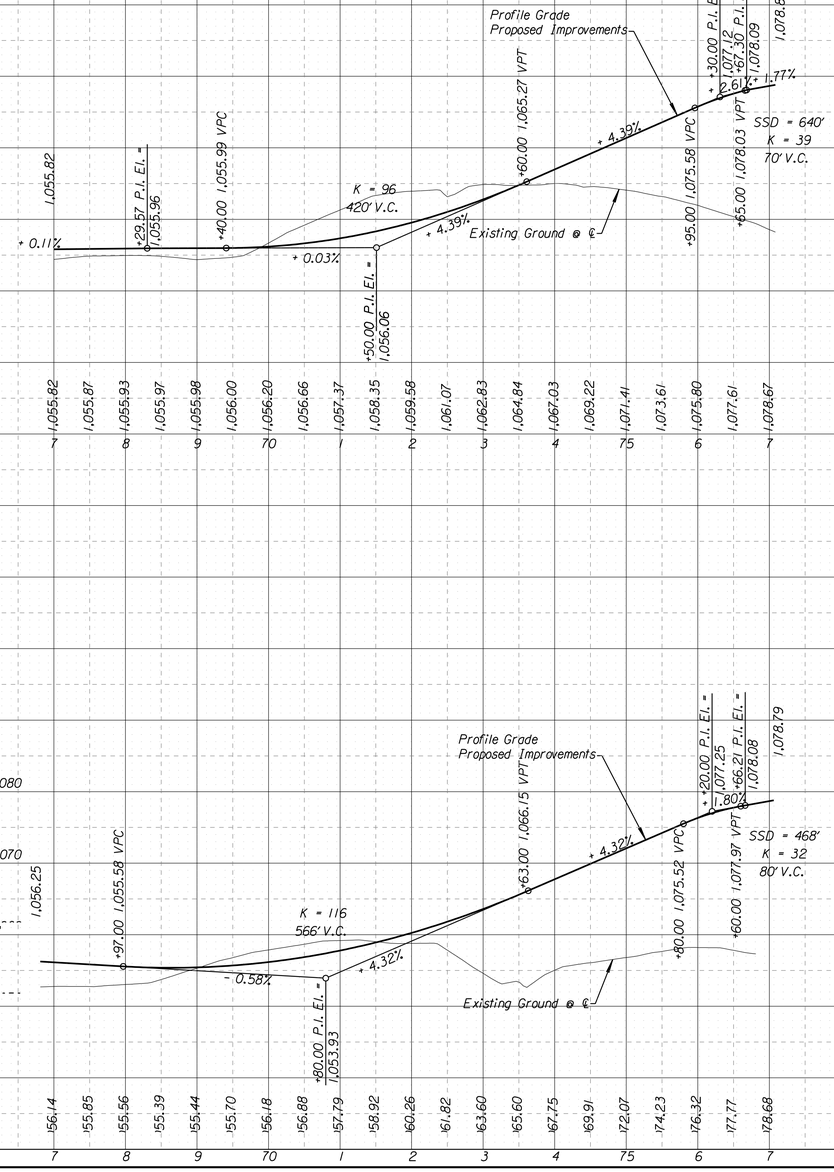
KANSAS DEPARTMENT OF TRANSPORTATION
LONE ELM OVER K-10
DIAMOND
INTERCHANGE LAYOUT

FIGURE E-3

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureE-3.dgn

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale



Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureE-4.dgn

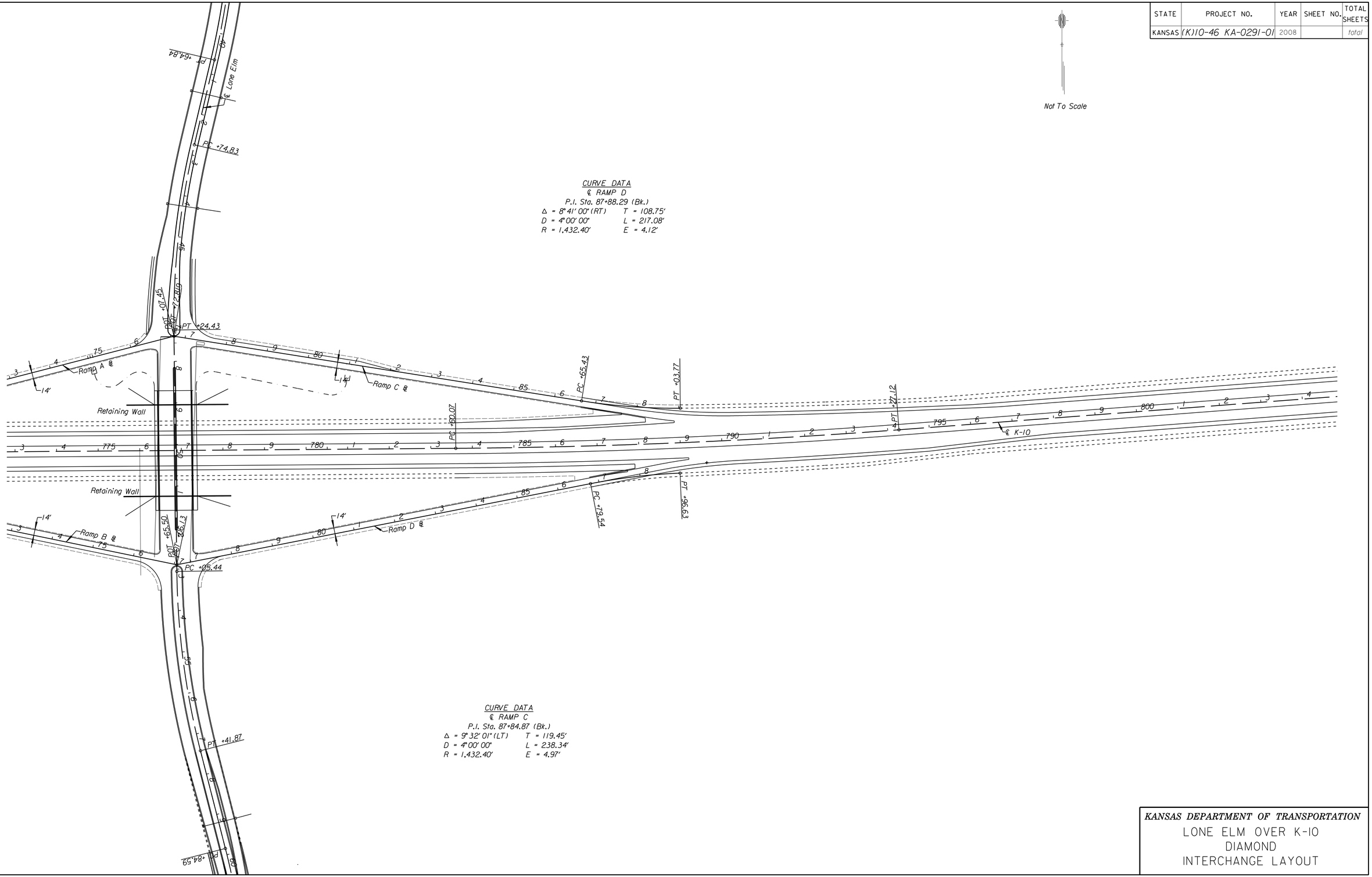
KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
DIAMOND INTERCHANGE
RAMP A & B PROFILES

FIGURE E-4

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale



CURVE DATA
℄ RAMP D
P.I. Sta. 87+88.29 (Bk.)

Δ = 8°41'00" (RT)	T = 108.75'
D = 4°00'00"	L = 217.08'
R = 1,432.40'	E = 4.12'

CURVE DATA
℄ RAMP C
P.I. Sta. 87+84.87 (Bk.)

Δ = 9°32'01" (LT)	T = 119.45'
D = 4°00'00"	L = 238.34'
R = 1,432.40'	E = 4.97'

BY	DATE
REFERENCES NOTED	
REFERENCES CHECKED	

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureE-5.dgn

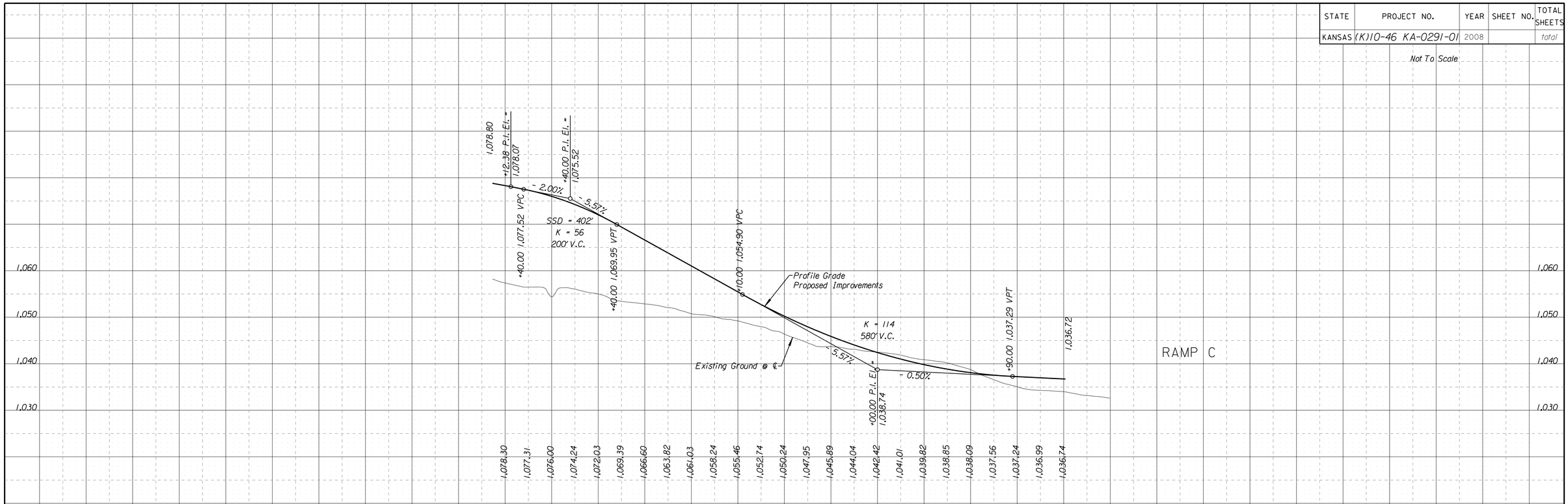
KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
DIAMOND
INTERCHANGE LAYOUT

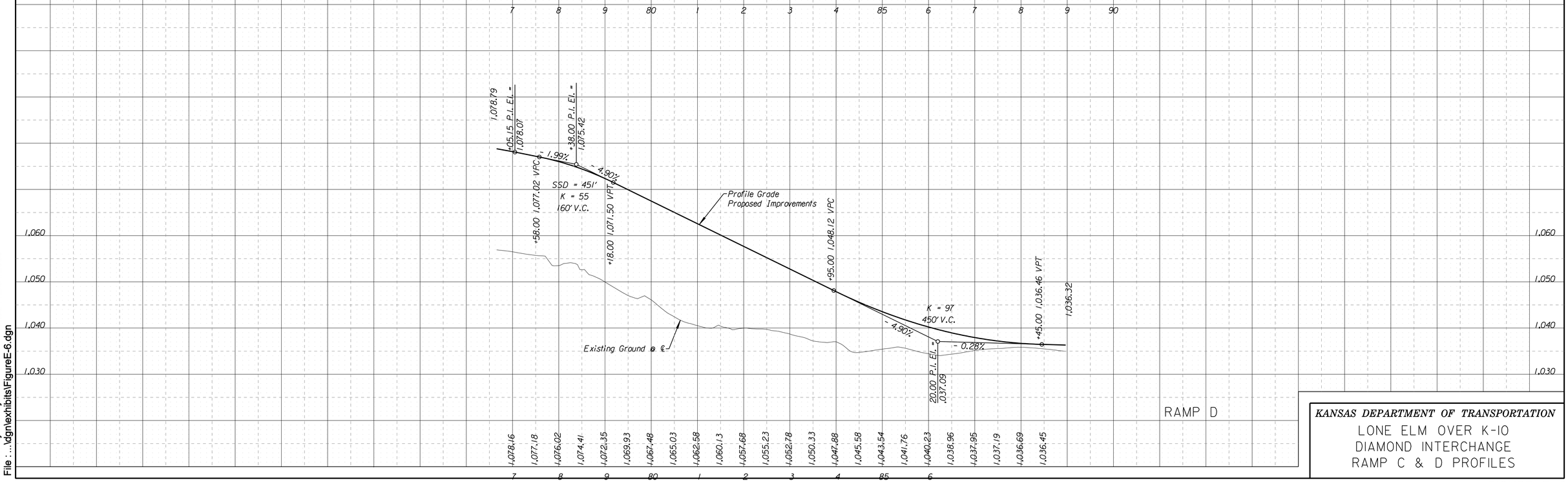
FIGURE E-5

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale



RAMP C



RAMP D

KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
DIAMOND INTERCHANGE
RAMP C & D PROFILES

FIGURE E-6

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureE-6.dgn

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

DATE	BY	
		REFERENCES NOTED
		REFERENCES CHECKED

Not To Scale

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureE-7.dgn

KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
RETAINING WALL
PLAN AND PROFILE

FIGURE E-7

Appendix F

Diamond Interchange Lone Elm Under K-10

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale

DATE	BY	
		REFERENCES NOTED
		REFERENCES CHECKED

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureF-1.dgn

KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM UNDER K-10
INTERCHANGE LAYOUT

FIGURE F-1

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

DATE	BY	
		REFERENCES NOTED
		REFERENCES CHECKED

Not To Scale

City of Lenexa, KS

Curve Data
P.I. Sta. 45+00.75 (Bk.)
Δ = 14° 00' 00" (LT)
D = 3° 06' 50"
R = 1,840.00'
T = 225.92'
L = 449.60'
E = 13.82'
SE = NC

Curve Data
P.I. Sta. 55+24.68 (Bk.)
Δ = 13° 35' 24" (LT)
D = 3° 06' 50"
R = 1,840.00'
T = 219.24'
L = 436.43'
E = 13.02'
SE = NC

Curve Data
P.I. Sta. 62+03.76 (Bk.)
Δ = 13° 35' 08" (RT)
D = 3° 06' 50"
R = 1,840.00'
T = 219.17'
L = 436.29'
E = 13.01'
SE = NC

Curve Data
P.I. Sta. 38+41.29 (Bk.)
Δ = 13° 59' 32" (RT)
D = 3° 06' 50"
R = 1,840.00'
T = 225.80'
L = 449.35'
E = 13.80'
SE = NC

Sta. 35+32.08 = Sta. 35+32.08 Survey ℓ

Sta. 35+32.08 Begin Const.

Sta. 50+14.41 ℓ Lone Elm = Sta. 776+85.64 ℓ K-10

Sta. 63+36.19 = Survey ℓ

ℓ Lone Elm

R/W

Const. Limits

Ramp C ℓ

Ramp A ℓ

Ramp B ℓ

K10

Existing Ground ℓ

Profile Grade Proposed Improvements

1,040.49

+23.02 1,034.52 VPC

+76.98 1,033.66 VPT

K = 414
354' V.C.

16.5' Min. Clear

- 0.67%

+ 0.18%

+00.00 P.I. El. = 1,038.33

+00.00 P.I. El. = 1,036.28

+00.00 1,036.10 VPC

SSD = 633'
K = 99
200' V.C.

+00.00 1,034.26 VPT

- 1.84%

1,032.22

1,070
1,060
1,050
1,040
1,030
1,020
1,010
1,000
990

KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM UNDER K-10
PLAN AND PROFILE
STA. 36+73.63 TO STA. 63+36.19

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureF-2.dgn

FIGURE F-2

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale

CURVE DATA
℄ RAMP A
P.I. Sta. 68+75.13 (Bk.)
Δ = 14°00' 55" (LT) T = 176.07'
D = 4°00' 00" L = 350.38'
R = 1,432.40' E = 10.78'

CURVE DATA
℄ RAMP B
P.I. Sta. 69+36.31 (Bk.)
Δ = 12°04' 31" (RT) T = 151.50'
D = 4°00' 00" L = 301.88'
R = 1,432.40' E = 7.99'

KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM UNDER K-10
DIAMOND
INTERCHANGE LAYOUT

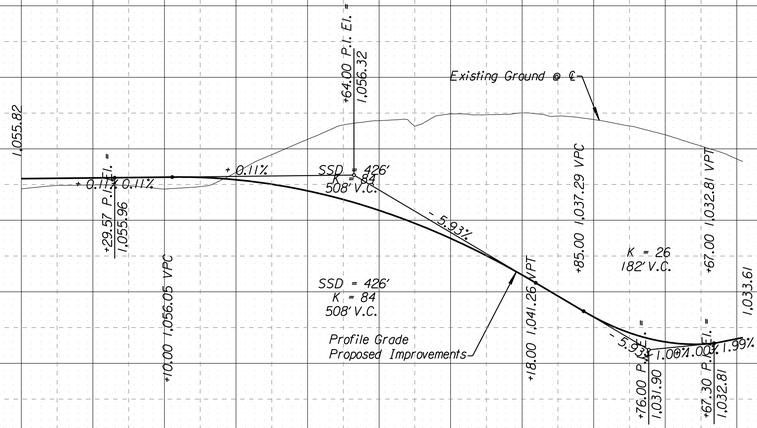
FIGURE F-3

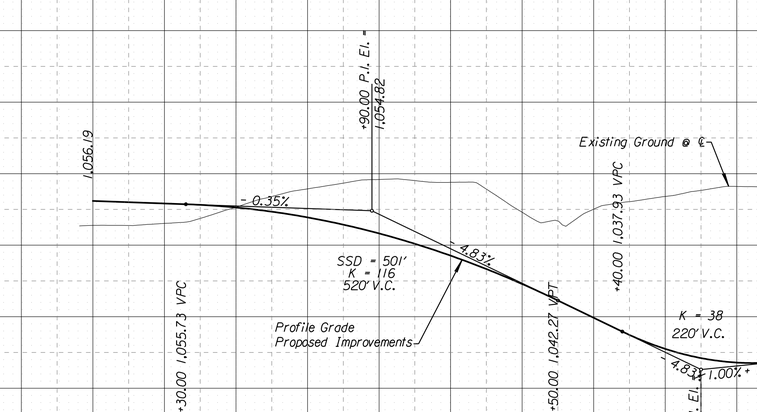
	BY	DATE
REFERENCES NOTED		
REFERENCES CHECKED		

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureF-3.dgn

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale





Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureF-4.dgn

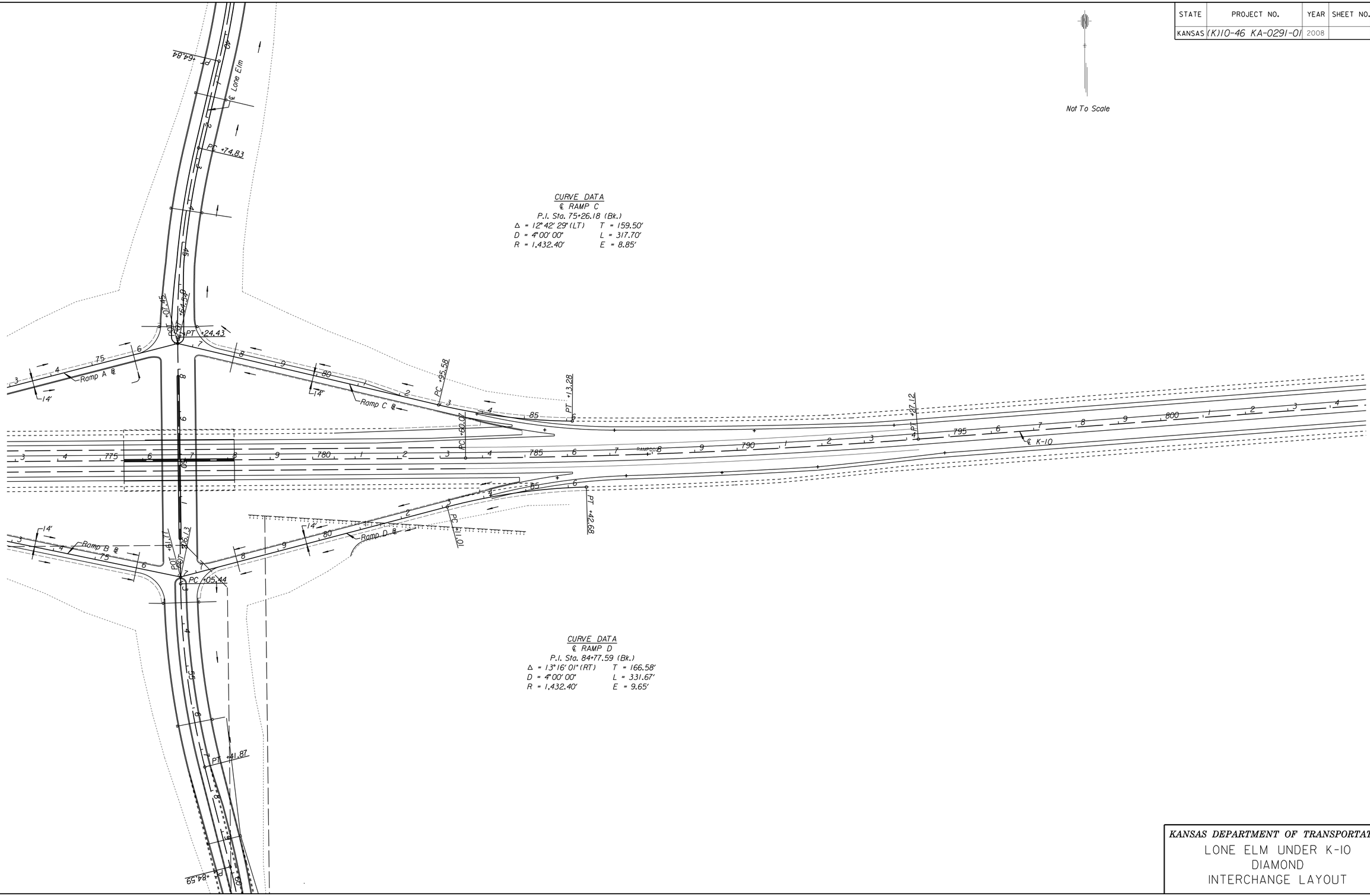
KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM UNDER K-10
DIAMOND INTERCHANGE
RAMP A & B PROFILES

FIGURE F-4

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale



CURVE DATA
℄ RAMP C
P.I. Sta. 75+26.18 (Bk.)

Δ = 12° 42' 29" (LT)	T = 159.50'
D = 4° 00' 00"	L = 317.70'
R = 1,432.40'	E = 8.85'

CURVE DATA
℄ RAMP D
P.I. Sta. 84+77.59 (Bk.)

Δ = 13° 16' 01" (RT)	T = 166.58'
D = 4° 00' 00"	L = 331.67'
R = 1,432.40'	E = 9.65'

DATE	BY	
		REFERENCES NOTED
		REFERENCES CHECKED

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureF-5.dgn

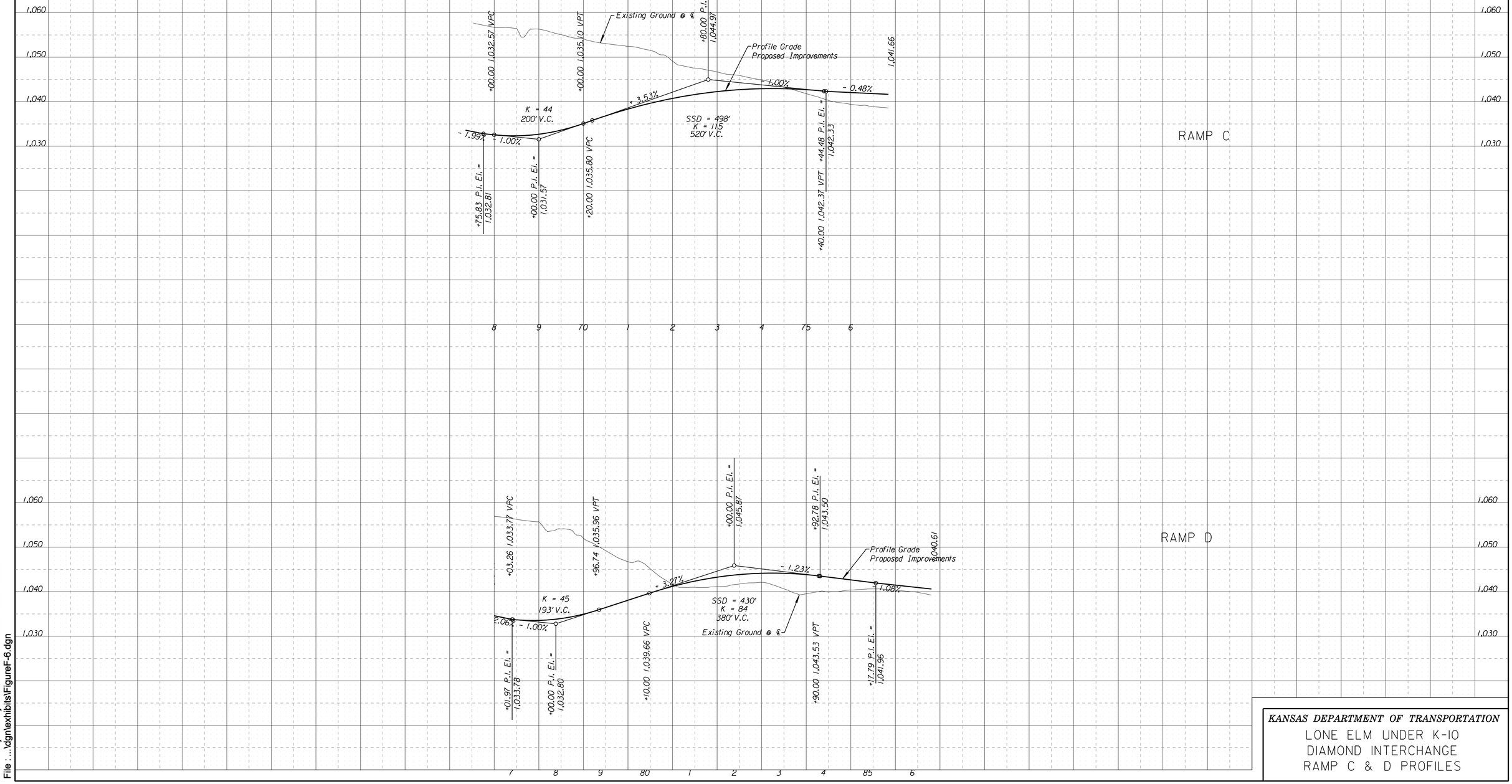
KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM UNDER K-10
DIAMOND
INTERCHANGE LAYOUT

FIGURE F-5

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale



Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureF-6.dgn

KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM UNDER K-10
DIAMOND INTERCHANGE
RAMP C & D PROFILES

FIGURE F-6

Appendix G

Tight Diamond Interchange Lone Elm over K-10

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale

Sta. 76+94.41 ℄ Ramp A=
Sta. 47+99.43 ℄ Lone Elm=
Sta. 776+84.66 ℄ K-10, 215' Lt.

℄ Lone Elm

℄ K-10

℄ Ramp A

℄ Ramp B

R/W

Const. Limits

Retaining Wall

89°44'19.23"

Sta. 50+14.43 ℄ Lone Elm=
Sta. 776+85.64 ℄ K-10

Sta. 76+95.20 ℄ Ramp B=
Sta. 52+29.44 ℄ Lone Elm=
Sta. 776+86.62 ℄ K-10, 215' Rt.

KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
TIGHT DIAMOND
INTERCHANGE LAYOUT

FIGURE G-1

DATE	BY	
		REFERENCES NOTED
		REFERENCES CHECKED

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureG-1.dgn

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

BY	DATE
REFERENCES NOTED	
REFERENCES CHECKED	

Not To Scale

City of Lenexa, KS

Curve Data
P.I. Sta. 45+00.75 (Bk.)
Δ = 14° 00' 00" (LT)
D = 3° 06' 50"
R = 1,840.00'
T = 225.92'
L = 449.60'
E = 13.82'
SE = NC

Sta. 35+32.08 = Sta. 35+32.08 Survey ℄

Sta. 35+32.08 Begin Const.

Const. Limits

R/W

℄ K10

Curve Data
P.I. Sta. 38+41.29 (Bk.)
Δ = 13° 59' 32" (RT)
D = 3° 06' 50"
R = 1,840.00'
T = 225.80'
L = 449.35'
E = 13.80'
SE = NC

Curve Data
P.I. Sta. 55+24.68 (Bk.)
Δ = 13° 35' 24" (LT)
D = 3° 06' 50"
R = 1,840.00'
T = 219.24'
L = 436.43'
E = 13.02'
SE = NC

℄ Lone Elm

Sta. 50+14.41 ℄ Lone Elm = Sta. 776+85.64 ℄ K-10

City of Olathe, KS

Sta. 63+90.76 Survey ℄

Curve Data
P.I. Sta. 62+03.76 (Bk.)
Δ = 13° 35' 08" (RT)
D = 3° 06' 50"
R = 1,840.00'
T = 219.17'
L = 436.29'
E = 13.01'
SE = NC

+40.00 P.I. El. = 1,078.33
+15.00 P.I. El. = 1,080.20
+00.00 P.I. El. = 1,078.28
+20.00 P.I. El. = 1,039.23
+00.00 P.I. El. = 1,034.26

+34.00 1,040.48 VPC
+06.00 1,047.13 VPT
+25.00 1,073.44 VPC
+55.00 1,078.90 VPT
+15.00 1,079.20 VPC
+15.00 1,079.20 VPT
+67.50 1,078.94 VPC
+32.50 1,071.87 VPT
+00.00 1,039.58 VPC
+20.00 1,032.24 VPT

1,040.49

K = 76
372' V.C.

K = 61
230' V.C.

K = 400
400' V.C.

K = 61
265' V.C.

K = 73
220' V.C.

+ 4.25%
+ 0.50%
- 0.50%
- 4.84%
- 0.67%
- 1.84%

SSD = 403'
SSD = 1279'
SSD = 381'

1,070
1,060
1,050
1,040
1,030
1,020
1,010

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureG-2.dgn

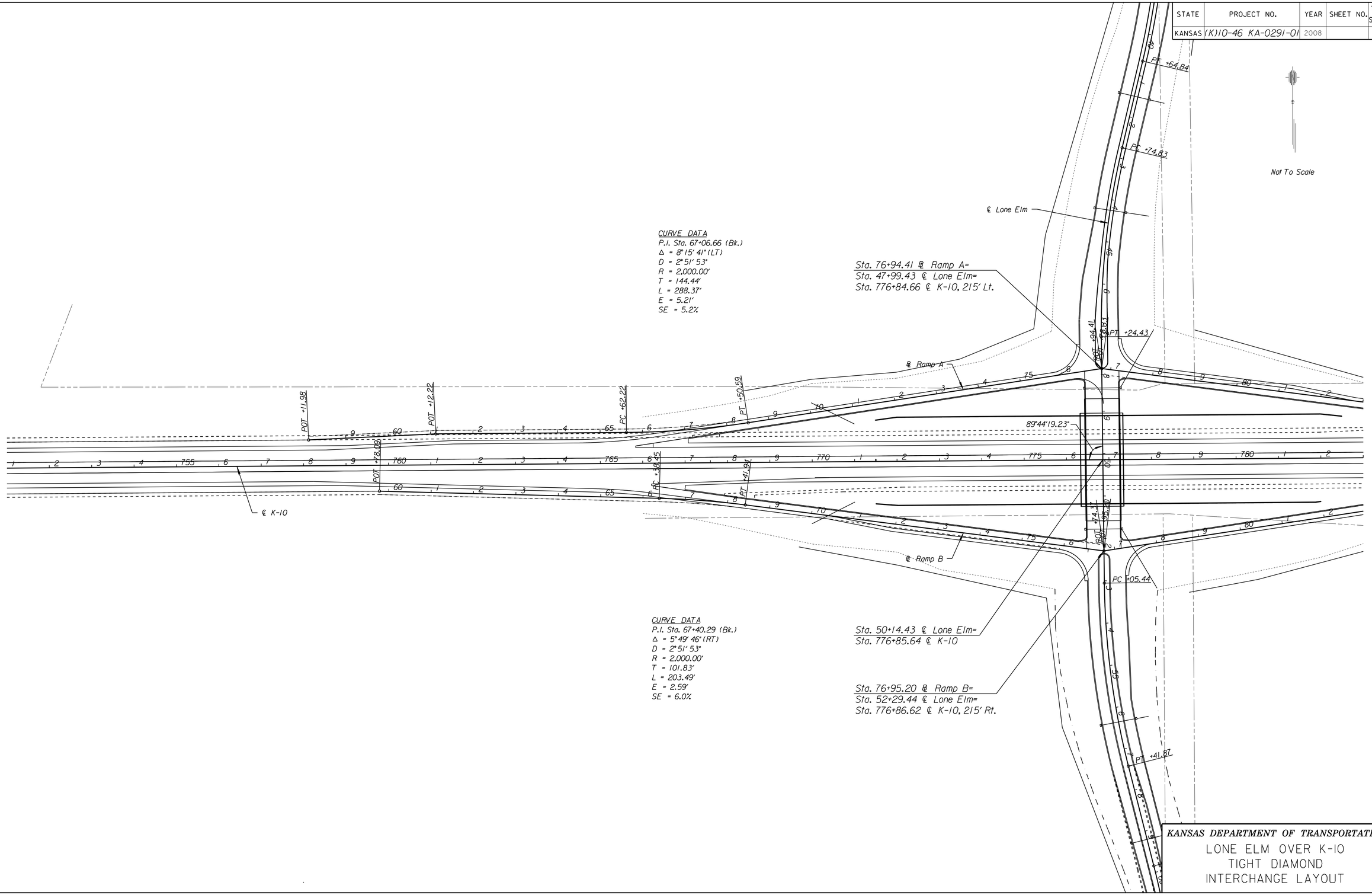
KANSAS DEPARTMENT OF TRANSPORTATION
LONE ELM OVER K-10
PLAN AND PROFILE
STA. 36+73.63 TO STA. 63+36.19

FIGURE G-2

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

DATE	BY	
		REFERENCES NOTED
		REFERENCES CHECKED

Not To Scale



KANSAS DEPARTMENT OF TRANSPORTATION

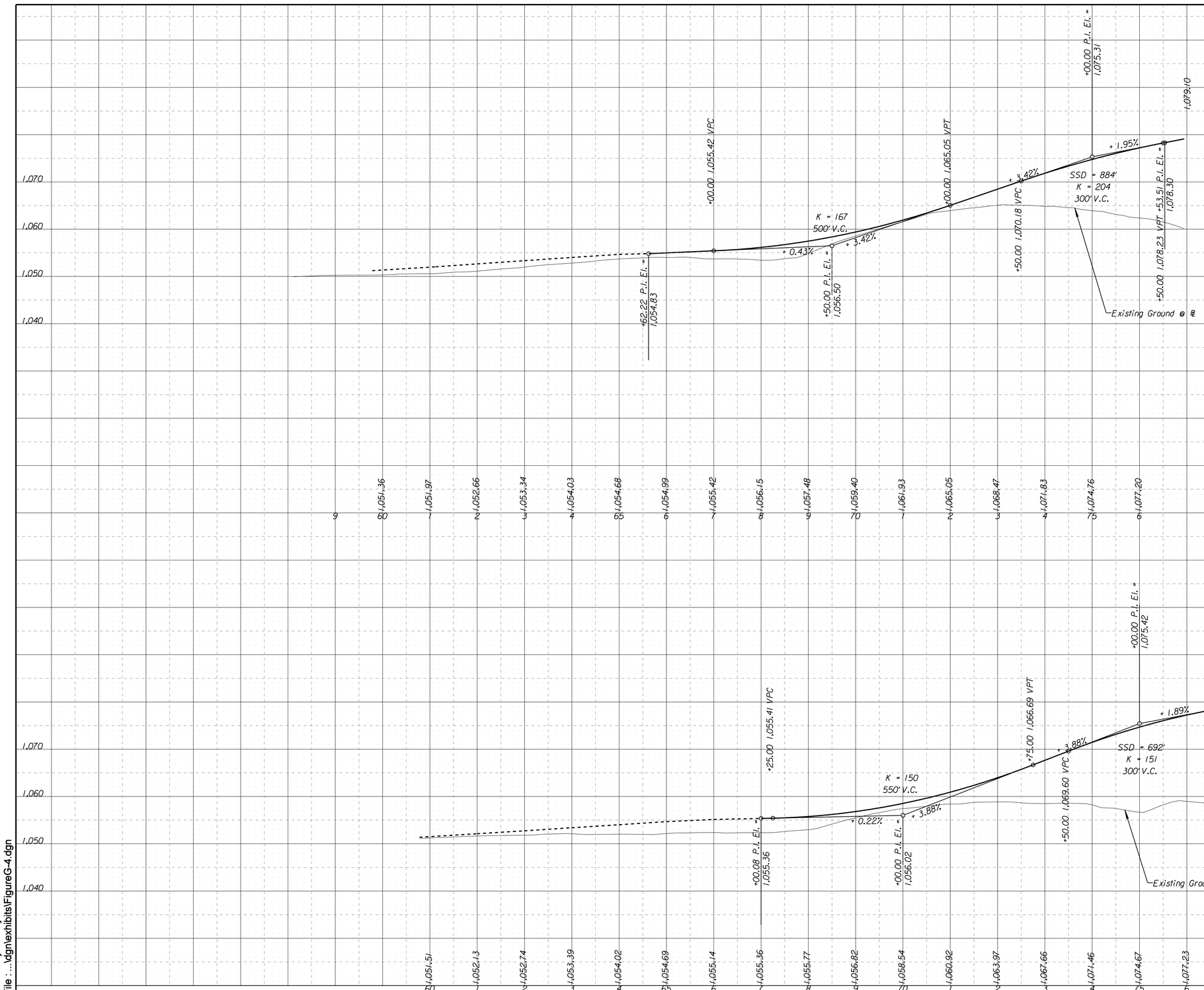
LONE ELM OVER K-10
TIGHT DIAMOND
INTERCHANGE LAYOUT

FIGURE G-3

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureG-3.dgn

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale



Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureG-4.dgn

KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
TIGHT DIAMOND INTERCHANGE
RAMP A & B PROFILES

FIGURE G-4

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

CURVE DATA
P.I. Sta. 86+34.70 (Bk.)
Δ = 8° 40' 35" (LT)
D = 2° 51' 54"
R = 1,999.89'
T = 151.71'
L = 302.85'
E = 5.75'
SE = 6.0%

CURVE DATA
P.I. Sta. 86+83.00 (Bk.)
Δ = 6° 39' 07" (RT)
D = 2° 51' 53"
R = 2,000.00'
T = 116.23'
L = 232.20'
E = 3.37'
SE = 5.2%

CURVE DATA
P.I. Sta. 90+25.04 (Bk.)
Δ = 1° 39' 00" (LT)
D = 0° 21' 54"
R = 15,699.09'
T = 226.07'
L = 452.10'
E = 1.63'
SE = N.C.

REFERENCES NOTED	BY	DATE
REFERENCES CHECKED		

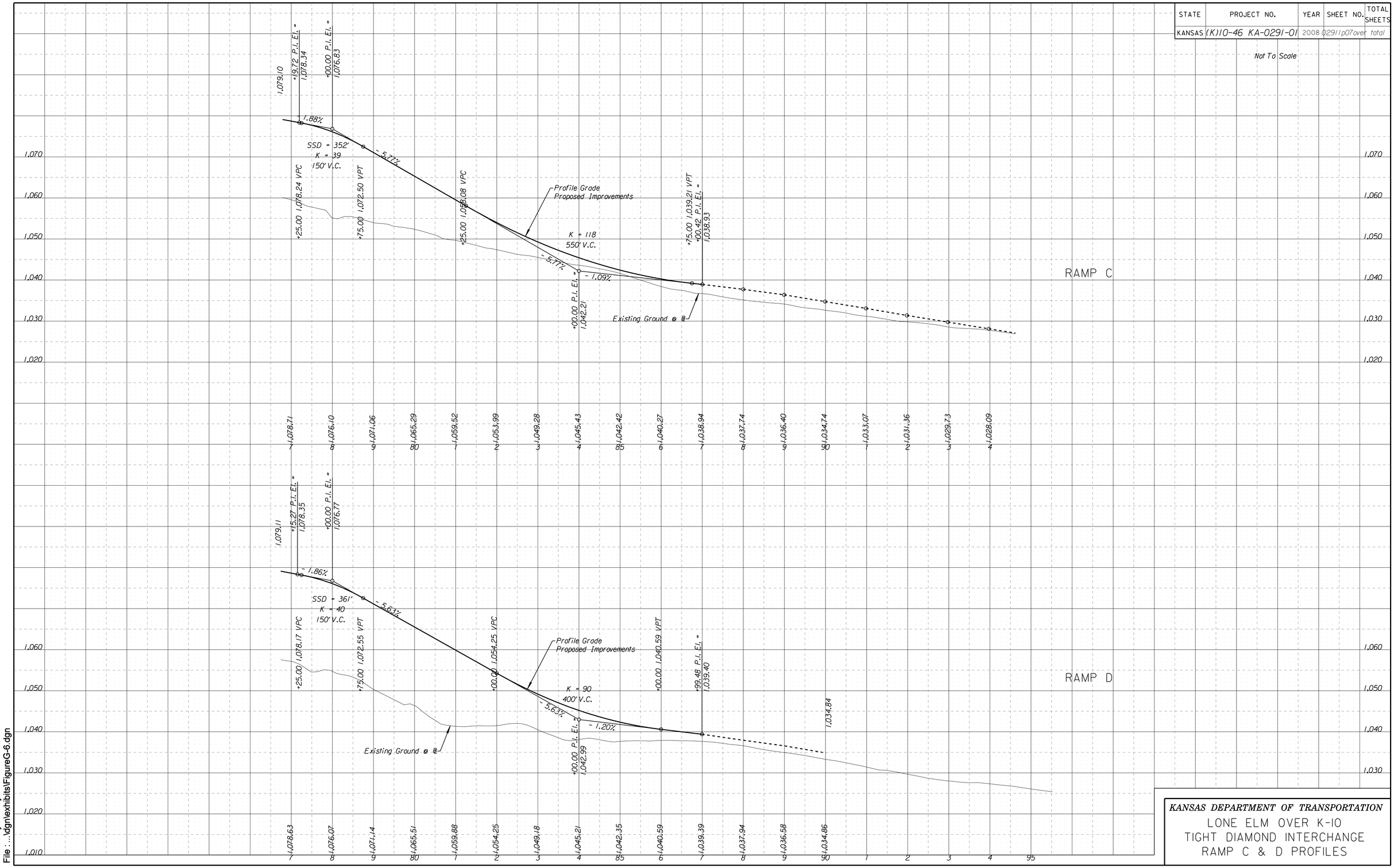
Drawn By : dmeyrand Plotted :12/31/2008
File :...\dgn\exhibits\FigureG-5.dgn

KANSAS DEPARTMENT OF TRANSPORTATION
LONE ELM OVER K-10
TIGHT DIAMOND
INTERCHANGE LAYOUT

FIGURE G-5

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008	02911p07over	total

Not To Scale



Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureG-6.dgn

KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
TIGHT DIAMOND INTERCHANGE
RAMP C & D PROFILES

FIGURE G-6

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale

Ramp A

Ramp C

Ramp B

Ramp D

North Retaining Wall

South Retaining Wall

BOT +94.41

Lone Elm 8.83

PT +24.43

PC +82.99

PC +60.07

PC +66.11

PC +05.44

BOT +74.37

BOT +95.20

70 1 2 3 4 75 6 7 8 9 80 1 2 3 4 85

770 1 2 3 4 775 6 7 8 9 780 1 2 3 4 785

70 1 2 3 4 75 6 7 8 9 80 1 2 3 4 85

DATE	BY	REFERENCES NOTED
		REFERENCES CHECKED

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureG-7.dgn

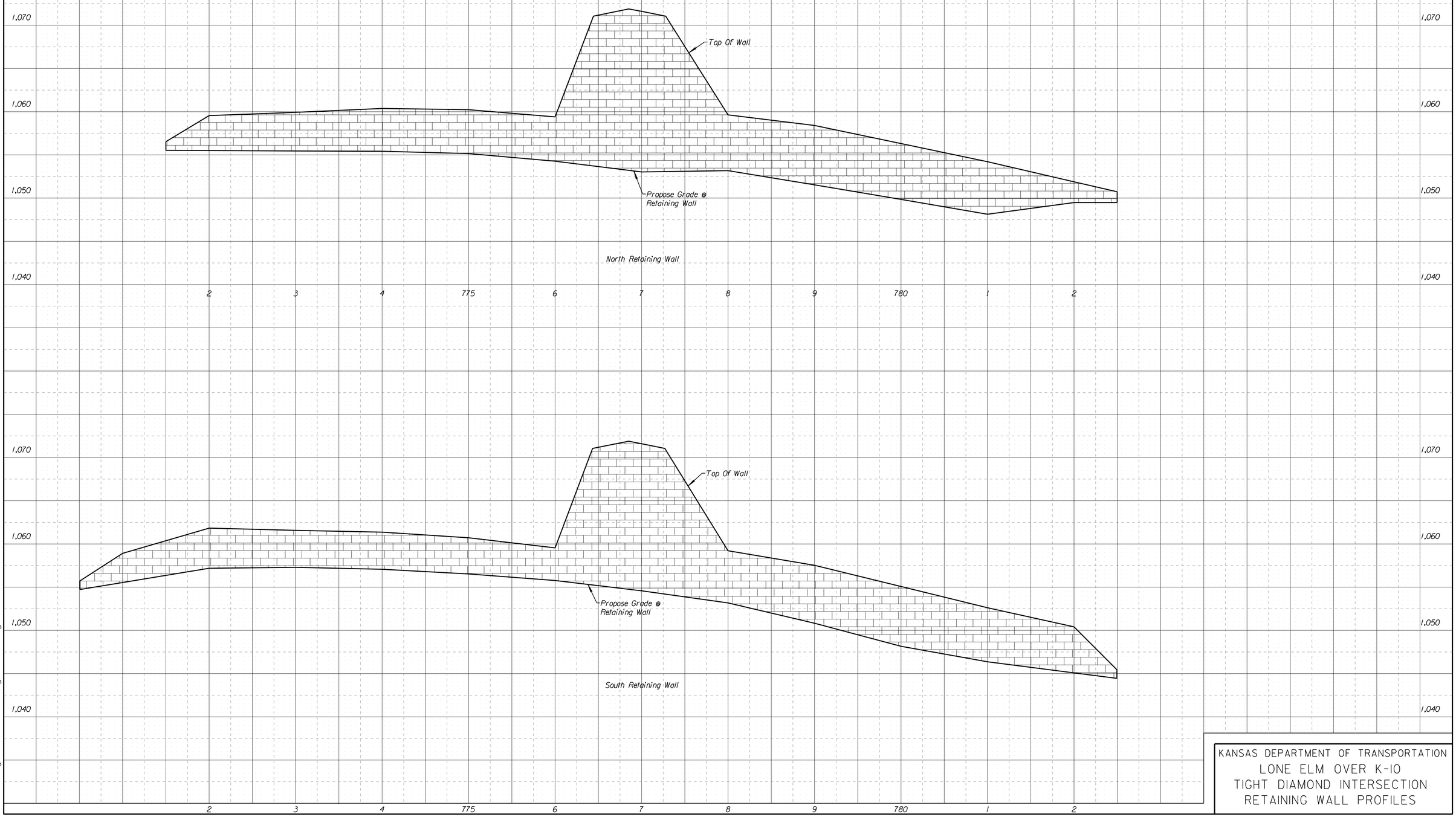
KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
TIGHT DIAMOND INTERCHANGE
RETAINING WALL PLAN

FIGURE G-7

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale



Drawn By: smeyrand Plotted: 12/31/2008
File: ...\dgn\exhibits\Figure6-8.dgn

KANSAS DEPARTMENT OF TRANSPORTATION
LONE ELM OVER K-10
TIGHT DIAMOND INTERSECTION
RETAINING WALL PROFILES

FIGURE G-8

Appendix H

Tight Diamond Interchange Lone Elm under K-10

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale
Sta. 76+94.41 ℄ Ramp A=
Sta. 47+99.43 ℄ Lone Elm=
Sta. 776+84.66 ℄ K-10, 215' Lt.
℄ Lone Elm
℄ Ramp A
℄ Ramp C
℄ Ramp B
℄ Ramp D
℄ K-10
R/W
Const. Limits
Retaining Wall
89°44'19.23"
PT +64.84
PC +74.83
PT +24.43
POT +49.99
POT +12.22
PC +62.22
PT +50.59
PC +38.45
PT +41.94
PC +60.07
PC +83.99
PT +85.35
PC +66.11
PRC +98.97
PT +51.07
PC +05.44
PT +41.87
+84.59
Sta. 50+14.43 ℄ Lone Elm=
Sta. 776+85.64 ℄ K-10
Sta. 76+95.20 ℄ Ramp B=
Sta. 52+29.44 ℄ Lone Elm=
Sta. 776+86.62 ℄ K-10, 215' Rt.
Pond
Rock Rip Rap
Cult.
Past.
Garden
Sh.
Ho.
Conc.

KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM UNDER K-10
TIGHT DIAMOND
INTERCHANGE LAYOUT

FIGURE H-1

BY	DATE

REFERENCES NOTED
REFERENCES CHECKED

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureH-1.dgn

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale

City of Lenexa, KS

City of Olathe, KS

Curve Data
P.I. Sta. 45+00.75 (Bk.)
Δ = 14° 00' 00" (LT)
D = 3° 06' 50"
R = 1,840.00'
T = 225.92'
L = 449.60'
E = 13.82'
SE = NC

Curve Data
P.I. Sta. 38+41.29 (Bk.)
Δ = 13° 59' 32" (RT)
D = 3° 06' 50"
R = 1,840.00'
T = 225.80'
L = 449.35'
E = 13.80'
SE = NC

Curve Data
P.I. Sta. 55+24.68 (Bk.)
Δ = 13° 35' 24" (LT)
D = 3° 06' 50"
R = 1,840.00'
T = 219.24'
L = 436.43'
E = 13.02'
SE = NC

Curve Data
P.I. Sta. 62+03.76 (Bk.)
Δ = 13° 35' 08" (RT)
D = 3° 06' 50"
R = 1,840.00'
T = 219.17'
L = 436.29'
E = 13.01'
SE = NC

R/W
Const. Limits
℄ K10
℄ Lone Elm
PC +05.49
PT +64.84
PC +74.83
PT +24.43
PC +05.44
PT +84.59
PC +20.87
Sta. 35+32.08 Survey ℄
Sta. 35+32.08
Sta. 35+32.08 Begin Const.
Sta. 50+14.4 ℄ Lone Elm = Sta. 776+85.64 ℄ K-10
Sta. 63+90.76 Survey ℄

1,040.49
+23.02 1,034.52 VPC
+76.98 1,033.66 VPT
K = 414
354' V.C.
- 0.67%
- 0.67%
+00.00 P.I. El. = 1,038.33
+ 0.18%
+00.00 P.I. El. = 1,036.28
+00.00 1,036.10 VPC
SSD = 633'
K = 99
200' V.C.
- 1.84%
+00.00 1,034.44 VPT
+00.00 P.I. El. = 1,034.26
1,032.22

KANSAS DEPARTMENT OF TRANSPORTATION
LONE ELM UNDER K-10
PLAN AND PROFILE
STA. 36+73.63 TO STA. 63+36.19

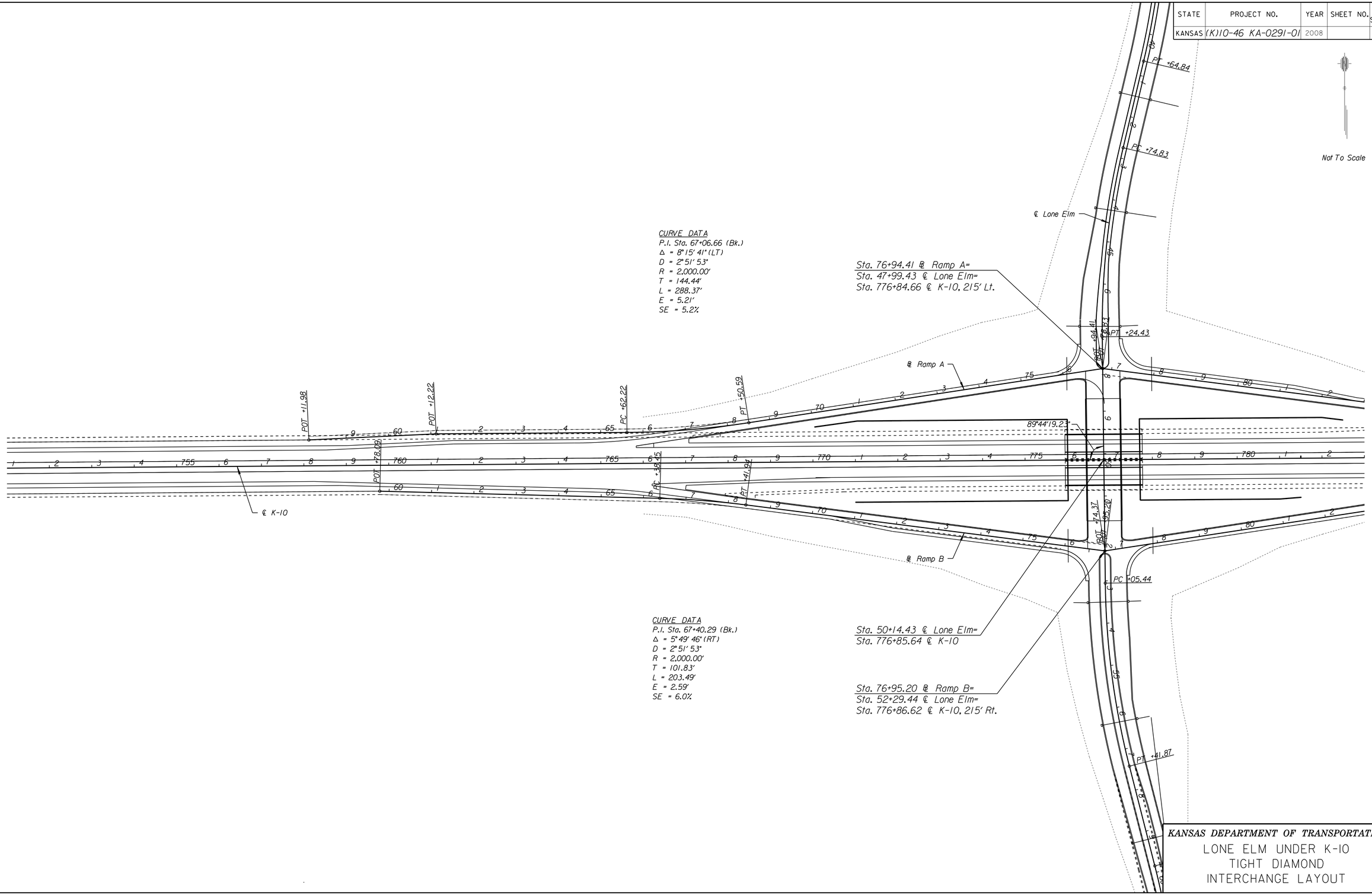
FIGURE H-2

BY | DATE
REFERENCES NOTED
REFERENCES CHECKED

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureH-2.dgn

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale



CURVE DATA
P.I. Sta. 67+06.66 (Bk.)
Δ = 8°15' 41" (LT)
D = 2° 51' 53"
R = 2,000.00'
T = 144.44'
L = 288.37'
E = 5.21'
SE = 5.2%

Sta. 76+94.41 ℄ Ramp A=
Sta. 47+99.43 ℄ Lone Elm=
Sta. 776+84.66 ℄ K-10, 215' Lt.

CURVE DATA
P.I. Sta. 67+40.29 (Bk.)
Δ = 5° 49' 46" (RT)
D = 2° 51' 53"
R = 2,000.00'
T = 101.83'
L = 203.49'
E = 2.59'
SE = 6.0%

Sta. 50+14.43 ℄ Lone Elm=
Sta. 776+85.64 ℄ K-10

Sta. 76+95.20 ℄ Ramp B=
Sta. 52+29.44 ℄ Lone Elm=
Sta. 776+86.62 ℄ K-10, 215' Rt.

DATE	BY	REFERENCES NOTED / REFERENCES CHECKED

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureH-3.dgn

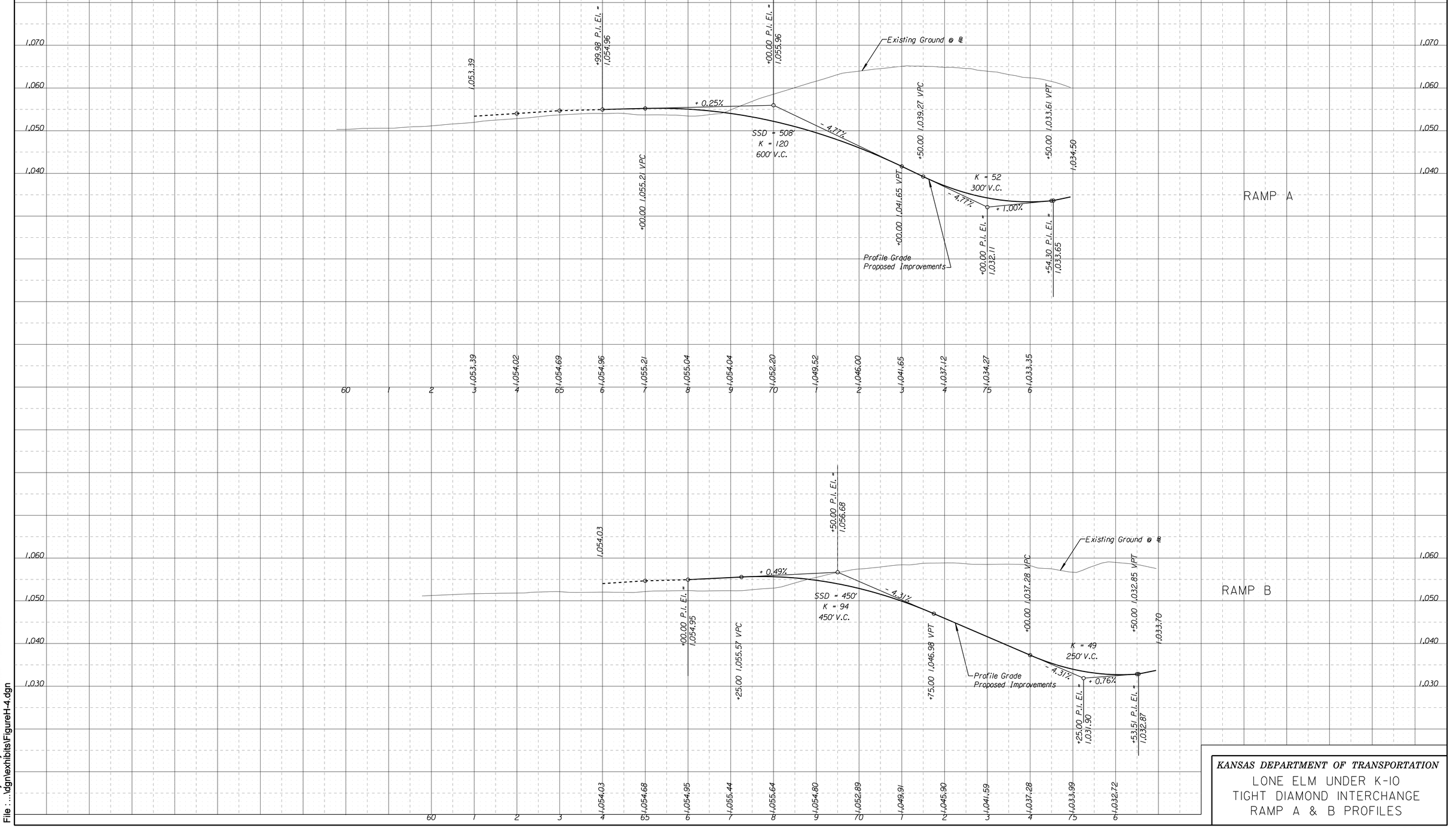
KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM UNDER K-10
TIGHT DIAMOND
INTERCHANGE LAYOUT

FIGURE H-3

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale



Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureH-4.dgn

KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM UNDER K-10
TIGHT DIAMOND INTERCHANGE
RAMP A & B PROFILES

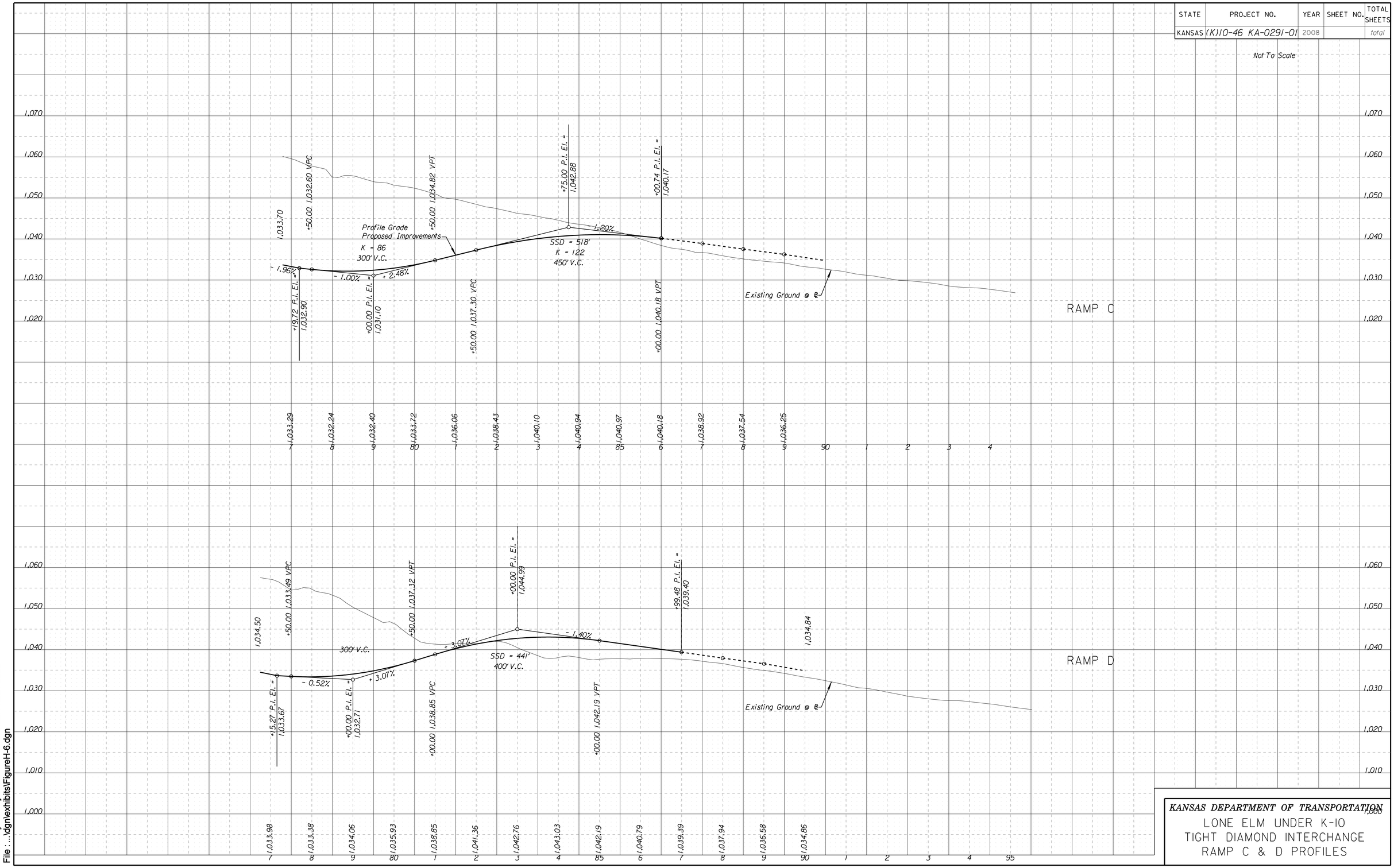
FIGURE H-4


STATE
PROJECT NO.
YEAR
SHEET NO.
TOTAL SHEETS
KANSAS
(K)10-46 KA-0291-01
2008
total
Not To Scale
℄ Lone Elm
Sta. 76+78.83 ℄ Ramp C=
Sta. 47+99.43 ℄ Lone Elm=
Sta. 776+84.66 ℄ K-10, 215' Lt.
CURVE DATA
P.I. Sta. 86+34.70 (Bk.)
Δ = 8° 40' 35" (LT)
D = 2° 51' 54"
R = 1,999.89'
T = 151.71'
L = 302.85'
E = 5.75'
SE = 6.0%
PT +64.84
PC +74.83
PT +24.43
℄ Ramp C
PC +82.99
PT +85.83
POT +61.93
PC +60.07
PRC +28.97
PT +51.07
POT +92.10
89°44'19.23"
℄ K-10
℄ Ramp D
PC +05.44
Sta. 50+14.43 ℄ Lone Elm=
Sta. 776+85.64 ℄ K-10
Sta. 76+74.37 ℄ Ramp D=
Sta. 52+29.44 ℄ Lone Elm=
Sta. 776+86.62 ℄ K-10, 215' Rt.
CURVE DATA
P.I. Sta. 86+83.00 (Bk.)
Δ = 6° 39' 07" (RT)
D = 2° 51' 53"
R = 2,000.00'
T = 116.23'
L = 232.20'
E = 3.37'
SE = 5.2%
CURVE DATA
P.I. Sta. 90+25.04 (Bk.)
Δ = 1° 39' 00" (LT)
D = 0° 21' 54"
R = 15,699.09'
T = 226.07'
L = 452.10'
E = 1.63'
SE = N.C.
PT +41.87
PC +84.59
BY
DATE
REFERENCES NOTED
REFERENCES CHECKED
Drawn By : dmeyrand
Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureH-5.dgn
KANSAS DEPARTMENT OF TRANSPORTATION
LONE ELM UNDER K-10
TIGHT DIAMOND
INTERCHANGE LAYOUT

FIGURE H-5

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale



Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureH-6.dgn

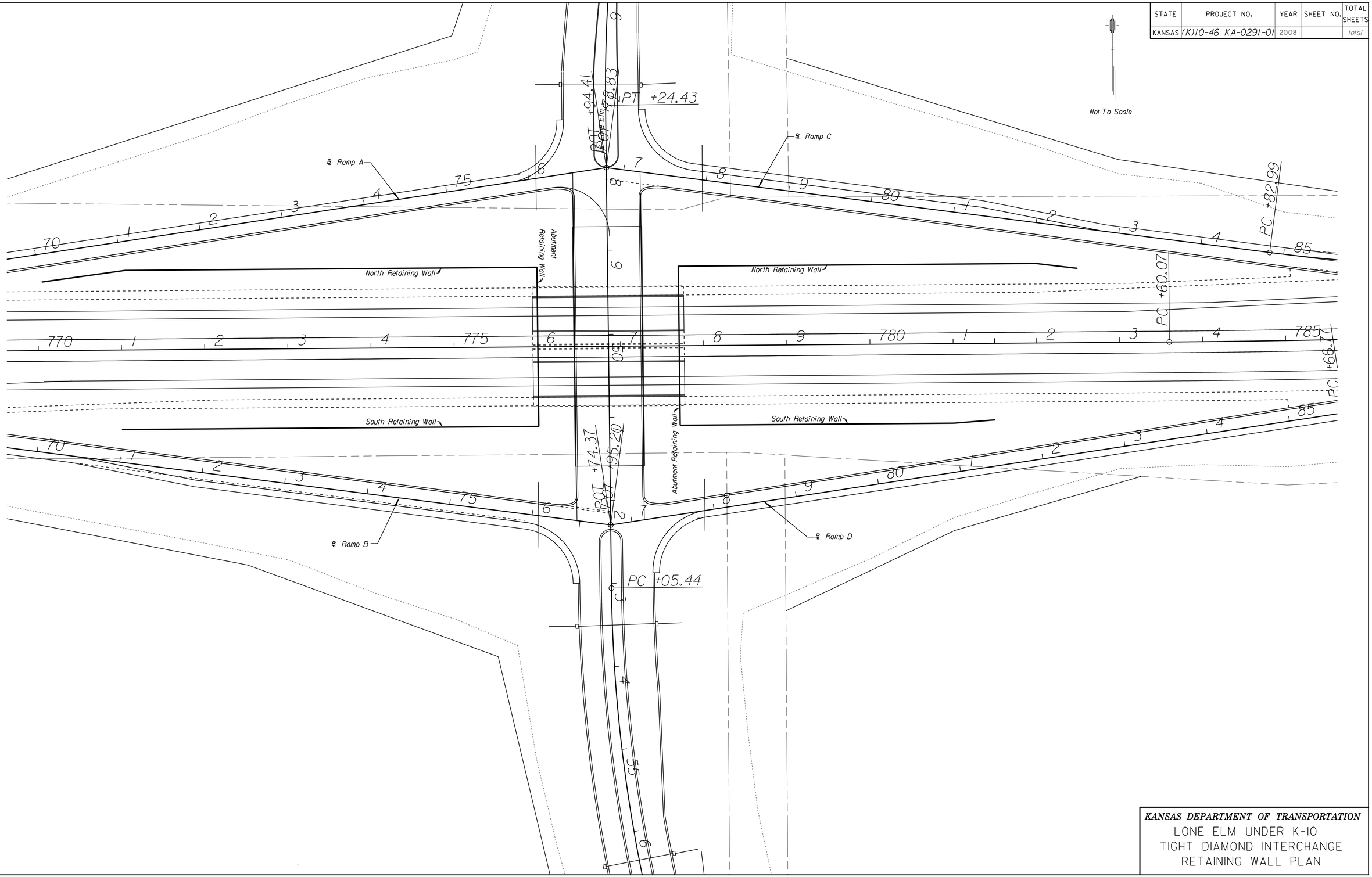
KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM UNDER K-10
TIGHT DIAMOND INTERCHANGE
RAMP C & D PROFILES

FIGURE H-6

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale



REFERENCES NOTED
REFERENCES CHECKED

BY	DATE

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureH-7.dgn

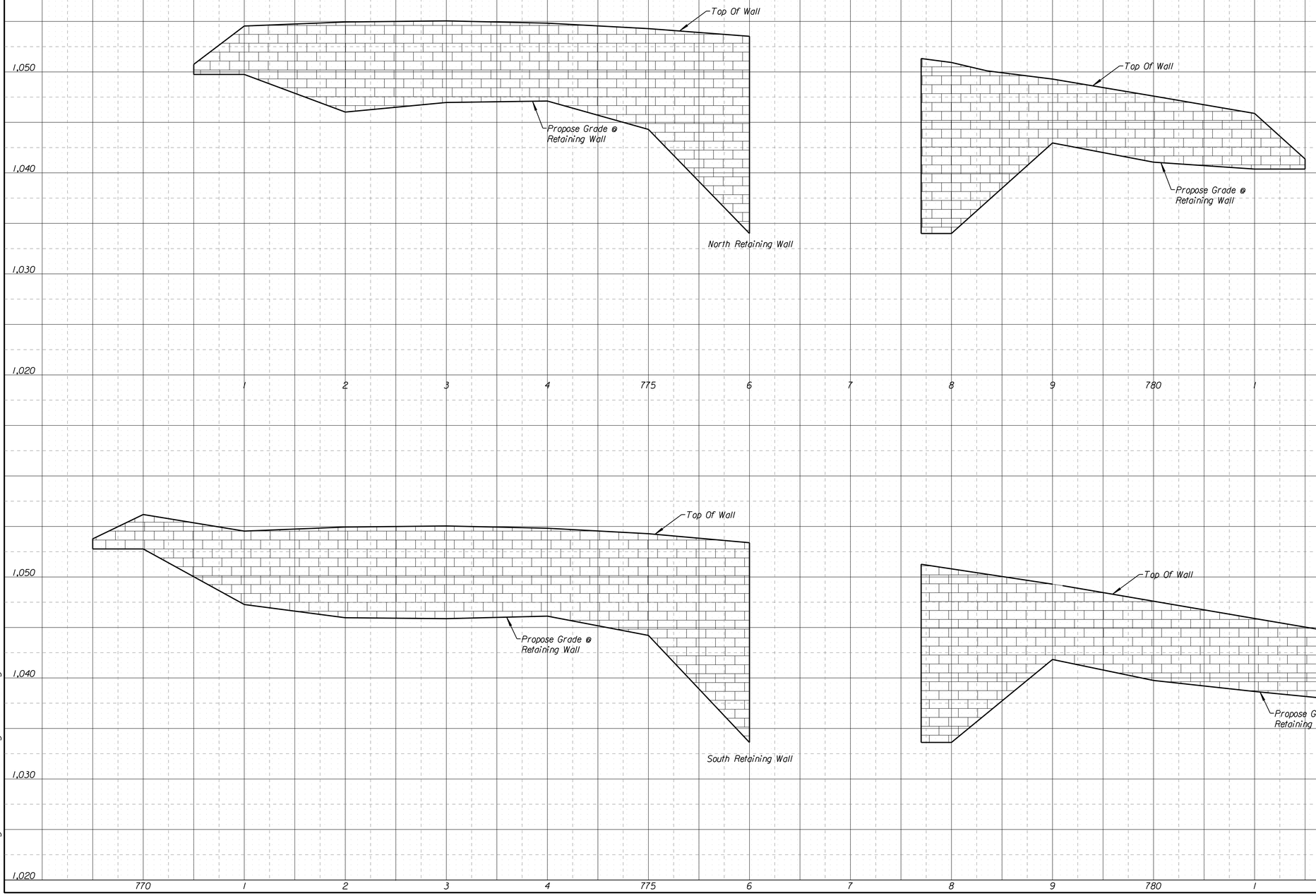
KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM UNDER K-10
TIGHT DIAMOND INTERCHANGE
RETAINING WALL PLAN

FIGURE H-7

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale



Drawn By: meyrand Plotted: 12/31/2008
File: ...\dgn\exhibits\FigureH-8.dgn

KANSAS DEPARTMENT OF TRANSPORTATION
LONE ELM UNDER K-10
TIGHT DIAMOND INTERCHANGE
RETAINING WALL PROFILES

FIGURE H-8

Appendix I

Single Point Urban Interchange Lone Elm over K-10

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

BY	DATE
REFERENCES NOTED	
REFERENCES CHECKED	

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureI-1.dgn

KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
SINGLE POINT
INTERCHANGE LAYOUT

FIGURE I-1


STATE
PROJECT NO.
YEAR
SHEET NO.
TOTAL SHEETS
KANSAS
(K)10-46 KA-0291-01
2008
total
Not To Scale
R/W
Const. Limits
℄ Lone Elm
℄ K-10
SSD = 403'
K = 61
230' V.C.
SSD = 1272'
K = 386
386' V.C.
SSD = 384'
K = 62
264' V.C.
K = 79
390' V.C.
240' V.C.
K = 82
+ 4.25%
+ 0.50%
- 0.50%
- 4.78%
- 0.67%
+00.00 P.I. El. 1,080.38
+15.00 P.I. El. 1,081.95
+40.00 P.I. El. 1,080.33
+30.00 P.I. El. 1,039.16
+00.00 P.I. El. 1,034.44
+25.00 1,047.45 VPT
+85.00 1,075.49 VPC
+72.00 1,074.02 VPT
+80.00 1,040.18 VPC
+20.00 1,032.24 VPT
KANSAS DEPARTMENT OF TRANSPORTATION
LONE ELM OVER K-10
PLAN AND PROFILE
STA. 36+73.63 TO STA. 63+36.19
REFERENCES NOTED
REFERENCES CHECKED
BY
DATE

FIGURE I-2

Plotted :12/31/2008
Drawn By : dmeyrand
File :...\dgn\exhibits\FigureI-2.dgn

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

DATE	BY	
		REFERENCES NOTED
		REFERENCES CHECKED

Not To Scale

CURVE DATA
P.I. Sta. 67+00.00 (Bk.)
Δ = 8°12' 22" (LT)
D = 4°00' 00"
R = 1,432.40'
T = 102.75'
L = 205.15'
E = 3.68'

CURVE DATA
P.I. Sta. 74+99.27 (Bk.)
Δ = 53°12' 22" (RT)
D = 16°22' 13"
R = 350.00'
T = 175.29'
L = 325.02'
E = 41.44'

Sta. 76+94.41 ℄ Ramp A=
Sta. 47+99.43 ℄ Lone Elm=
Sta. 776+84.66 ℄ K-10, 215' Lt.

Sta. 50+14.43 ℄ Lone Elm=
Sta. 776+85.64 ℄ K-10

Sta. 76+95.20 ℄ Ramp B=
Sta. 52+29.44 ℄ Lone Elm=
Sta. 776+86.62 ℄ K-10, 215' Rt.

CURVE DATA
P.I. Sta. 68+43.49 (Bk.)
Δ = 6°48' 01" (RT)
D = 4°00' 00"
R = 1,432.40'
T = 85.10'
L = 170.01'
E = 2.53'

CURVE DATA
P.I. Sta. 75+00.62 (Bk.)
Δ = 53°42' 34" (LT)
D = 16°22' 13"
R = 350.00'
T = 177.22'
L = 328.09'
E = 42.31'

KANSAS DEPARTMENT OF TRANSPORTATION

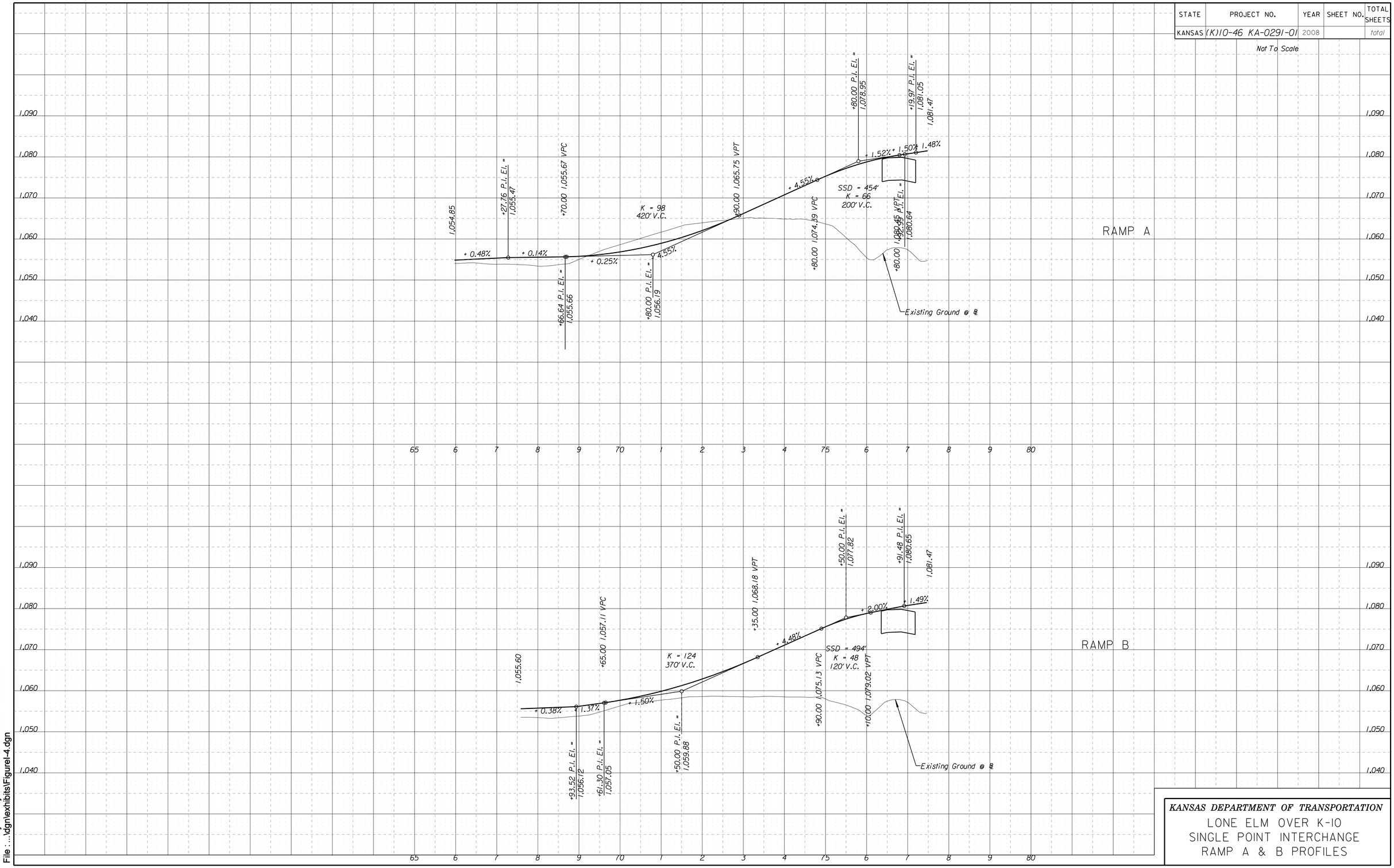
LONE ELM OVER K-10
SINGLE POINT
INTERCHANGE LAYOUT

FIGURE I-3

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\Figure1-3.dgn

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale



Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\Figure1-4.dgn

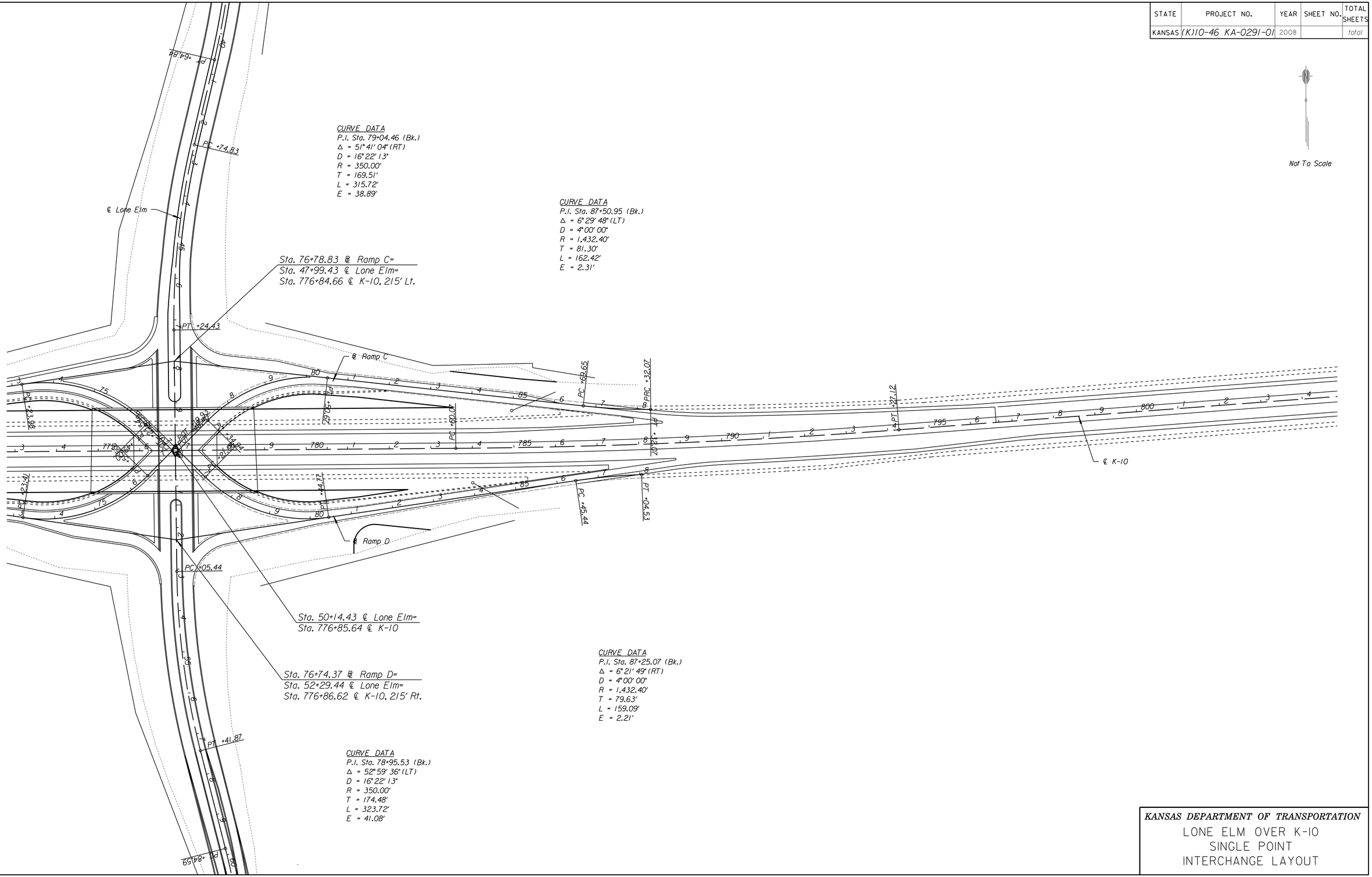
KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
SINGLE POINT INTERCHANGE
RAMP A & B PROFILES

FIGURE I-4

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale



CURVE DATA
P.I. Sta. 79+04.46 (Bk.)
Δ = 51° 41' 04" (RT)
D = 16° 22' 13"
R = 350.00'
T = 169.51'
L = 315.72'
E = 38.89'

CURVE DATA
P.I. Sta. 87+50.95 (Bk.)
Δ = 6° 29' 48" (LT)
D = 4° 00' 00"
R = 1,432.40'
T = 81.30'
L = 162.42'
E = 2.31'

CURVE DATA
P.I. Sta. 87+25.07 (Bk.)
Δ = 6° 21' 49" (RT)
D = 4° 00' 00"
R = 1,432.40'
T = 79.63'
L = 159.09'
E = 2.21'

CURVE DATA
P.I. Sta. 78+95.53 (Bk.)
Δ = 52° 59' 36" (LT)
D = 16° 22' 13"
R = 350.00'
T = 174.48'
L = 323.72'
E = 41.08'

DATE	BY	
REFERENCES NOTED		
REFERENCES CHECKED		

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\Figure1-5.dgn

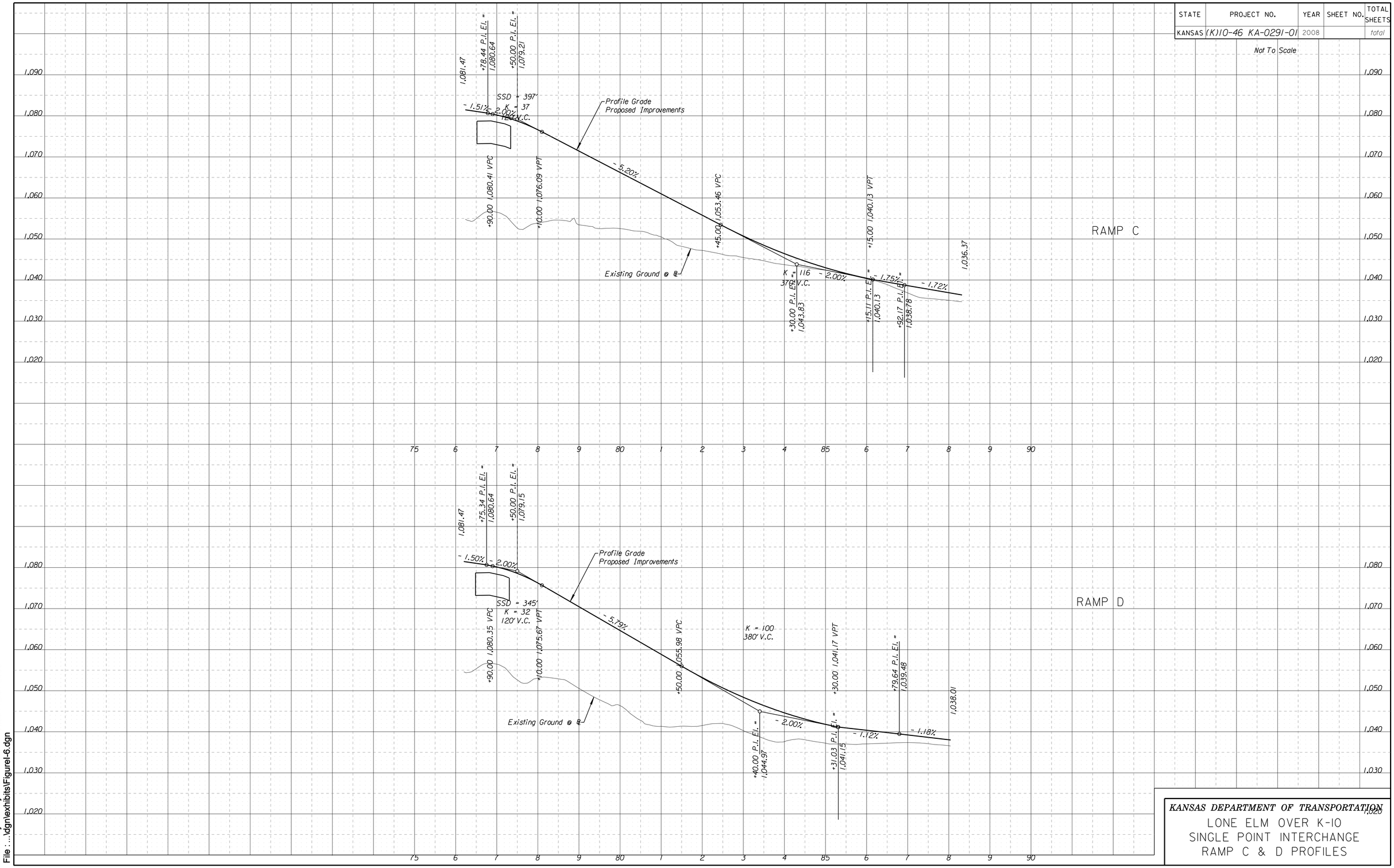
KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
SINGLE POINT
INTERCHANGE LAYOUT

FIGURE I-5

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale



Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\Figure1-6.dgn

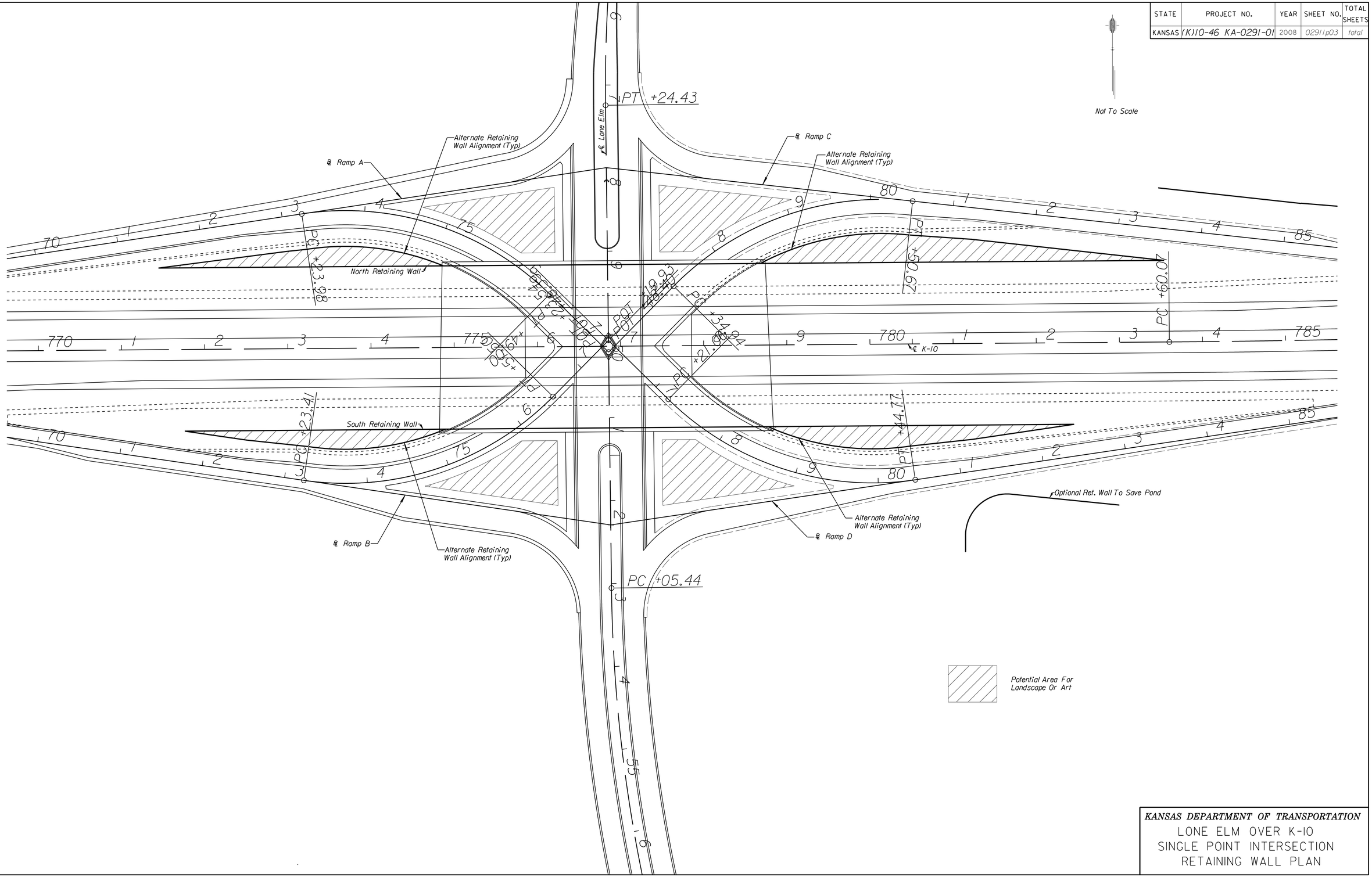
KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
SINGLE POINT INTERCHANGE
RAMP C & D PROFILES

FIGURE I-6

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008	02911p03	total

Not To Scale



REFERENCES NOTED
REFERENCES CHECKED

DATE	BY

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\Figure1-7.dgn

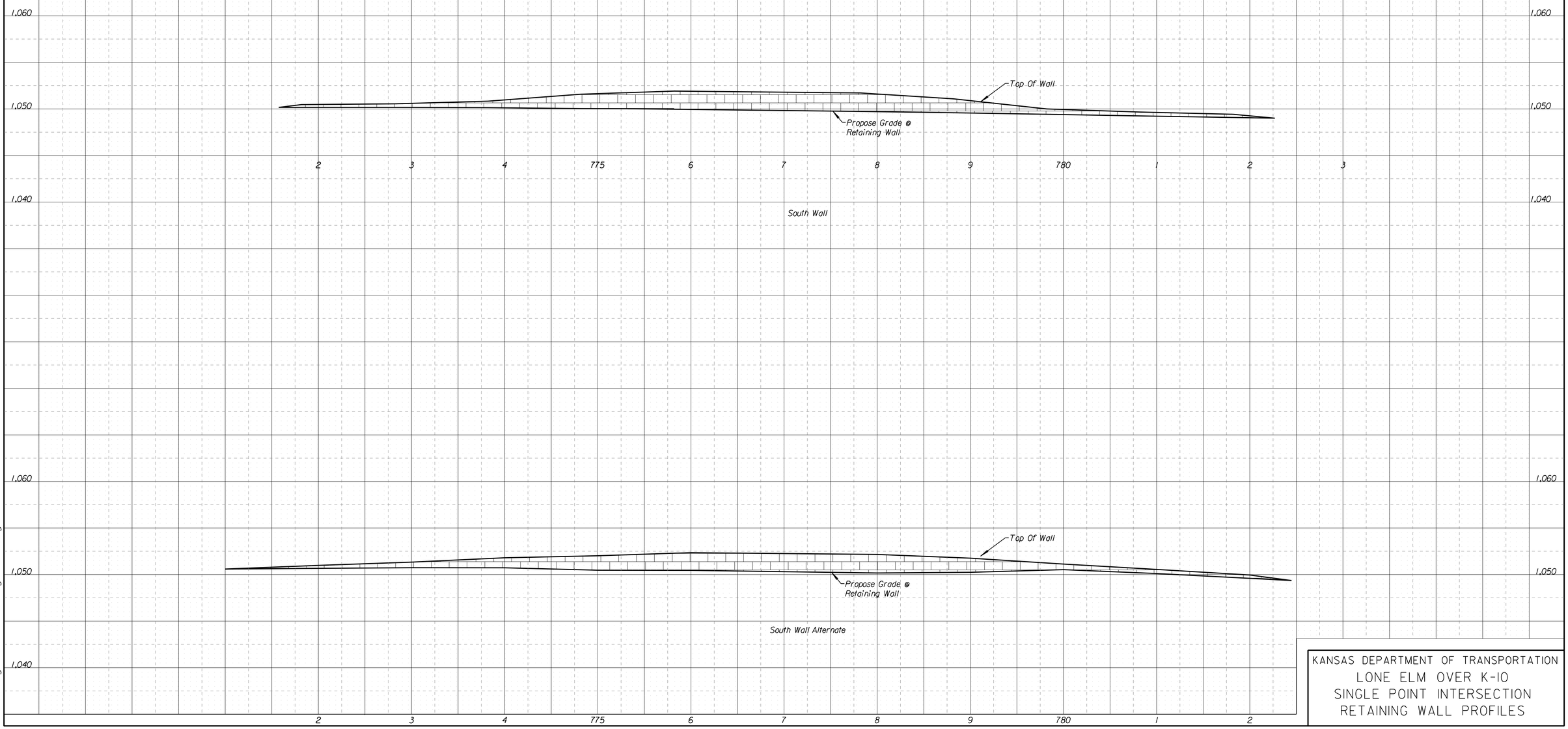
KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
SINGLE POINT INTERSECTION
RETAINING WALL PLAN

FIGURE I-7

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale



Drawn By: mayrand Plotted: 8/31/2008
File: ...\dgn\exhibits\Figure1-8.dgn

KANSAS DEPARTMENT OF TRANSPORTATION
LONE ELM OVER K-10
SINGLE POINT INTERSECTION
RETAINING WALL PROFILES

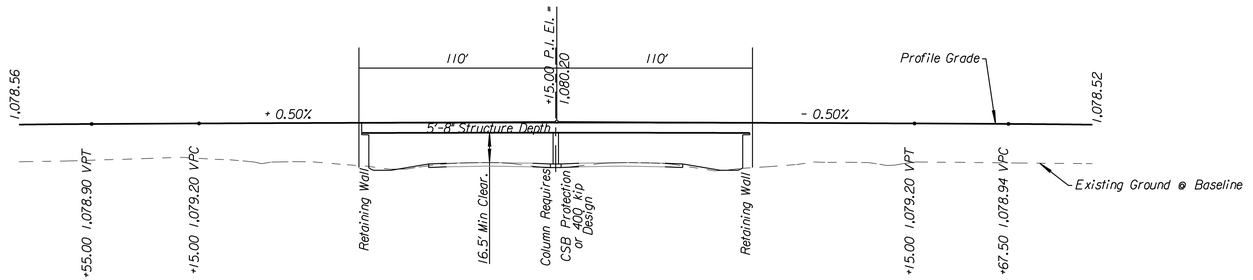
FIGURE I-8

Appendix J

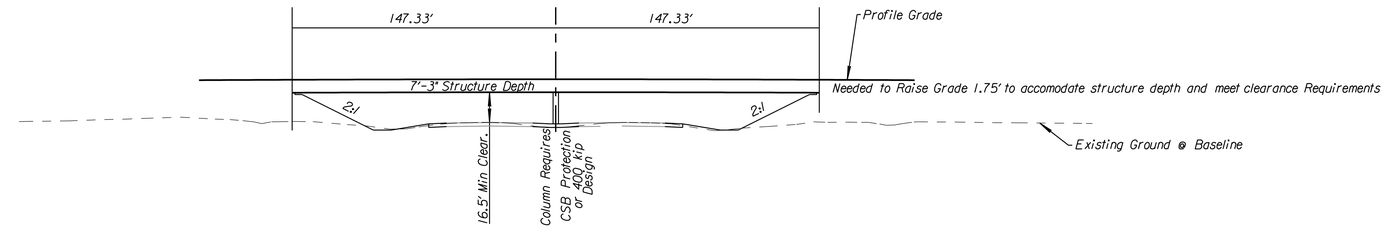
Bridge Elevations and Sections

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

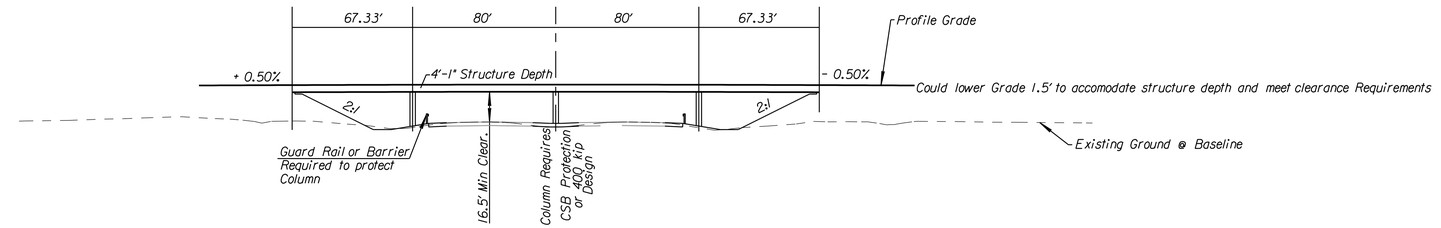
DATE	BY	
		REFERENCES NOTED
		REFERENCES CHECKED



OPTION 1
Lone Elm Over K-10



OPTION 2
Lone Elm Over K-10



OPTION 3
Lone Elm Over K-10

Note:
All Bridge Options Are Assuming Steel Plate Girder Bridges.

KANSAS DEPARTMENT OF TRANSPORTATION

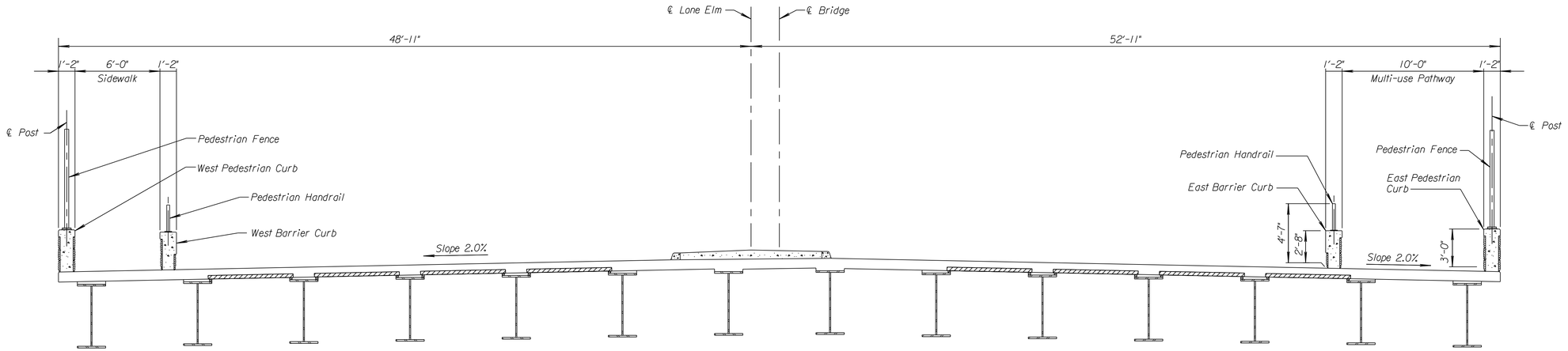
TYPICAL ELEVATION
LONE ELM OVER K-10

FIGURE J-1

Drawn By: : dmeyrand Plotted :12/31/2008
File :...\dgn\exhibits\Figure J-1.dgn

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

REFERENCES NOTED	BY	DATE
REFERENCES CHECKED		



TYPICAL SECTION

Bridge

NOT TO SCALE

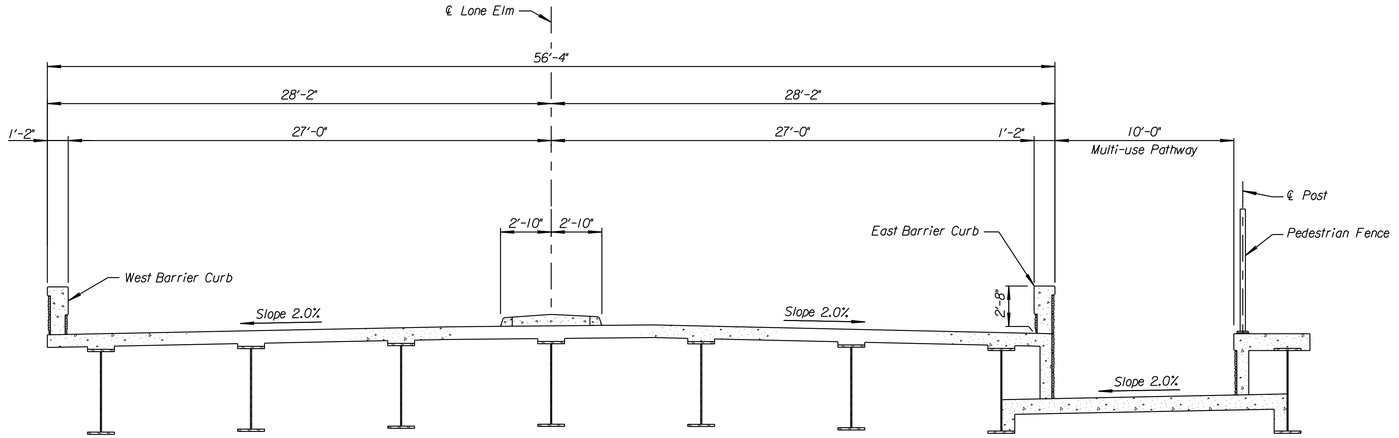
KANSAS DEPARTMENT OF TRANSPORTATION

TYPICAL SECTION
BRIDGE
LONE ELM OVER K-10

Drawn By : $$USERNAME$$ Plotted : $$$$$SYTIME$$$$$
File : $$$$$$$$$$$$$DGNSPEC$$$$$$$$$$$

FIGURE J-2

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total



TYPICAL SECTION LOOKING NORTH

Bridge

NOT TO SCALE

DATE	BY	REFERENCES NOTED	REFERENCES CHECKED

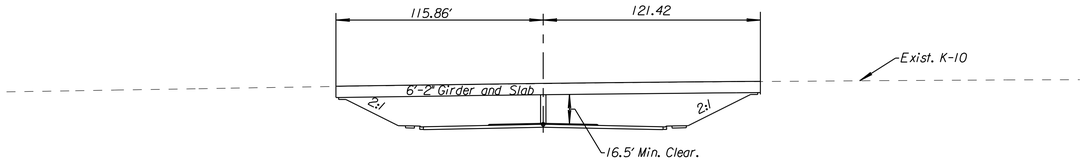
Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureJ-3.dgn

KANSAS DEPARTMENT OF TRANSPORTATION

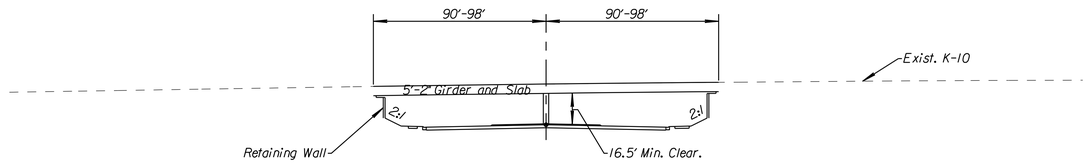
TYPICAL SECTION
BRIDGE WITH RECESSED PATH
LONE ELM OVER K-10

FIGURE J-3

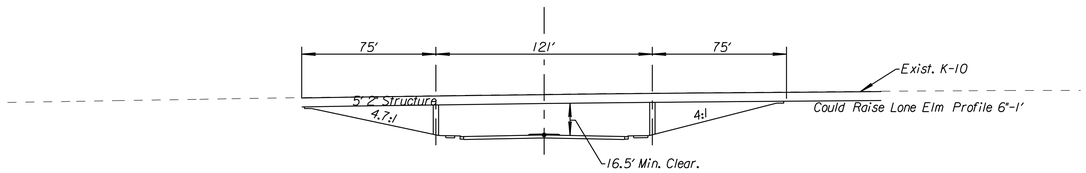
STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total



OPTION 1
Lone Elm Under K-10

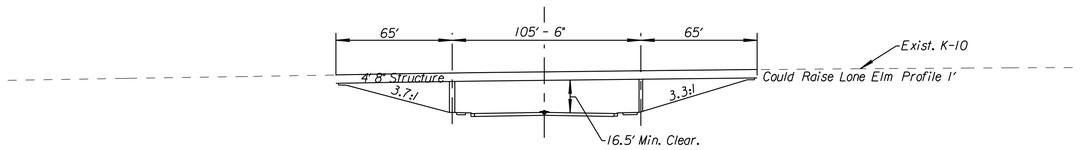


OPTION 2
Lone Elm Under K-10



OPTION 3
Lone Elm Under K-10

Note:
All Bridge Options Are Assuming
Steel Plate Girder Bridges.



OPTION 4
Lone Elm Under K-10

KANSAS DEPARTMENT OF TRANSPORTATION

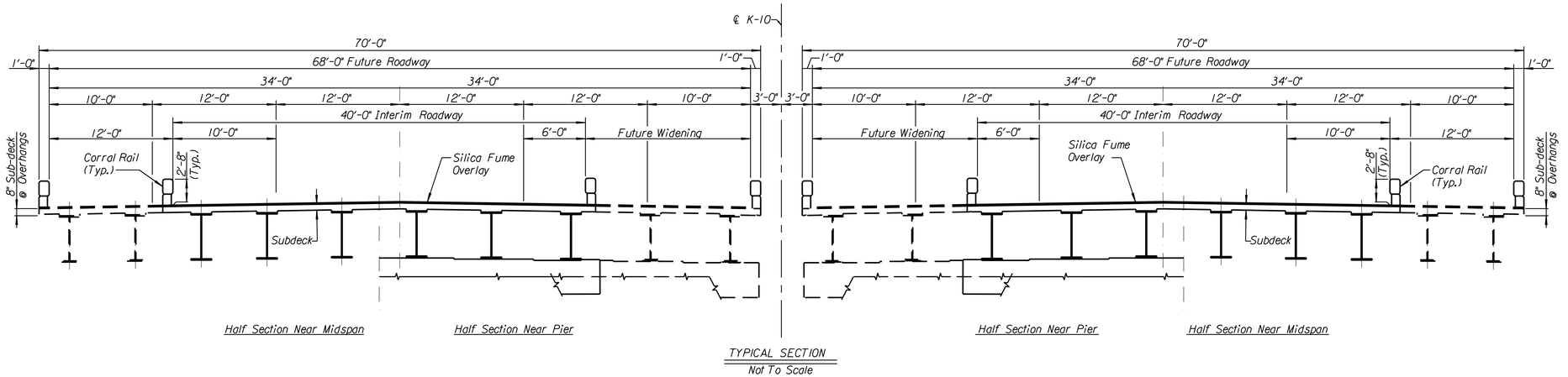
TYPICAL ELEVATION
LONE ELM UNDER K-10

FIGURE J-4

DATE	BY	
		REFERENCES NOTED
		REFERENCES CHECKED

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\dgn\exhibits\FigureJ-4.dgn

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total



TYPICAL SECTION
Not To Scale

BY	DATE
REFERENCES NOTED	
REFERENCES CHECKED	

Drawn By : d_howard Plotted : 4/13/2009
File : ...\DGN\Exhibits\FigureJ-5.dgn

KANSAS DEPARTMENT OF TRANSPORTATION

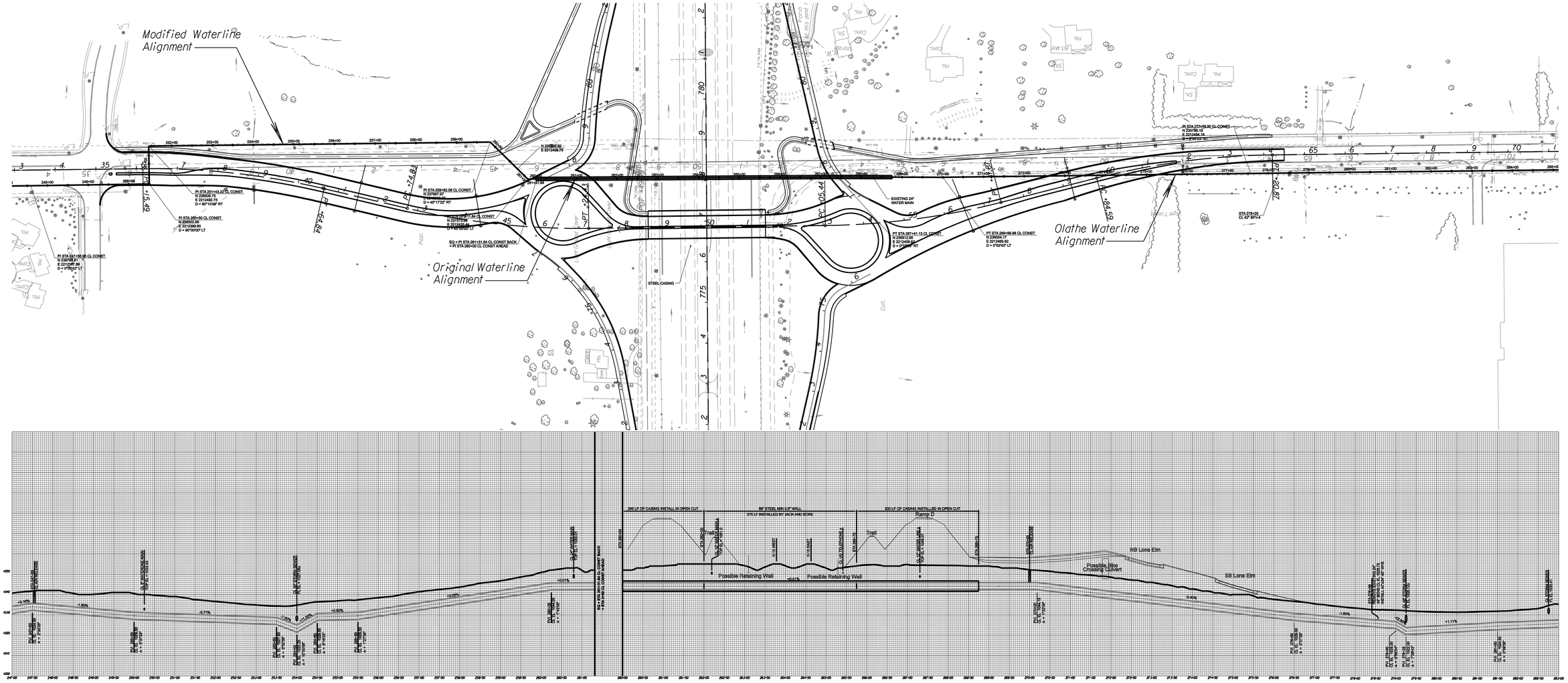
TYPICAL SECTION
BRIDGE
K-10 OVER LONE ELM

FIGURE J-5

Appendix K

Olathe Waterline

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total



REFERENCES NOTED	
REFERENCES CHECKED	
BY	
DATE	

Drawn By : dmeyrand Plotted : 6/8/2009
File : ...\DGN\Exhibits\FigureK-1.dgn

KANSAS DEPARTMENT OF TRANSPORTATION

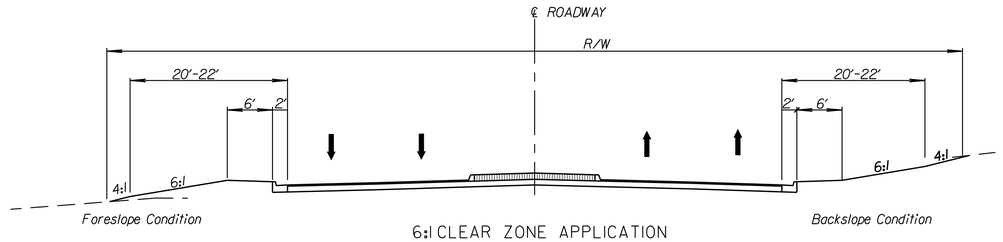
LONE ELM AT K-10
BREAK-IN-ACCESS STUDY
LOCATION MAP

FIGURE K-1

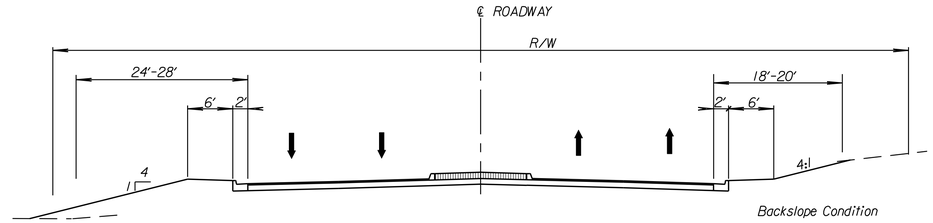
Appendix L

Clear Zone Options

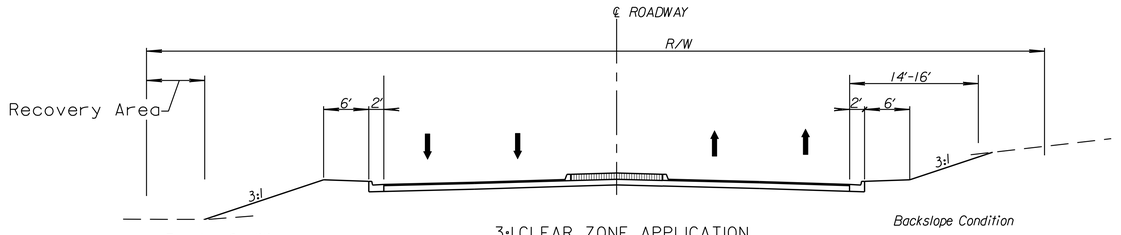
STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total



6:1 CLEAR ZONE APPLICATION
Lone Elm



4:1 CLEAR ZONE APPLICATION
Lone Elm



3:1 CLEAR ZONE APPLICATION
Lone Elm

DATE	BY	
		REFERENCES NOTED
		REFERENCES CHECKED

Drawn By : d_howard Plotted : 4/13/2009
File : ...\DGN\Exhibits\FigureL-1.dgn

KANSAS DEPARTMENT OF TRANSPORTATION

CLEAR ZONE CONCEPTS
LONE ELM

FIGURE L-1

Appendix M

Environmental Screening

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

Not To Scale

Lone Elm at K-10 Interchange Study
Environmental Corridor

BY	DATE
REFERENCES NOTED	
REFERENCES CHECKED	

Drawn By : dmeyrand Plotted : 12/31/2008
File : ...\DGN\Exhibits\FigureM-1.dgn

KANSAS DEPARTMENT OF TRANSPORTATION
LONE ELM AT K-10
INTERCHANGE STUDY
ENVIRONMENTAL CORRIDOR

FIGURE M-1

Kansas Department of Transportation

RECEIVED

SEP 04 2008

BUREAU OF DESIGN ADMINISTRATION

MEMO TO: James Brewer, P.E., Engineering Manager
State Road Office

FROM: Scott Vogel, Chief
Environmental Services Section

DATE: September 2, 2008

SUBJECT: Preliminary Environmental Review
10-46 KA-0291-01
HPD-HPD-A029(101)
Johnson County

A Preliminary Environmental Review for the proposed K-10/Lone Elm Road Interchange was initiated based on a corridor map received July 22, 2007 (Lone Elm at K-10 Interchange Study: Environmental Corridor). The following is a summary of the review for each environmental task evaluated.

NOISE: This project fulfills the criteria for a "Type I Project", as outlined in the KDOT Environmental Manual. Therefore a traffic noise study will be required.

ARCHEOLOGY: A Phase I review was completed by the Highway Archeologist at the Kansas State Historical Society. The study area illustrated on the Environmental Corridor map will have no effect as described in 36 CFR 800.5, on any archeological property listed in or eligible for listing on the National Register of Historic Places or the State Register.

CULTURAL & HISTORICAL: Photographs of all potentially eligible standing structures within the Area of Potential Effect (1,000' from the study area) were taken during Activity I field investigation on August 22, 2007 and were submitted to the State Historic Preservation Office (SHPO) for review. Following review of the photographs the SHPO request an Activity II investigation for Property #1 (Potential Historic Properties).

WETLANDS: The potential exists that wetlands may have developed around any of the ponds, stream channels, or poorly drained low areas within the study corridor. The attached National Wetlands Inventory map (NWI Mapped Wetlands) of the study corridor shows an emergent wetland in the SW/4 SE/4 Sec.3-T13S-R23E located approximately 120 feet north of the southern-most residence on Monticello Street. The Coon Creek channel south and north of K-10 in the NW/4 NE/4 Sec.11-T13S-R23E and SW/4 SE/4 Sec.2-T13S-R23E is shown as forested wetland. National Wetlands Inventory mapped wetlands do not always qualify as wetlands when wetland determinations are performed according to the methods described in the 1987 Corps of Engineers Wetlands Delineation Manual. The US Army Corps of Engineers regulates fill placed in jurisdictional streams, ponds, and wetlands. If fill is placed in jurisdictional waters Section 404 permits will be required. Corps of Engineers regulations normally requires replacement of filled jurisdictional wetlands or stream channels.

WATER RESOURCES: The study corridor includes the intermittent stream Coon Creek in Sections 11 and 2-T13S-R23E, and an unnamed tributary to Coon Creek in Sections 10 and 3-T13S-R23E. On the north side of K-10 the tributary to Coon Creek has been dammed to create a pond near the golf course in the SE/4 SW/4 Sec.3-T13S-R23E. Another small pond is located in the SE/4 SE/4 of Sec.3-T13S-R23E. South of K-10 two ponds are located in the NE/4 NE/4 Sec.11-T13S-R23E.

SEK

The Kansas Department of Agriculture, Division of Water Resources (DWR), regulates dams, stream obstructions, channel changes, and floodplain fills. If the project would require bridges, culverts, or channel changes on streams with drainage areas exceeding 240 acres Dams, Stream Obstructions and Channel Changes permits would be required.

FLOODPLAINS: The Federal Emergency Management Agency, Flood Insurance Rate Map 20091C0180F does not indicate a mapped 100-year floodplain within the study corridor.

WILDLIFE: Federally listed – The US Fish & Wildlife Service (USFWS) lists two threatened and/or endangered species in Johnson County, the Pallid sturgeon and Mead's milkweed. The USFWS has not established designated critical habitat (DCH) for either species in Johnson County. The Pallid sturgeon may inhabit the Kansas River located approximately 4.65 miles north of the study corridor. A project within the study corridor would not affect Pallid sturgeon habitat. Mead's milkweed may occur on undisturbed high quality native prairies in Johnson County. There are no Kansas Biological Survey records of rare species occurring within the study corridor. Land use within the study corridor includes highway right-of-way, residential, agricultural, and a golf course. The potential is low that Mead's milkweed occurs within the study corridor.

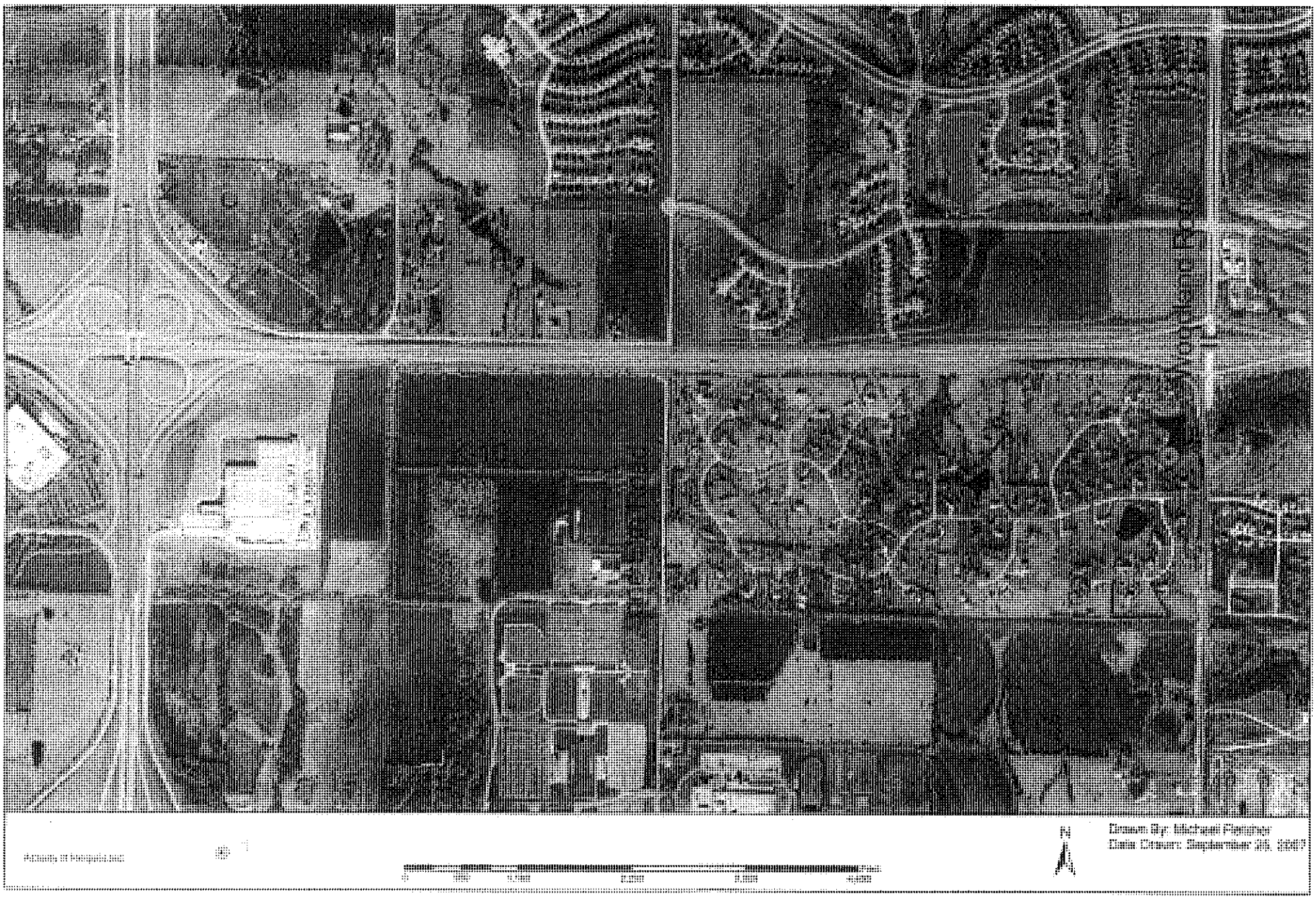
State listed – The Kansas Department of Wildlife & Parks (KDWP) lists eighteen threatened and/or endangered species in Johnson County. Those species include the American burying beetle, Bald eagle, Chestnut lamprey, Eastern spotted skunk, Eskimo curlew, Flathead chub, Least tern, Pallid sturgeon, Peregrine falcon, Piping plover, Redbelly snake, Sicklefin chub, Silver chub, Smooth earth snake, Snowy plover, Sturgeon chub, Topeka shiner, and Western silvery minnow. In Johnson County DCH has not been established for the American burying beetle, Chestnut lamprey, Eastern spotted skunk, Eskimo curlew, Pallid sturgeon, Peregrine falcon, Sicklefin chub, Snowy plover, Topeka shiner, or Western silvery minnow. Designated critical habitat has been established for the Bald eagle, Flathead chub, Least tern, Piping plover, Redbelly snake, Silver chub, Smooth earth snake, and Sturgeon chub. Designated critical habitat for the Bald eagle includes the Kansas River corridor and all lands and waters that lie within 5 air miles of Hillsdale Lake public lands. The study corridor is located 4.65 miles south of the Kansas River and approximately 15 miles from public lands on Hillsdale Lake. A project within the study corridor will not affect Bald eagle DCH. Designated critical habitat for the Flathead chub, Least tern, Piping plover, Silver chub, and Sturgeon chub are limited to the Kansas River. A project within the study corridor will not affect DCH at the Kansas River. Redbelly snake and Smooth earth snake DCH includes all suitable woodland habitat in Johnson County. The study corridor includes two small areas of fragmented woodlands adjacent to Coon Creek. There are no Kansas Biological Survey records of either species occurring at this location. If the project would impact suitable Redbelly snake or Smooth earth snake habitat a KDWP Action Permit would be required. Action Permits normally require mitigation for impacts to DCH.

HAZARDOUS WASTE: The Kansas Department of Health & Environment Identified Sites and Permitted Landfills database, the EPA CERCLIS (Superfund) database, and the National Priorities List database did not identify any hazardous waste sites within the project study area. A field survey of the study corridor conducted on August 14, 2007 did not identify any obvious hazardous waste sites.

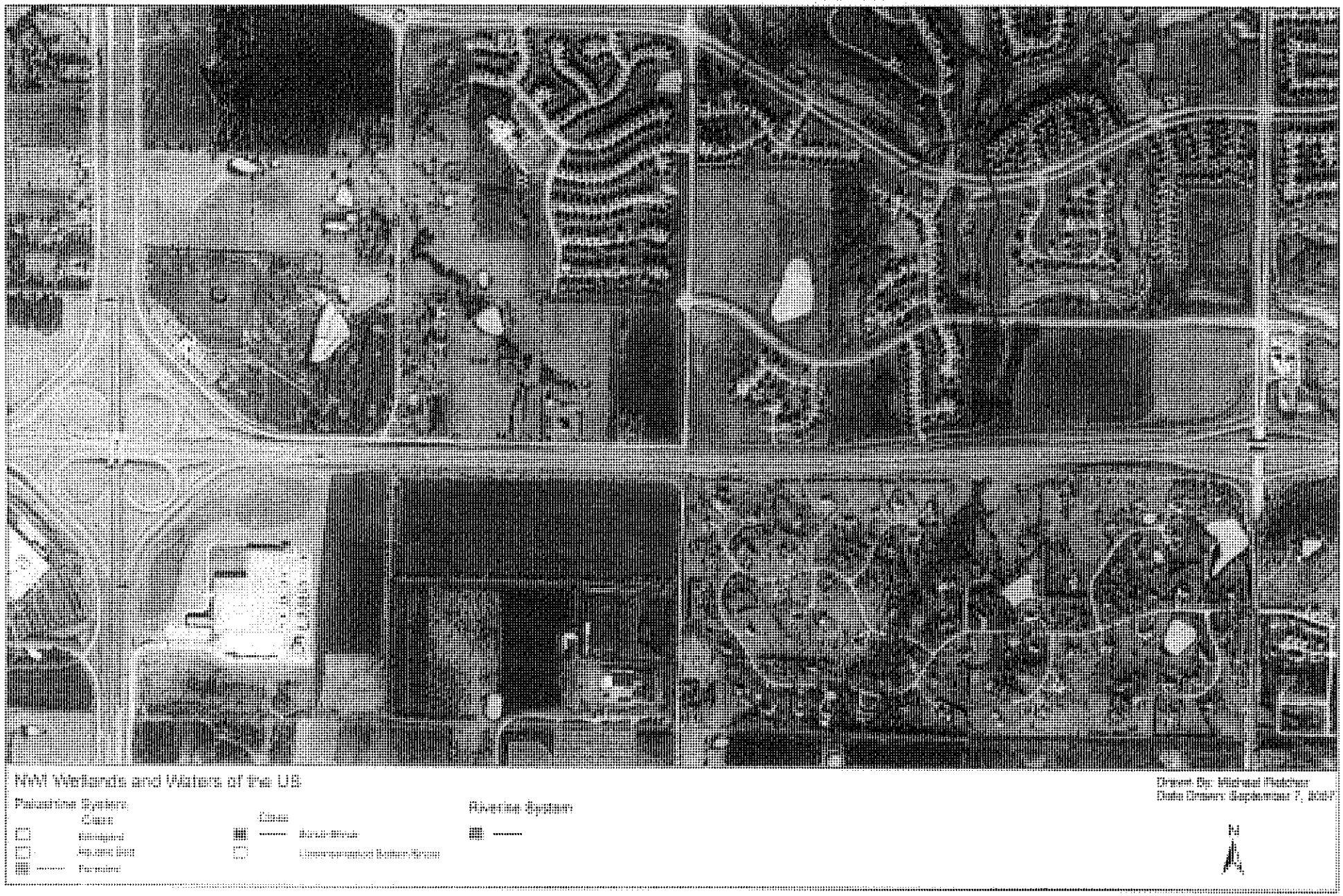
If you have any questions contact this office at (785) 296-0853.

SPV:MPF
Attachments

Potential Historic Properties
10-46 KA-0291-01 Study Corridor



NWI Mapped Wetlands
KA-0291-01 Study Corridor



Appendix N

Sign Concept Plans

LEGEND

- PROPOSED SIGN
- EXISTING SIGN
- REMOVE EXISTING SIGN

wrcobb
5/29/2009 - $TIME$ - g:\KC07\0205\Traffic\CT-SN-K10-101.dgn

TranSystems

2400 PERSHING ROAD
SUITE 400
KANSAS CITY, MISSOURI
PHONE: 816-329-8600
FAX: 816-329-8601

CONSULTANTS

K-10 AND LONE ELM GUIDE SIGNING

K-10 CORRIDOR

MARK	DATE	DESCRIPTION

PROJ NO: P101070205
SCALE: 1" = 500"
DATE: 5/29/2009
DESIGNED BY: JDT
DRAWN BY: JCG
CHECKED BY: JDM

SHEET TITLE

CONCEPT SIGNING PLAN

EXHIBIT N1

LEGEND

- PROPOSED SIGN
- EXISTING SIGN
- REMOVE EXISTING SIGN

N

SCALE 1" = 500'
0 500 1000 FEET

K-7

Cedar Creek Pkwy
Canyon Creek Blvd
EXIT 1 ½ MILES
BRIDGE MOUNTED SIGN

Lone Elm Rd
EXIT ¾ MILE
REPLACE BRIDGE MOUNTED SIGN

~~Woodland Rd~~
~~EXIT 1 ¾ MILE~~

UIP
7 NORTH
Bonner Springs
30 MPH

UIP
EXIT

RELOCATE LATERALLY TO PROPER OFFSET
Ernie Miller
Nature Center & Park
Deaf Cultural Center
via 7 south

MATCH LINE A

K-10

K-10

MATCH LINE B

~~Shawnee~~
~~SECOND RIGHT~~
REPLACE GROUND MOUNTED SIGN

Lenexa
Shawnee
SECOND RIGHT

UIP

UIP
REMOVE

~~7 ½~~
~~Woodland Rd 2 ½~~
~~Ridgeview Rd 3 ½~~
REPLACE SIGN; REUSE EXISTING BUTTERFLY STRUCTURE

7 NORTH
Bonner Springs
EXIT ¼ MILE
UIP

7 SOUTH
Olathe
UIP

7 SOUTH
Olathe
EXIT ¼ MILE
UIP

~~7 NORTH~~
~~Bonner Springs~~
REPLACE SIGN; REUSE EXISTING STRUCTURE

7 ½
Lone Elm Rd 1 ½
Woodland Rd 2 ½

K-7

Adopt a Highway
UIP

7 NORTH
Bonner Springs
EXIT ONLY

wrcobb
5/29/2009 - $TIME$ - g:\KC07\0205\Traffic\CT-SN-K10-102.dgn

TranSystems
2400 PERSHING ROAD
SUITE 400
KANSAS CITY, MISSOURI
PHONE: 816-329-8600
FAX: 816-329-8601

CONSULTANTS

K-10 AND LONE ELM GUIDE SIGNING
K-10 CORRIDOR

MARK	DATE	DESCRIPTION

PROJ NO: P101070205
SCALE: 1" = 500"
DATE: 5/29/2009
DESIGNED BY: JDT
DRAWN BY: JCG
CHECKED BY: JDM

SHEET TITLE

CONCEPT SIGNING PLAN

EXHIBIT N2

NEW BUTTERFLY STRUCTURE

7 — Cedar Creek Pkwy — 1/4
Canyon Creek Blvd — 2

REMOVE GROUND MOUNTED SIGN

~~7 NORTH Bonner Springs EXIT 1/4 MILE~~

REMOVE BUTTERFLY STRUCTURE

~~7 — Cedar Creek Pkwy — 3/4
2 1/2~~

NEW SIGN TRUSS AT THEORETICAL GORE

7 Olathe Bonner Springs EXITS 3/4 MILE

Lone Elm Rd ↗ EXIT ONLY

N

SCALE 1" = 500'

0 500 1000 FEET

RELOCATE LATERALLY TO PROPER OFFSET

CAR POOL INFO 816-842-RIDE

NEW CANTILEVER 2300' FROM THEORETICAL GORE

7 NORTH Bonner Springs EXIT ↓ ONLY

RELOCATE

auto tour signs

NEW GROUND MOUNTED SIGN

EXIT ↗

RELOCATE LATERALLY TO PROPER OFFSET

SPEED LIMIT 70

RELOCATE LATERALLY TO PROPER OFFSET

WEST 10

NEW BUTTERFLY STRUCTURE

Lone Elm Rd — 1/4
7 — 1 1/4
Cedar Creek Pkwy — 2
Canyon Creek Blvd

Lenexa Shawnee NEXT EXIT

REPLACE GROUND MOUNTED SIGN

~~Shawnee NEXT RIGHT~~

W4-1R

RELOCATE TO

LONE ELM ROAD

MATCH LINE B

K-10

K-10

MATCH LINE C

LONE ELM ROAD

RELOCATE TO

Lone Elm Rd EXIT ↓ ONLY

NEW CANTILEVER STRUCTURE 1320' FROM THEORETICAL GORE

SPEED LIMIT 70

RELOCATE LATERALLY TO PROPER OFFSET

Lone Elm Rd — 1/4
Woodland Rd — 1 1/4
Ridgeview Rd — 2 1/4

NEW BUTTERFLY STRUCTURE

EXIT ↗

NEW GROUND MOUNTED SIGN

Lone Elm Rd ↗ EXIT ONLY

Woodland Rd EXIT 3/4 MILE

NEW SIGN TRUSS AT THEORETICAL GORE

W4-1R

FOR HIGHWAY EMERGENCIES DIAL *47 ON YOUR CELLULAR PHONE

RELOCATE

~~Woodland Rd — 3/4
Ridgeview Rd — 1 3/4
Renner Blvd — 2 1/2~~

REMOVE BUTTERFLY STRUCTURE

GAS NEXT EXIT
FOOD NEXT EXIT

RELOCATE LATERALLY TO PROPER OFFSET

Woodland Rd — 1/4
Ridgeview Rd — 1 1/4
Renner Blvd — 2

NEW BUTTERFLY STRUCTURE

Woodland Rd EXIT ↓ ONLY

LEGEND

- PROPOSED SIGN
- EXISTING SIGN / NEW CANTILEVER 1320' FROM THEORETICAL GORE
- REMOVE EXISTING SIGN

TranSystems

2400 PERSHING ROAD
SUITE 400
KANSAS CITY, MISSOURI
PHONE: 816-329-8600
FAX: 816-329-8601

CONSULTANTS

K-10 AND LONE ELM GUIDE SIGNING

K-10 CORRIDOR

MARK	DATE	DESCRIPTION

PROJ NO: P101070205
SCALE: 1" = 500"
DATE: 5/29/2009
DESIGNED BY: JDT
DRAWN BY: JCG
CHECKED BY: JDM

SHEET TITLE

CONCEPT SIGNING PLAN

EXHIBIT N3

wrcobb - $TIME$ - g:\KC070205\Traffic\CT-SN-K10-103.dgn
5/29/2009

NEW CANTILEVER
2600' FROM THEORETICAL GORE

Lone Elm Rd
EXIT ONLY

Lone Elm Rd
EXIT 3/4 MILE

REPLACE GROUND MOUNTED SIGN

7
Olathe
Bonner Springs
EXITS 1 3/4 MILES

UIP
Adopt a Highway

UIP

UIP
Woodland Road

UIP
EXIT

Woodland Rd 1/4
Lone Elm Rd 1 1/4
7 2 1/4

REPLACE SIGN
REUSE EXISTING
BUTTERFLY STRUCTURE

Woodland Rd 1/4
7 2 1/4
Cedar Creek Pkwy 4

UIP
SPEED LIMIT 70

UIP
FOR
HIGHWAY EMERGENCIES
DIAL * 47
ON YOUR CELLULAR PHONE

UIP
MILL CREEK

UIP
WEST
10

UIP
Adopt a Highway

UIP
GAS NEXT EXIT
FOOD NEXT EXIT

0 500 1000
SCALE FEET
1" = 500'

N

MATCH LINE C

K-10

K-10

MATCH LINE D

WOODLAND ROAD

Woodland Road
REMOVE GROUND MOUNTED SIGN

Woodland Rd
EXIT ONLY
NEW CANTILEVER

UIP

Ridgeview Rd 1/2
Renner Blvd 1 1/4
435 1 3/4
UIP

MILL CREEK
UIP

LEGEND
- PROPOSED SIGN
- EXISTING SIGN
- REMOVE EXISTING SIGN

TranSystems
2400 PERSHING ROAD
SUITE 400
KANSAS CITY, MISSOURI
PHONE: 816-329-8600
FAX: 816-329-8601

CONSULTANTS

K-10 AND LONE ELM GUIDE SIGNING
K-10 CORRIDOR

MARK	DATE	DESCRIPTION

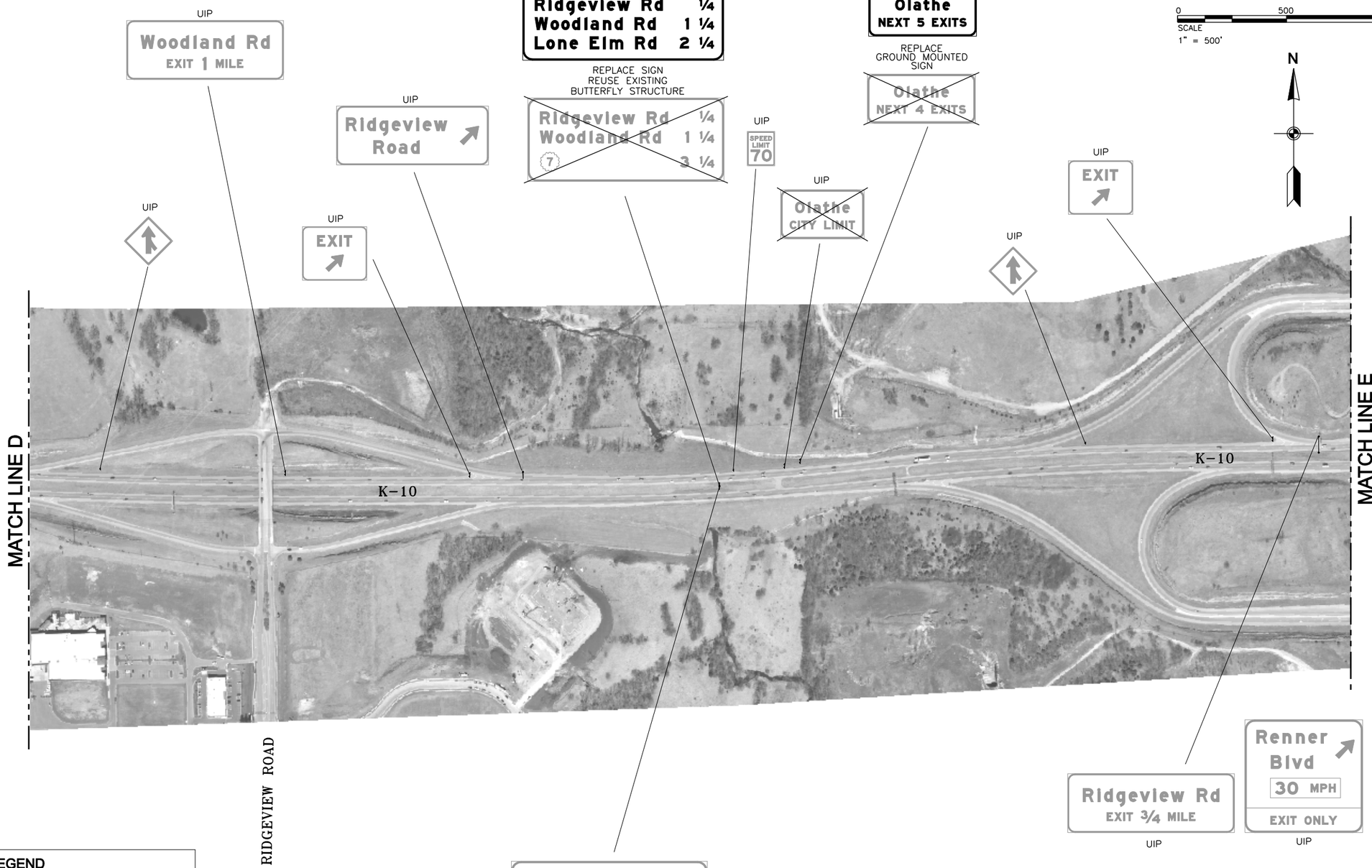
PROJ NO: P101070205
SCALE: 1" = 500'
DATE: 5/29/2009
DESIGNED BY: JDT
DRAWN BY: JCG
CHECKED BY: JDM

SHEET TITLE

CONCEPT SIGNING PLAN

EXHIBIT N4

wrcobb
5/29/2009 - $TIME$ - g:\KC07\0205\Traffic\CT-SN-K10-104.dgn



LEGEND

- PROPOSED SIGN
- EXISTING SIGN
- REMOVE EXISTING SIGN

wrcobb
5/29/2009 - $TIME$ - g:\KC07\0205\Traffic\CT-SN-K10-105.dgn

TranSystems

2400 PERSHING ROAD
SUITE 400
KANSAS CITY, MISSOURI
PHONE: 816-329-8600
FAX: 816-329-8601

CONSULTANTS

K-10 AND LONE ELM GUIDE SIGNING

K-10 CORRIDOR

MARK	DATE	DESCRIPTION

PROJ NO: P101070205
SCALE: 1" = 500"
DATE: 5/29/2009
DESIGNED BY: JDT
DRAWN BY: JCG
CHECKED BY: JDM

SHEET TITLE

CONCEPT SIGNING PLAN

EXHIBIT N5

0 500 1000
SCALE FEET
1" = 500'

N

LEGEND

PROPOSED SIGN

EXISTING SIGN

REMOVE EXISTING SIGN

TranSystems
2400 PERSHING ROAD
SUITE 400
KANSAS CITY, MISSOURI
PHONE: 816-329-8600
FAX: 816-329-8601

CONSULTANTS

K-10 AND LONE ELM GUIDE SIGNING

K-10 CORRIDOR

MARK	DATE	DESCRIPTION

PROJ NO: P101070205
SCALE: 1" = 500"
DATE: 5/29/2009
DESIGNED BY: JDT
DRAWN BY: JCG
CHECKED BY: JDM

SHEET TITLE

CONCEPT SIGNING PLAN

EXHIBIT N6

wrcobb
5/29/2009 - $TIME$ - g:\KC07\0205\Traffic\CT-SN-K10-106.dgn

Appendix O

Alternative Cost Comparisons

Lone Elm
KDOT Project (K)10-46 KA-0291-01

Opinion of Probable Cost (Modified)
Alternative Concept Review

Item	Unit	Unit Cost	Alternative: Diamond Over		Diamond Over With Roundabouts		Diamond Under		Tight Diamond Over		Tight Diamond Under		SPUI Over	
			Quan	Cost	Quan	Cost	Quan	Cost	Quan	Cost	Quan	Cost	Quan	Cost
Excavation	CY	$4.50	17688	$79,596	10,508	$47,286	479688	$2,158,596	6539	$29,426	485576	$2,185,092	10709	$48,191
Embankment	CY	$1.50	343832	$515,748	440,145	$660,218	3118	$4,677	329024	$493,536	4051	$6,077	360453	$540,680
Excavation (Contractor Furnished)	CY	$3.70	386820	$1,431,235	507,310	$1,877,046	0	$0	380548	$1,408,028	0	$0	413353	$1,529,407
Curb Inlets	Each	$3,300.00	16	$52,800	16	$52,800	18	$59,400	16	$52,800	18	$59,400	18	$59,400
Area Inlets	Each	$4,100.00	3	$12,300	3	$12,300	2	$8,200	3	$12,300	2	$8,200	8	$32,800
Storm Sewer Pipe (Assume 30")	LF	$65.00	1456	$94,640	1,727	$112,255	2056	$133,640	1434	$93,210	2094	$136,110	1540	$100,100
Traffic Signal System	Per Inter.	$150,000.00	2	$300,000	0	$0	2	$300,000	2	$300,000	2	$300,000	1	$200,000
Ramp Pavement (10" Conc.)	SY	$60.00	8385	$503,113	9,475	$568,487	7453	$447,207	8346	$500,767	8346	$500,767	11793	$707,567
Ramp Shoulder	SY	$60.00	4951	$297,087	6,214	$372,867	4628	$277,660	5236	$314,160	5236	$314,160	5239	$314,320
Lone Elm Pavement (10" HMA)	SY	$30.00	15127	$453,810	18,091	$542,723	17441	$523,243	15192	$455,757	17671	$530,117	14220	$426,610
Bridge Approach Slab Conc. PVMT	SY	$215.00	601	$129,287	408	$87,768	1034	$222,310	601	$129,287	1034	$222,310	1308	$281,292
Curb & Gutter	LF	$20.00	9622	$192,440	10,110	$202,200	9622	$192,440	9622	$192,440	9622	$192,440	9622	$192,440
Curb	LF	$16.00	0	$0	410	$6,560	0	$0	0	$0	0	$0	0	$0
Retaining Wall	SF	$45.00	0	$0		$0	0	$0	16322	$734,490	12626	$568,170	24769	$1,114,605
Subtotal Road				**$4,062,056**		**$4,542,509**		**$4,327,373**		**$4,716,199**		**$5,022,842**		**$5,547,411**
10' Multi-Use Trail														
4" HMA	SY	$15.00			992	$14,877								
4" Aggregate Base	SY	$12.00			992	$11,902								
16'x10'x77' RCB under Ramp C	LS	$112,000.00			1	$112,000								
16'x10'x66' RCB under Ramp D	LS	$99,000.00			1	$99,000								
Subtotal Multi-Use Trail						$237,779								
Bridge Option 1 Adjustment				$2,382,605		$1,778,420		$3,525,570		$2,108,735		$3,525,570		$5,086,859
Bridge Option 2 Adjustment				$2,822,848		$2,013,959		$2,923,708		$2,822,848		$2,923,708		$7,343,459
Bridge Option 3 Adjustment				$2,832,848		$2,023,959		$3,993,571		$2,832,848		$3,993,571		
Bridge Option 4 Adjustment								$3,469,287				$3,469,287		
Cost Effective Bridge Option	SF	$100.00	28944	$2,382,605		$1,778,420	36664	$2,923,708	22405	$2,108,735	36664	$2,923,708	52233	$5,086,859
Subtotal Bridge				**$2,382,605**		**$1,778,420**		**$2,923,708**		**$2,108,735**		**$2,923,708**		**$5,086,859**
Interchange Subtotal				**$6,444,661**		**$6,320,928**		**$7,251,081**		**$6,824,935**		**$7,946,549**		**$10,634,270**
Contingencies (30%)				**$1,933,398**		**$1,896,278**		**$2,175,324**		**$2,047,480**		**$2,383,965**		**$3,190,281**
TOTAL				**$8,378,059**		**$8,217,207**		**$9,426,405**		**$8,872,415**		**$10,330,514**		**$13,824,550**
Add/Deduct for Exc. Needed for Aux Ln Con	CY	$3.70	36581	$135,350	36,581	$135,350	-36581	-$135,350	36581	$135,350	-36581	-$135,350	36581	$135,350
Interchange Cost Opinion				**$8,513,409**		**$8,352,556**		**$9,291,055**		**$9,007,765**		**$10,195,164**		**$13,959,900**
Percent Cost				**100%**		**98%**		**109%**		**106%**		**120%**		**164%**
Auxiliary Lanes														
Pavement	SY	$60.00	16790.22222	$1,007,413	16790.22	$1,007,413	16790.22222	$1,007,413	16790.22222	$1,007,413	16790.22222	$1,007,413	16790.22222	$1,007,413
Shoulder Pavement	SY	$60.00	11791.88889	$707,513	11791.89	$707,513	11791.88889	$707,513	11791.88889	$707,513	11791.88889	$707,513	11791.88889	$707,513
Clear Zone Embankment	CY	$1.50	33230	$49,845	33230	$49,845	33230	$49,845	33230	$49,845	33230	$49,845	33230	$49,845
Contractor Furnished	CY	$3.70	39094	$144,648	39094	$144,648	39094	$144,648	39094	$144,648	39094	$144,648	39094	$144,648
Subtotal				$1,909,419		$1,909,419		$1,909,419		$1,909,419		$1,909,419		$1,909,419
Contingencies (30%)				$572,826		$572,826		$572,826		$572,826		$572,826		$572,826
Auxiliary Lanes Cost Opinion				$2,482,245		$2,482,245		$2,482,245		$2,482,245		$2,482,245		$2,482,245
Project Build Cost With Auxiliary Lanes				**$10,995,654**		**$10,834,802**		**$11,773,300**		**$11,490,010**		**$12,677,410**		**$16,442,145**
ROW Area			14.10				13.53		11.76		11.90		12.43	
Property Impacts														
House Lost			1,1*				1		1*		1		1,1*	
Pond Lost			1				1*		1*		1*		1*	

* May be able to use small retaining wall to preserve existing pond

Appendix P

Diamond Interchange Lone Elm over K-10 with Roundabouts

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

REFERENCES NOTED | REFERENCES CHECKED | BY | DATE

Drawn By : d_howard
File : ...\DGN\Exhibits\FigureO-1.dgn
Plotted : 5/19/2009

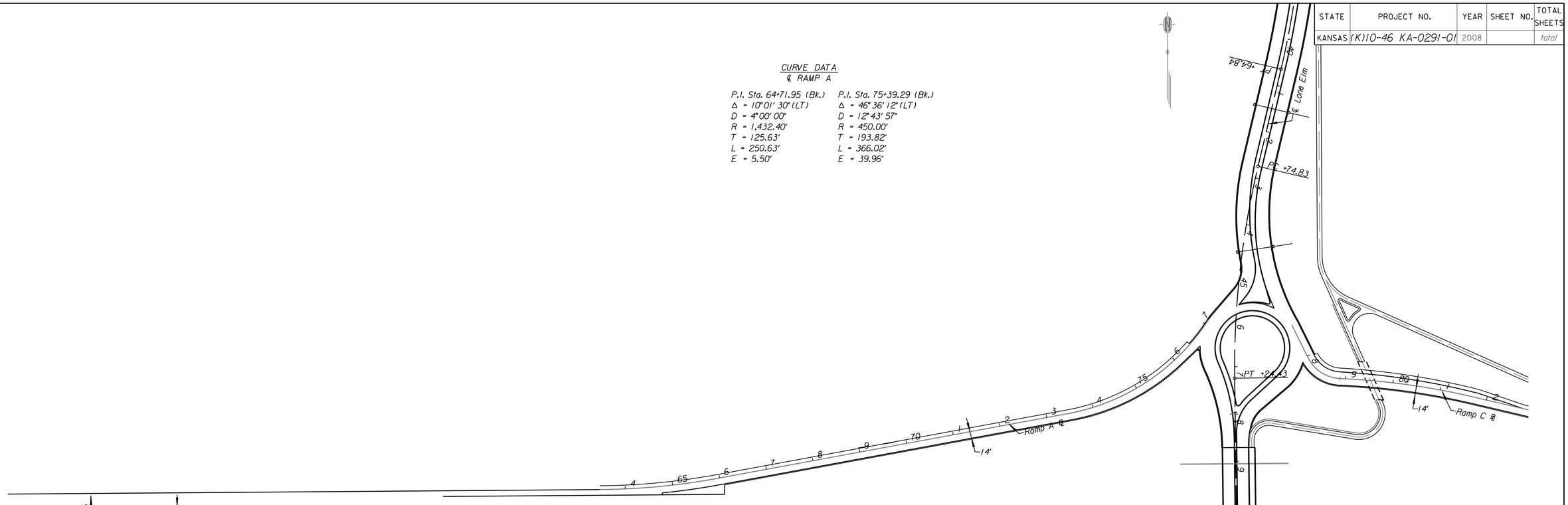
KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
PLAN AND PROFILE
STA. 36+73.63 TO STA. 63+36.19

FIGURE P-1

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

BY	DATE
REFERENCES NOTED	
REFERENCES CHECKED	



CURVE DATA
℄ RAMP A

P.I. Sta. 64+71.95 (Bk.)	P.I. Sta. 75+39.29 (Bk.)
Δ = 10°01' 30" (LT)	Δ = 46°36' 12" (LT)
D = 4°00' 00"	D = 12°43' 57"
R = 1,432.40'	R = 450.00'
T = 125.63'	T = 193.82'
L = 250.63'	L = 366.02'
E = 5.50'	E = 39.96'

CURVE DATA
℄ RAMP B

P.I. Sta. 64+39.89 (Bk.)	P.I. Sta. 73+95.51 (Bk.)	P.I. Sta. 75+34.40 (Bk.)
Δ = 13°08' 24" (RT)	Δ = 10°29' 21" (LT)	Δ = 60°46' 46" (RT)
D = 4°00' 00"	D = 5°39' 02"	D = 72°31' 35"
R = 1,432.40'	R = 1,014.00'	R = 79.00'
T = 164.97'	T = 93.08'	T = 46.33'
L = 328.50'	L = 185.63'	L = 83.80'
E = 9.47'	E = 4.26'	E = 12.58'

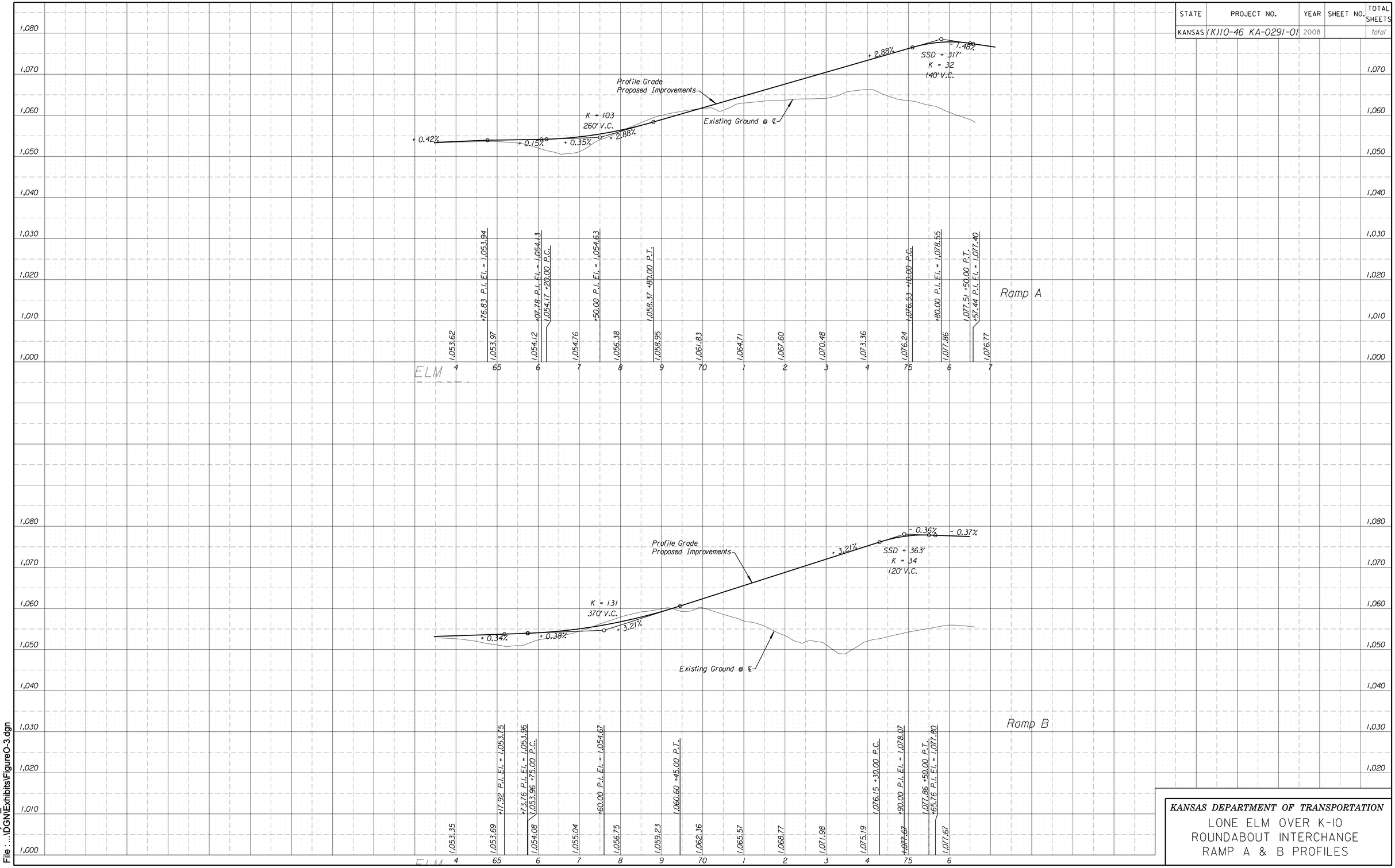
KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
DIAMOND
INTERCHANGE LAYOUT

FIGURE P-2

Drawn By : d_howard Plotted : 5/19/2009
File : ...\DGN\Exhibits\FigureO-2.dgn

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total



Drawn By : d_howard Plotted : 5/19/2009
File :...\DGN\Exhibits\FigureO-3.dgn

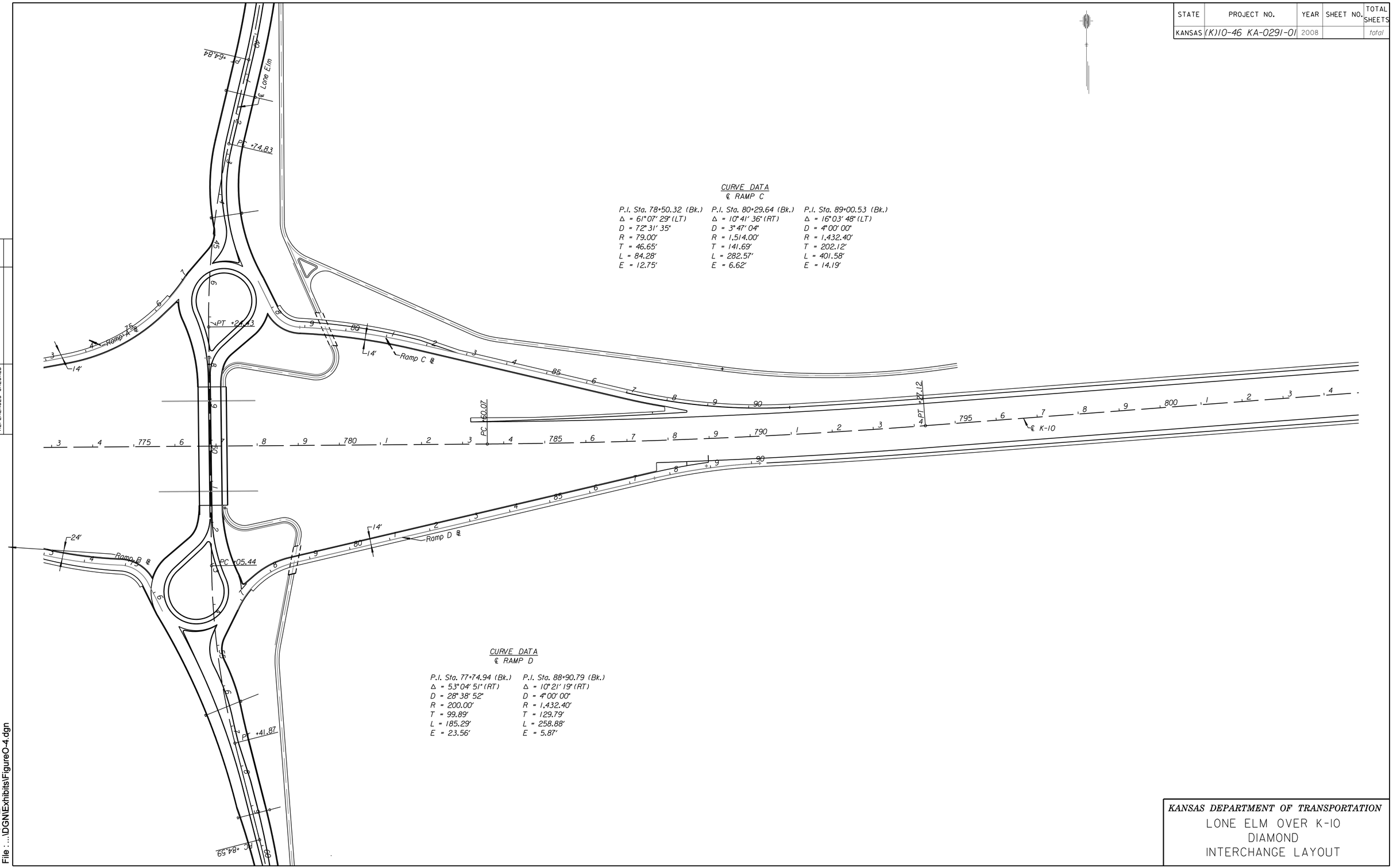
KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
ROUNDABOUT INTERCHANGE
RAMP A & B PROFILES

FIGURE P-3

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

DATE	BY	
		REFERENCES NOTED
		REFERENCES CHECKED



CURVE DATA
℄ RAMP C

P.I. Sta. 78+50.32 (Bk.)	P.I. Sta. 80+29.64 (Bk.)	P.I. Sta. 89+00.53 (Bk.)
Δ = 61°07' 29" (LT)	Δ = 10°41' 36" (RT)	Δ = 16°03' 48" (LT)
D = 72°31' 35"	D = 3°47' 04"	D = 4°00' 00"
R = 79.00'	R = 1,514.00'	R = 1,432.40'
T = 46.65'	T = 141.69'	T = 202.12'
L = 84.28'	L = 282.57'	L = 401.58'
E = 12.75'	E = 6.62'	E = 14.19'

CURVE DATA
℄ RAMP D

P.I. Sta. 77+74.94 (Bk.)	P.I. Sta. 88+90.79 (Bk.)
Δ = 53°04' 51" (RT)	Δ = 10°21' 19" (RT)
D = 28°38' 52"	D = 4°00' 00"
R = 200.00'	R = 1,432.40'
T = 99.89'	T = 129.79'
L = 185.29'	L = 258.88'
E = 23.56'	E = 5.87'

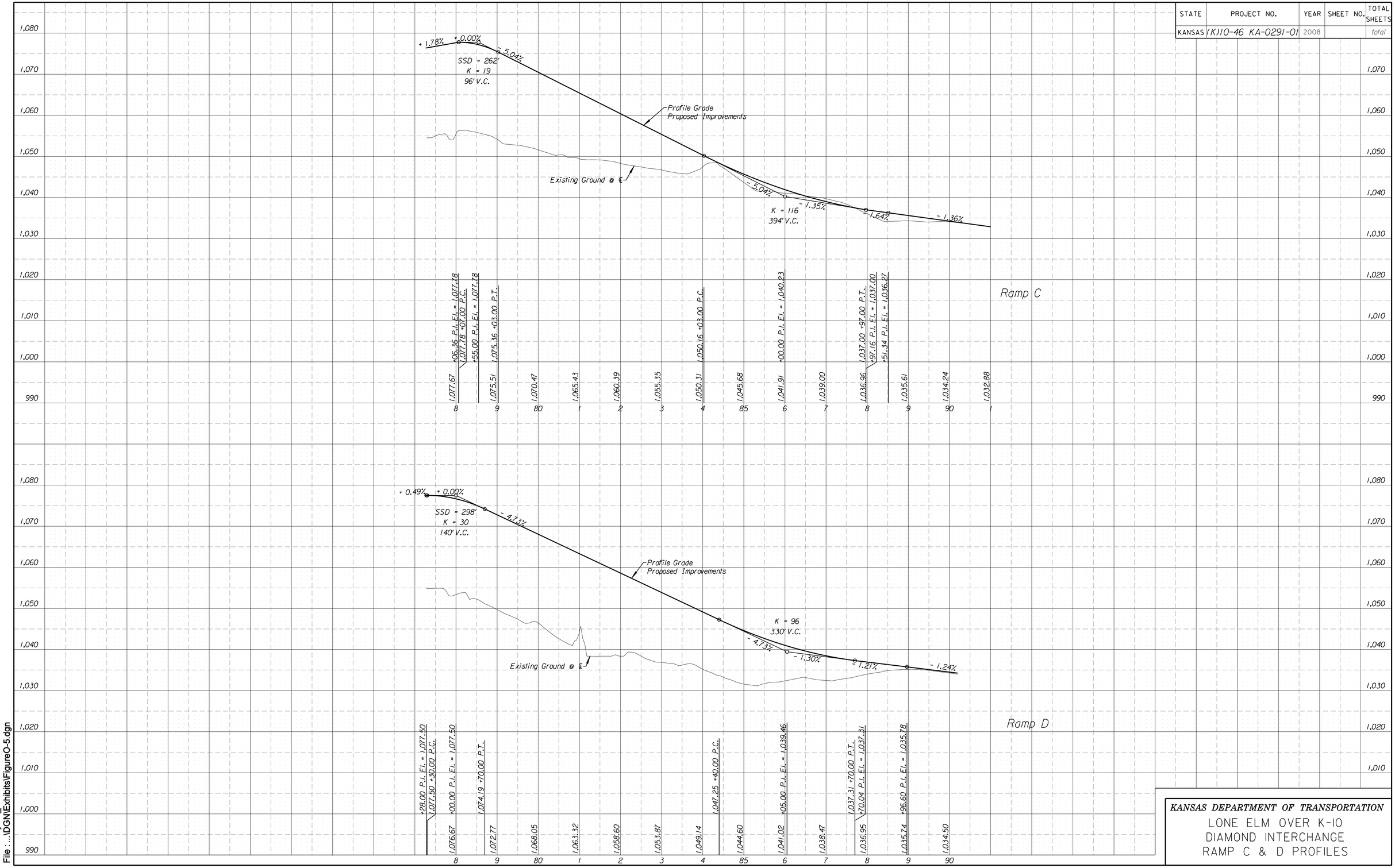
Drawn By : d_howard Plotted : 5/19/2009
File : ...\DGN\Exhibits\FigureO-4.dgn

KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
DIAMOND
INTERCHANGE LAYOUT

FIGURE P-4

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total



Drawn By : d_howard Plotted : 5/19/2009
File :...\DGN\Exhibits\FigureO-5.dgn

KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
DIAMOND INTERCHANGE
RAMP C & D PROFILES

FIGURE P-5

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
RETAINING WALL
PLAN AND PROFILE

FIGURE P-6

REFERENCES NOTED
REFERENCES CHECKED
BY
DATE

Drawn By : d_howard
File : ...\DGN\Exhibits\FigureO-6.dgn
Plotted : 5/19/2009

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	(K)10-46 KA-0291-01	2008		total

REFERENCES NOTED
REFERENCES CHECKED
BY
DATE

Drawn By : d_howard
File : ...\DGN\Exhibits\FigureO-7.dgn
Plotted : 5/19/2009

KANSAS DEPARTMENT OF TRANSPORTATION

LONE ELM OVER K-10
MULTI-USE PATH
GRADE SEPARATED CROSSINGS

FIGURE P-7

Appendix Q

Project Build Costs for Diamond Interchange with Roundabouts

Lone Elm
KDOT Project (K)10-46 KA-0291-01

Opinion of Probable Cost
Build Option (Diamond Interchange with Roundabout Ramp Terminal Intersections)

Alternative

Item	Unit	Unit Cost	Diamond Over With Roundabouts	
			Quan	Cost
Excavation	CY	$9.80	10,508	$102,978
Embankment (Compaction)	CY	$2.00	440,145	$880,290
Excavation (Contractor Furnished)	CY	$9.80	507,310	$4,971,635
Curb Inlets	Each	$3,300.00	16	$52,800
Area Inlets	Each	$4,100.00	3	$12,300
Storm Sewer Pipe (Assume 30")	LF	$65.00	1,727	$112,255
End Sections (Assume 30")	Each	$950.00	12	$11,400
Ramp Pavement (10" Conc.)	SY	$60.00	7,143	$428,580
Ramp Shoulder	SY	$60.00	4,339	$260,340
Lone Elm Pavement (10" HMA)	SY	$71.00	18,091	$1,284,461
Bridge Approach Slab Conc. PVMT	SY	$215.00	408	$87,720
Curb & Gutter	LF	$20.00	10,110	$202,200
Roundabout Treatments	LS	$400,000.00	1	$400,000
Curb	LF	$16.00	410	$6,560
Fencing	LS			$30,000
Retaining Wall	SF	$82.50	6,086	$502,095
Subtotal Road				**$9,345,614**
Project Signing	**LS**			**$675,000**
Project Pavement Marking	**LS**			**$136,800**
Interchange Lighting	**LS**			**$375,000**
Lone Elm Lighting	**LS**			**$210,000**
Project Traffic Control	**LS**			**$936,000**
	10' Multi-Use Trail			
4" HMA	SY	$23.25	9200	$213,900
4" Aggregate Base	SY	$23.63	9200	$217,350
Handrail in Interchange Area	LF	$214.50	636	$136,422
16'x10'x77' RCB under Ramp C	LS	$245,175.00	1	$163,450
16'x10'x66' RCB under Ramp D	LS	$159,975.00	1	$106,650
Subtotal Multi-Use Trail				**$837,772**
Bridge	SF	$100.00	16,170	$1,617,000
Subtotal Bridge				**$1,617,000**
Interchange Subtotal				**$13,923,186**
Contingencies (30%)				**$4,176,956**
Interchange Build Costs Without Auxiliary Lanes				**$18,100,142**
	Auxiliary Lanes			
Pavement	SY	$60.00	16790	$1,007,413
K-10 Shoulders	SY	$60.00	11792	$707,520
Cross Road Pipe Extensions	LF	$65.00	154	$10,010
End Sections	Each	$680.00	11	$7,480
Inlet Modifications	Each	$4,100.00	3	$12,300
RCB Extensions	LS			$9,000
Shoulder Pavement	SY	$60.00	11791.89	$707,513
Common Excavation	CY	$9.80	33516	$328,457
Clear Zone Embankment (Compaction)	CY	$2.00	47760	$95,520
Contractor Furnished	CY	$9.80	19271	$188,856
Subtotal Auxiliary Lanes				$3,074,069
Contingencies (30%)				$922,221
Subtotal Auxiliary Lanes Cost Opinion				**$3,996,290**
Project Build Cost Interchange With Auxiliary Lanes (2009)				**$22,100,000**
2012 Inflation Increase (12.4% Increase)				**$24,840,400**

Burns & McDonnell
SINCE 1898

9400 Ward Parkway
Kansas City, MO 64114

www.burnsmcd.com

Atlanta
Chattanooga, Tenn.
Chicago
Dallas-Fort Worth
Denver
Houston
Kansas City, Mo.
Miami
Minneapolis-St. Paul
New York
O'Fallon, Ill.
Phoenix
San Diego
San Francisco
St. Louis
Wallingford, Conn.
Washington, D.C.
Wichita, Kan.

"Every service provided by Burns & McDonnell is backed by the integrity and commitment of all our employee owners. That's my promise to you."

Greg Graves, Chairman & CEO

Burns & McDonnell, making our clients successful for more than 100 years.