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## Alberta Transportation

Final Report

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Highway 22 Functional Planning Study  
South of Highway 8 to  
Town of Cochrane South Corporate Limits

Report R-1102

March 2014





ISL Engineering and Land Services Ltd. is an award-winning full-service consulting firm dedicated to working with all levels of government and the private sector to deliver planning and design solutions for transportation, water, land, and environmental projects.

## Executive Summary

### 1.0 Background and Overview

Highway 1, the Trans Canada Highway, is a critical route on the National Highway System and one of the primary east-west transportation corridors in Alberta. It is vital gateway for interprovincial trade, and has been identified as part of the provincial freeway network. Highway 22, the “Cowboy Trail,” is a key north-south arterial highway in the western part of Alberta. Near Calgary, the highway is also a key trade and commuter corridor, connecting the communities of Black Diamond, Turner Valley, Priddis, Bragg Creek and Redwood Meadows to the south, and Cochrane to the north of Highway 1. It is also a major truck route connecting Highway 22X, Highway 8, Highway 1 and various secondary highways north of Calgary. The existing Highway 1 and 22 interchange dates to the 1960s, and is a tight cloverleaf configuration that has prompted numerous operational concerns in recent years.

This study considered the following needs for Highway 1 and Highway 22:

- Functional planning for interim and ultimate improvements to the Highway 1 & Highway 22 interchange.
- Functional planning and access management plans for the ultimate upgrading of Highway 22 between Highway 8 and the Town of Cochrane
- Functional planning for any necessary improvements to Highway 1 in the immediate vicinity of the interchange.

A number of previous studies were referenced in preparation of this report, including:

- *Highway 1 Interchange at Highway 22, Safety and Operational Review* (TSH Associates, November 2008)
- *Safety Rest Area Review / Update, Southern Region* (AECOM, 2010)
- *In-Service Road Safety Review: Intersection of Highway 22 at Township Road 250 and at Township Road 252 in the Southern Region* (Alberta Transportation, August 2010)
- *Greater Springbank Functional Study* (iTrans and Urban Systems, May 2008)
- *Rocky View 2060 Growth Management Strategy* (ISL et al, November 2008).

The study was administered by Alberta Transportation, Southern Region, with input and direction provided by a Technical Review Committee (TRC) comprised of members from Alberta Transportation, Rocky View County and ISL Engineering and Land Services. The majority of the technical analysis for the study occurred from 2010 through mid-2012. The study was subsequently finalized in late 2013, following an extensive landowner and public engagement process by Alberta Transportation.

### 2.0 Design Parameters

Highway 1 has been planned as an ultimate 8-lane freeway, widening the existing 4-lane carriageway by an additional two lanes in each direction. Highway 22 has been planned as an ultimate 6-lane arterial highway, which will twin and widen the existing 2-lane highway. The center-to-center spacing on both highways is 40.0 m, based on the updated Alberta Transportation design standard established in 2010.

The typical section for Highway 22 includes a conceptual “Bikeway” alignment. In the course of the study, Rocky View County requested that this be identified on the west side of Highway 22, to serve the large recreational cycling demand in the summer months. No additional planning or review of this potential facility was completed as part of this study.

### 3.0 Traffic Forecasting

The traffic volumes for the study area were obtained from existing Alberta Transportation data and include a mix of manual counts, estimates and automated traffic counts, and traffic forecasts were developed for two planning horizons – a twenty-year horizon for development of interim-stage plans, and a forty-year horizon for development of the ultimate stage interchange plans.

The forecasts are based on factors including historical growth patterns, “background” growth of interprovincial trade traffic on the corridor, and potential local developments as indicated in approved land use plans and related documents. The manual forecasts were verified against the City of Calgary’s regional traffic forecasting model, and considered scenarios with and without a regional ring road east of Highway 22 (Scenarios 1 and 2, respectively). Consideration was also made for a scenario with a Highway 8 bypass extended west of Highway 22, which confirmed that it had little practical effect on the requirements for the Highway 22 interchange. The projected two way daily traffic volumes for each highway segment are summarized in Table I below.

*Table I Daily Traffic Projections*

Highway	Horizon (vpd)			
	Current	2030	2050 Scenario 1	2050 Scenario 2
Hwy 1 (W of 22)	18,100	27,300	36,900	36,900
Hwy 1 (E of 22)	17,770	29,300	46,200	43,000
Hwy 22 (N of 1)	12,100	20,000	32,000	32,000
Hwy 22 (S of 1)	9,700	15,200	20,000	22,000

### 4.0 Interchange, Intersection and Staging Analysis

Initial analysis at the Highway 1 interchange was used to screen and evaluate basic service interchange forms. Once the interchange form was selected, detailed analysis was completed to evaluate details including number of lanes and intersection type. The screening of Diamond, Rotary, Parclo A and Parclo B forms confirmed that the Parclo A configuration is best suited to the traffic patterns, as it accommodates the higher-volume left-turns (Calgary-to-Banff routing and Cochrane-to-Calgary routing) via loop ramps.

Detailed analysis of the Parclo A considered a number of potential capacity enhancements, and to review either traffic signals or roundabouts as an ultimate intersection form at the ramp junctions. From this analysis, the following conclusions were reached:

- There are a variety of Parclo A configurations that will operate well at the ultimate 2050 Horizon
- The provision of bypass lanes to route loop ramp traffic around the ramp junction intersections will provide significant additional capacity, allowing the interchange to continue to function well beyond the 40-year planning horizon.
- Operationally, either traffic signals or three-lane roundabouts have similar performance at the Parclo junctions, and each provide about the same relative longevity beyond the 2050 horizon.

As the operational aspects of the signals and three-lane roundabouts are essentially equal, either can be considered a viable long-term intersection solution for the ramp junctions. Roundabouts in general provide additional safety benefits (primarily via

reduced collision severity) and consistent 24-hour operations, although in this case the Road Safety Audit highlighted that the steeper grades on the south side of the interchange are not a desirable condition for roundabouts. The visibility of traffic control on the vertical crest curve south of the interchange would be substantially better for signals than it would be for roundabouts.

Given the long-term nature of the study and desire to maintain flexibility, it was determined by Alberta Transportation that the ultimate plan would protect for roundabout junctions, which will ensure adequate right-of-way is protected for either intersection option to be considered in future.

Analysis of interim conditions at the 20-year horizon indicated that a basic Parclo A configuration would need to be maintained (in contrast to an interim diamond or dumbbell with dual roundabouts). The analysis also confirmed that improved ramp junctions (either traffic signals or roundabouts, consistent with whatever form is selected for the ultimate interchange in future) provide a greater cost-benefit ratio than the loop-ramp bypasses. This confirmed that the interchange should be initially staged without the bypass structures.

## **5.0 Options and Evaluation – Highway 1**

The Highway 1 at Highway 22 Interchange Functional Planning and Access Management Study involved the development and evaluation of a number of conceptual alternatives for each facility in the study area. For the purpose of option development and evaluation, the study was divided into three areas:

- Review of the Highway 1 and Highway 22 interchange
- Review of Highway 1 east and west of the interchange
- Review of the Highway 22 corridor from Highway 8 to the Town of Cochrane boundary, including access management

Evaluation of the interchange included assessment of various routing options for Highway 22, to optimize the Parclo A configuration. Key evaluation parameters that differentiated the options included: land impacts to homestead / acreage sites, and adjacent Petro Canada and ATCO Pipelines sites; environmental considerations, particularly the impact to the Class 5 wetland north of Highway 1; and relative costs. By process of elimination, the recommended optimum interchange location is to twin Highway 22 to the west side of the existing carriageway, within the limits of the interchange.

Evaluation of Highway 1 included consideration of the existing horizontal and vertical alignment east of Highway 22, where the Trans Canada crosses over a steep escarpment. Evaluation of profile options confirmed that it is feasible to realign and reconstruct the highway to a maximum 3.0% gradeline, consistent with Alberta Transportation standards for new freeway facilities. These long-term upgrades provide numerous benefits including:

- Improved safety for all users by providing a more moderate downgrade, especially in inclement weather conditions.
- Substantial improvement in truck climbing performance, with improved level of service for all roadway users.
- Improvement of sightlines and roadway curvature well beyond minimum standards. It is consistent with good planning practices to go beyond minimum standards, so that the freeway does not have concurrent application of interrelated minimum design parameters.

In addition to interchanges, Alberta Transportation recently completed planning for a Safety Rest Area on eastbound Highway 1, west of Highway 22. On review, it was found that weaving distance between the proposed rest area and Highway 22 will be limited. It

is recommended that Alberta Transportation consider reviewing the location of this SRA to locate it mid-way between Jumping Pound Road and Highway 22. If this can be accommodated, then the SRA would be located ~5 km from each interchange, and there would be no weaving activity. Alberta Transportation's Transportation Safety Services branch has confirmed that an existing mobile weight station on westbound Highway 1 near the Petro Canada is planned for relocation in future, and did not need to be accommodated in the interchange functional plan.

## **6.0 Options and Evaluation – Access Management**

The local road network around Highway 22 will support existing property access and future development within Rocky View County. Long-term network needs in the area were identified by the County in the *Greater Springbank Functional Planning Study*, which was approved by County Council in 2008. On review, it was found that there are a number of challenges in accommodating all components of the access management plan identified in the Greater Springbank Plan. Evaluation of these areas, and resulting recommendations, are as follows:

- Township Road 243 – the Springbank study had identified a new east-west corridor at this location, but evaluation confirmed that this would have significant impacts on operations of the adjacent sites. From review of the options, it is recommended that parcels on the west side of Highway 22 be serviced from a parallel frontage road, instead.
- Township Road 245 – the Springbank study had identified a southerly diversion of this roadway, connecting to Highway 22 ~800 m north of Township Road 244. On review, it was confirmed that this spacing would not meet Alberta Transportation access management guidelines, and that front service roads connecting Township Road 245 south to 244 is a preferred solution.
- Township Road 250 – Review of weaving, sightlines and profiles confirmed that this intersection could be maintained with adequate separation from the Highway 1 interchange, consolidating the existing split-T intersection at a single location, consistent with the existing northerly leg.
- Township Road 253 – the Springbank study had identified a new roadway at Township Road 253A, 800 m north of the undeveloped road allowance at 253. On review, it was found that this is not a suitable location for an intersection, due to steep grades and reduced sightlines. Review of numerous alternate locations confirmed that the optimal solution was to maintain local access from the existing subdivision road located south of the Township Road 253 road allowance, providing access to local parcels via front service roads.
- Township Road 254 – this undeveloped road allowance may be needed in future to service rural areas south of the Town of Cochrane. To allow separation of rural and urban traffic, the study identifies an intersection location for this road on Highway 22, ~350 m south of Highway 22.

The final access points on Highway 22 are shown on Plan ES-1 and summarized in Table II below.

Table II Recommended Intersection Locations

Location	Intersection Spacing		Notes
	To South	To North	
Fireside Drive	1.0 km	---	First urban intersection in Cochrane
Twp Rd 254	1.8 km	1.0 km	~350 m south of road allowance
Twp Rd 253	1.0 km	1.8 km	At the existing access road
Twp Rd 252	1.6 km	1.0 km	Existing Road
Twp Rd 251	1.4 km	1.6 km	Future Road
Twp Rd 250	950 m	1.4 km	Combine @ existing north junction
Hwy 1 WB	550 m	950 m	Ramp Terminal
Hwy 1 EB	1.9 km	550 m	Ramp Terminal
Twp Rd 244	1.6 km	1.9 km	Existing Springbank Road
Twp Rd 243	1.6 km	1.6 km	Future Road
Twp Rd 242	1.6 km	1.6 km	Existing Road, extended East
Highway 8	---	1.6 km	Existing Roundabout

## 7.0 Options and Evaluation – Highway 22

Twinning Highway 22 will be a complex undertaking that will require land acquisition, utility relocations, and geometric design in areas of steep topography. The purpose of twinning is to provide a high standard divided expressway route, which serves numerous functions including:

- Acting as a primary interprovincial trade route, providing connectivity between Highway 1 and Glenmore Trail in Calgary (via Highway 8), and serving as part of the Provincial Long Combination Vehicle (LCV) Route.
- Acting as a primary commuter route between the Town of Cochrane, the City of Calgary and other area communities (Redwood Meadows, Bragg Creek, etc.)
- Providing the central link of the Highway 22 / Cowboy Trail corridor, which is the main north-south provincial highway on the west side of Alberta.

Being a high priority corridor, it is preferred by Alberta Transportation to take as consistent an approach as possible when twinning the corridor, minimizing horizontal alignment deflections and maintaining design standards well in excess of minimums, wherever possible. As such, the first step in determining the alignment of the twinned highway was to complete a global assessment of which side of twinning is preferred on an overall basis. This was then followed for a site-specific evaluation in areas of special constraint.

### 7.1 Global Twinning Evaluation

The initial evaluation considered twinning the highway either to the west or the east, maintaining the existing carriageway as one half of the future twinned corridor. Through the public engagement process, a third option to widen the corridor on center and construct two new carriageways was also considered. Evaluation of the options considered a number of factors including: impact to home / business sites; general property impacts; historical resources; wetlands; water wells; rock outcroppings; pipelines; other utilities; and relative cost.

On evaluation, it was found that twinning to the west side provides the most advantageous solution on a global basis. Key considerations include:

- Less overall property impact, including direct impact to homes.
- Opportunity to mitigate / avoid some detailed impacts, such as water wells (refer to Section 6.5 of the main report).
- Lowest overall cost.

- Achieves a closer earth balance on the Highway 22 mainline.
- Provides the most advantageous interchange geometry by allowing Highway 22 to cross Highway 1 at a lower elevation.
- Avoids the major rock outcropping south of the Highway 1 interchange.
- Avoids additional underground utilities, which are more concentrated on the east side of the highway.
- While impacting the ATCO Pipelines metering station and several pipeline crossings, this factor is also applicable to east twinning, and not a major differentiator.

Based on the evaluation, it is recommended that the primary twinning of Highway 22 occur to the west side. The evaluation assumes that the highway would transition to the east side at the Cochrane Town Boundary, and at the Elbow River bridge, consistent with prior construction at those locations. Evaluations of additional local adjustments in areas of more significant impact are discussed in the following section.

## **7.2 Local Twinning Assessments**

With the global recommendation to twin the west side, there are three home / business sites that would be impacted: the Inverarity home / business site in NE-15 (near the future Township Road 243); the Yvonne Callaway homestead in SE-15 (on Township Road 252); and the Irene Edge homestead in SE-3 (north of Township Road 250). In general, Alberta Transportation gave high priority to minimizing impacts to these sites, where possible. Site-specific evaluation for each of the three locations included extensive on-site review and discussion with the landowners, with the technical recommendations summarized below.

- *Inverarity Site* – twinning to the west side of Highway 22 would affect a home in the Inverarity site in NE-15-24-4W5 (noted as 1358788 Alberta Ltd. on the property plans.) Following on-site review, a cost evaluation was also completed to consider the cost of transitioning Highway 22 to the east side, between Township Road 244 and Township Road 243. These additional costs were found to be about \$300k, which on balance was agreed with Alberta Transportation to be a reasonable additional cost in order to minimize impact on the site. There are also no structures or infrastructure on the opposite side of the highway at this location.
- *Callaway Site* – twinning to the west side of Highway 22 would affect the Callaway homestead in SE-15-25-4W5, located just off Township Road 252. The historic Taylor homestead is located on the east side of Highway 22, opposite the Callaway homestead, but is set back farther from the highway. Thus, it was found that the highway could be shifted to the east through this area, without affecting any buildings or infrastructure on the east side. The transition requires an additional 1.5 km of road reconstruction relative to a straight alignment, with a net additional cost of about \$1.4 Million (which includes consideration of the reduced property impact cost on the west side.) On balance, it was agreed with Alberta Transportation to be a reasonable additional cost in order to avoid impact on the Callaway site. The transition has generous curves that exceed all Alberta Transportation design standards, and does not introduce any additional infrastructure impacts on the east side.
- *Edge Site* – twinning to the west side of Highway 22 would affect Edge homestead site in SE-3-25-4W5, located north of Township Road 250 at the crest of the major hill north of Highway 1. The Edge family are original homesteaders of the area, and the family remains a major landowner on both sides of the corridor (particularly on the west side). All lands are actively used for



ranching today, and the SE-3 site is a key hub with corrals, quonsets, shelter belts and water wells. ISL visited the site in August 2012 to document site conditions, including surveys of building and well locations. The detailed evaluation for this site is discussed below.

Initial evaluation at the Edge site indicated that twinning to the east side has several challenges in comparison to the other detailed sites: first, because there is another home site (Lauder) immediately opposite; and second, because the Edge home and adjacent buildings are so close to Highway 22 that it would still be impacted, even if the road were fully twinned to the east. On review of the above constraints during the public engagement process, the Edge family particularly highlighted the importance of the water well located behind the house, as opposed to the house itself.

As an area of significant constraint, a wide variety of options were evaluated, including various combinations of shifting or narrowing the highway. Review of options confirmed:

- In all cases, the Edge home and adjacent garage are impacted by the highway widening. However, options to shift the highway further east can minimize other impacts, particularly to the water well that is of primary concern to the landowners.
- All options generally have similar costs to the base option, with variation of up to ~\$900k above and ~\$400k below (due to reduced land requirements for the narrower options).
- Options that narrow the cross section do not meet Alberta Transportation standards for an expressway facility. The use of a narrow or no median poses a number of concerns including safety (increased risk of head-on collisions), winter maintenance (snow drifting and snow storage), drainage, and driver expectations for a facility of this nature.

As a long-term functional planning study, it is Alberta Transportation's practice to protect for full highway standards, with the intent that adjacent land use functions can be adapted to the highway requirements over time. AT's standards and practices benefit the public at large, by providing a consistent and predictable highway system throughout the province. As such, it is highly undesirable to establish a long-term, ultimate plan that includes a significant compromise of these standards, such as by narrowing the median to an urban or low-speed standard. Because they do not meet these design standards, and do not allow for the property impacts to be fully avoided, options that narrowed or eliminated the median were not considered further.

With respect to the water well, twinning to the west has the most direct impact, but it is believed that options may be available to avoid the conflict at the time of detailed design. These strategies could include:

- Steeper Slopes – because the area is in a rock outcropping, it is probable that the adjacent ditch backslope could be steepened beyond the typical 3:1 used for this study. Options to adjust the highway sideslope could also be considered, although it is highly desirable to maintain a flat, recoverable slope for roadside safety.
- Narrower Ditch – because the area is at the crest of the highway, the ditch carries no significant flows. Hydraulic considerations would allow for narrowing of the ditch, provided that roadside safety is maintained.
- Lower Well – the well cap could be lowered, to intercept the modified gradeline generated by the widened highway. Top-of-well access for trucks would need to be provided for maintenance purposes, from the property side.

In general, if the highway section could be adjusted in order to fall within the basic 100 m wide ROW, then the water well could be avoided. Detailed consideration of the above options is not within the scope of the functional planning study, and would require additional design data including a detailed geotechnical investigation of the cut slope.

On review by Alberta Transportation, it was determined that the preferred option is to maintain the twinning to the west side at the Edge site, acknowledging that property impacts will need to be mitigated and compensated at the time of construction. In particular, the recommendations of this report have highlighted the need to further evaluate options to avoid impacts to the water well, and minimize other property impacts to the extent possible.

## **8.0 Recommended Plans**

Following evaluation of options for the interchange configuration, interchange location, access management, mainline geometry and side-of-twinning on Highway 22, detailed functional planning was prepared. The recommended ultimate functional plans for Highway 22 are illustrated on Plan ES-2 through ES-6, while Highway 1 and the interchange are shown on Plans ES-7 and ES-8, respectively.

At the interim stage, Highway 1 will remain a four-lane freeway corridor, while Highway 22 will be twinned to a four-lane divided arterial, connected via a newly upgraded Parclo A interchange. The interim stage for the Highway 22 mainline will consist of the external four lanes of the ultimate six-lane section, and all ultimate access management components. The interim interchange is illustrated on Plan ES-9.

The plans require a total of 388 acres of land to be acquired for highway right-of-way, service roads and local access roads, and stormwater management.

A planning-level Road Safety Audit (RSA) for the recommended plan did highlight five areas of potential concern with the use of roundabouts on Highway 22, including:

- Inconsistent with driver expectations.
- Poor accommodation for cyclists.
- Operational / safety issues associated with truck acceleration / deceleration.
- High fastest path due to roundabout width.
- Potential for truck rollovers due to steep grades at the south roundabout.

On review with Alberta Transportation, the findings of the RSA were acknowledged. However, it was determined by Technical Standards Branch that the specific concerns raised by the RSA could likely be addressed to the Department's satisfaction at the detailed design stage. The preferred approach at the functional stage was to maintain flexibility to implement either roundabouts or signalized intersections, depending on future requirements. The roundabouts were identified as the primary alternative in the recommended plans above, solely for the purpose of right-of-way preservation.

## **9.0 Bridges**

The existing overpass carrying Highway 22 over Highway 1 was built in the 1960s, and is nearing the end of its nominal 50-year service life. Recent BIM inspections have recommended a full deck replacement by this time. Given the condition of the bridge, its unsuitability for ultimate widening of Highway 1, and the need for expensive upcoming repairs, it is recommended that the bridge not be retained for an upgraded interchange, even on an interim basis. Indeed, it would be most cost-effective to forego the deck replacement, and reconstruct the new bridge entirely in the coming years.

Four new structures are ultimately required at the interchange: two carrying the mainline carriageways of Highway 22; and two additional bridges built in the long-term, for the loop ramp bypasses. Bridge outline plans have been developed for two-span structures.

The other major bridge in the project area carries Highway 22 over the Elbow River. The bridge is generally in good condition, and would be maintained in the ultimate plan. A twinned bridge on Highway 22 will retain similar characteristics as the existing bridge, with the exception that the mainline profile will be modified to provide a minimum grade of 1.0% on the bridge deck (as opposed to the existing bridge, which is essentially flat.) The two-span structure would provide 35 m spans over the river, with a center pier.

## **10.0 Stormwater, Environmental and Related Issues**

The following sections provide a brief summary of stormwater management, utilities, geotechnical, environmental and historical resource considerations for the study.

### **10.1 Stormwater Management**

The functional planning study included a high level review of major drainage requirements and storm water management. The twinning and realignment of Highway 22 and replacement of the existing interchange will ultimately create approximately 45 ha of new pavement area, requiring management of the increased runoff. The additional flow will be routed via highway ditches and released at multiple discharge locations to ensure the existing overall flows are maintained. Flows will be controlled and stored through the utilization of traditional stormwater management measures, including ditch blocks and five stormwater ponds located at strategic locations (three of them in the vicinity of the interchange).

### **10.2 Utilities**

A preliminary review of potential utility conflicts was performed as a part of this study. A number of these utility crossings / conflicts will need to be addressed during the design and construction phases of the project. This particularly includes relocation of the joint ATCO Pipelines Metering Station / Trans Canada Pipelines Compression Station, located on the west side of Highway 22, north of Highway 1. There are numerous high-pressure pipeline crossings at various locations throughout the corridor, and underground and overhead utilities including power and cable will need to be relocated.

### **10.3 Geotechnical Review**

A geotechnical desktop study was completed by EBA Engineering Consultants to provide an overview of known information for the existing Highway 22 corridor and interchange at Highway 1. Numerous recommendations have been made with respect to sub-surface soil conditions, slope requirements, bridge foundations, and construction best practices.

### **10.4 Environmental Overview**

A desktop environmental overview was completed for the project by EBA Engineering Consultants. The desktop review included a field visit in June 2010. The proposed twinning and interchange reconfiguration for Highway 22 has the potential to impact the natural environment within the study area. Valued Ecosystem Components (VECs), including soils, vegetation, wildlife, wetlands, fisheries, water quality, and navigation, may be directly or indirectly impacted during the construction and operation of the proposed highway twinning. However, if mitigation measures and best management practices are utilized, negative residual effects are not anticipated or will likely be minimal.

One of the key environmental constraints is a major Class 5 (permanent) wetland, located on either side of Highway 22, north of Highway 1. The major component of the wetland is on the east side of Highway 22. Although sensitive, the wetland would not be considered sensitive enough to preclude development. Impacts to the wetland, if necessary, could be mitigated or compensated according to Alberta Environment policy. The other key environmental constraints are the watercourses that are known to support fish populations or contain potential fish habitat. The Elbow River is the most significant watershed in the project area.

Numerous recommendations have been made in the study with respect to landform and soils, vegetation, wildlife, wetlands, fisheries, and the need for Environmental Screening Assessments (ESAs) in select areas.

#### 10.4 Historical Resources

An Historical Resources Overview study was completed by Bison Historical Services Ltd. in the areas surrounding the Highway 22 corridor and Highway 1 interchange. According to the Listing of Historic Resources (March 2010 edition), all land sections affected by the project have a Historical Resource Value (HRV) notation of 5 for archaeology, with the exception of 26-25-4W5, which has an HRV notation of 4 due to a stone feature that will not be affected by the project. Beyond the archaeological sites, the HRO identified many historic sites near the project area, including historic homes, buildings and ranch sites. The HRO reference to Alberta Culture and Community Spirit confirmed that an Historical Resources Impact Assessment (HRIA) was required for the project.

The HRIA was completed in June 2011, and included two components:

- Archaeological HRIA, prepared by Bison Historical Services Ltd.
- Paleontological HRIA, prepared by Nautilus Paleontology

The Archaeological HRIA found a paucity of recovered subsurface materials in the study area, and recommended that the project could proceed through construction without further investigative work. The Paleontological HRIA highlighted ongoing potential for resource to be found in the Paskapoo Formation (rock outcropping north of Township Road 250) and Brazeau Coalspur Formation (rock outcropping south of Township Road 244.) Based on this potential, the HRIA recommended that final plans be reviewed by a professional paleontological consultant, followed by periodic inspection of these area during the construction and post-construction periods.

#### 11.0 Cost Estimates

Cost estimates were developed for Stage One and the Ultimate Stage for various sections of the project, and are summarized in Table III below.

*Table III Cost Estimate Summary*

<b>Project Component</b>	<b>Total Estimate</b>	<b>Stage One</b>	<b>Ultimate Stage</b>
Highway 1 Mainline	\$44.1 Million	\$11.6 Million	\$32.5 Million
Highway 22 (North)	\$58.2 Million	\$50.4 Million	\$ 7.8 Million
Highway 22 (South)	\$49.9 Million	\$41.6 Million	\$ 8.3 Million
Interchange	\$74.8 Million	\$59.3 Million	\$15.5 Million
<b>TOTAL</b>	<b>\$227 Million</b>	<b>\$163 Million</b>	<b>\$64 Million</b>

## **12.0 Public Engagement**

The Highway 1 and Highway 22 Interchange Functional Planning and Access Management Study included extensive public engagement through every stage of the project. Public engagement included the following phases:

- Phase 1 – Stakeholder identification and contact (Q3 2010)
- Phase 2 – Project introduction and option evaluation (Q4 2010)
- Phase 3 – Evaluation and identification of preferred plan (Q2 2012)
- Phase 4 – Detailed review with affected landowners (Q3 2012)
- Phase 5 – Present updated recommendations (Q1 2013)
- Phase 6 – Final review with affected landowners (Q3 2013)

A total of three open houses were held, in Phases 2, 3 and 5. Presentations were also made to Rocky View County council committees on two occasions, in June 2012 and January 2014. This report and presentation were accepted for information at the latter committee meeting.

Among the open houses and many one-on-one landowner meetings, there were more than 200 individual contacts made with landowners during the course of the study. Generally, most of the concerns raised by the public were able to be addressed through changes to the plan, with the concurrence of Alberta Transportation, though some impacts and landowner concerns do remain and will require additional attention at the design stage. This particularly includes the Edge homestead, where the landowners have emphasized the particular importance of the water well located just west of Highway 22, near the home site.

## **13.0 Closure**

Upgrading Highway 22 to a divided expressway standard will be a major undertaking, requiring consideration of numerous design challenges in an area of significant existing land use and complex topography. The interchange at Highway 1 is a major junction point in the provincial highway network, and must be protected to the highest standards to ensure safe and effective operations on and between both provincial highway routes.

The final report for this study provides 43 detailed recommendations for the future upgrading of Highway 22 and the Highway 1 interchange. These recommendations and the plan presented herein provide a sound foundation on which to progressively implement these upgrades in the coming decades.

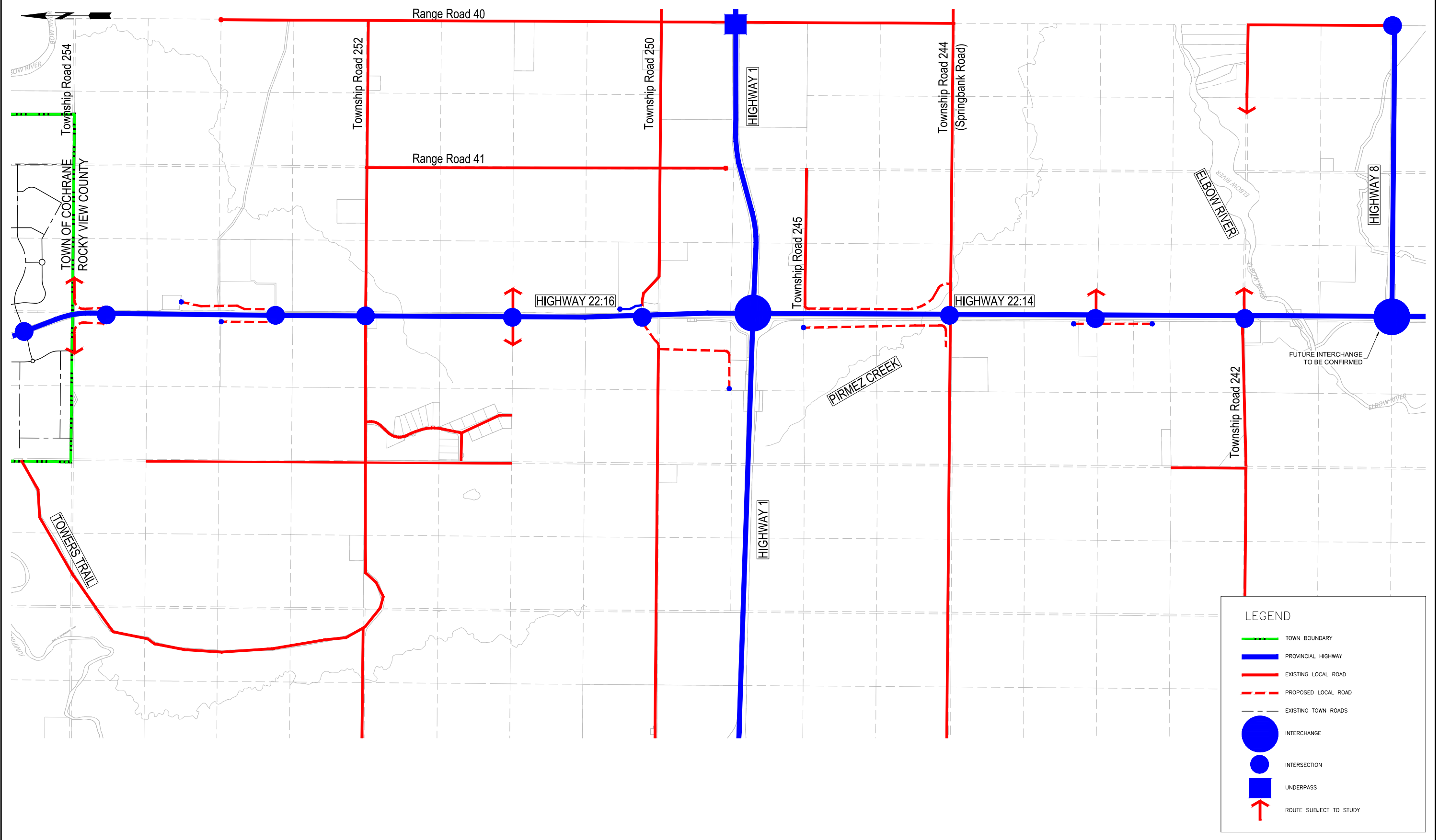
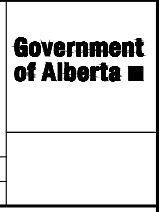
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 P-3382  
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 PLAN DESCRIPTION  
**HWY 22 FUNCTIONAL PLANNING STUDY**  
 ACCESS MANAGEMENT PLAN

CONSULTANT

JOB No.	25303	PLAN No.	ES-1
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**HWY 22 FUNCTIONAL PLANNING STUDY**  
ACCESS MANAGEMENT PLAN

REGION	PLAN No.	PROJECT	CONTRACT No.	SHEET
SOUTHERN	P-3382	HWY 22-14	CE_1352009	4 of 6



**LEGEND**

- TOWN BOUNDARY
- PROVINCIAL HIGHWAY
- EXISTING LOCAL ROAD
- PROPOSED LOCAL ROAD
- EXISTING TOWN ROADS
- INTERCHANGE
- INTERSECTION
- UNDERPASS
- ROUTE SUBJECT TO STUDY

PLAN DESCRIPTION  
**HWY 22 FUNCTIONAL PLANNING STUDY**  
 PLAN PROFILE AND DRAINAGE  
 LIMIT OF STUDY TO STA 5+100

BAR CODE

PLAN No. P-3382  
 CONTRACT No. CE\_1352009

PHOTO No. 0808/2010  
 TITLE SEARCH DATE 0808/2010  
 GRAPHICS FILE

REVISION	DATE	BY	DATE	BY	DATE	BY

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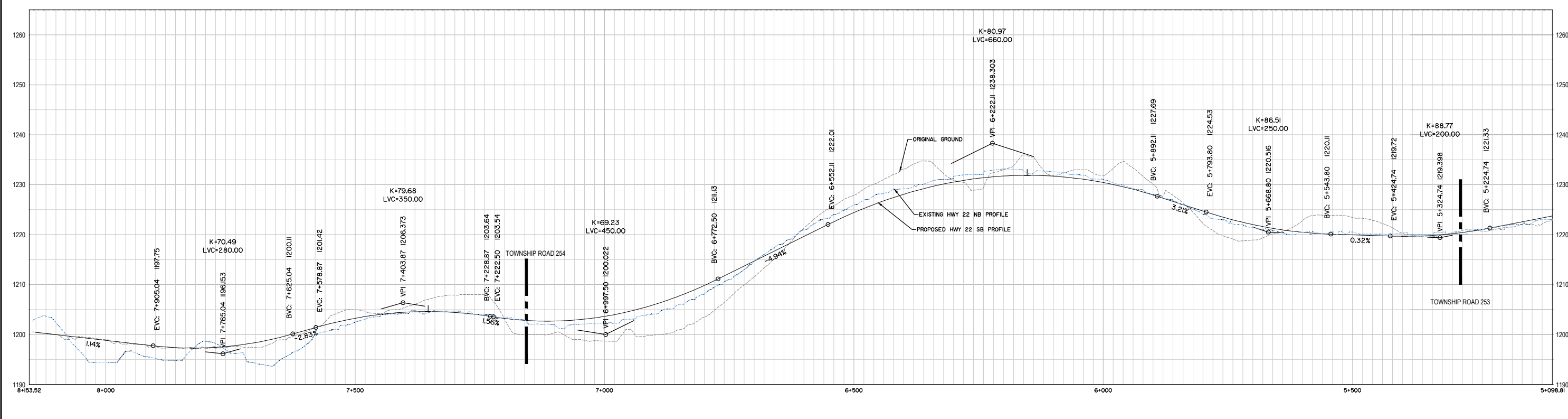
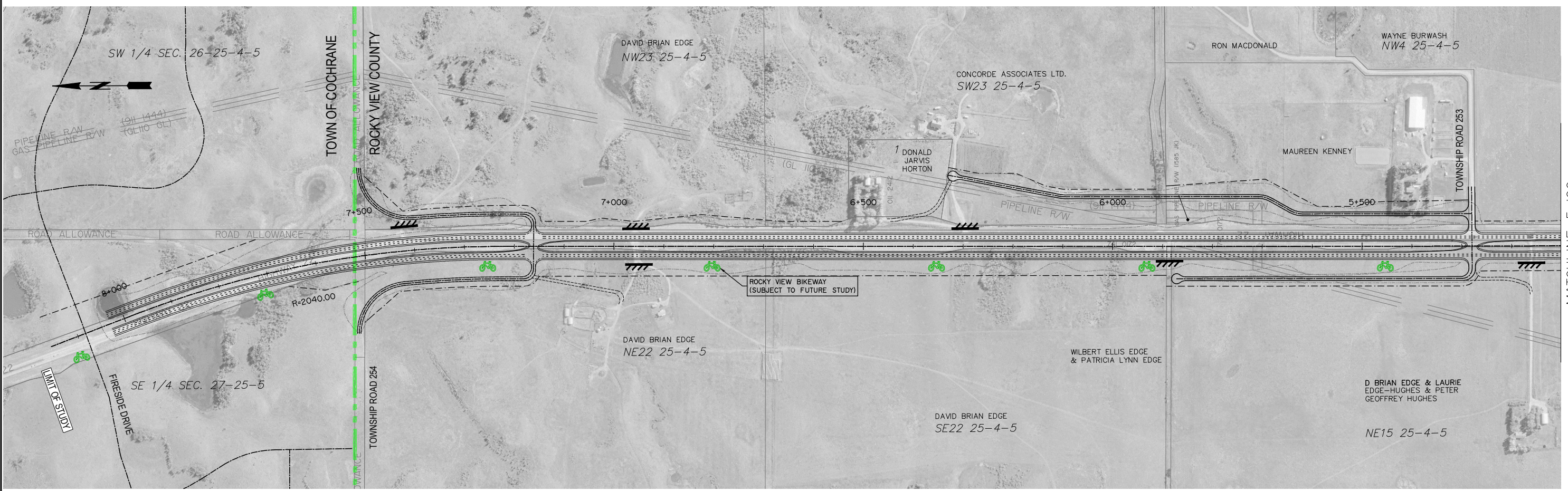
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- ROAD CLOSURE
- PRIVATE ACCESS
- PROPOSED ROW
- GRADING LIMIT

CONSULTANT  
 JOB No. 25303 PLAN No. ES-2

**HWY 22 FUNCTIONAL PLANNING STUDY**  
 PLAN PROFILE AND DRAINAGE  
 LIMIT OF STUDY TO STA 5+100

REGION	PLAN No.	PROJECT	CONTRACT No.	SHEET
SOUTHERN	P-3382	HWY 22-14	CE_1352009	1 of 12

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MATCHLINE 5+100

PLAN DESCRIPTION  
**HWY 22 FUNCTIONAL PLANNING STUDY**  
 PLAN PROFILE AND DRAINAGE  
 STA 5+100 TO STA 2+000

BAR CODE

PLAN No. P-3382  
 CONTRACT No. CE\_135/2009

PHOTO No. 0806/2010  
 TITLE SEARCH DATE 0806/2010  
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REVISION	BY	DATE	SURVEYED	DESIGNED	CHECKED	DRAWN

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**LEGEND**

- BIKEWAY
- ROAD CLOSURE
- PRIVATE ACCESS
- PROPOSED ROW
- GRADING LIMIT

CONSULTANT

JOB No. 25303 PLAN No. ES-3

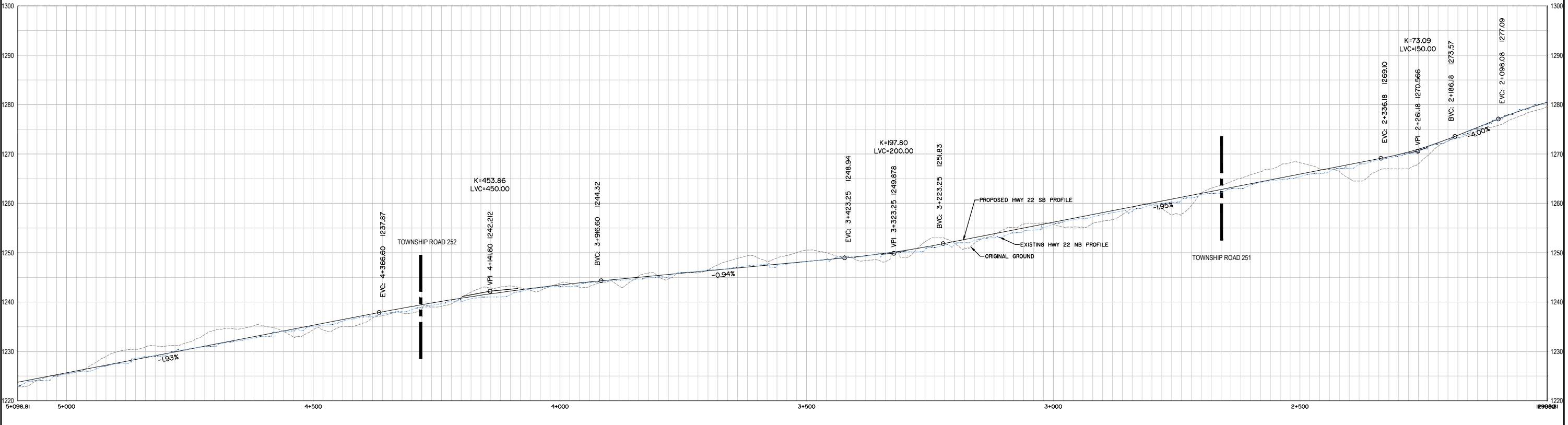
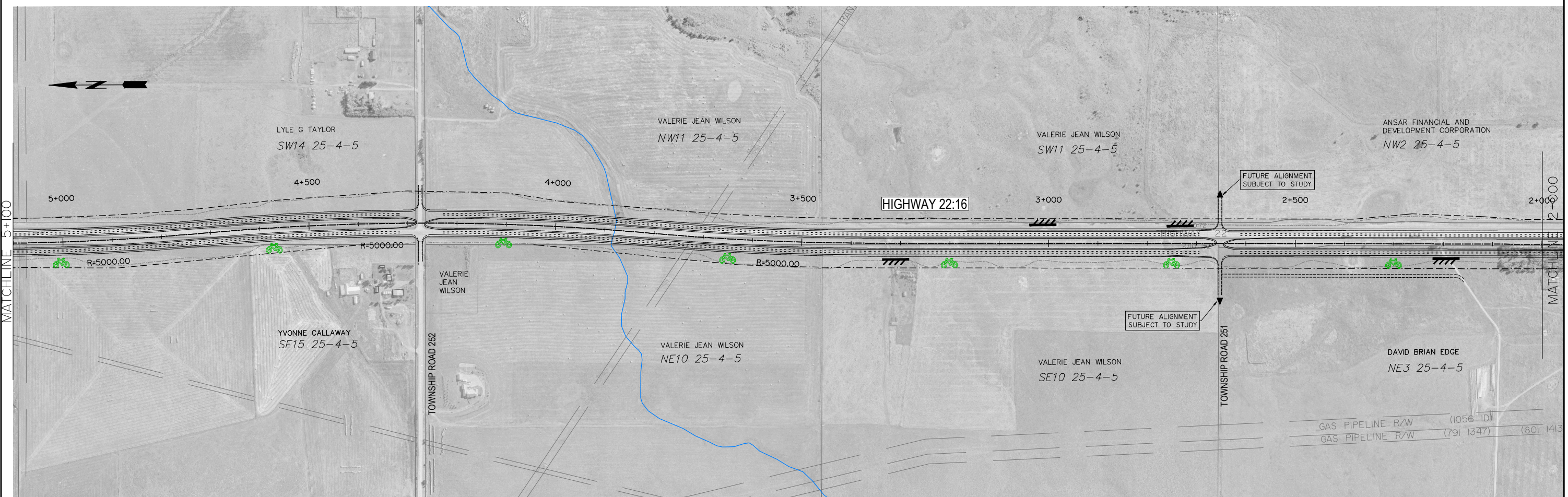
**ISL Engineering and Land Services**

**HWY 22 FUNCTIONAL PLANNING STUDY**  
 PLAN PROFILE AND DRAINAGE  
 STA 5+100 TO STA 2+000

REGION	PLAN No.	PROJECT	CONTRACT No.	SHEET
SOUTHERN	P-3382	HWY 22-14	CE_135/2009	2 of 12

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Government of Alberta





PLAN DESCRIPTION  
**HWY 22 FUNCTIONAL PLANNING STUDY**  
 PLAN PROFILE AND DRAINAGE  
 STA 2+000 to STA 54+000

BAR CODE  
 P-3382  
 CE\_1352/2009

PLAN No.  
 CONTRACT No.  
 INTERSECTION ID

PHOTO No.  
 TITLE SEARCH DATE  
 GRAPHICS FILE

REVISION	DATE	BY	DESIGNED	CHECKED	DRAWN

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**LEGEND**

- BIKEWAY
- ROAD CLOSURE
- PRIVATE ACCESS
- PROPOSED ROW
- GRADING LIMIT

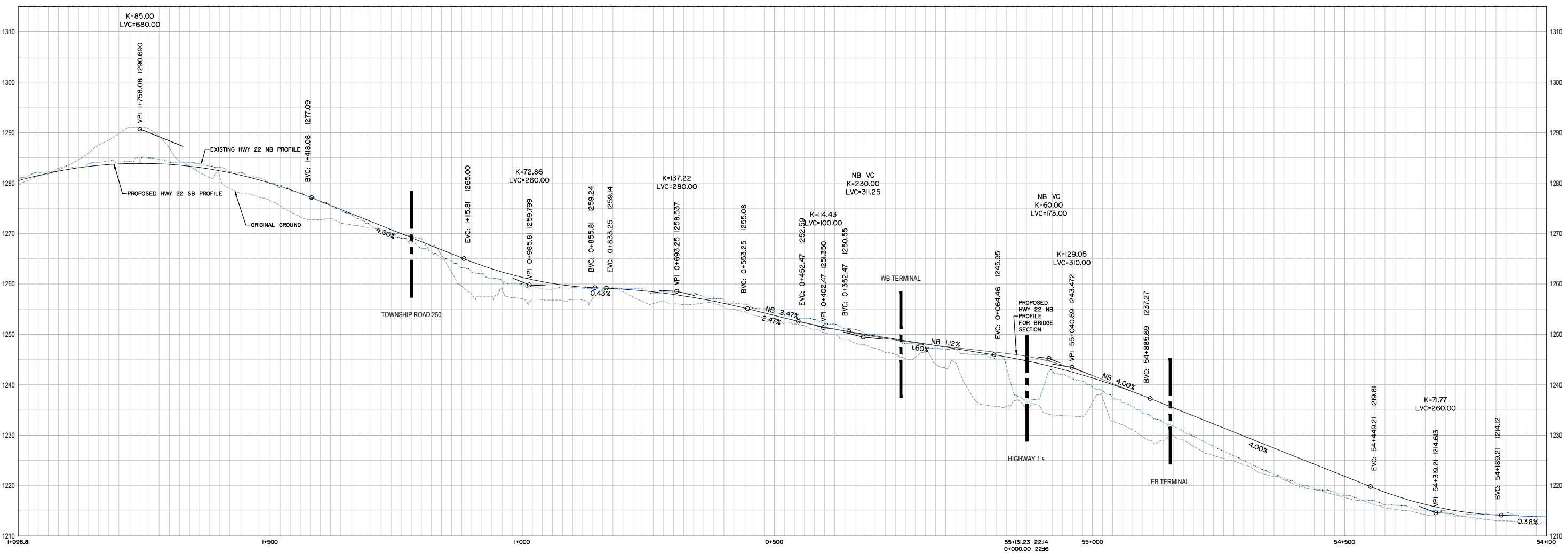
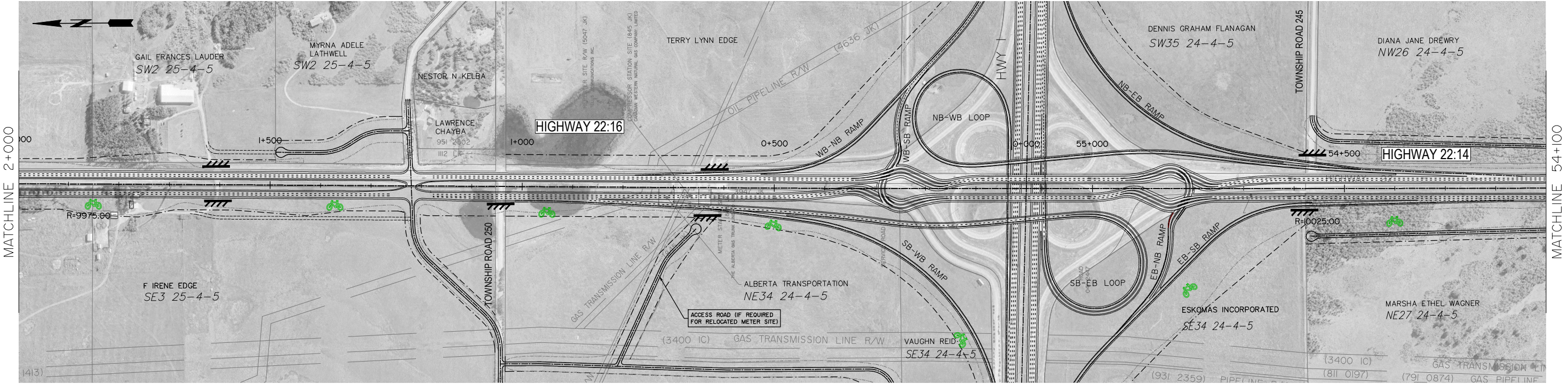
CONSULTANT

JOB No. 25303 PLAN No. ES-4

**HWY 22 FUNCTIONAL PLANNING STUDY**  
 PLAN PROFILE AND DRAINAGE  
 STA 2+000 to STA 54+000

REGION	PLAN No.	PROJECT	CONTRACT No.	SHEET
SOUTHERN	P-3382	HWY 22-14	CE_1352/2009	3 of 12

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PLAN DESCRIPTION  
**HWY 22 FUNCTIONAL PLANNING STUDY**  
 PLAN PROFILE AND DRAINAGE  
 STA 54+100 TO STA 51+000

BAR CODE

P-3382  
 CE\_135/2009

PLAN No.  
 CONTRACT No.

INTERSECTION ID

08/08/2010

PHOTO No.  
 TITLE SEARCH  
 DATE

GRAPHICS FILE

REVISION	BY	DATE	SURVEYED	DESIGNED	CHECKED	DRAWN

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**LEGEND**

- BIKEWAY
- ROAD CLOSURE
- PRIVATE ACCESS
- PROPOSED ROW
- GRADING LIMIT

CONSULTANT

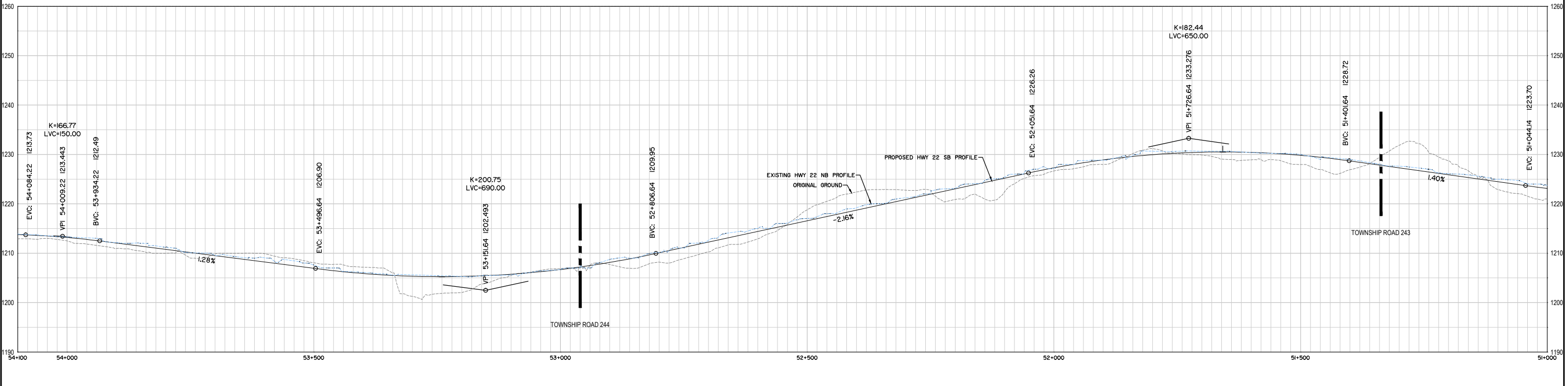
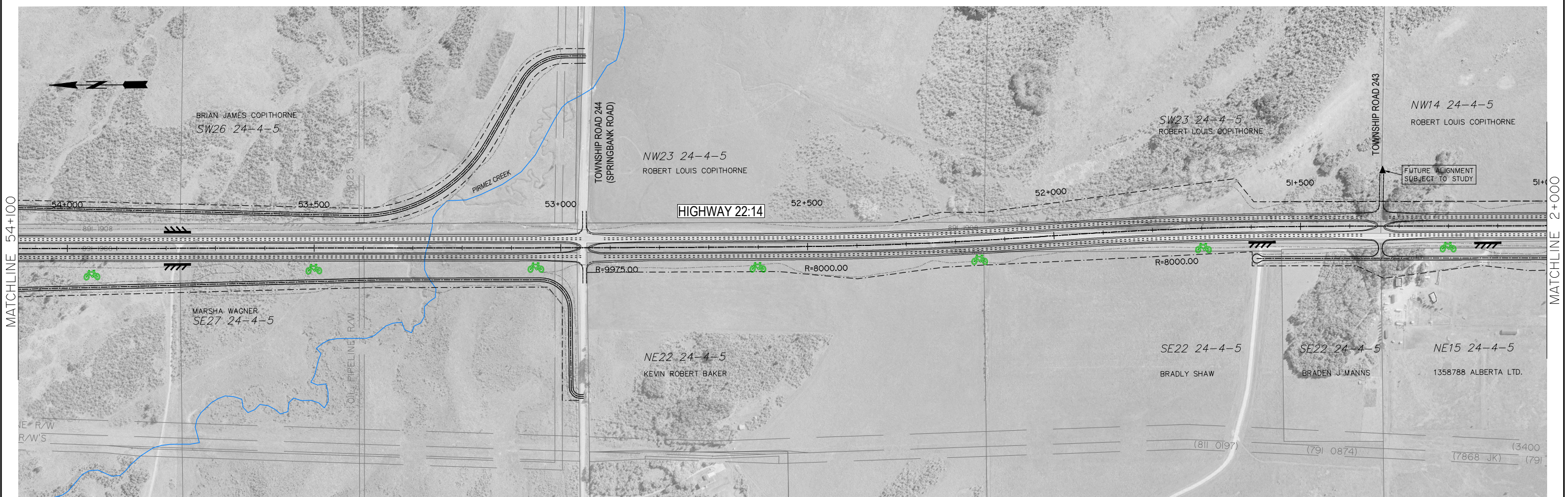
JOB No.	25303	PLAN No.	ES-5
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**HWY 22 FUNCTIONAL PLANNING STUDY**  
 PLAN PROFILE AND DRAINAGE  
 STA 54+100 TO STA 51+000

REGION: SOUTHERN | PLAN No.: P-3382 | PROJECT: HWY 22-14 | CONTRACT No.: CE\_135/2009 | SHEET: 4 of 12

**Government of Alberta**

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PLAN DESCRIPTION  
**HWY 22 FUNCTIONAL PLANNING STUDY**  
 PLAN PROFILE AND DRAINAGE  
 STA 51+000 TO LIMIT OF STUDY

BAR CODE

PLAN No. P-3382  
 CONTRACT No. CE\_135/2009  
 INTERSECTION ID

PHOTO No. 0806/2010  
 TITLE SEARCH DATE 0806/2010  
 GRAPHICS FILE

REVISION	DATE	BY	DATE	BY

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**LEGEND**

- BIKEWAY
- ROAD CLOSURE
- PRIVATE ACCESS
- PROPOSED ROW
- GRADING LIMIT

CONSULTANT

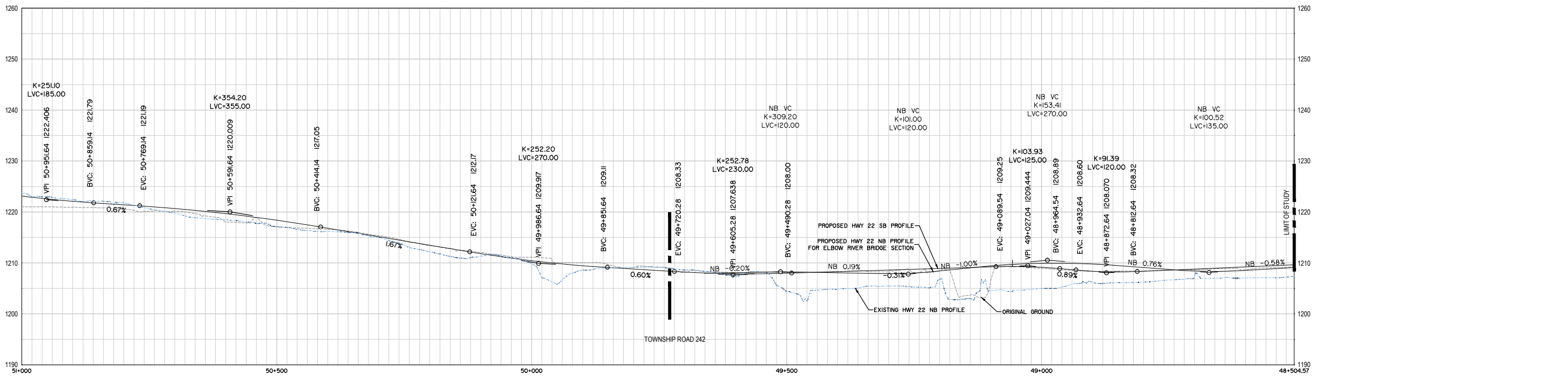
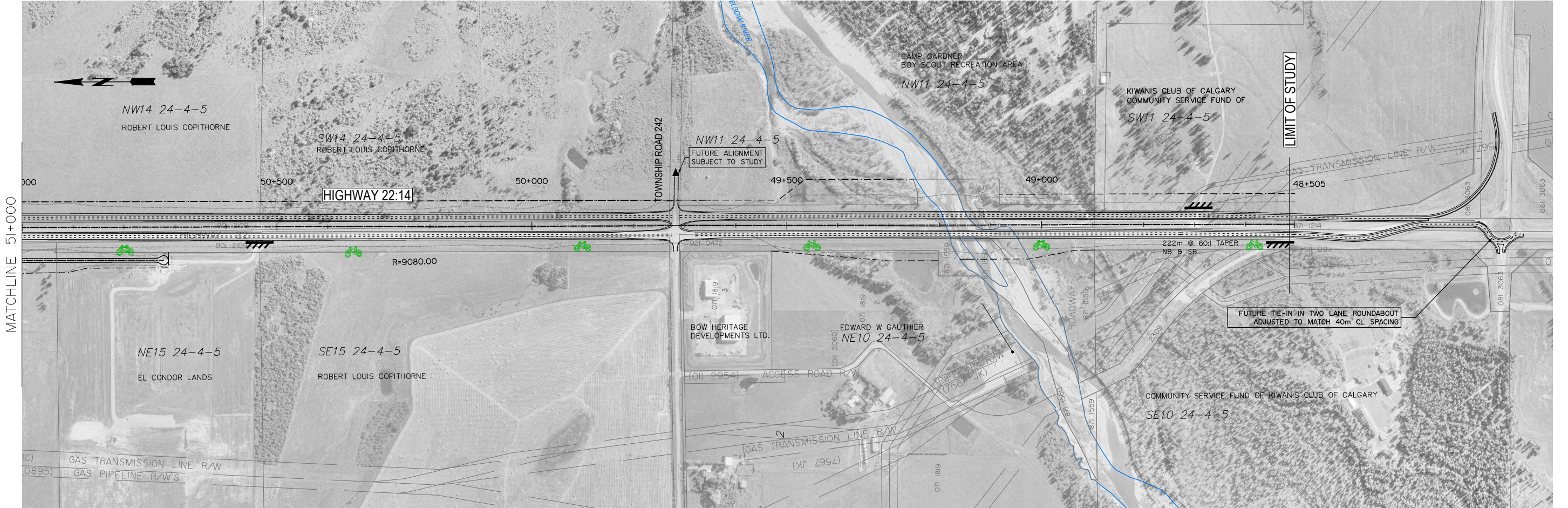
JOB No. 25303 PLAN No. ES-6

**HWY 22 FUNCTIONAL PLANNING STUDY**  
 PLAN PROFILE AND DRAINAGE  
 STA 51+000 TO LIMIT OF STUDY

REGION SOUTHERN PLAN No. P-3382 PROJECT HWY 22-14 CONTRACT No. CE\_135/2009 SHEET 5 of 12

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**Government of Alberta**





PLAN DESCRIPTION  
**HWY 22 FUNCTIONAL PLANNING STUDY**  
 RECOMMENDED INTERCHANGE PLAN  
 ULTIMATE STAGE

BAR CODE  
 P-3382  
 CE\_1362009

PLAN No.  
 CONTRACT No.  
 INTERSECTION ID

PHOTO No.  
 TITLE SEARCH  
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 GRAPHICS FILE

BY DATE  
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 DESIGNED  
 CHECKED  
 DRAWN

REVISION  
 No.

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CONSULTANT

JOB No. 25303 PLAN No. ES-8

**HWY 22 FUNCTIONAL PLANNING STUDY**

RECOMMENDED INTERCHANGE PLAN  
 ULTIMATE STAGE

Government of Alberta

REGION	PLAN No.	PROJECT	CONTRACT No.	SHEET
SOUTHERN	P-3382	HWY 22-14	CE_135/2009	7 of 12

