

EXECUTIVE SUMMARY

CastleGlenn Consultants Inc. was retained in October 2006 by Alberta Infrastructure and Transportation to undertake a functional planning study that would evaluate the design and traffic operational impacts of implementing a partial diamond interchange along Highway 2 (QEII) in the vicinity of Township Road 265 (just south of the City of Airdrie). Development pressures adjacent to Highway 2 and the desire for future widening of Highway 2 have warranted the need to confirm the “ultimate” vision for the Highway 2 (QE II) corridor. It should be noted that for the purpose of this study the Highway 2/Township Road 265 interchange was designed to accommodate an eight lane Highway 2 cross-section; however, at the time of detailed design:

- the interchange should be designed to accommodate ten core lanes on the QE II Highway;
- the Right-of-Way requirements should be reviewed to ensure that adequate ROW has been requested for a ten lane Highway 2 design.

Objectives

The primary objectives of the *Highway 2/Township Road 265 Partial Interchange Functional Planning Study* was to:

- confirm the “ultimate” vision for the Highway 2 (QE II) corridor in terms of its long-range function and desired traffic operations;
- confirm the “ultimate” layout of the interchange at Highway 2 and Township Road 265/40th Ave./Sharp Hill Way and protect the necessary right-of-way required to accommodate the proposed partial interchange design; and
- confirm future roadway requirements for 40th Ave/Sharp Hill Way west of the CP Rail corridor to east of Kingsview Blvd;
- develop plans showing the recommended improvements and/or realignments required on this highway to address identified deficiencies; and
- define basic right-of-way requirements for the recommended improvements within the study area and prepare basic right-of-way request plans depicting all right-of-way dimensions, appropriate areas and updated land ownership.

Highway 2/Township Road 265 Interchange Scenarios

The proposed configuration selected for the future Highway 2/Township Road 265 interchange is contingent upon the type of interchange (systems or service) implemented at the junction of Highway 2 and Township Road 264 (located 1600m south of Township Road 265). During the process of this study the Township Road 264 corridor was being considered as a potential location for a future “*Outer Ring Road*” north of the City of Calgary with a “systems” interchange located at the junction of Highway 2 and Township Road 264. If Township Road 264 is selected as a

preferred location for a “systems” interchange, the Highway 2/Township Road 265 interchange would be limited to a grade separated “flyover” structure (referred to as Scenario “B” in this report) due to the relatively short 1600m separation between the two interchanges. Alternatively, if the Highway 2/Township Road 264 junction is selected as a location for a “service” interchange (with no provision for an “Outer Ring Road” along the Township Road 264 corridor) the Highway 2/Township Road 265 interchange could accommodate a partial diamond configuration (referred to as Scenario “A” in this report).

Proposed Interchange Designs

Exhibit ES-1 and ES-2 depict the proposed functional designs for the “ultimate” Scenario “A” Stage “II” Highway 2/Township Road 265 interchange configuration and the Scenario “B” Highway 2 flyover configuration. The following proposed design characteristics (illustrated in Exhibits ES-1 and E-2) are applicable to both interchange scenarios and include a:

- six lane continuously divided Township Road 265 alignment with a 0° skew angle at Highway 2;
- grade separated CP Rail crossing that accommodates an additional future possible high speed rail track;
- grade separated Township Road 265 over Main Street structure that provides for a possible four lane undivided Main Street cross-section
- bridge size culvert under the Township Road 265 embankment that accommodates a realigned Nose Creek channel (a bridge structure may also be an additional solution to improve fish passage and habitat conditions);
- Highway 2 overpass structure designed for an ultimate eight lane (38m centerline spacing) Highway 2 cross-section with widening assumed to take place on the outside of the existing six lane configuration;
- north and south ramps connecting Main Street to Township Road 265 that provide for free-flow movements (right-in, right-out only) at the intersection between the ramps and Township Road 265; and
- stormwater drainage system designed to capture runoff from the proposed infrastructure and avoid stormwater directly discharging into Nose Creek as outlined in the “Nose Creek Watershed Water Management Plan, (Palliser Environmental Services, January 2007). (It should be noted the Scenario “B” flyover configuration does not provide for new stormwater management ponds; however, in conjunction with existing stormwater management facilities and proposed storm sewer systems, direct discharge into Nose Creek can be avoided)

Scenario “A” – Highway 2/Township Road 265 Interchange Configuration

A potential two stage staging strategy was developed for the partial diamond interchange with the objective of permitting construction costs to be staged over time and developing a phased

interchange design that generally corresponds to the proposed staged 40th Avenue improvements (as outlined in the “*City of Airdrie Transportation Master Plan 2006*” ISL, May 2006)

The primary differences between the two interchange stages is the addition of two loops in the northern quadrants of the interchange (N-W loop and W-S loop) in the “Stage II” design and the widening of Township Road 265 from a four lane (“Stage I”) to a six lane (“Stage II”) cross-section. A cost analysis completed for the interchange and associated infrastructure indicated that:

- The conceptual construction cost of sequentially proceeding with “Stage I” followed by “Stage II” was found to be approximately \$62.4M;
- The conceptual construction cost of proceeding directly to “Stage II” was found to be approximately \$57.8M;

Despite the above findings, this functional planning study provides AIT with flexibility to choose to respond to either a sequential implementation or proceed directly to “Stage II”.

To permit the construction of the W-S interchange loop and the Highway 2 entrance terminal from the loop approximately 850m of new Nose Creek channel is proposed. Realignment of the creek will require implementation of environmental mitigation measures and possible compensation including restoration of riparian function at or near the creek. Construction of the proposed N-W loop will require partial relocation (estimated at 1.5 hectares) of the existing stormwater management pond located in the northwest quadrant of the interchange to a new location in the southeast quadrant of the interchange.

Scenario “B” – Highway 2 Flyover Configuration

The Scenario “B” Highway 2 flyover configuration assumes a westerly shift of Nose Creek to the outside of the west Highway 2 right-of-way boundary to accommodate the future widening of Highway 2 to an eight lane cross-section. As in Scenario “A” appropriate environmental mitigation measures and possible compensation will be required for the realignment of the creek. Based on the proposed tentative profile of Township Road 265 no relocation of the existing stormwater management pond (located in the northwest quadrant of the interchange) is required.

Traffic Forecasts

Forecast traffic volumes were determined by identifying estimates of the potential land use development that could occur within the study area over 20-year and 100 year (ultimate build-out). Time horizons. The traffic analysis indicated that for the:

20-Year Time Horizon

- Under the “low” development scenario (4,300 dwellings/11,700 population south of Big Hill Springs/Yankee Valley Road) assuming the signalization of each of the ramp terminal (loop ramps associated with the Stage II configuration are not in place) the Stage I interchange partial

diamond configuration is forecast to operate at satisfactory levels of service (LOS “A” and “B”).

- Under the “high” development growth scenario (10,000 dwellings/27,100 population south of Big Hill Springs/Yankee Valley Road) the west ramp terminal of the interchange is anticipated to operate at unsatisfactory levels of service (LOS “E” and “F”) assuming the Stage I configuration. This scenario may require early implementation of the Stage II W-S loop entrance ramp within the north-west quadrant of the interchange by the 20-year horizon. The advent of the W-S loop entrance ramp allows the west ramp terminal to revert to un-signalized free-flow operations.

It is worthwhile to note that the City of Airdrie has indicated that they have estimated the need for the interchange at approximately 5 years and has encouraged AIT to secure the required right-of-way immediately.

100-year Time Horizon

- The Stage II interchange configuration will be required prior to the build-out (100-year) time horizon as the 6-lane 40th Avenue/Township Road 265 configuration (inclusive of double left-turn lanes) is anticipated to experience constrained (LOS “F”) operations during both peak hours of travel demand.
- A weaving analysis assuming the build-out (100-year) land use forecast and Stage II infrastructure scenario concluded that satisfactory operations could be achieved during morning peak hour conditions; however, during the afternoon peak hour of travel demand constrained operations (LOS “F”) resulted on the weaving lane located between the N-W and W-S loops.

Conceptual Construction Costs

The estimated construction costs for the interchange (includes all proposed infrastructure associated with Township Road 265, and Main Street) was divided into four sections along Township Road 265 to assist in determining the cost sharing of the proposed infrastructure. A cost analysis indicated the total estimated construction cost for the:

- Scenario “A” “Stage I” configuration is \$48.3M (\$27.1M accounts for the interchange construction including: Highway 2 overpass, ramps, Nose Creek realignment, and bridge culvert);
- Scenario “A” “Stage II” interchange configuration is \$57.8M (\$35.1M accounts for the interchange construction including: Highway 2 overpass, ramps, Nose Creek realignment, bridge size culvert and stormwater management pond relocation); and
- Scenario “B” configuration interchange configuration is \$45.1M (\$22.1M accounts for the interchange construction including: Highway 2 overpass, Nose Creek realignment and bridge size culvert)

Recommendations

It is recommended that...

1. *The infrastructure improvements consistent with the Highway 2/Township Road 265 Partial Interchange Functional Planning Study be received by Alberta Infrastructure and Transportation;*

2. The City of Airdrie is informed that the *Highway 2/Township Road 265 Partial Interchange Functional Planning Study* represents a planning document and as such highway widening / construction is currently not scheduled.
3. *The City of Airdrie Council be requested to incorporate the Highway 2/Township Road 265 Partial Interchange Functional Planning Study within their area structure and municipal development plans noting comments related to;*
 - *The desire to establish priority improvements which integrate with local planning initiatives; and*
 - *The desire to effect timing of improvements to address areas of local concern.*
4. Subsequent to AIT's endorsement of the *Highway 2/Township Road 265 Partial Interchange Functional Planning Study*, AIT is encouraged to pursue those initiatives necessary to confirm the detailed engineering feasibility of the preferred Highway 2/Township Road 265 "ultimate" interchange or flyover configuration. These activities would likely include, but are not limited to:
 - a) Undertaking further environmental studies as recommended by the Environmental Overview prepared by Pioneer Land and Environmental Services prior to detailed design and construction to obtain the necessary clearance.
 - b) Undertaking further evaluation regarding the relocation and redesign of the existing stormwater management facility located in the northeast corner of Highway 2 and Township Road 265.
 - c) Preparing an "Integrated Stormwater Management Plan" should be prepared that outlines procedures for ensuring "post-development runoff-conditions mimic the predevelopment rates". Various action plans for achieving this objective are outlined in the "*Nose Creek Watershed Water Management Plan*", (Palliser Environmental Services, January 2007).
 - d) Undertaking further study of the proposed Nose Creek realignment, including required environmental mitigation measures, possible compensation for the restoration of riparian function at or near the creek and channel section requirements.
 - e) Monitoring of development initiatives on adjacent lands to enable AIT to assess warrants for infrastructure improvements.
 - f) Confirming the location for the Outer Ring Road corridor located north of the City of Calgary.

