6.0 AREAS OF CONCERN AND MITIGATION

Areas of environmental sensitivity or concerns associated with the Recommended Plan are described in the following sections.

6.1 Recommended Plan

The Recommended Plan will provide the operational improvements necessary to upgrade Highway 17 to a 4-lane divided freeway with controlled access. The highway meets the 120 km/h design standard for both the horizontal and vertical alignments.

6.1.1 Major Features of the Recommended Plan

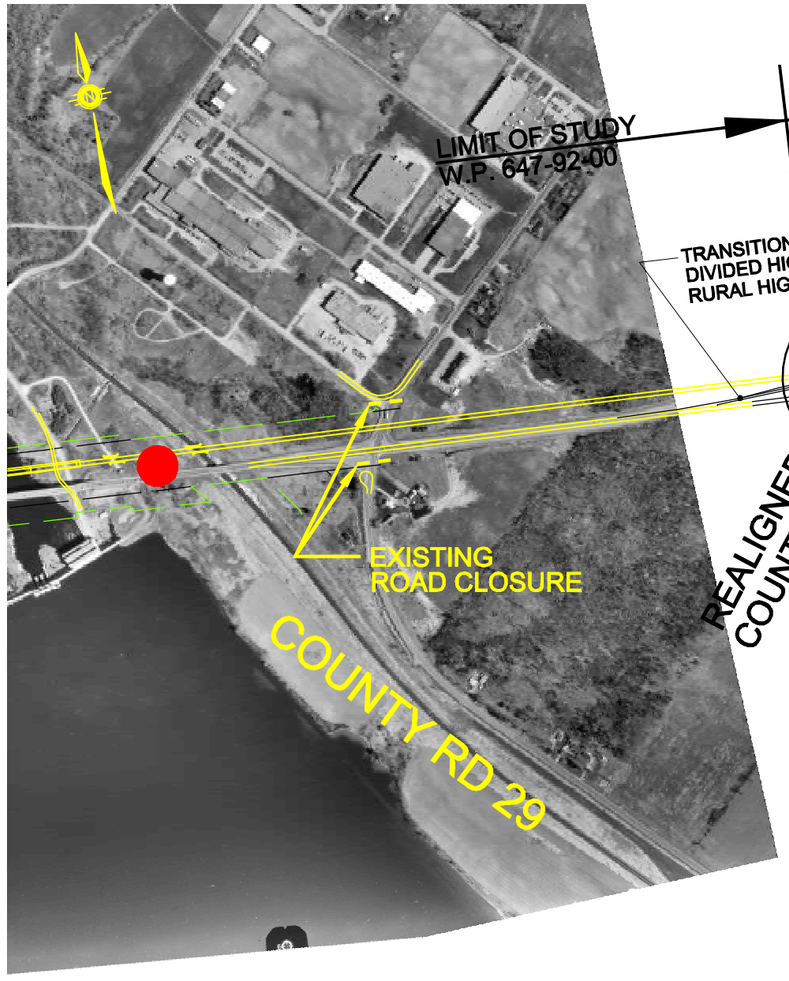
The Recommended Plan includes the following recommendations:

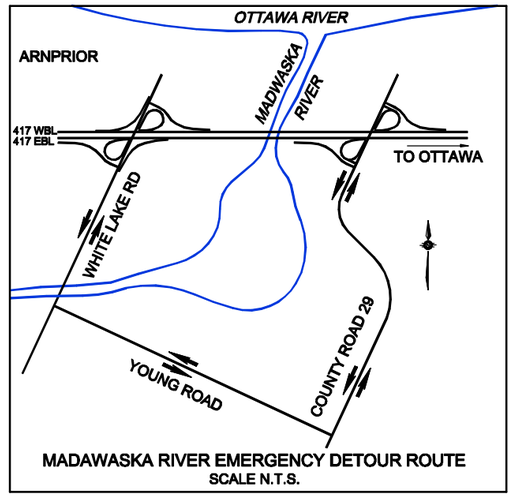
- Twinning Highway 17 to the north between County Road 29 and 1 km west of County Road 6, and to the south side from this point westerly, with small widenings where property not currently owned;
- Minimum median width of 32.5 m;
- Baskin Drive overpass with a sidewalk on the west side;
- White Lake Road to Baskin Drive south Service Road including replacement of displaced parking at Boeing;
- Improvements to White Lake Road/Daniel Street from the south service road to Baskin Drive including 4-lane cross section and illumination;
- Parclo A4 interchange at White Lake Road with a sidewalk on the west side;
- Division Street underpass with 2.0 m shoulders to accommodate snowmobiles, pedestrians and cyclists;
- Parclo A2 interchange at Campbell Drive, with protection for a long term Parclo A4 interchange configuration, design speed 80 km/h;
- Scheel Drive underpass with a design speed of 80 km/h;
- Parclo A4 interchange at County Road 508/54 on a new alignment;
- Improved geometrics for County Road 508/54 side roads;
- New County Road on the north side of Highway 17 between Miller Road (County Road 63) and County Road 54;
- Possible car pool facilities at County Road 508 interchange if surplus land is available;
- New township road to provide access to a land-locked property on the south side of Highway 17 at Anderson Road;
- Goshen Road overpass with 2.0 m shoulders to accommodate snowmobiles;
- New Parclo A2 interchange at County Road 6 with 2.0 m shoulders to accommodate snowmobiles as well as long term property protection for an ultimate Parclo A4 design;
- Realign Deil's Creek at County Road 6;
- New culverts to accommodate the existing Recreational Trail corridor;
- Transition of Highway 17 twinning to the south side of the right-of-way west of County Road 6;
- Trumpet/Diamond interchange at O'Brien Street (Highway 60); and
- Parclo A2 interchange at Bruce Street and long term property protection for an ultimate Parclo A4 design.

The freeway plan is expected to be constructed as a series of future projects. An initial plan for the delivery of the project is to carry out the recommendations listed above in two phases. Staged implementation may, subject to the availability of funding and provincial priorities, include:

- Phase 1 construction, will consist of several projects between County Road 29 to Scheel Drive, including the Scheel Drive underpass;
- Phase 2 construction, including several projects from Scheel Drive to 3 km west of Bruce Street.
- Transitions to the freeway where staging results in the cross section reducing from 4 lanes to 2 lanes at the west limit of the Phase 1 phase and the west limit of Phase 2;
- Landscaping adjacent to residential dwelling units in close proximity to highway construction; and
- Land acquisition, as required, to allow the above noted freeway expansion plan.

The Recommended Plan and the areas of environmental concern for the Highway 17 Twinning between Arnprior and Renfrew are shown in **Figures 6-1** to **6-10, Recommended Plan**. The Recommended Cross Section for the Highway 17 Twinning is shown in **Figure 6-11, Recommended Cross Sections**. The areas of concern are described further in **Section 6.2 Environmental Issues and Commitments**.





MADAWASKA RIVER EMERGENCY DETOUR ROUTE
SCALE N.T.S.

LEGEND:

AREAS OF MITIGATION:

FISHERIES MITIGATION

COLD WATER, MIXED

COOL/WARM WATER

VISUAL SCREENING/ SNOW DRIFTING/ HEADLIGHT GLARE

DEER YARD MITIGATION (SHOULD A SURPLUS OF PROPERTY BE AVAILABLE)

PROVINCIALLY RARE PLANT SPECIES (RAMS-HEAD ORCHID)

STAGE 2 ARCHAEOLOGICAL ASSESSMENT

STAGE 3/4 ARCHAEOLOGICAL ASSESSMENT

OTHER

ENGINEERING:

EMERGENCY VEHICLE MEDIAN CROSSOVER

ROAD CLOSING

PROPERTY:

PROPERTY AQUISITION

EXISTING MTO PROPERTY

ADDITIONAL PROPERTY REQUIRED

PROTECTION FOR LONG TERM PLAN

DATE OF AIRPHOTO SPRING 1999

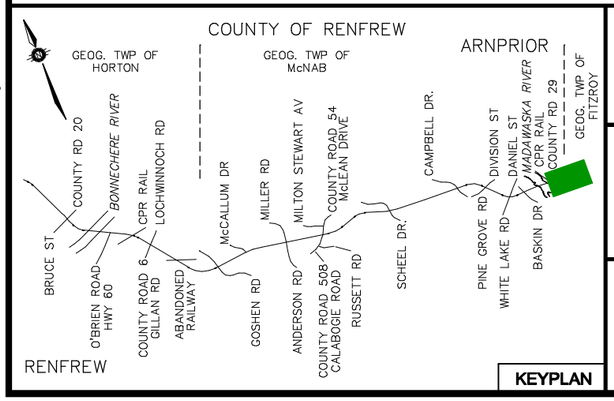


FIGURE 6-1

RECOMMENDED PLAN

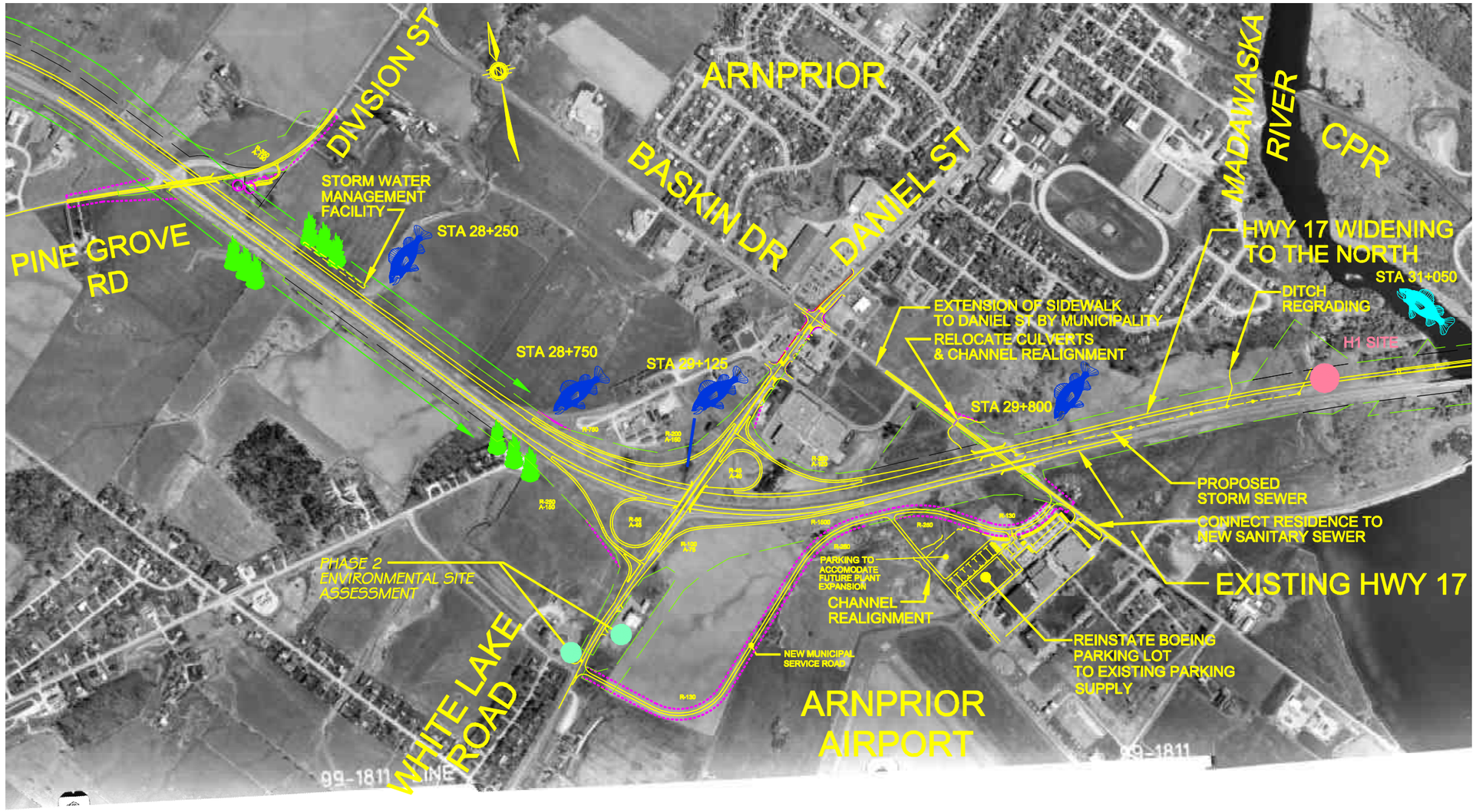
HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 137.5m 0 275m
Horizontal

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LEGEND:

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- *STAGE 3/4 ARCHAEOLOGICAL ASSESSMENT*
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ENGINEERING:

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- ROAD CLOSING

PROPERTY:

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- ADDITIONAL PROPERTY REQUIRED
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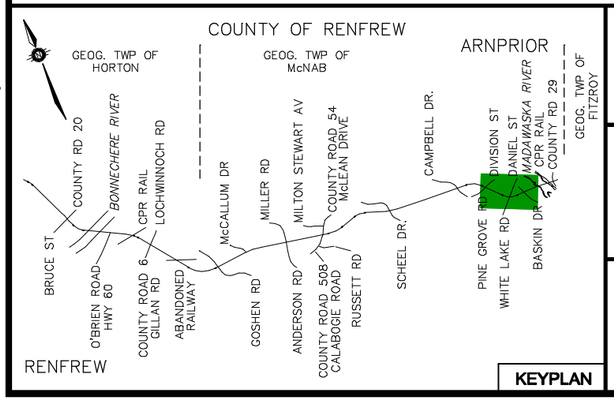


FIGURE 6-2

RECOMMENDED PLAN

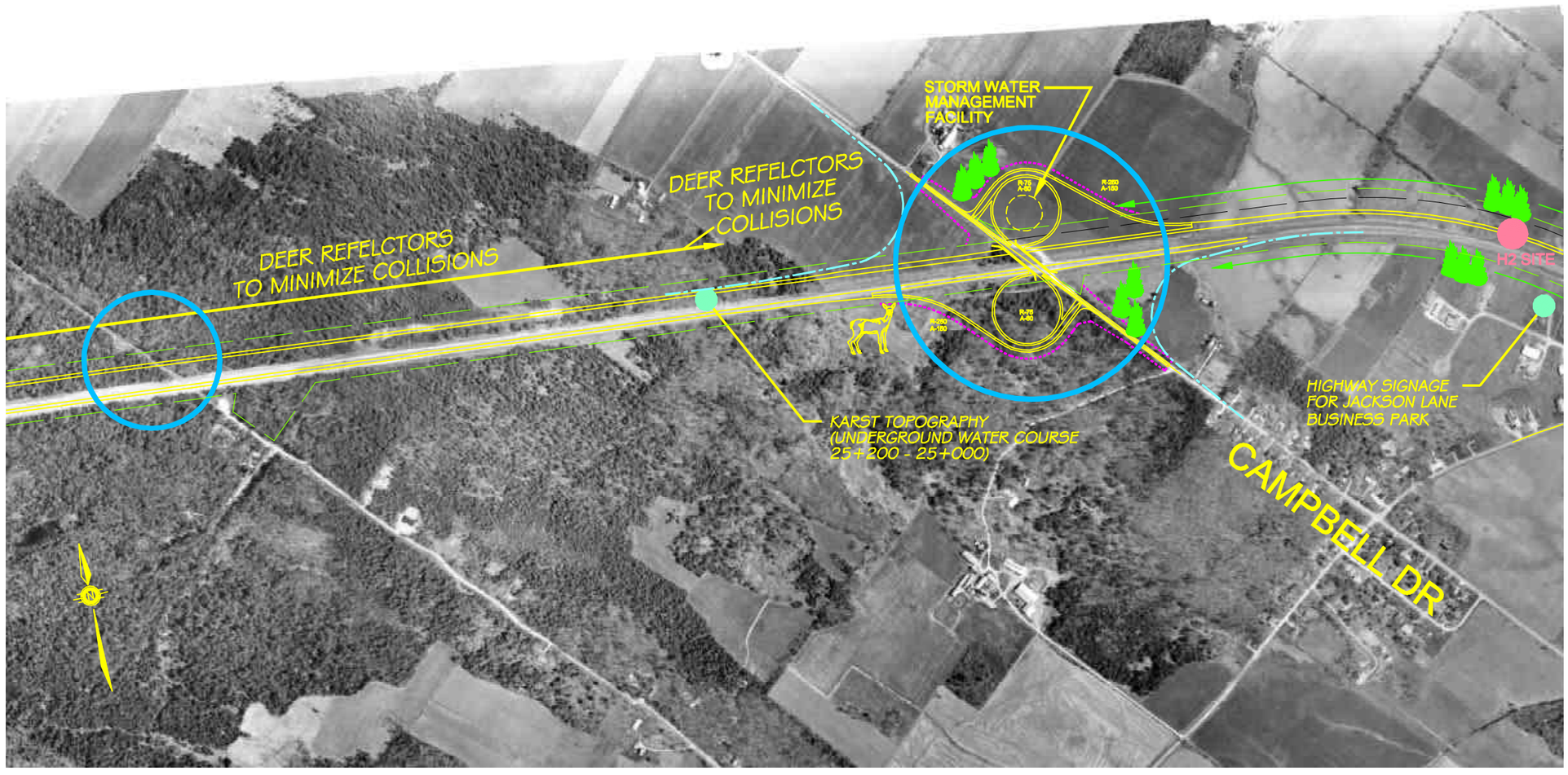
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ENGINEERING:

- **EMERGENCY VEHICLE MEDIAN CROSSOVER**
- **ROAD CLOSING**

PROPERTY:

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- **EXISTING MTO PROPERTY**
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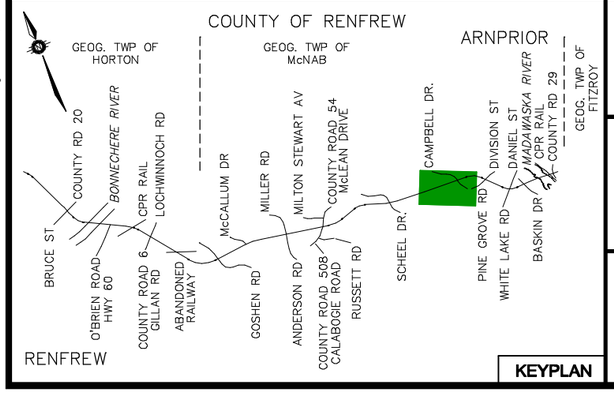


FIGURE 6-3

RECOMMENDED PLAN

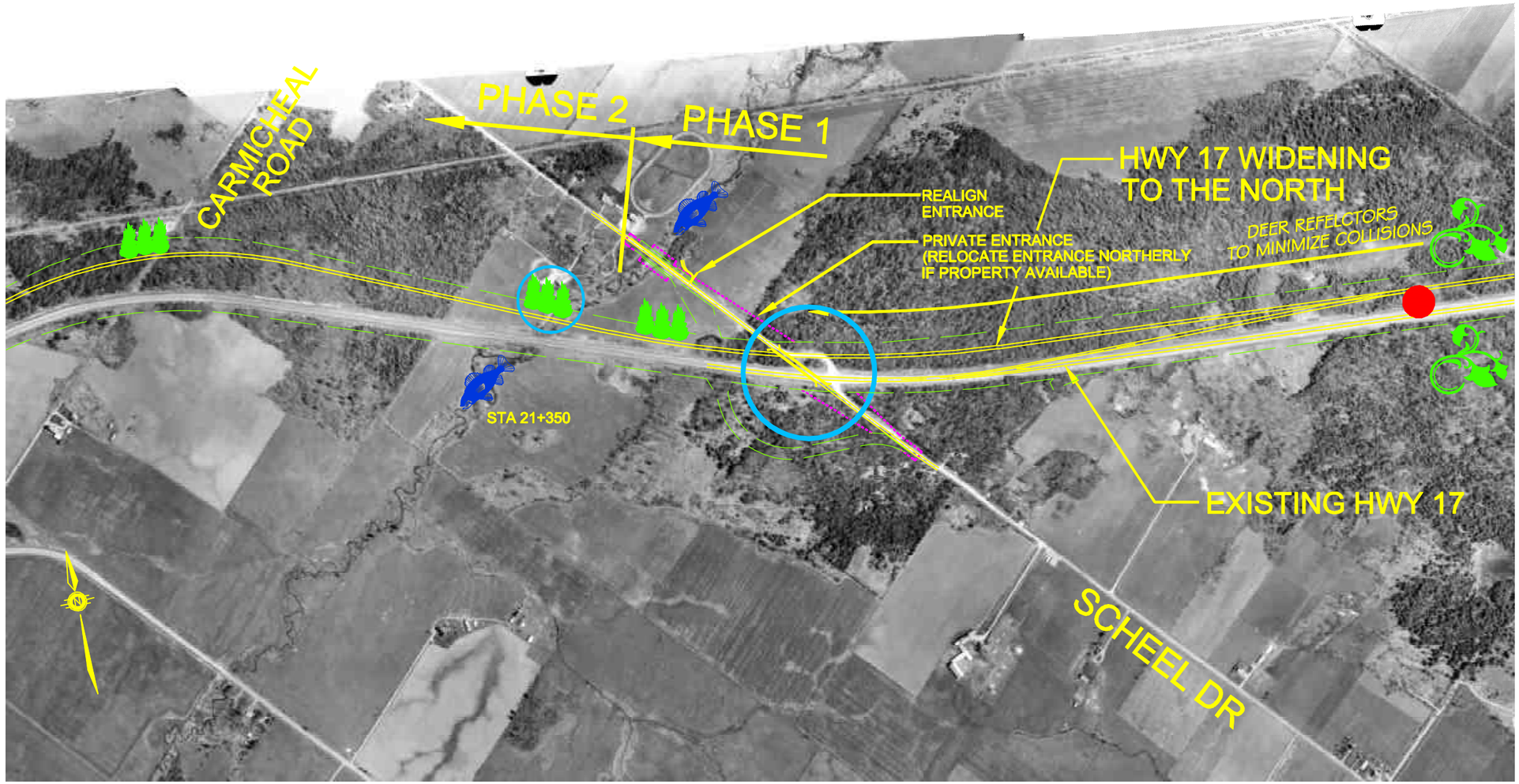
HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
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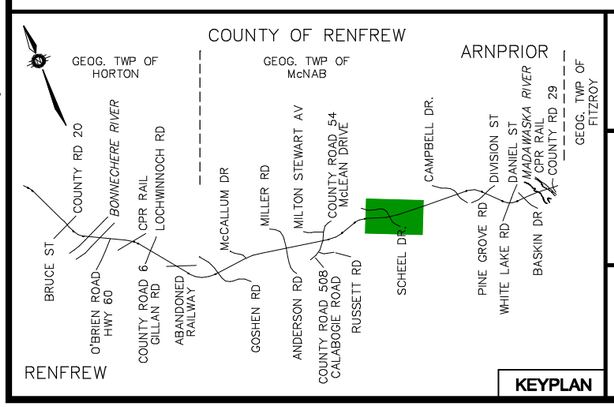
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ENGINEERING:

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Horizontal

FIGURE 6-4

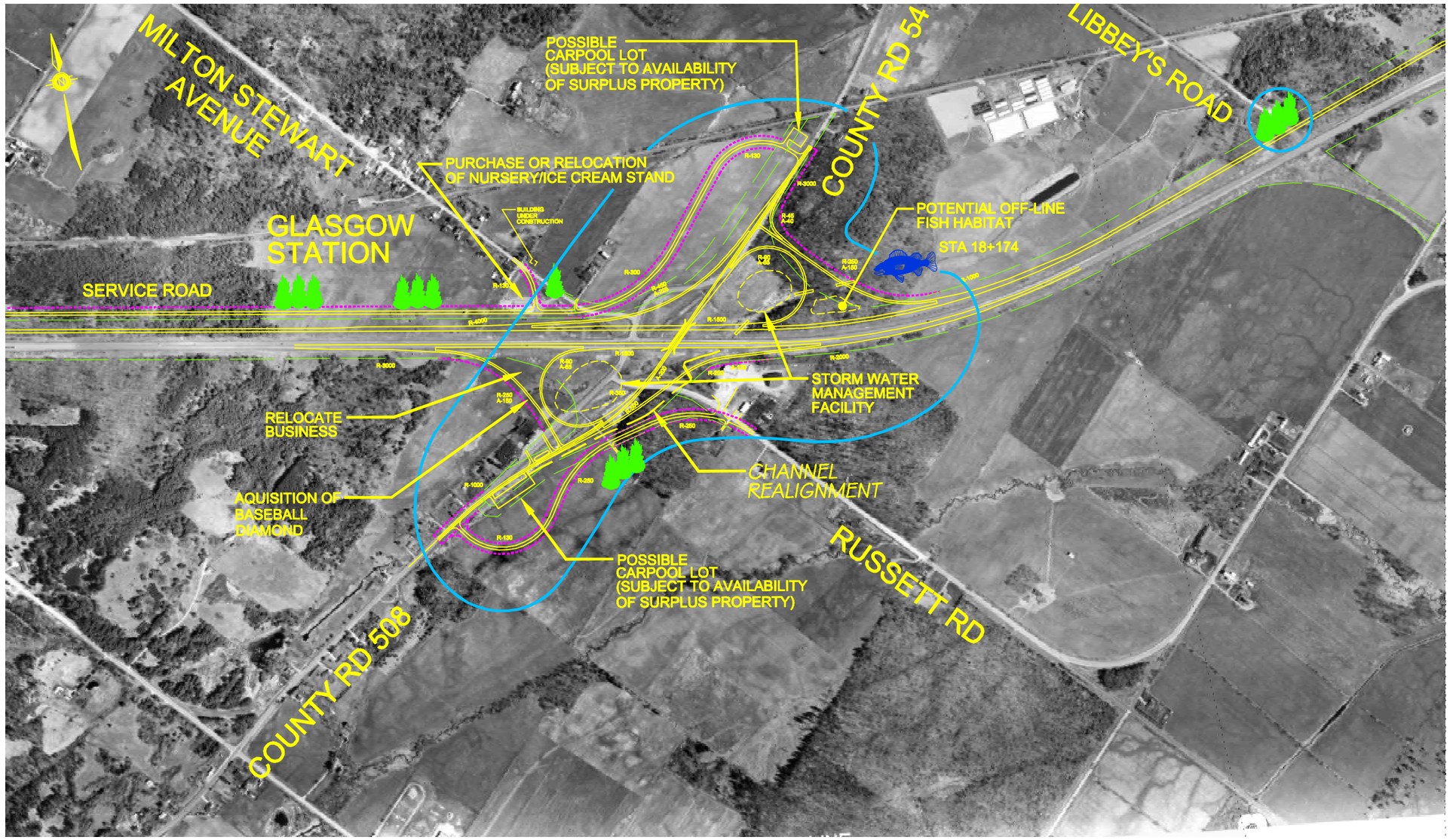
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HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
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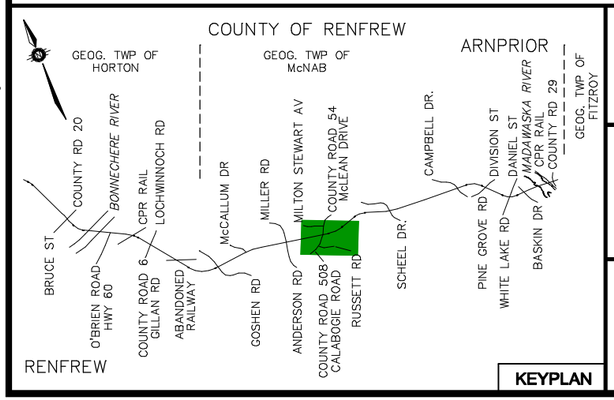


FIGURE 6-5

RECOMMENDED PLAN

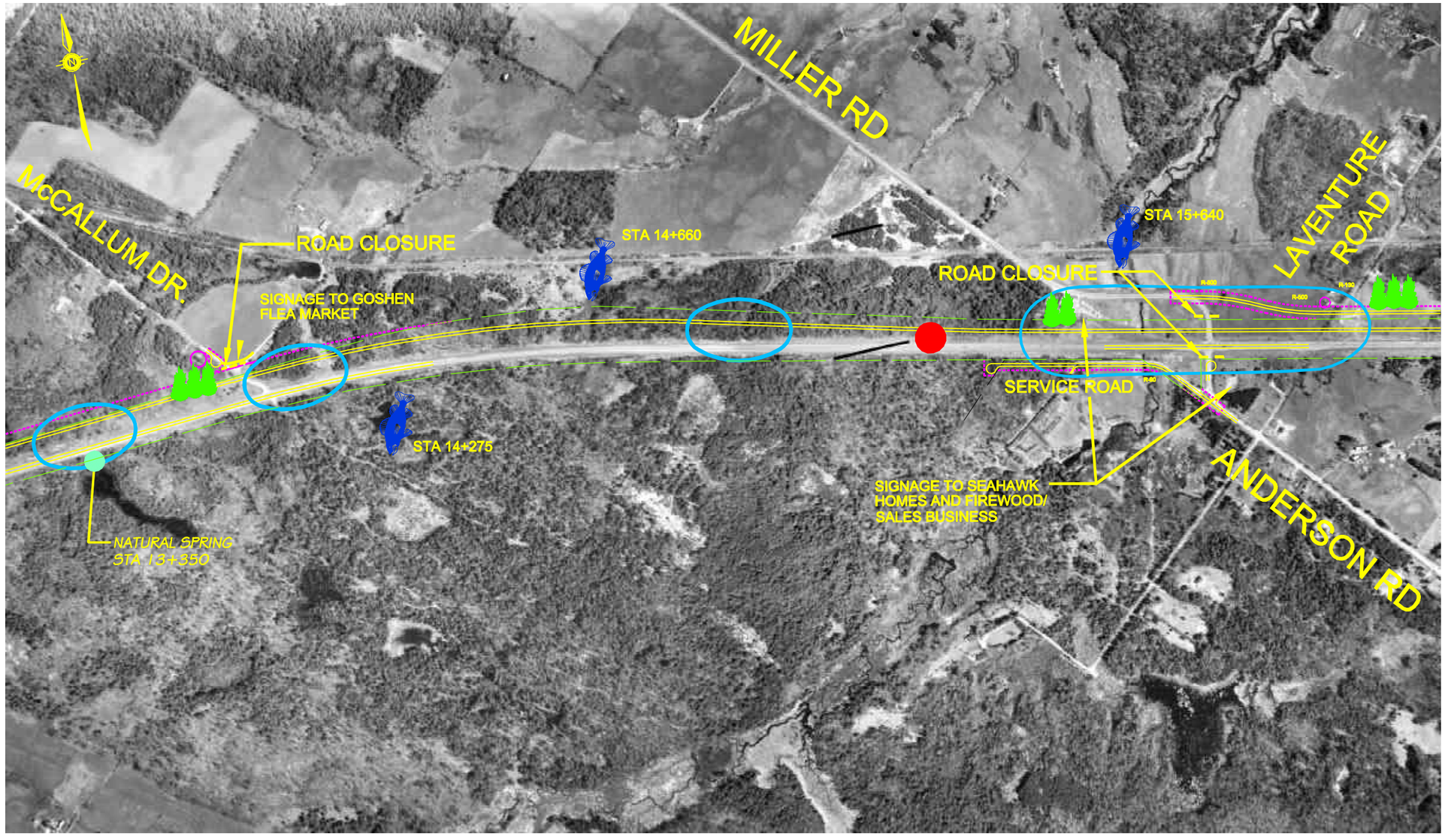
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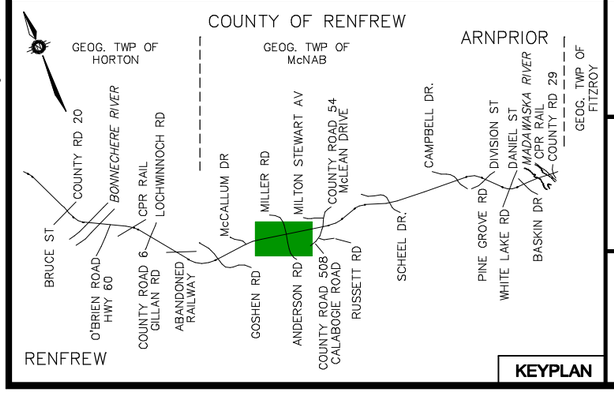


FIGURE 6-6

RECOMMENDED PLAN

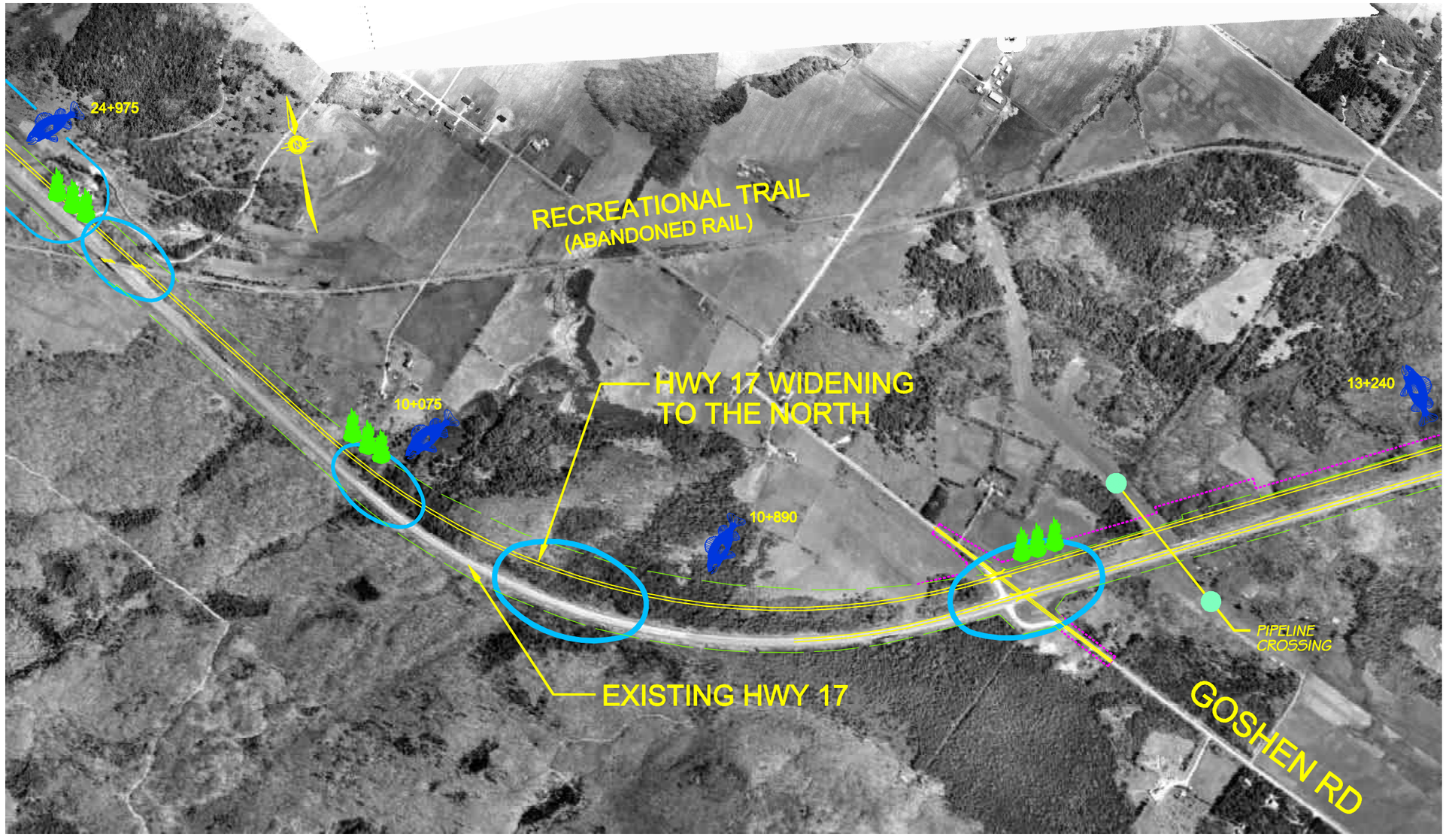
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WP 647-92-00

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Horizontal

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2002-013 RECOMMENDED PLAN CHAP 6.dwg – Fri, 5 Dec 2003 – 11:10



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PROVINCIALLY RARE PLANT SPECIES (RAMS-HEAD ORCHID)

STAGE 2 ARCHAEOLOGICAL ASSESSMENT

STAGE 3/4 ARCHAEOLOGICAL ASSESSMENT

OTHER

ENGINEERING:

EMERGENCY VEHICLE MEDIAN CROSSOVER

ROAD CLOSING

PROPERTY:

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ADDITIONAL PROPERTY REQUIRED

PROTECTION FOR LONG TERM PLAN

DATE OF AIRPHOTO SPRING 1999

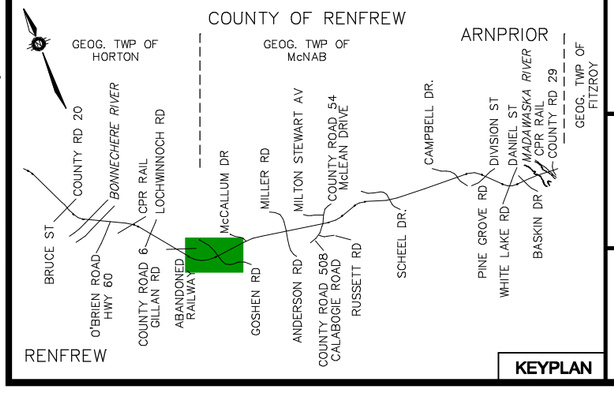


FIGURE 6-7

RECOMMENDED PLAN

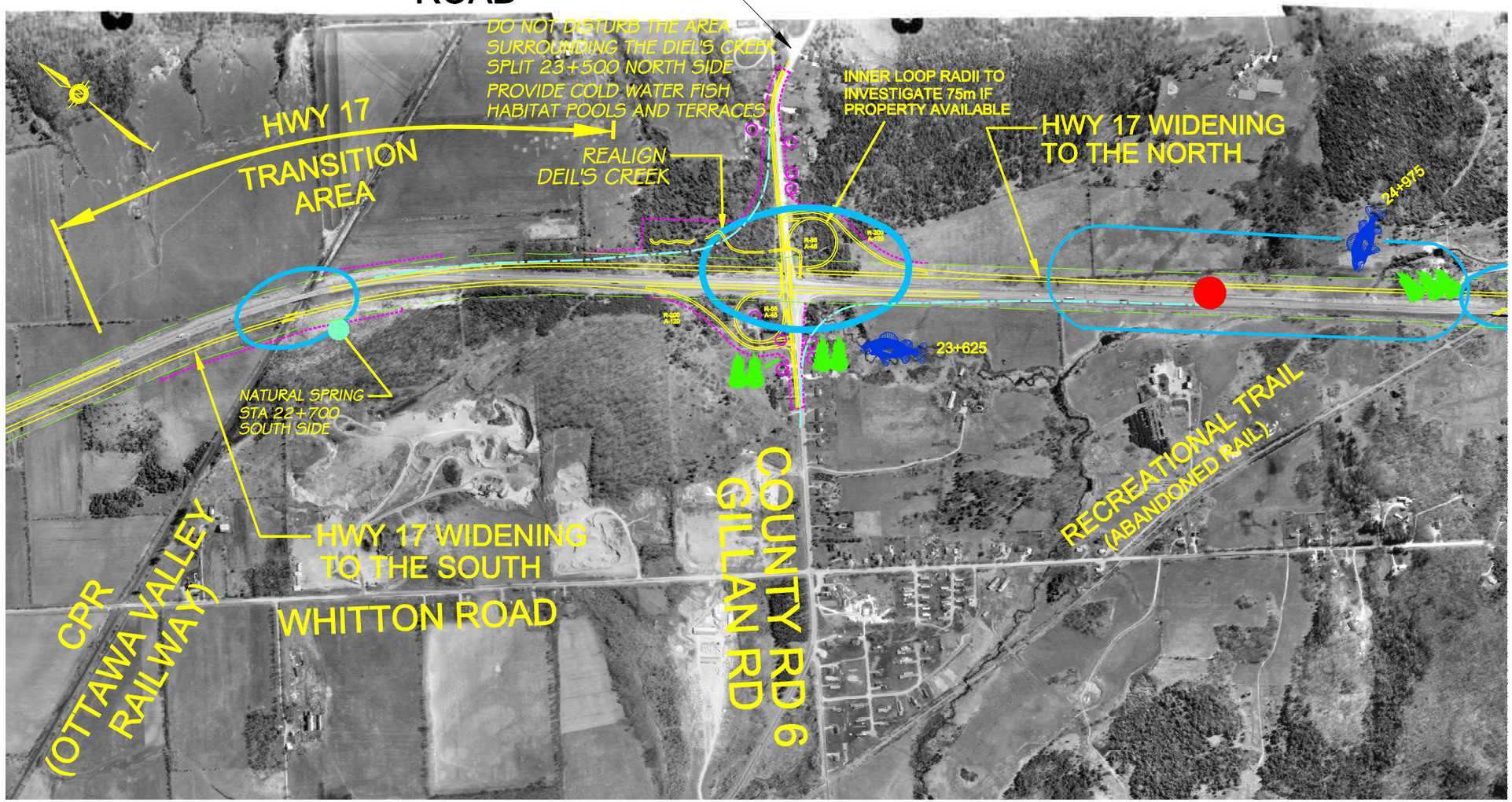
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Horizontal

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2002-013 RECOMMENDED PLAN CHAP 6.dwg – Fri, 5 Dec 2003 – 11:10



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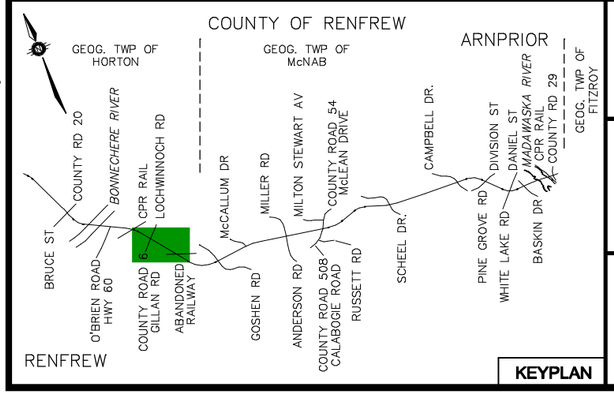


FIGURE 6-8

RECOMMENDED PLAN

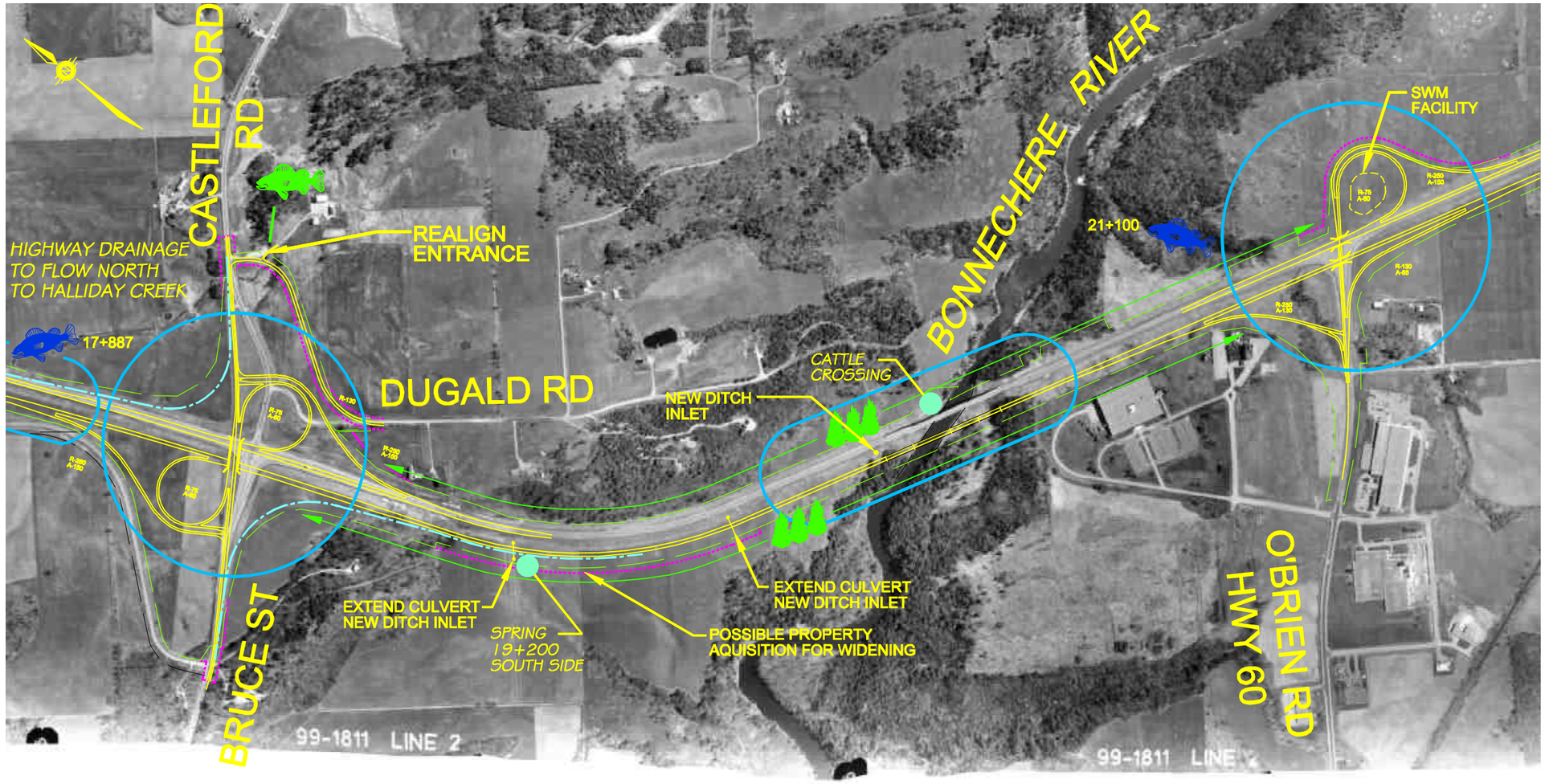
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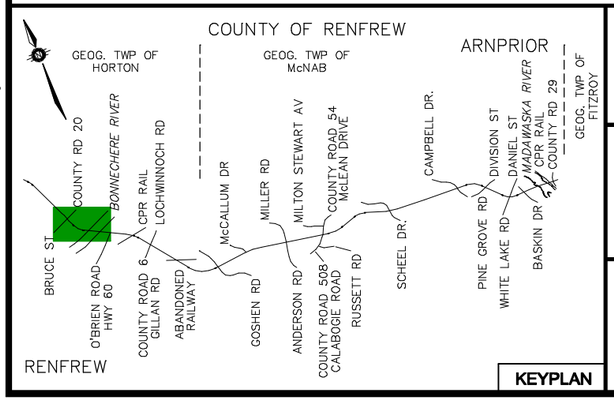


FIGURE 6-9

RECOMMENDED PLAN

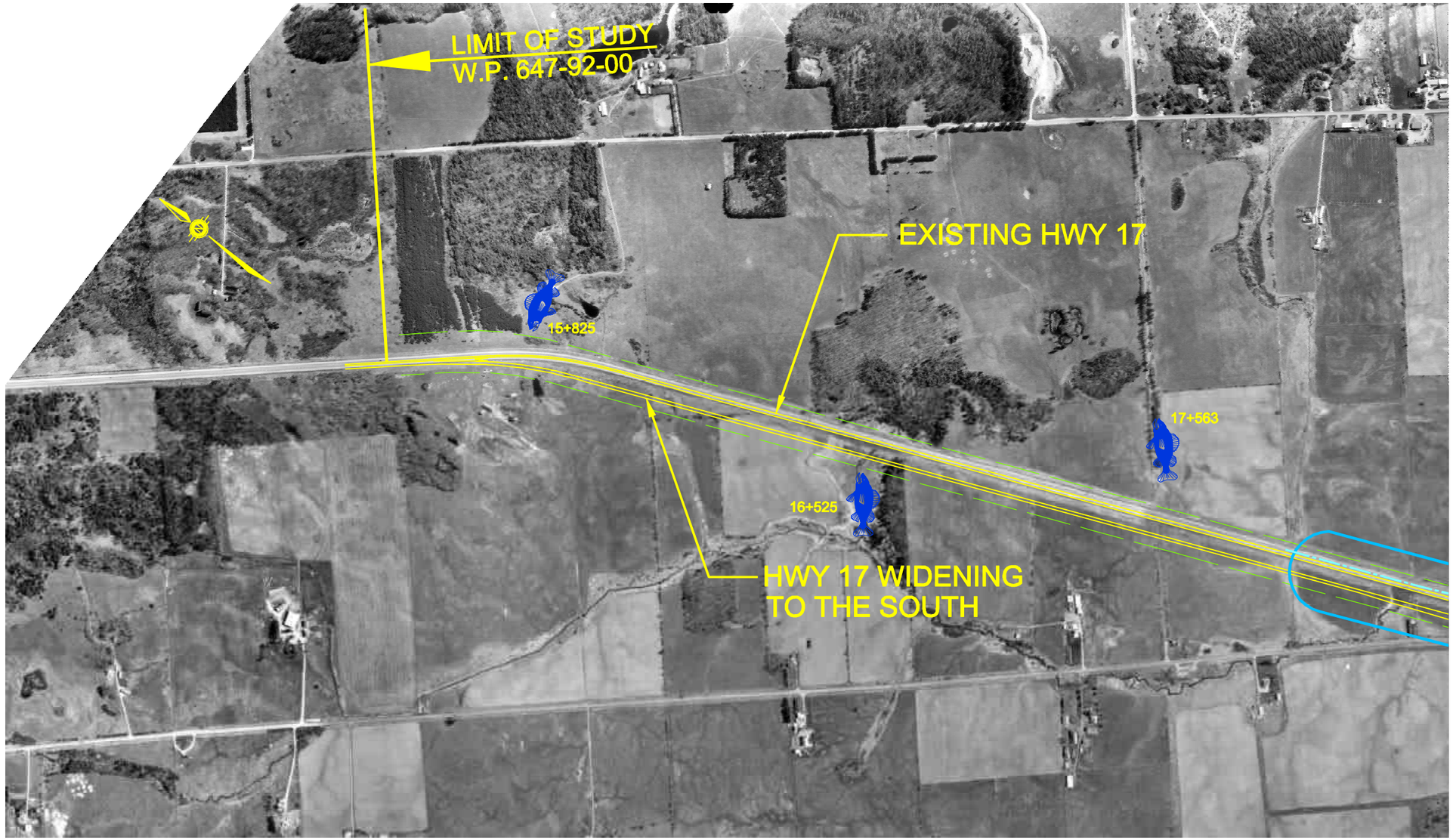
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ENGINEERING:

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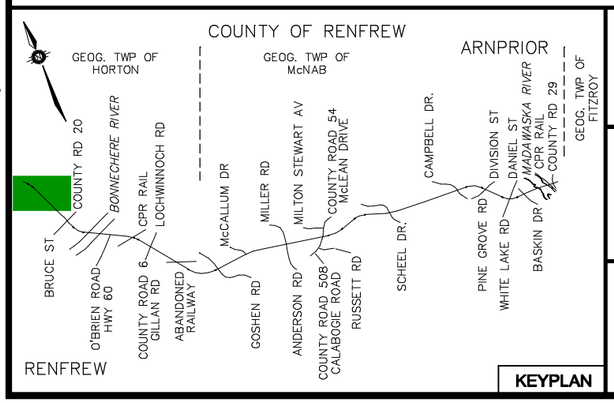


FIGURE 6-10

RECOMMENDED PLAN

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
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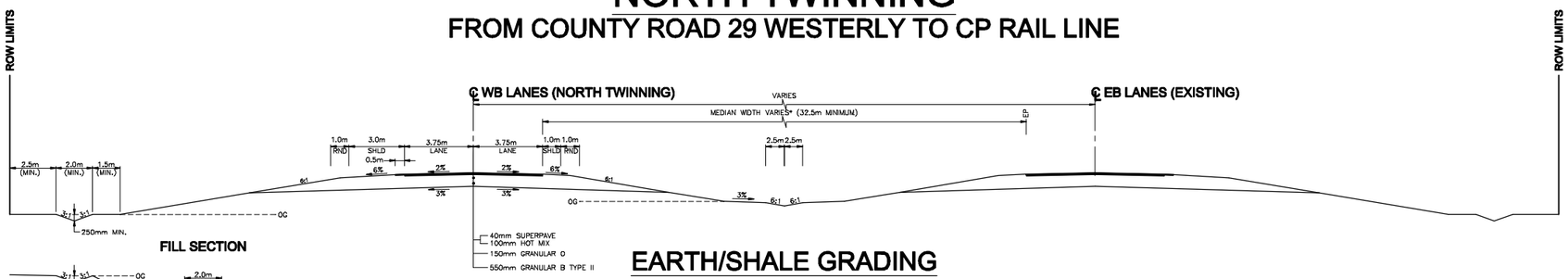
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NORTH TWINNING

FROM COUNTY ROAD 29 WESTERLY TO CP RAIL LINE

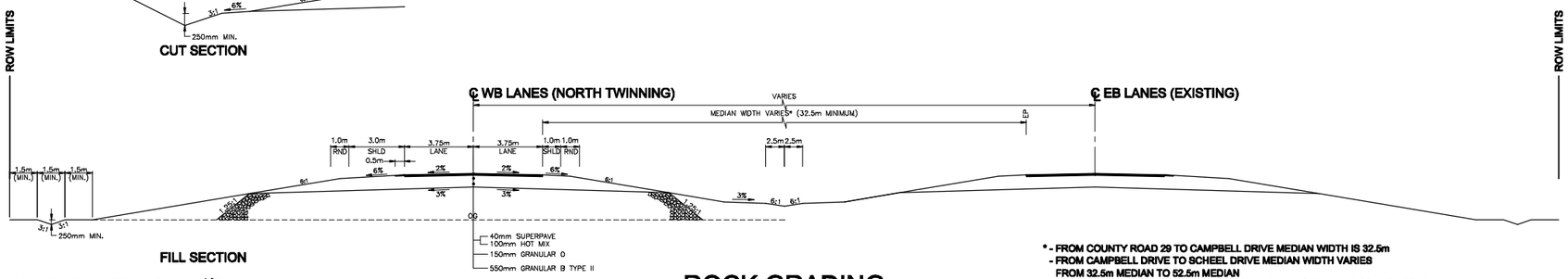


FILL SECTION

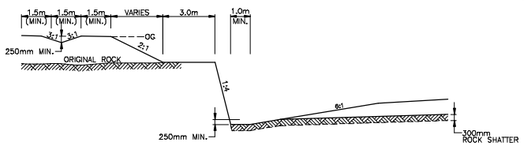


CUT SECTION

EARTH/SHALE GRADING



FILL SECTION



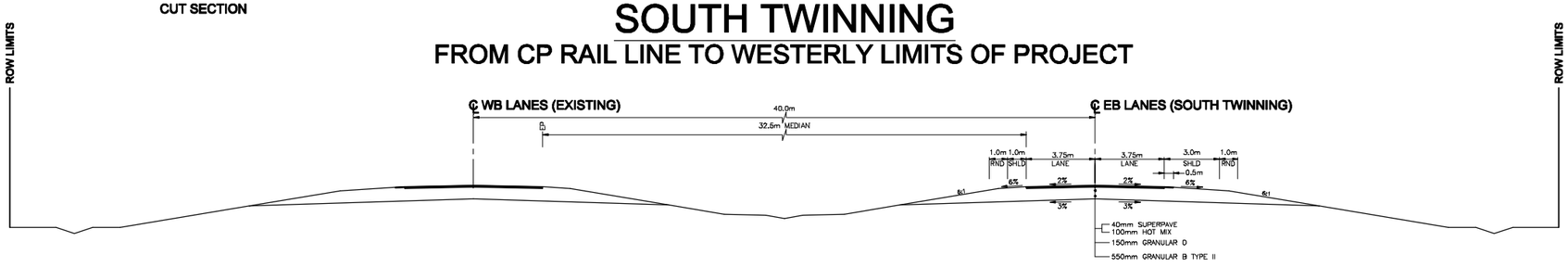
CUT SECTION

ROCK GRADING

* - FROM COUNTY ROAD 29 TO CAMPBELL DRIVE MEDIAN WIDTH IS 32.5m
- FROM CAMPBELL DRIVE TO SCHEEL DRIVE MEDIAN WIDTH VARIES FROM 32.5m MEDIAN TO 52.5m MEDIAN
- FROM SCHEEL DRIVE TO APPROXIMATELY 1.0km EASTERLY OF COUNTY ROAD 508 MEDIAN WIDTH VARIES
- FROM APPROXIMATELY 1.0km EASTERLY OF COUNTY ROAD 508 TO LAVENTURE RD MEDIAN WIDTH IS 32.5m
- FROM LAVENTURE RD TO APPROXIMATELY 500m EASTERLY OF RECREATIONAL TRAIL MEDIAN WIDTH IS 52.5m
- FROM APPROXIMATELY 500m EASTERLY OF RECREATIONAL TRAIL TO CP RAIL LINE MEDIAN WIDTH IS 32.5m

SOUTH TWINNING

FROM CP RAIL LINE TO WESTERLY LIMITS OF PROJECT



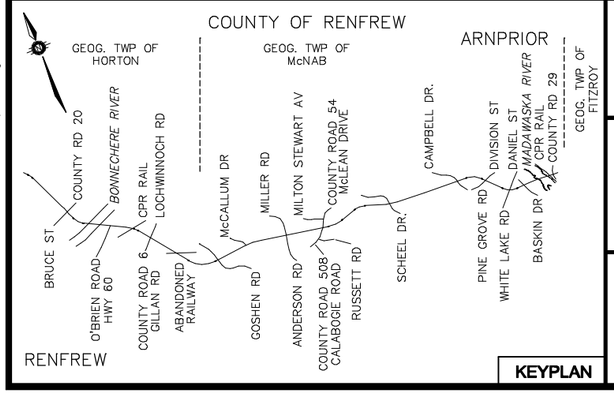


FIGURE 6-11

RECOMMENDED CROSS SECTION

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: N.T.S.

Ministry of Transportation

NCE
TRANSPORTATION AND VALUE ENGINEERS

2002-013 DWG TYPICAL SECTIONS chap 6.dwg – Thu, 4 Dec 2003 – 9:52

6.2 Environmental Issues and Commitments

Areas of environmental sensitivity or concerns associated with the Recommended Plan are described in the following sections. **Table 6.1 Summary of Fish Habitat Mitigation/Compensation Measures,** and **Table 6.2 Effects and Mitigation** provide a summary of the effects remaining, and a description of the mitigation measures to reduce the overall net effects of the Recommended Plan.

6.2.1 Natural Environment

6.2.1.1 Groundwater

Natural springs have been identified at three locations along the corridor; they are located on the south side of the existing highway at approximately Station 22+700 and 19+200, in Horton Township and 13+350 McNab-Braeside Township. Mitigation measures entail clear stone to be used to backfill the roadway and to direct the water to surface ditches or be piped to the Bonnechere River.

MTO has confirmed an underground watercourse uncovered as part of the Arnprior to Renfrew By-pass construction of Highway 17, in the 1970's. The watercourse is referred to as a karst topographic feature and is located between Station 25+200 and 25+000 west of Campbell Drive. Mitigation measures entail clear stone to be used to backfill the roadway in this location and special blasting techniques to reduce fracturing the bedrock (and impacts to the watercourse).

6.2.1.2 Surface Water

Deil's Creek is a significant cool/cold water creek that crosses the highway at the County Road 6 interchange. Immediately north of the westbound lanes the creek splits, at approximately 23+500, with a westerly branch continuing parallel to the highway before flowing north, and an eastern branch that flows northward behind the County Road 6 residents. Both creeks rejoin before crossing the CPR right-of-way. Mitigation will seek to avoid altering the proportions of flow in either branch by maintaining the point of water division within the future interchange.

Drainage concerns were identified by an adjacent property owner in northwest quadrant at Bruce Street. Mitigation will entail regrading the ditch to flow northward to Halliday Creek tributary at 17+887.

Stormwater management measures, as presented in **Appendix G**, are recommended for right-of-way outlet locations. These recommendations are made on the basis of the analyses presented in the preceding sections and are designed to:

- Minimize the impact of road salt impacts on the local vegetation and receiving watercourses
- Minimize the impact of increased flows on receiving watercourses
- Minimize potential erosion within the drainage system ,and within the local receiving watercourses

6.2.1.3 Fisheries and Aquatic Habitat

Table 6.1 Summary of Fish Habitat Mitigation/Compensation Measures provides mitigation and compensation measures developed and evaluated in accordance with the Department of Fisheries and Oceans "Fish Habitat Conservation and Protection Guidelines for Attaining No Net Loss". The following measurements were made based on the hydraulic recommendations for the structures and culverts. Where net habitat loss appears to be unavoidable, a strategy for compensation is provided. This summary of the assessment of compensation and mitigation strategies, as well as the recommended strategies are presented in **Appendix H Final Fisheries and Aquatic Ecosystem Technical Report.**

Culvert replacements have been used as an opportunity to improve culvert design with respect to fish migration and habitat productive capacity.

Open footing concrete structures are proposed for new culverts, and culvert extensions will also be of the open footing type, regardless of the existing type of culvert, (unless foundations investigations during the detail design identify site specific constraints). This work will involve excavation along the affected stream embankments to construct footings, and dewatering will be required.

Table 6-1
Summary of Fish Habitat Mitigation/Compensation Measures

Refer to Figure No.	Site Location	Proposed Structure(s)	Compensation Area*	Mitigation/Compensation
*** Width of water course x length of proposed structure and/or realignment.**				
6-2	Station No. 29+800 Madawaska River West Tributary 2	**New Culverts:** Highway 17: 3.0 m span x 1.8 m rise x 32 m long downstream of existing structure. **Baskin Drive:** (2) 3.0 m span by 1.2 m rise x 19 m long open footing concrete box culvert (CBC). Baskin Drive culvert invert lowered by approximately 1 m and shifted north.	1 m x (32+19) m = 51 m2 Consider length of creek realignment to reduce compensation area: **Local Channel Realignment:** 1 m x (71 + 72 m) = 143 m2	• "Cold/mixed/unknown" restricted in-water construction timing guideline – October 1 through July 15 • Fluvial geomorphological analysis and natural channel design for 143 m of channel realignments. Channel substrate enhancement with 50-150 river stone. • One m wide low flow channels to be formed through new culverts and lined to 300 mm depth with river run stone. • Overbank areas through culverts to be created to permit small mammal/reptile passage on both sides. • Dogwood and willow shrubs to be planted on areas of disturbed ground adjacent to streambanks, within right-of-way. • Consider extended stream length as part of gain and replacement of existing culverts • Consider rechannelization on Boeing lands for a net gain if ditching can be improved to fish habitat. This area is not considered at HADD.
6-2	Station No. 29+125 Madawaska River West Tributary 1A	**New Culverts:** **N-W ramp:** 3.0 m span x 2.0 m rise x 35 m long concrete box culvert (CBC) under new N – W ramp downstream of Hwy 17. **Highway 17:** 3.0 m span x 2.0 m rise 47 m long downstream of existing structure. **Culvert Replacement White Lake Road:** 2.0 m x 1.5 m x 72 m long CBC upstream of Hwy 17.	1.5 m x (47 + 35 + 72) m = 231 m2 Consider length of existing White Lake Road as part of net gain. **White Lake Road Existing Culvert Replacement:** 1.5 m x 33 m lg. = 108 m2	• "Cold/mixed/unknown" restricted in-water construction timing guideline – October 1 through July 15 • 1.5 m wide low flow channel to be formed through new culverts and lined to 300 mm depth with river run stone. • Overbank areas through culverts to be created to permit small mammal/reptile passage on both sides. • Dogwood and willow shrubs to be planted on areas of disturbed ground adjacent to streambanks, within right-of-way. • Consider self-compensating HADD

Table 6-1
Summary of Fish Habitat Mitigation/Compensation Measures

Refer to Figure No.	Site Location	Proposed Structure(s)	Compensation Area*	Mitigation/Compensation
*** Width of water course x length of proposed structure and/or realignment.**				
6-2	Station No. 28+750 Madawaska River West Tributary 1	**New Culvert:** 4.0 m span x 1.5 m rise x 43 m long, open footing concrete box culvert. Downstream of existing culvert**.**	1.5 x 43 m = 64.5 m2	• "Cold/mixed/unknown" restricted in-water construction timing guideline – October 1 through July 15 • 1.5 m wide low flow channel to be formed through new culvert and lined to 300 mm depth with river run stone. • Overbank areas through culvert to be created to permit small mammal/reptile passage on both sides. • Dogwood and willow shrubs to be planted on areas of disturbed ground adjacent to streambanks, within right-of-way. • During detail design consider meandering natural stream design.
6-2	Station No. 28+250 Dochart Creek East Tributary 2	**New Culvert** 6.5 m w x 2.0 m ht x 40 m lg. open footing concrete box culvert. Downstream of existing structure.	2 m x 40 m = 80 m2	• "Cold/mixed/unknown" restricted in-water construction timing guideline – October 1 through July 15 • Two m wide low flow channel to be formed through new culvert and lined to 300 mm depth with river run stone. • Overbank areas through culvert to be created to permit small mammal/reptile passage on both sides. • Dogwood and willow shrubs to be planted on areas of disturbed ground adjacent to streambanks, within right-of-way.
6-4	Station No. 21+350 Dochart Creek	**New culvert** 38 m long 7.0 m span by 3.0 m rise open footing concrete box culvert. **Culvert Extension:** Extension of existing (20.3 m long) 2.4 m Φ CSP Scheel Drive structure with 3.0 m span x 2.4 m rise open footing concrete box culvert (34.5 m± long). Significant velocities may prohibit open footing culvert.	**New culvert** 10 m x 38 m = 380 m2 **Culvert Extension:** 3.0 m x 14 m (7 m each side) = 42 m2	• "Cold/mixed/unknown" restricted in-water construction timing guideline – October 1 through July 15. • Culvert barrel to be lined to 300 mm depth with river run stone. • Overbank areas through culvert to be created to permit small mammal passage on both sides. • Dogwood and willow shrubs to be planted on areas of disturbed ground adjacent to streambanks, within right-of-way. • At detail design stage consider meandering natural stream design • Review Hwy 17 structure condition during detail design. Replacement of existing culverts on Highway 17 would be considered for a reduction in compensation area.

Table 6-1
Summary of Fish Habitat Mitigation/Compensation Measures

Refer to Figure No.	Site Location	Proposed Structure(s)	Compensation Area*	Mitigation/Compensation
*** Width of water course x length of proposed structure and/or realignment.**				
6-5	Station No. 18+174 Dochart Creek West Tributary	**New culverts:** **E-NS Ramp** 2.5 m span by 1.5 m rise open footing concrete box culverts 45 m long. **S-W Ramp:** 2.5 m span by 1.5 m rise open footing concrete box culverts 26 m long **Highway 17:** 2.5 m span by 1.5 m rise open footing concrete box culverts x 46 m long. **S-E Ramp:** 2.5 m span by 1.5 m rise open footing concrete box culverts 26 m long. **Creek Realignment:** 575 m total realignment	1.5 m x (45+26+46+26+575) m = 1077 m^2 Consider off line pond and culvert replacement for reduction in compensation area in northeast quadrant	• "Cold/mixed/unknown" restricted in-water construction timing guideline – October 1 through July 15 • Maximize maintenance of natural vegetation cover. • Fluvial geomorphological analysis and natural channel design for 575 m of channel realignments. Channel substrate enhancement with 50-150 river stone. • Low flow channel to be formed through new culverts and lined to 300 mm depth with river run stone. • Create narrow overbank area through culvert to permit small mammal passage. • Tree and shrub planting plan for entire reach of disturbance. • 41 m long x 2.5 m span by 1.5 m rise open footing concrete box culvert. • Maybe an opportunity for an off line pond in the northeast quadrant of the interchange. • Integrate 90° turns into design of watercourse.
6-6	Station No. 15+640 Locha Creek	**Culvert Extension:** Extension of existing culvert 4.8 span x 2.9 m rise x 32 m open footing concrete box culvert under new lanes with transition to existing arch.	12.5 m x 32 m= 400 m^2 **Culvert Replacement**: Replacement of existing culvert could be considered for a net gain.	• "Cold/mixed/unknown" restricted in-water construction timing guideline – October 1 through July 15 • Culvert to be lined to 300 mm depth with river run stone. • Dogwood and willow shrubs to be planted on areas of disturbed ground adjacent to streambanks, within right-of-way. • If possible consider off right-of-way downstream restoration if land owner consents (between MTO right-of-way and County right-of-way). • Replacement of existing 4.78 m x 2.9 m CSPA with 16 m long x 4.8 m x 2.9 m open footing concrete box culvert. New culvert to be constructed in association with upgrading laneway to Township Road. • Investigate opportunities to open weeds for pike and provide additional vegetation cover downstream.
6-6	Station No. 14+660 Locha Creek West Tributary A	**New culvert**: 3.0 m span x 2.0 m rise x 35 m long open footing concrete box culvert, downstream of existing structure.	1 m x 35 m = 35 m^2	• "Cold/mixed/unknown" restricted in-water construction timing guideline – October 1 through July 15 • One m wide low flow channel to be formed through new culvert and lined to 300 mm depth with river run stone. • Overbank areas through culvert to be created to permit small mammal/reptile passage. • Dogwood and willow shrubs to be planted on areas of disturbed ground adjacent to streambanks, within right-of-way.

Table 6-1
Summary of Fish Habitat Mitigation/Compensation Measures

Refer to Figure No.	Site Location	Proposed Structure(s)	Compensation Area*	Mitigation/Compensation
*** Width of water course x length of proposed structure and/or realignment.**				
6-6	Station No. 14+275 Locha Creek West Tributary A	**New Culvert** 1.1 m span by 1.35 m rise x 33 m long open footing concrete box culvert, downstream of existing structure.	1 m x 33 m = 33 m^2 Replacement of existing culvert could be considered for a net gain: **Culvert Replacement**: Replacement of existing culvert could be considered for a net gain.	• "Cold/mixed/unknown" restricted in-water construction timing guideline – October 1 through July 15 • One m low flow channel to be formed through new culvert(s) and lined to 300 mm depth with river run stone. • Dogwood and willow shrubs to be planted on areas of disturbed ground adjacent to streambanks, within right-of-way. • Provide a pool of similar dimensions shall be recreated at that location ensuring that the channel hydraulic function and bank stability are not compromised. The pool(s) shall be deep enough to provide refugia for fish during low flow conditions. • Inspection of the existing structure indicates that it is completely plugged or buckled. Therefore, assuming replacement (or clearing of this structure) the downstream requirement is a 0.8 m span by 1.0 m rise open footing concrete box culvert.
6-7	Station No. 13+240 Locha Creek West Tributary	**New culvert** 0.8 m span x 1.0 m rise x 47 m long open footing concrete box culvert, downstream of existing culvert.	1 m x 47 m = 47 m^2	• "Cold/mixed/unknown" restricted in-water construction timing guideline – October 1 through July 15 • Culvert to be lined to 300 mm depth with river run stone. • Dogwood and willow shrubs to be planted on areas of disturbed ground adjacent to streambanks, within right-of-way.
6-7	Station No. 10+890 Bonnechere River East Tributary 2A	**New culvert:** 3.0 m span x 1.5 m rise x 29 m long, downstream of existing structure. Hydraulic analysis of existing structure indicates potential for overtopping of highway during design storm conditions, due to poor downstream drainage and standing water at culvert outlet.	1 m x 29 m = 29 m2 Replacement of existing culvert could be considered for a net gain: **Culvert Replacement:** Replacement of existing culvert could be considered for a net gain.	• "Cold/mixed/unknown" restricted in-water construction timing guideline – October 1 through July 15 • One m wide low flow channel to be formed through new culverts and lined to 300 mm depth with river run stone. • Overbank areas through culverts to be created to permit small mammal/reptile passage. • Dogwood and willow shrubs to be planted on areas of disturbed ground adjacent to streambanks, within right-of-way. • Provide a pool of similar dimensions shall be recreated at that location ensuring that the channel hydraulic function and bank stability are not compromised. The pool(s) shall be deep enough to provide refugia for fish during low flow conditions. • Replacement of existing Hwy. 17 structure (35.2 m long) with 3.0 m span x 0.90 m rise is recommended. • Improving culvert will provide a potential net gain in fish habitat.

Table 6-1
Summary of Fish Habitat Mitigation/Compensation Measures

Refer to Figure No.	Site Location	Proposed Structure(s)	Compensation Area*	Mitigation/Compensation
*** Width of water course x length of proposed structure and/or realignment.**				
6-7	Township of McNab-Braeside Station No. 10+075 Bonnechere River East Tributary 2	**New culvert**: 1.6 m span x 1.6 m rise x43 m long open footing concrete box culvert, downstream of existing culvert.	0.7 m x 43 m = 30 m^2	• "Cold water-mixed" restricted in-water construction timing guideline – October 1 through July 15 • 0.7 m wide low flow channel to be formed through new culvert and lined to 300 mm depth with river run stone. • Overbank areas through culvert to be created to permit small mammal passage. • Dogwood and willow shrubs to be planted on areas of disturbed ground adjacent to streambanks, within right-of-way.
6-7	Station No. 24+975 Deils Creek Tributary	**New culvert**: 1.6 m span X 1.6 m rise x 44 m long open footing concrete box culvert – upstream of existing structure.	1.5 m x 44 m = 66 m^2	• "Cold water-mixed" restricted in-water construction timing guideline – October 1 through July 15 • One and one half m wide low flow channel to be formed through new culvert and lined to 300 mm depth with river run stone. • Overbank areas through culvert to be created to permit small mammal/reptile passage. • Dogwood and willow shrubs to be planted on areas of disturbed ground adjacent to streambanks, within right-of-way.
6-8	Station No. 23+625 Deils Creek	**New Culverts**: **Highway 17:** 26 m long – downstream of existing structure - 4.2 m span by 1.5 m rise box culvert. **County Road 6:** 49 m long. - 4.2 m span by 1.5 m rise box culvert. **Creek Realignment:** Total resultant creek realignment includes 48 m east of Cty Road 6 and 306 m east of Cty Road 6.	4.0 m x (26+49+306+48) m = 1716 m^2	• "Cold water-mixed" restricted in-water construction timing guideline – October 1 through July 15 • Maximize maintenance of natural vegetation cover. • Fluvial geomorphological analysis and natural channel design for 354 m of channel realignments. Channel substrate enhancement with 50-150 river stone. • Upstream of intersection (north) stream flow splits. This split flow drainage pattern must be maintained (see related correspondence in Appendix E). • Three m wide low flow channel to be formed through new culverts and lined to 300 mm depth with river run stone. • Create overbank areas through culverts to permit small mammal/reptile passage. • Tree and shrub planting plan for entire reach of disturbance. • Investigate negotiations with downstream landowner for stream restoration. • Consider cold water temperature impacts at inlets.

Table 6-1
Summary of Fish Habitat Mitigation/Compensation Measures

Refer to Figure No.	Site Location	Proposed Structure(s)	Compensation Area*	Mitigation/Compensation
*** Width of water course x length of proposed structure and/or realignment.**				
6-9	Station No. 21+100 Bonnechere River East Tributary 1	**Culvert Extension** Extension of existing (100.6 m long) structure by 55 m – expected 2.3 m x 2.7 m concrete box under new lanes. *Velocities prohibit open footing structure.* **Creek Realignment**: Creek realignment of 65 m. **New Culvert**: 2.2 m span x 2.7 m rise x 20 m long open footing concrete box culvert under new W – N/S ramp	1.5 m x (55+65+20) m = 210 m^2	• "Cold/mixed/unknown" restricted in-water construction timing guideline – October 1 through July 15 • Culverts must be designed at suitable grade to permit fish passage – baffles, boulder placements within structure. • Embed concrete box culvert extension minimum of 300 mm. • 1.5 m wide low flow channels to be formed through culvert extension and new culvert and lined to 300 mm depth with river run stone. • Create overbank areas through culverts to permit small mammal/reptile passage. • Dogwood and willow shrubs to be planted on areas of disturbed ground adjacent to streambanks, within right-of-way. • If possible, consider off right-of-way downstream restoration if land owner consents. • Ensure downstream fish migration.
6-9	Station No. 17+887 Little Halliday Creek	**New Culvert:** 4.8 m span x 2.8 m rise x 46 m long open footing concrete box culvert) – upstream of existing culvert. Improved inlet design for existing culvert should be provided in detail design phase.	2.5 m x 46 m = 115 m^2	• "Cold water-mixed" restricted in-water construction timing guideline – October 1 through July 15 • Culvert extension to be lined to 300 mm depth with river run stone. • Dogwood and willow shrubs to be planted on areas of disturbed ground adjacent to streambanks, within right-of-way. • At detail design stage consider meandering natural stream design. • If possible consider off right-of-way restoration if land owner consents. • Investigate opportunities to improve downstream habitat.
6-10	Station No. 17+563 Little Halliday Creek Tributary C	**New culvert:** 34 m long (3.0 m span x 2.1 m rise open footing concrete box culvert) – downstream of existing culvert. Re-grading of westbound lane roadside ditch to permit increased spill along roadway to watercourse at fisheries station 4 (downstream side of highway).	1 m x 34 m = 34 m^2	• "Cold/mixed/unknown" restricted in-water construction timing guideline – October 1 through July 15. • One m wide low flow channel to be formed through new culvert and lined to 300 mm depth with river run stone. • Overbank areas through culvert to be created to permit small mammal/reptile passage. • Dogwood and willow shrubs to be planted on areas of disturbed ground adjacent to streambanks, within right-of-way.

Table 6-1
Summary of Fish Habitat Mitigation/Compensation Measures

Refer to Figure No.	Site Location	Proposed Structure(s)	Compensation Area*	Mitigation/Compensation
*** Width of water course x length of proposed structure and/or realignment.**				
6-10	Station No. 16+525 Little Halliday Creek Tributary B	**Culvert Extension:** Provide 1650 x 1650 x 47 m concrete box culvert with open footings. Maintain existing cross section or with transition to existing structure.	4 m x 47 m = 188 m^2	• "Cold/mixed/unknown" restricted in-water construction timing guideline – October 1 through July 15. • River run stone (50-150 diameter) is to be spread through culvert barrel and over disturbed areas of bottom substrate. • Shrubs of willow and dogwood are to be planted along streambanks within road allowance on areas of disturbed soil. • If possible, consider upstream off right-of-way restoration if land owner consents. • Investigate the opportunity to provide an open pond area upstream (outside right-of-way) during detail design.
6-10	Township of Horton Station No. 15+825 Little Halliday Creek Tributary A	**New culvert:** 1.2 m span x 1.5 m rise x 34 m long open footing concrete box culvert, downstream of existing culvert.	1 m x 34 m = 34 m^2	• "Cold/mixed/unknown" restricted in-water construction timing guideline – October 1 through July 15. • Unperch existing culvert with rock vortex weir. • (1) one m wide low flow channel to be formed through new culvert and lined to 300 mm depth with river run stone. • Overbank areas through culvert to be created to permit small mammal/reptile passage. • Dogwood and willow shrubs to be planted on areas of disturbed ground adjacent to streambanks, within right-of-way. • Provide a pool of similar dimensions shall be recreated at that location ensuring that the channel hydraulic function and bank stability are not compromised. The pool(s) shall be deep enough to provide refugia for fish during low flow conditions.

New culverts will be constructed to maintain drainage under the new lanes and interchange ramps. At 20 of these locations there will be impacts to fish habitat. In addition, there are culvert extensions for seven watercourses, and channel modifications are required for six watercourses. The new bridges at the Bonnechere and Madawaska Rivers will have their piers located out of the waterway and the abutments will be placed back from the water. No impacts to aquatic habitat are expected at either of these locations.

Direct in-water impacts are anticipated with new culverts and extensions, which may be included as part of the HADD. There will in some cases be resultant losses of terrestrial vegetation to gain access to construction areas and riparian vegetation will be lost in the immediate vicinity of placement areas.

Additional opportunities to reduce the area of compensation for loss of fish habitat may include the following (to be investigated during detail design):

- Investigate an off-line pond in the northeast quadrant of the County Road 54/508 interchange;
- Investigating downstream improvements with adjacent property owners and other government agencies;
- Provide additional planting along watercourses where possible; and
- Provide meandering stream designs through culverts, where possible.

6.2.1.4 Terrestrial Ecosystems

There are relatively few significant natural environment values at risk within the study area, refer to **Appendix I, Natural Environment Assessment**. This reflects the extensively transformed nature of much of the study area corridor, with only a few large areas of predominantly natural habitat remaining. Mitigation opportunities include:

- Reducing the loss of animal life (and simultaneously, reducing the risk to public safety) resulting from wildlife crossing the widened roadway; and
- Minimizing the impacts on significant natural values resulting from habitat reduction or degradation.

The length of continuous woodland area traversed by some sections of the Highway 17 right-of-way makes the effective mitigation of wildlife road kill difficult to predict. However, where available, wildlife passage will be facilitated within the overbank areas of new open footing box culverts within the Highway 17 right-of-way.

Widened Medians

Construction and maintenance of a wide, vegetated highway median appears to offer a refuge area for crossing animals (mammals, breeding birds, amphibians and reptiles,) which are vulnerable to both vehicle impact and predation pressures in the Highway 17 right-of-way study area.

A wide median - particularly one with a natural vegetation cover - will provide more accessible protective cover for individual wildlife in comparison to other options. The other options (narrow median or median barrier) have longer travel distances for a single wildlife movement. The closer protective habitat offered by a wider median should also allow individual animals to move more safely across the active roadway, reducing the frequency of sudden retreats commonly observed with startled wildlife. Such an improvement in wildlife roadway crossing behaviour would have obvious public safety advantages.

Employment, where possible, of such wide median development may also lessen edge effect degradation of adjacent woodlands and reduce the vulnerability of forest edges from such physical impacts as wind storm damage. An aesthetic enhancement of the travel corridor would also result.

Sub-Roadway Passageways

Allowance for dryland, sub-roadway crossing by small mammals and other animal life (e.g., amphibian and reptiles) through the construction of a dry ledge in sub-roadway drainage structures will encourage less on-road wildlife activity. The use of concrete box culverts sufficiently wide to accommodate a dry ledge, or to include an area of dry ground would facilitate such wildlife movement at existing stream crossing. Low fencing or walls in the open median portion of such passages would be required to prevent or dissuade animals from leaving the passageway before completing their roadway passage. While likely not suitable or feasible at all existing culvert locations, replacement of smaller metal culverts with these more wildlife-friendly structures, at least in stream-side areas known to have significant wildlife crossing potential, should reduce both the amount of road kill and the threat to public safety.

Deer Yard Habitat

The deer yard extending from Campbell Drive to Scheel Drive was identified by the Ministry of Natural Resources as an area of habitat to be protected. MNR participated in the study by completing aerial winter 2003 photo surveys of the area which confirmed yarding activity both north and south of the highway.

The study recommendations include three measures to mitigate impacts to deer habitat. Firstly, the Campbell Drive interchange was modified following PIC No. 3 to narrow the median which reduced the footprint of the freeway construction at the east limit of the yard. Secondly, an area of approximately 0.8 ha will be replanted within surplus property, if available, that is adjacent and part of the deer yard in the southwest quadrant of the Campbell Drive interchange. This is to partially replace the estimated 7 ha of trees removed (from the MTO owned right-of-way) for the north twinning of the highway. The third measure to mitigate impacts to deer is a pilot project to install reflectors, as described in the next section.

The public also provided comments on deer activity. Historically 30-40 years ago deer populations were scarce in this area and it was unusual to see deer. However, today the deer population is considered a nuisance.

Deer Reflector Systems

Use of a reflector system as a MTO pilot project in the deer yard from Campbell Drive to Scheel Drive will be designed to discourage deer from crossing the highway at night while vehicles are approaching. The opportunity to test the effectiveness of these reflectors is presented by the length of highway in the deer yard from 22+500 to 23+500 on both sides of the highway, which is an active deer crossing area. The installation of reflectors along a portion of the deer hazard area would test the effectiveness of this system in such a rugged landscape. Such a test installation, however, should allow for monitoring of pre and subsequent post road kill results between the modified roadway margin and comparable, unaltered roadway margins over a three to five year period.

Rare Species Salvage

Transplantation is recommended of the stand of Provincially Rare Ram's-head Orchids in the proposed new highway right-of-way between 23+200 and 23+500, north and south of the existing highway. This is not normally a preferred option due to limited success with transplanting such species. However, the existence of very suitable habitat near by, which is already occupied by some individuals of this species, suggests a much better than usual potential for success in this situation.

6.2.2 Social/Cultural Environment

6.2.2.1 Archaeological Resources

A Stage 1 Archaeological Assessment was carried out for the entire study area, which identified areas that require a Stage 2 Archaeological Assessment prior to detail design, refer to **Appendix J, Stage 1 and Stage 2 Archaeological Assessment**. A Stage 2 Archaeological Assessment was undertaken for the Phase 1 Highway 17 twinning, between County Road 29 and Campbell Drive. The findings of the Stage 2 assessment revealed two nineteenth century archaeological sites that require a Stage 3 and possibly a Stage 4 recovery investigation prior to construction. These sites are located at:

H1 Site (BiGc-4) 30+650
H2 Site (BiGc-5) 27+000

Mitigation for these sites will be undertaken following the finalization of detail design and prior to construction.

The approximate location of future Stage 2 Archaeological Assessments for Phase 2 construction are listed as follows:

- Areas within 300 metres of primary watercourses (Madawaska and Bonnechere Rivers, measured from the top of bank).
- Areas within 200 metres of secondary watercourses. (12 locations in Phase 2)
- Areas within 100 m of individual features depicted in the 1881 Renfrew County Supplement of the *Illustrated Atlas of the Dominion of Canada*, including early settlement roads and within 50 metres of early railways. (10 locations in Phase 2)

Stage 2 testing is required within these potential zones where lands have not been previously disturbed.

6.2.2.2 *Community/Recreation*

6.2.2.2.1 Emergency Services

The Madawaska Generating Station, owned by Ontario Power Generation identified a concern regarding that possibility of a failure of the dam structure or operating equipment that would require the controlled blasting of a rock dam to the west of the station in order to save the dam structure. This rock dam blast would require the detour of traffic from the County Road 29 interchange to the White Lake Road interchange via Young Road south of Highway 17.

Emergency services median crossovers were identified to permit adequate access for services such as OPP, ambulance services and fire protection. The median cross overs are located at the following locations:

- 31+200, Town of Arnprior;
- 23+500, McNab-Braeside; and
- 13+100, McNab-Braeside.

Another improvement is the upgrading of Russett Road at the County Road 508 interchange. This change will facilitate emergency services (fire and ambulance) that are provided from the southeast quadrant.

6.2.2.2.2 Pedestrian Access

Concern for provision of pedestrian access was highlighted in the Town of Arnprior. Sidewalks have been recommended on the new structures at Baskin Drive and White Lake Road. The extension of the sidewalk along Baskin Drive from the new south service road to Daniel Street and along Daniel Street from Vanjunsen Road to Baskin Drive will be undertaken in partnership with the Town of Arnprior.

6.2.2.2.3 Carpool Lots

The Recommended Plan identifies two possible carpool lot locations within the County Road 508 interchange, if property is available. A third candidate location was identified at the White Lake Road interchange; however the location would be outside the MTO right-of-way and would be a partnership with the Town of Arnprior.

6.2.2.2.4 Residential Land Uses

The following residential properties require driveway realignments, purchase or visual intrusion mitigation, (refer to **Appendix Z, Landscape Design Report**) to implement the Recommended Plan:

Town of Arnprior:

- Connect residence on Baskin Drive to new sanitary sewer on Baskin Drive and driveway grade changes; and
- Division Street- (1) property acquisition.

McNab-Braeside Township:

- 60 Russett Drive – visual screening;
- 510 Campbell Drive – visual screening;
- 664 Campbell Drive – visual screening;
- 734 Scheel Drive – visual screening;
- 765 Scheel Drive – visual screening;
- 772 Carmichael Road – visual screening;
- 188 Libby's Road – visual screening;
- 195 Libby's Road – visual screening;
- 41 Calabogie Road (County Road 508) – visual screening from new service road;
- 34 Milton Stewart Avenue – visual screening from new service road;
- 181 Laventure Road – visual screening;
- 1889/1895 Miller Road – visual screening;
- 49 McCallum Drive – visual screening;
- 181 Laventure Road – (1) partial property acquisition;
- McCallum Drive - (1) property acquisition; and
- Scheel Drive - driveway grade changes.

Horton Township:

- 936 Goshen Road – visual screening;
- 1315 Goshen Road – visual screening;
- 1223 Goshen Road – visual screening;
- 1536 Gillan Road – visual screening;
- 1538 Gillan Road – visual screening;
- County Road 6 - (9) property acquisitions; and
- Castleford Road - driveway and entrance change. Provide storm sewer to Halliday Creek tributary.

6.2.2.2.5 Recreational Land Uses

Two recreational facilities will be impacted by the Recommended Plan, they are:

- Concern regarding Abandoned Rail Line safety – existing alignment maintained (see below); and
- County Road 508 impact to municipal baseball field.

Snowmobiles

Snowmobiles currently use the former rail line in Horton Township at Station 25+350. At this crossing, access will be maintained by providing concrete culverts.

The overpass and underpass structures from Pine Grove/Division Street west to Bruce Street will be constructed with a minimum of 2.0 metre shoulders allowing either bicycle or snowmobiles to cross the highway.

The connection for a snowmobile trail from Campbell Drive to the Madawaska Dam using the MTO right-of-way will no longer be permitted due to the MTO policy regarding motorized vehicles on freeway right-of-way. Snowmobile crossings of the freeway will be accommodated at both the Campbell Drive and Division Street structures.

6.2.3 Economic Environment

6.2.3.1 Commercial/Industrial Land Uses

The following commercial or industrial land uses will be impacted by the Recommended Plan, mitigation varies; refer to **Table 6.2, Effects and Mitigation**.

Town of Arnprior:

- New service road between Baskin Drive and White Lake Road;
- Reinstatement of parking area at Boeing with connection to new service road; and
- Gun Club driveway relocation, parking lot (15 spaces) and replacement of their septic system at the adjacent residential property on Division Street which will be acquired as part of the project.

Township of McNab-Braeside:

- Signage to Jackson Lane Business Park;
- Change in access for MacEwen's Gas Bar, County Road 508;
- Relocate Bonneville Homes outside the limits of the interchange, County Road 508;
- Miller Road extension –
  - Signage to Seahawk Home Sales from Highway 17;
  - Signage to firewood supply and sales shop; and
  - Relocate (or buyout) Nursery greenhouses.
- Signage to Goshen Flea Market, McCallum Drive (including relocation of the existing sign on McCallum Drive).

6.2.3.2 Aggregates and Mines

There was considerable concern regarding the use of Campbell Drive south of Highway 17 by trucks from the quarries located to the north. It is recommended that the Township of McNab-Braeside restrict trucks on Campbell Drive through their zoning by-laws and signage i.e. "local trucks only" signage.

6.2.3.3 *Rural and Agricultural Land Uses*

The following Rural and Agricultural lands will be impacted by the Recommended Plan and will require consideration during detail design:

Township of McNab-Braeside:

- Land locked property Con 6, Lot 22 and 23 will have a new service road extension off of Anderson Road along the south side of the highway to the property limits;
- Property acquisition in the northwest quadrant and southeast quadrant for new service roads at County Road 54/508;
- Property acquisition in northeast quadrant for interchange at County Road 54/508;
- Concern for tile drains in agricultural land in northwest quadrant at County Road 54;
- Concern for tile drains in agricultural land in northwest quadrant at Campbell Drive north side; and
- Property impacts along Miller Road extension as a north service road.

Horton Township:

- Provide gate to allow continued cattle access to under the Bonnechere River Bridge, west side; and
- Improve highway drainage in northwest quadrant Bruce Street; refer to **Section 6.2.1.2 Surface Water**.

6.2.4 Erosion and Sedimentation Control

Deil's Creek, north of Highway 17, has been affected by erosion that has deposited sediment in the deeper pools. This impact can be enhanced by cleaning out the accumulated silt from pools downstream, between Highway 17 and the Ottawa Valley Rail line (OVR) CPR rail line, refer to **Sections 6.2.1.2 Surface Water** and **6.2.1.3 Fisheries and Aquatic Habitat**.

6.2.5 Management of Excess Materials

Excess material generated during construction will be managed in accordance with OPSS 180 and Ministry of Environment's (MOE) guideline, "*Management of Excess Material in Road Construction and Maintenance Guidelines*".

6.2.6 Landscaping

The following locations within the study area will require landscape screening measures (berms, shrubs, etc.) to abate headlight glare and reduce snow drifting on the Highway:

Town of Arnprior:

- New service road – White Lake Road to Basking Drive, south side – headlight glare.

McNab-Braeside Township:

- Campbell Drive to White Lake Road – snow drifting; and
- Miller Road extension – headlight glare.

Horton Township:

- Bruce Street to O'Brien Road – snow drifting.

6.2.7 Potential Contaminated Waste Sites

Sites identified with potential soils contamination from previous or known sites of fuel storage, which may be impacted by the Recommended Plan, and require a Phase 2 Environmental Site Assessment during detail design are listed as follows:

Town of Arnprior:

- Stinson's Gas Station, Vanjunsen Road; and
- Vacant property, east side of White Lake Road at Vanjunsen Road.

6.2.8 Utilities

Concerns regarding existing and future utilities identified to be accommodated during detail design are listed as follows:

Town of Arnprior:

- New services at Baskin Drive and Russett Drive.

McNab-Braeside Township:

- Trans-Canada Pipeline crossing (existing), located east of Goshen Road at 12+200, McNab-Braeside Township.

Bell Canada and Hydro One

- All existing plant will be relocated outside the freeway right-of-way

6.3 Future Consultation

There was an extensive consultation program that included the public, municipal governments and external agencies during the study. This involvement included the exchange of information, supply of notices, and meetings with individuals and agencies that identified substantial interest in the project. A summary of meetings, comments received and the action that resulted from this consultation is provided on **Table 6-2, Future Consultation Requirements**; refer to **Appendices X, Council Resolutions** and **Y Selected Correspondence**. Those agencies, which identified substantial issues, are described in the following sections.

Table 6-2
Future Consultation Requirements

Title/Agency	Comments/Concern	Actions	Future Consultation
County of Renfrew	Resolution in Council that the County support the Recommended Plan.		New County Road extension at Miller Road to County Road 54.
Town of Arnprior	Resolution from Council approving the Recommended Plan.		New service road between White Lake Road and Baskin Drive, south of Highway 17. Cost sharing agreements for new sidewalks.
	Baskin Drive utility relocations (watermain, gas, sanitary sewer)	Relocation in advance of construction	
	Future municipal services (Station 28+750) proposed to south of Highway 17	Profile to accommodate future municipal services	To be implemented during detail design.
	Sidewalks on Baskin Drive and White Lake Rd.	Cost Sharing Agreement to construct sidewalks.	To be implemented during detail design.
Township of McNab-Baeside	Resolution from Council approving the Recommended Plan.		New Township roads extension at Anderson Road (County Road 63(and Russett Road connection to County Road 508.
Township of Horton	Resolution from Council approving the Recommended Plan.		
	Requested to keep original abandoned rail line alignment.	Maintain existing alignment.	To be implemented during detail design.
Ministry of Natural Resources	Confirmed twenty (20) HADDS (Harmful Alteration Disturbance Destruction). Agreed in principle with the proposed compensation strategy.	Contact Department of Fisheries and Oceans prior to the detail design stage. Follow MTO/MNR Protocol.	Develop fisheries compensation agreements for new culverts, creek realignments and culvert extensions. Secure Federal Fisheries Act (FFA) Authorization during detailed design stage
Canadian Coast Guard	Navigable waters at Bonnechere and Madawaska River.	Application under the Navigable Waters Act.	Forward Detail Design (3) copies.
Environment Canada	• Consider all valued ecosystem components potentially impacted by the project., having due regard to those ecosystem components… • Ground water assessment not be restricted to areas where residential units or wells are located • Implement the Best Available Technology Economically Achievable (BATEA) • Conduct inventories in a through manner to avoid overlooking significant species.		Maintain liaison during detail design.
Canadian Pacific Railway	No plans for development in the Highway 17 corridor.	Contact CPR Manager Structures.	Forward Detail Design of CPR structures.

Table 6-2
Future Consultation Requirements

Title/Agency	Comments/Concern	Actions	Future Consultation
Ministry of the Environment	Consider the following: • Noise • Surface water • Wells • Management of surplus materials/waste.	Follow MOE/MTO noise protocol. Reference earlier planning documents in the TESR.	Maintain liaison during detail design.
Snow Country Snowmobile Association	Abandoned rail line structure to be a minimum width of 13 ft and 11 ft height Maintain the straight alignment at the Highway 17 crossing.	Forward detail design to reaffirm desirable measurements with snowmobile club.	Contact president prior to construction.
Trans-Canada Pipeline	Existing gas line corridor crosses Highway 17.	Reinforce highway sub-grades, contract prior to digging.	Liaise with Trans-Canada Pipelines.

6.4 Summary of Environmental Effects, Proposed Mitigation and Commitments to Future Work

Table 6-3, Summary of Environmental Effects, Proposed Mitigation and Commitments to Future Work provides a summary of the potential direct and indirect environmental effects associated with the Recommended Plan, mitigation measures proposed to prevent, lessen or remedy potential detrimental environmental effects and a description of the commitments to future work.

Table 6-3
Summary of Environmental Effects, Proposed Mitigation and Commitments to Future Work

Issue/Concern Potential Detrimental Environmental Effects	Concerned Agency	Proposed Mitigation (prevent, lessen or remedy potential detrimental environmental effects)	Commitments to Additional Work	
			Item	Reference
Transportation Loss of parking at Boeing Plant.	Boeing	Parking lot design and construction.	Implementation of parking, landscaping and lighting during detail design.	
Fish and Aquatic Habitat In general, due to the sensitive nature of watercourse crossings, mitigation measures will be required in order to protect sensitive aquatic habitats from the impacts of such deleterious substances as the sediments resulting from exposed soils during excavation, granular road base and shoulder materials, oils from pavement application, construction vehicle and equipment leakage, concrete debris from demolition operations, and accidental spills.	MNR DFO	The cool and cold water habitat characteristics identified at several of the watercourse crossings will result in restrictions in construction timing as established by the Ministry of Natural Resources for culvert works that may be considered by MTO. The timing guidelines (no construction permitted) applicable to the watercourses in the study area include: Cold water/mixed/unknown – October 1 through July 15 Cold water/mixed – October 1 through July 15 Cool/warm water – March 15 through July 15 Compensation measures are described in **Appendix H**.	Fish habitat compensation package preparation during detail design in accordance with MTO/MNR Fisheries Protocol. FFA Authorization	NSSP 376 Watercourse/Fisheries Protection During Work in Watercourses and on Watercourse Banks. OPSS 565 & 577 MTO Operational Constraints: Erosion and Sedimentation Control – General Watercourse/Fisheries Protection - General OPSD 219.110 SSP 199F12 OPSS 209 **Appendix H**
Vegetation Loss of existing vegetation		Replace with salt tolerant or same species. Widen median to accommodate aesthetic value of woodlands	Develop a tree survey plan, which identifies locations to be preserved.	**OPSS 565** **OPSD 220.01**
Visual Intrusion Snowdrifting Headlight glare		Thirteen (13) sites identified for visual intrusion mitigation. Where possible implement landscape treatment to establish plantings effectiveness prior to	Landscape Development Plan.	**Appendix Z**

Table 6-3
Summary of Environmental Effects, Proposed Mitigation and Commitments to Future Work

Issue/Concern Potential Detrimental Environmental Effects	Concerned Agency	Proposed Mitigation (prevent, lessen or remedy potential detrimental environmental effects)	Commitments to Additional Work	
			Item	**Reference**
		highway construction; and Three (3) service roads identified for headlight glare: o White Lake/Baskin Drive o Miller Road Extension o Russett Road at County Road 508 Interchange Two (2) areas were identified for snow drifting measures: o Campbell Drive to White Lake Road; and o Bruce Street to O'Brien Road.		
Wildlife Provincially Rare Plant Species Deer Yard Loss/Deer-vehicle accidents	MNR	Transplant plants at appropriate time of year to similar habitat on south side of right-of-way.	Negotiations with landowners to obtain permission.	**Appendix I**
	MNR/ OPP	Possible reforestation in southwest quadrant at Campbell Drive; Possible pilot project for installation of reflectors; and Signage.	Monitoring pilot project	**Appendix I**
Surface Water and Groundwater Erosion and siltation during construction	MNR/MOE/ Environment Canada	The following stormwater management measures are recommended for each of the right-of-way outlet locations. These recommendations are made on the basis of the analysis presented in the preceding sections and are designed to: o Minimize the delivery of sediments and associated pollutants to receiving watercourses o Minimize the impact of road salt impacts on the local vegetation and receiving watercourses o Minimize the impact of increased flows on receiving watercourses o Minimize potential erosion within the drainage system, and within the local receiving watercourses	MTO Operational Constraints: Erosion and Sedimentation Control – General Watercourse/Fisheries Protection - General	OPSS 565 & 577 **Appendices G** and **H**
Archaeological Disturbance to areas outside existing development.	MCL	Stage 2 Archaeological Assessment – Campbell Drive to 3 km west of Bruce Street; Stage 3/ 4 Archaeological Assessment – H1 Site (BiGc-4) 30+650 H2 Site (BiGc-5) 27+000	Carry out Stage 2 Archaeological Assessments where proposed work extends beyond the existing disturbed areas, except east of Campbell Drive.	NSSP prior to construction OPSS 0001 **Appendix J**

Table 6-3
Summary of Environmental Effects, Proposed Mitigation and Commitments to Future Work

Issue/Concern Potential Detrimental Environmental Effects	Concerned Agency	Proposed Mitigation (prevent, lessen or remedy potential detrimental environmental effects)	Commitments to Additional Work	
			Item	Reference
Community/Recreation Connect residence on Baskin Drive to new sanitary sewer on Baskin Drive Driveway grade changes Division Street- (1) property acquisition McCallum Drive - (1) property acquisition Scheel Drive - driveway grade changes Laventure Road – Partial property acquisition County Road 508 impact to municipal baseball field Accommodate Snowmobile crossings County Road 6 - (9) property acquisitions Castleford Road - driveway and entrance change. Provide storm sewer to Halliday Creek tributary	Landowners Snow Country Snowmobile Assoc. Twp of Horton	Landowner mitigation to be determined. Structures to provide 2.0 shoulders to accommodate snowmobiles: o Division Street o Campbell Drive o Scheel Drive o Goshen Road o County Road 508 o County Road 6 o Bruce Street o Abandoned Rail line culverts to retain existing alignment.	Retain existing alignment.	Liaison with Township of Horton

Table 6-3
Summary of Environmental Effects, Proposed Mitigation and Commitments to Future Work

Issue/Concern Potential Detrimental Environmental Effects	Concerned Agency	Proposed Mitigation (prevent, lessen or remedy potential detrimental environmental effects)	Commitments to Additional Work	
			Item	Reference
Economic Highway signage to: Jackson Lane Business Park Seahawk Home Sales Firewood supply and sales shop, Miller Road Goshen Flea Market Driveway changes/extensions: Reinstatement of parking area at Boeing with connection to new service road Gun Club driveway relocation and parking lot (1) property Division Street MacEwen's Gas Bar, County Road 508 Relocate Bonneville Homes **Agricultural:** Field drainage or tile drains: County Road 54/508 Campbell Drive Miller Road extension Provide gate to allow continued cattle access to under Bonnechere River Bridge, west side Highway drainage in northwest quadrant Bruce Street	Landowners		Implementation during detail design	Liaison with landowners.
Contamination Waste Issues Stinson's Gas Station Vanjunsen Rd. Vacant property – White Lake Rd. Petro Canada – Daniel Street	MOE	Possible remediation of contamination in accordance with MOE Guidelines Remove and dispose of petroleum contaminated soil.		OPSS 180 Operational Constraint: Management of Petroleum Hydrocarbon Contaminated Materials (if required).

Table 6-3
Summary of Environmental Effects, Proposed Mitigation and Commitments to Future Work

Issue/Concern Potential Detrimental Environmental Effects	Concerned Agency	Proposed Mitigation (prevent, lessen or remedy potential detrimental environmental effects)	Commitments to Additional Work	
			Item	Reference
Management of Excess Materials	MOE	Apply MOE "Management of Excess Materials in Road Construction and Maintenance Guidelines".	Apply MOE "Management of Excess Materials in Road Construction and Maintenance Guidelines"	OPSS 180

6.5 Next Steps

Following the filing of the Transportation Environmental Study Report (TESR) and environmental clearance, MTO may proceed to the next steps as outlined in the *Class EA process for Provincial Transportation Facilities*, and illustrated on **Figure 6-12, Next Steps**. The TESR will be available for a 30-day public review period.

Interested persons are encouraged to review this document and provide comments. If, after consulting with the Ministry's consultants and staff, you have serious unresolved concerns, you have the right to request the Minister of the Environment (135 St. Clair Avenue West, Toronto, Ontario, M4V 1P5) to "bump-up (i.e. make a Part II Order for this project). A Part II Order may lead to preparation of an individual environmental assessment. A copy of the "bump-up" request should be forwarded to the Ministry of Transportation and NCE at the addresses provided in **Section 1.14** of this TESR.

A Design and Construction Report (DCR) will be prepared during detail design to address all issues, which were outstanding at the end of preliminary design.

Detail Design and Construction activities will include:

- Complete Drawings and Tender Documents;
- Cross-section details;
- Surveyed structure and culvert location/span/width;
- Details of illumination, traffic signals and safety infrastructure;
- Project–specific standards and calculation of quantities;
- Resolution of major rail and utility conflicts; and
- Final property requirements.
- Environmental Clearances/30 day notice if DCR completed;
- Design and Construction Report and 30 day review period;
- Construction; and
- Monitor for Environmental Provisions and commitments.

Monitoring objectives during construction include:

- Individual measures and issues (e.g. erosion and sedimentation control, waste handling and materials/equipment storage):
- Monitoring of overall effectiveness of control measures; and
- Ongoing identification of areas of potential concern.

MTO or contracted environmental inspectors will make regular visits to the work site to ensure that mitigation measures described in this report and in the subsequent contract document provisions are carried out effectively. The timing and frequency of these visits will coincide with the schedule of the construction operations and will be adjusted to reflect the sensitivity of site concerns and the development of unforeseen environmental problems during and after construction. The inspectors will use a standardized inspection report form, which will detail any concerns, and further actions required. A copy of the completed form is provided to the site inspector, construction manager and the environmental inspection supervisor with noted action items to be signed off as completed.

Figure 6-12 Next Steps

