



# **Matamata Piako District Council**

## **Horrell Road Plan Change**

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### **Horrell Road Designation**

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September 2016

# Matamata Piako District Council

## Horrell Road Plan Change

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### Horrell Road Designation

### Quality Assurance Statement

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Status: Final

Date: September 2016



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*Traffic Survey Summary*

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## 1. Background

The Matamata-Piako District Council (MPDC) is currently completing Plan Change 47 which includes urban development in Morrinsville.

A new area has been identified by Council that requires a structure plan to provide development details for the roading and utility infrastructure. The area proposed to be zoned rural-residential is set out in the plan change report and located on the western side of Horrell Road between Horrell Road and the Piako River and extends approximately 1.3 km north of Murray Road. The area is expected to accommodate up to 59 additional lots within a rural-residential zone which allows minimum size lots of 1 ha. On this basis the expected trip generation associated with the rural residential block of land has been previously assessed at 472 veh/day and up to 53 veh/h in the peak hour.

The TDG report *Structure Plan Transportation Assessment Summary*, dated April 2016 considers the options to provide a safe, cost effective, well connected access to the proposed zone for all modes of transport. Following completion of that report Council have adopted Option 2a for public consultation.

This report summarises the further traffic surveys and preliminary design parameters adopted to refine the scope of transportation infrastructure recommended as part of Option 2a. Topographic survey and preliminary design layouts have been developed in sufficient detail to define required designation boundaries and excludes geotechnical investigations. Cost Estimates have been refined for those items for which preliminary layouts have been developed.

### 1.1 Existing Horrell Road

Horrell Road is locally known and signposted as intersecting with State Highway 26 (SH26) approximately 100 m to the west of its intersection with Murray Road, however it is noted that the District Plan describes Horrell Road as commencing at Murray Road. For the purposes of this report Horrell Road will be referred to as commencing at SH26 as is the local convention. On this basis, Murray Road provides a 500 m linkage from Horrell Road to SH26. A railway line runs parallel to Murray Road and the Murray Road formation crosses the railway line approximately 35 m north-west of the SH26 intersection. SH26 crosses the same railway line by way of an overbridge located approximately 120 m east of the Horrell Road intersection.

The Matamata Piako District Plan classifies SH26 as a “Significant Road”, Horrell Road as a “Collector Road” (from Murray Road to SH27) and Murray Road as a “Local Road”.

Both intersections on SH26 (at Horrell Road and Murray Road) are currently “T” intersections with standard highway width i.e. no additional widening for turning movements is currently available.

The existing intersection of SH26 and Horrell Road is currently located on the western side of the railway overbridge on SH26, which limits sight distance to the east. The available sight line to the east is 165 m which equates to a safe approach speed of 75 km/h which is less than the current surveyed 85%ile approach speeds on SH26 of 82 km/h. Sight distance

to the west is approximately 265 m which is adequate for the currently surveyed operating speeds on this approach.

While the sight distance is less than desirable the intersection does not currently exhibit an atypical crash record with one minor injury crash related to turning traffic in the last 5 year period. The proximity of the adjacent rail overbridge also restricts the ability to widen the carriageway in the vicinity of the existing intersection.

## 1.2 Option 2a Horrell Road Realignment

This option involves relocation of the Horrell Road intersection with SH26 to the west by approximately 50 m and construction of a new link road to the existing Horrell Road as illustrated in Figure 1. The objective of this option is to optimise the available sight lines to the east whilst maintaining a safe intersection sight line to the west. The proposed location will result in a minimum 214 m sight line to both the west and east of the proposed intersection location (which equates to an equivalent safe speed of 90 km/h and meets the surveyed operating speeds).

This option is intended to enable all movements at the new intersection and in this way cater for all movements that are currently feasible at the existing Horrell Road intersection albeit with improved sightlines. The alignment intersects with the existing Horrell Road at a new "T" intersection and retains the intersection of Horrell Road and Murray Road in the current form.

Option 2a includes a shared path connection between Horrell Road and Morrinsville, upgrading of the Murray Road rail crossing and consideration of widening of the intersection of Murray Road and SH26.



Figure 1: Horrell Road Structure Plan Option 2a

## 2. Preliminary Design Parameters

The following design parameters have been adopted in development of the preliminary design layout for Option 2a as shown on drawings in Appendix B.

### 2.1 Horrell Road / SH26 Intersection Location

The location of the proposed relocated intersection of Horrell Road with SH26 has been selected based on optimised sight lines in each direction along SH26.

Traffic surveys (7 day counts) have been undertaken on both SH26 approaches to Horrell Road intersection to determine existing operating speeds and summarised in Table 1.

| 85 <sup>th</sup> PERCENTILE OPERATING SPEED |           |                        |
|---|-----------|------------------------|
| Survey Location                             | Westbound | Eastbound <sup>1</sup> |
| East of Horrell Road                        | 82 km/h   | 84 km/h                |
| West of Horrell Road                        | 86 km/h   | 90 km/h                |

**Table 1: SH26 Existing Operating Speeds**

The previous assessment for the Structure Plan assessed the eastbound speeds on SH26 (west of Horrell Road) at 90 km/h and as shown in Table 1 the traffic surveys undertaken confirm the previous speed assessment is appropriate.

The safe intersection sight distance recommended by the Austroads guidelines is 214 m for a design speed of 90 km/h and 200 m for a design speed of 85 km/h. The preliminary intersection location adopted is based on maximising the available sight lines in both directions corresponding with the measured operating speeds and the design meets these sight line criteria in both directions on SH26.

### 2.2 Link Road Width Standards

The District Plan includes recommended road standards for rural residential roads (Table 3.1) which requires a total sealed carriageway width of 6.0 – 7.0 m for collector roads with traffic volumes in the range of 250 – 1500 veh/day.

For this project a sealed carriageway width of 7.5 m has been adopted which is expected to be marked with 3.25 m lanes and a 0.5 m sealed shoulder on each side thereby meeting the District Plan standards.

The District Plan does not require a footpath or allowance for parking on rural-residential roads. However, allowance has been made for a shared path on the west side of the alignment.

<sup>1</sup> Austroads Guide to Road Design Part 4a Unsignalised and Signalised Intersections

## 2.3 Link Road Geometry

The proposed link road results in a short (about 130 m) length of road connecting SH26 and the existing Horrell Road. Speeds will therefore be controlled by turning movements at each end of the road. A single 200 m radius horizontal curve is proposed with 4% superelevation resulting in a safe design speed of 65 km/h.

Vertical geometry will be based on minimum gradients to meet drainage requirements.

## 2.4 Pedestrian and Cycle Connectivity

Option 2a includes construction of a shared off road cycle/pedestrian path alongside Horrell Road over the length of the proposed zone and adjacent to the proposed link road. From the proposed new intersection of SH26 and Horrell Road the shared facility is expected to follow parallel to SH26 to the Piako River and cross the river by way of a new bridge structure to connect with existing shared facilities that traverse beneath the existing highway bridge on the south bank of the Piako River.

North of the Piako River the existing western boundary of the highway is currently within the current batter extent which constrains any widening without the need for additional land. While a narrow (approximately 2.0m) path may be feasible between the road edge and the batter this would require kerbing the road edge and drainage infrastructure whilst resulting in a path alongside the traffic lane. It is preferable that any shared path is therefore located at the top of the batter within the adjacent property with the balance of the alignment located as far as possible from the traffic lane.

The final choice of shared path alignment alongside SH26 is therefore subject to further consultation with landowners and the preliminary cost estimate is based on the use of private property for the section of alignment north of the Piako River as shown on the preliminary plans.

It is noted that the structure plan concept showed the shared path extending from the Piako River to Holmwood Park Drive. However, following discussions with Council, the shared path has now been connected to the existing path under the state highway bridge (on the south bank of the river) which will still provide pedestrian and cycle connectivity through to the greater Morrisville area including the schools.

No investigations or preliminary design work have been progressed for the shared path bridge crossing of the Piako River and the preliminary cost estimate is based on similar project cost information provided by a bridge consultant for Council.

## 2.5 SH26 Intersections

### 2.5.1 Existing Turning Counts

Turn-count surveys were undertaken on Tuesday 16<sup>th</sup> August 2016 at the four intersections in the surrounding area namely: SH26/ Horrell Road; SH26/ Murray Road; SH26/ Roache Road and Horrell Road / Roache Road. The surveys were undertaken continuously between 7:30am and 6pm, with data recorded in 15-minute intervals.

The surveyed right turns into Murray Road and Horrell Road from SH26 are summarised in Figure 2. This shows the number of vehicle movements per hour throughout the day.



**Figure 2: Surveyed number of right turns per hour into Horrell Road and Murray Road from SH26**

Figure 2 shows that up to four right turn movements per hour were observed at both intersections in the peak periods of the day, although lower values are more typical.

Tube count data has also been assessed for Murray Road, recorded on the midblock section between Horrell Road and SH26 during the week beginning 12 November 2015. During that week the two-way peak hours on weekdays ranged from 13 to 24 veh/h with a peak of 32 veh/h recorded on the Saturday. The hourly flows for each day are shown on Figure 3.

Tube count data for Horrell Road, just north of Murray Road, indicates a 7-day ADT of 766 veh/day. The peak hour volumes ranged from 51 veh/h to 85 veh/h. The busiest hour on any given day was in the range of 9 – 10% of the daily volume for that day.

Data for SH26 in the vicinity of the site, recorded in March 2016, indicated AM peak two-way volumes of 490 to 510 veh/h and PM peak two-way volumes of 593 to 673 veh/h.

The hourly traffic volumes on Murray Road immediately adjacent to its intersection with SH26 have been plotted on Figure 3. It is noted that there are two vehicle crossings between the tube count location and the surveyed intersection data, which between them serve four dwellings and farming activities. The surveys were also undertaken at different times of the year. For these reasons the data is not intended to match perfectly, but serves to confirm that the manual count data is representative of typical flows.



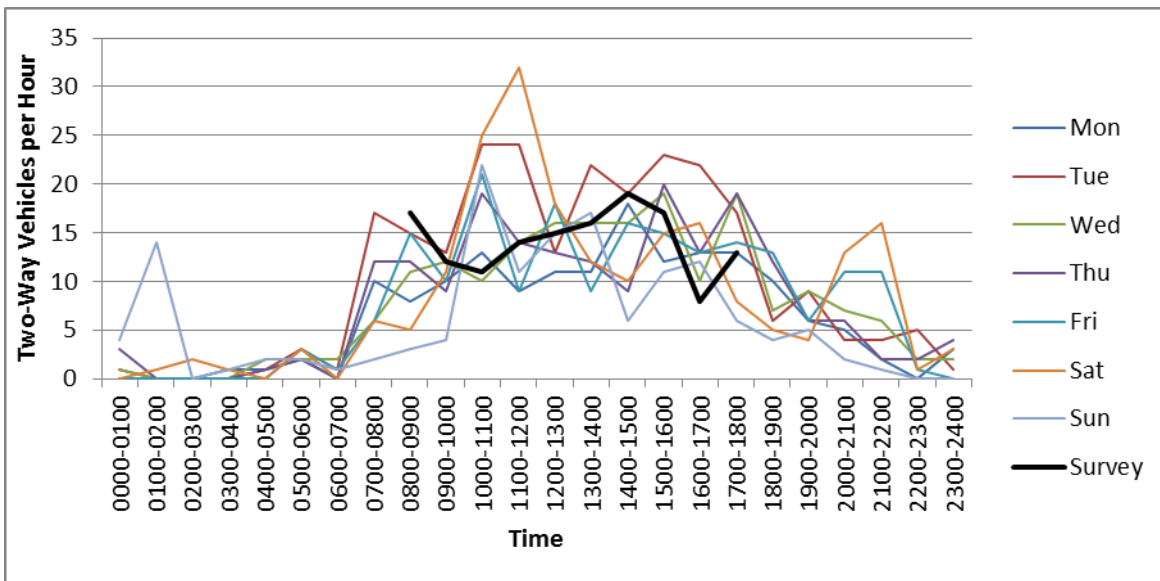


Figure 3: Comparison of Tube Count data and Manual count data

On the basis of the recorded survey data, it is assessed that the right-turn demand off SH26 at the Murray Road and Horrell Road intersections is in the region of two to four vehicles per hour at peak times.

### 2.5.2 Forecast Trip Distribution

The forecast generation and distribution of traffic has been assessed in structure plan assessment. On the basis of this assessment it is expected that up to 53 veh/h is expected to use Horrell Road north of its intersection with Murray Road. This is based on the peak hour volume being 11% of the daily volume, derived from the trip generation data used for the assessment. It is noted that this is a higher proportion than the observed traffic patterns on Horrell Road, as described above, and is therefore considered to be conservative.

The 53 peak hour movements have been distributed onto the network in proportion to the existing turn movements at the Horrell Road / Murray Road intersection. For the inbound vehicles, consideration was given to the origin of vehicles, based on the numberplate data collected. This allowed the identification of those which had turned right from SH26, and then proceeded to turn into Horrell Road from the Horrell/Murray intersection.

On the basis of the recorded data, of the 53 vehicle movements associated with the structure plan area, up to 3 veh/h are expected to turn right into Murray Road from SH26.

When combined with existing turning movements at the intersection, the total right turn-in demand at the intersection of SH26 and Murray Road is expected to increase to 7 veh/h.

### 2.5.3 Proposed Layouts

The structure plan report recommended the installation of a right turn bay at the intersection of SH26 and Murray Road. This assessment has been updated based on the intersection turning count data described in the above sections.

Austrroads design guidelines include recommended warrants for assessing the need for right-turn treatments, based on the number of turning vehicles and the opposing flows. Based on the existing state highway peak hour traffic flows, the threshold for consideration of a right turn bay is reached at a right turn demand of 5 veh/h.

The right turn-in volume at both state highway intersections is expected to be around 5 veh/h - 7 veh/h or very close to the threshold. On this basis neither the existing turn volumes nor the expected increase in turn volume (3 veh/h) is considered sufficient to warrant the extensive work associated with a right turn bay in the constrained road corridors (road corridors are only 20 m wide).

A minimum intersection layout "Austrroads Basic" is however recommended for both the existing Murray Road intersection and the proposed relocated Horrell Road intersection. The proposed treatment comprises a shoulder widening over 50 m (35 m prior to intersection and 15 m following) to provide a 2.5 m shoulder which enables through traffic width to pass a vehicle waiting to turn from either the centreline or the shoulder.

#### *2.5.3.1 SH26/ Horrell Road Intersection*

Existing highway constraints, principally the existing drain and property boundary on the southern side, have resulted in a proposed centreline shift on SH26 in order to achieve the minimum recommended shoulders. The shoulder on the southern side is proposed to be up to 8% which is similar to the existing shoulder slopes.

An increased length of taper has also been included for the left turn -in shoulder due to the left turn-in being a dominant movement at this intersection and is based on Austrroads Rural Basic left –turn treatment<sup>2</sup>.

#### *2.5.3.2 SH26 / Murray Road Intersection*

To accommodate the recommended widening of SH26 opposite Murray Road intersection it is proposed to infill the existing watertable and install a culvert to maintain drainage. This detail will enable the widening to be accommodated within the existing highway corridor.

## **2.6 Murray Road Rail Crossing**

Murray Road crosses an existing railway line, with approximately 35 m between the SH26 give way limit line and the railway crossing limit line. The railway crossing is currently signed and marked as a priority controlled (give way) crossing without bells or flashing warning lights. Council have previously consulted Kiwirail with respect to the appropriateness of the crossing control for both the existing and forecast traffic volume. There are reportedly about 8 trains per day in the peak milk season on this line and all trains are expected to operate at slow speeds of 25 km/h. On this basis Kiwirail have advised that they do not believe any upgrading of this crossing is necessary for the forecast increases in traffic.

Irrespective of the Kiwirail assessment, from a traffic safety perspective it is recommended that warning flashing lights with bells would be beneficial to both existing and future road users. Given that Kiwirail consider the warrant for warning lights has not been met, the

<sup>2</sup> Figure 8.2 of Austrroads Guide to Road Design Part 4a

addition of these warning devices is a decision for Council and/or Kiwirail to conclude and therefore is not a mandatory requirement for this plan change proposal. The physical works base cost of warning bells and lights is approximately \$140,000<sup>3</sup>.

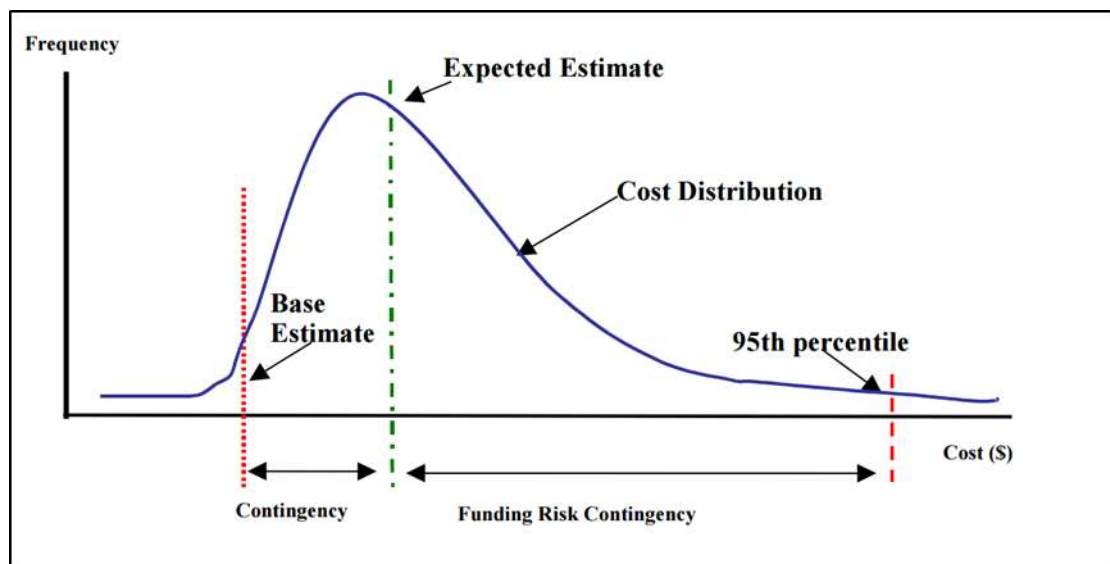
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<sup>3</sup> Kiwirail website

### 3. Cost Estimate

Cost estimates for Option 2a have been refined based on the further investigations and preliminary designs. While the additional design work has improved the level of uncertainty in some areas (eg the link road design – but excluding geotechnical investigations), other elements of work are estimated without detailed design (eg Piako River bridge crossing and approach paths). Furthermore land acquisition costs are noted to be highly sensitive to market conditions.

The cost estimates represent the “expected cost” for this stage of development (i.e. a combination of elements designed to preliminary level and others with no investigation or design work undertaken) and therefore actual costs could be considered to be within a range of this expected cost represented by a bell curve. The range of the actual cost with respect to the expected cost is illustrated in Figure 4 below as extracted from the NZTA Cost Estimation Manual.



**Figure 4: Funding Risk profile with respect to the Expected Value (sourced NZTA Cost Estimation Manual)**

Topographic survey and preliminary design layouts have been developed in sufficient detail to define required designation boundaries but excludes geotechnical investigations. The cost risks include but are not limited to the following key areas:

- Variations in unit rates;
- Unknown features such as relocation of services both above and below ground;
- Geotechnical ground conditions for roads and structures;
- Bridge structure which has not been progressed to preliminary design;
- Property Costs (estimates are currently based on property values provided by Council).

### 3.1 Option 2a Estimate

The expected cost of Option 2a is \$1.35 m as detailed in the cost schedule attached in Appendix C. This updated estimate includes an allowance for land costs and contingency but it is noted that funding risk should be added to this figure (refer Figure 4 above).

In comparison to the cost estimates provided at the time of the structure plan report (\$1.3 m) it is noted that one of the key differences relates to land values which have been revised upward based on the latest data provided by Council, offset chiefly by a reduction in the extent of works at the intersection of SH26 and Murray Road.

The expected cost is summarised in Table 2 below:

| Column 1   | Column 2           |
|--|--------------------|
| Horrell Link Road (Includes Intersection with Horrell Road and SH26, and land costs) | \$728,000          |
| SH26 Murray Road Widening  | \$96,000           |
| Shared Path (including land costs)   | \$131,000          |
| Shared Path bridge structure   | \$250,000          |
| Murray Road Rail Controls (Optional)   | \$140,000          |
| <b>Total Expected Cost</b>   | <b>\$1,345,000</b> |

*Table 2: Option 2a Cost Estimate*

TDG

## Appendix A

### Traffic Survey Summary

## Number Plate Surveys

Turn-count surveys were undertaken on Tuesday 16<sup>th</sup> August 2016 at the four intersections shown on Figure A. The surveys were undertaken continuously between 7:30am and 6pm, with data recorded in 15-minute intervals. The numberplates of each turning vehicle were also recorded, to allow the identification of vehicles which passed through more than one of the intersections.



**Figure A: Survey Locations**

The following figures summarise the turning counts for the period of the survey:

- Figure B: Total turn movements during the survey (10.5 hours).
- Figure C: Turn movements during the AM peak hour.
- Figure D: Turn movements during the midday peak hour
- Figure E: Turn movements during the PM peak hour

The busiest hour for each intersection is shown on each diagram. Note that the peak hour for total movements at each intersection is not necessarily the same.



Figure B: Total turn movements during the survey (10.5 hours)



Figure C: Turn movements during the AM peak hours





Figure D: Turn movements during the mid-afternoon peak hours

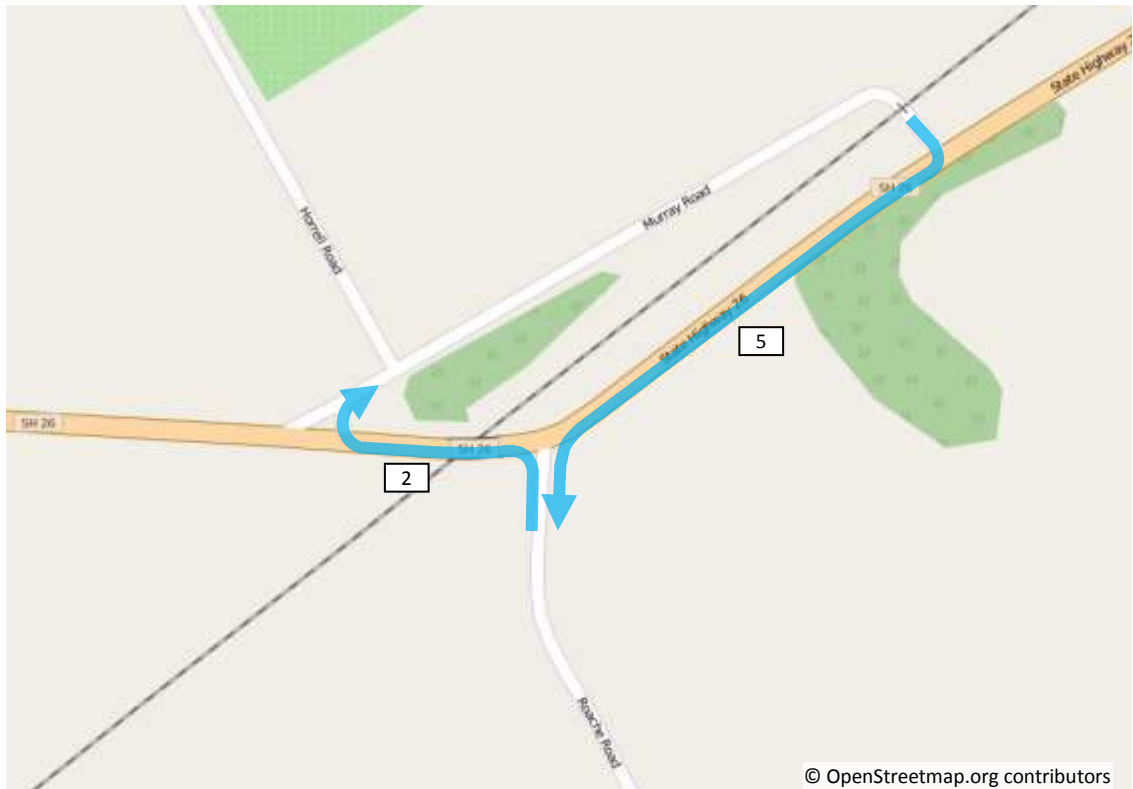


Figure E: Turn movements during the PM peak hours

For the key right-turn movements into Murray Road and Horrell Road from SH26, the highest hourly volumes were four and three vehicle movements per hour (vph) respectively.

Figure F shows:

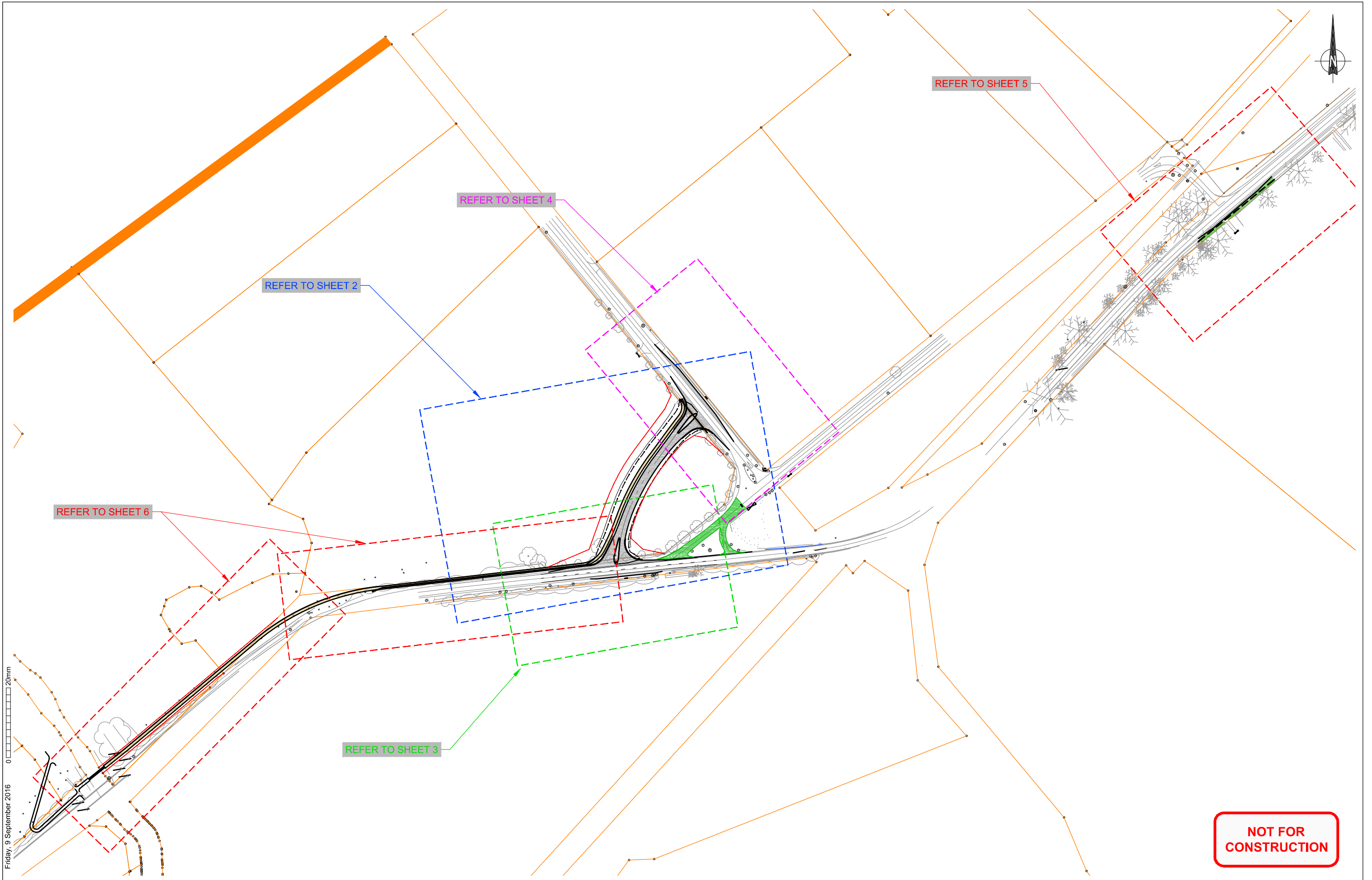
- The highest hourly flow of vehicles that turned left out of Roache Road and then right into Horrell Road.
- The highest hourly flow of vehicles that turned right from Murray Road and then left into Roache Road.



**Figure F: The highest hourly flows for Roache Road related movements**

## Appendix B

### Preliminary Design Layouts



Friday, 9 September 2016

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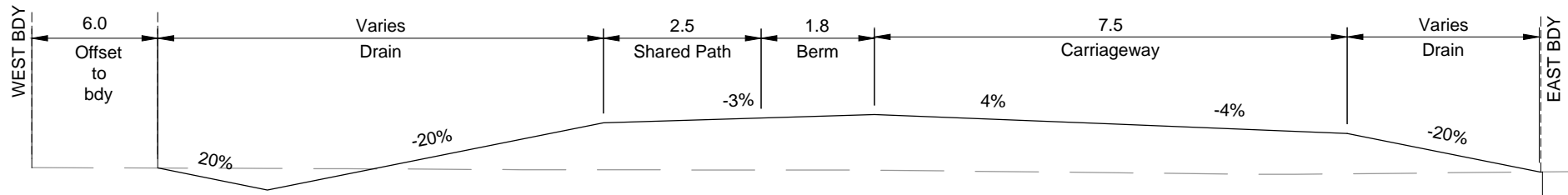
**MATAMATA PIAKO DISTRICT COUNCIL**  
**STRUCTURE PLANS**  
**PRELIMINARY DESIGN**  
**OVERVIEW PLAN**



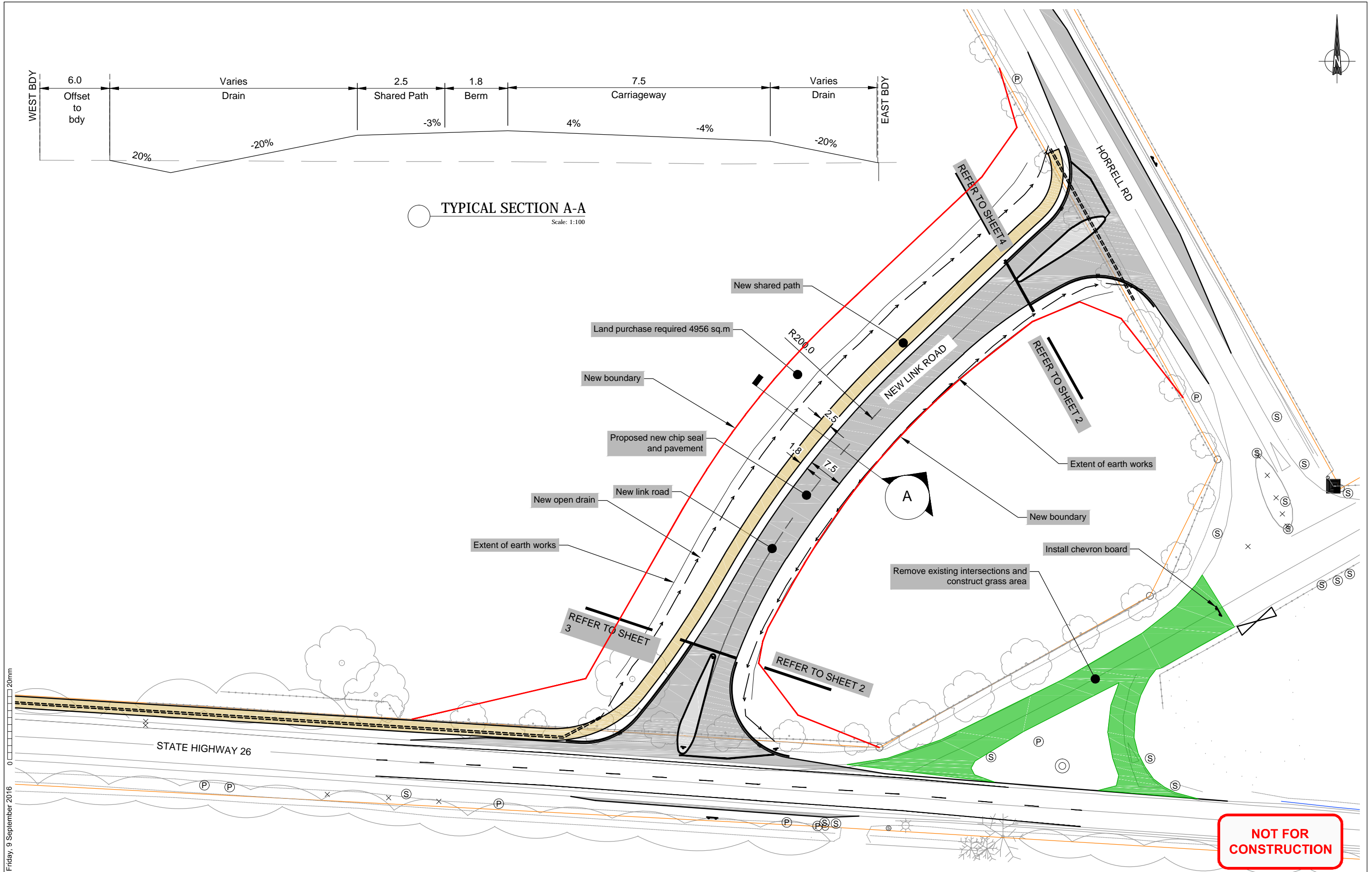
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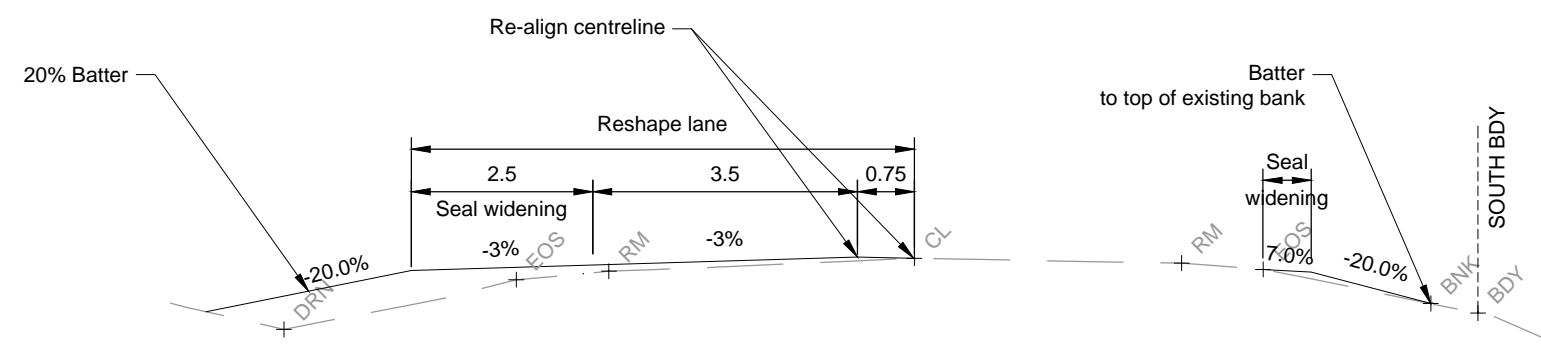
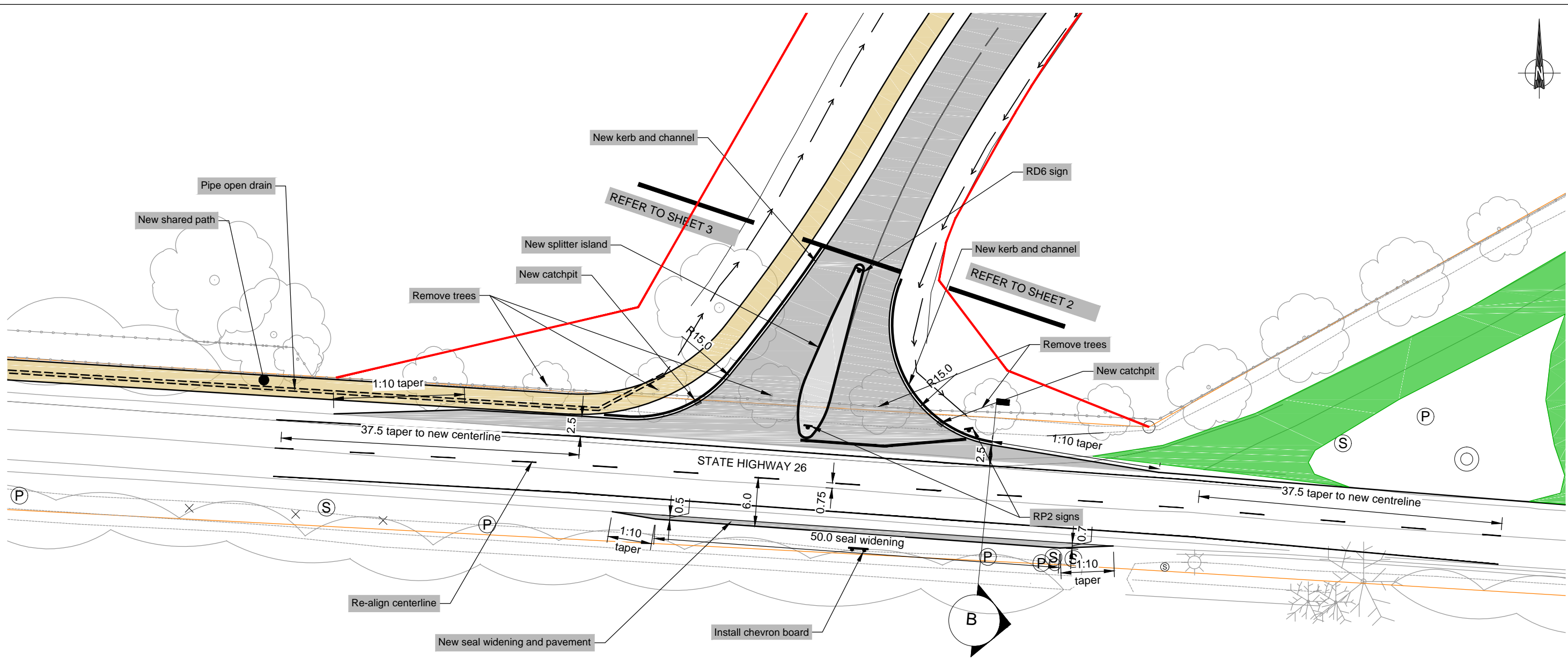
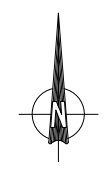
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MATAMATA PIAKO DISTRICT COUNCIL  
STRUCTURE PLANS  
PRELIMINARY DESIGN  
NEW LINK ROAD



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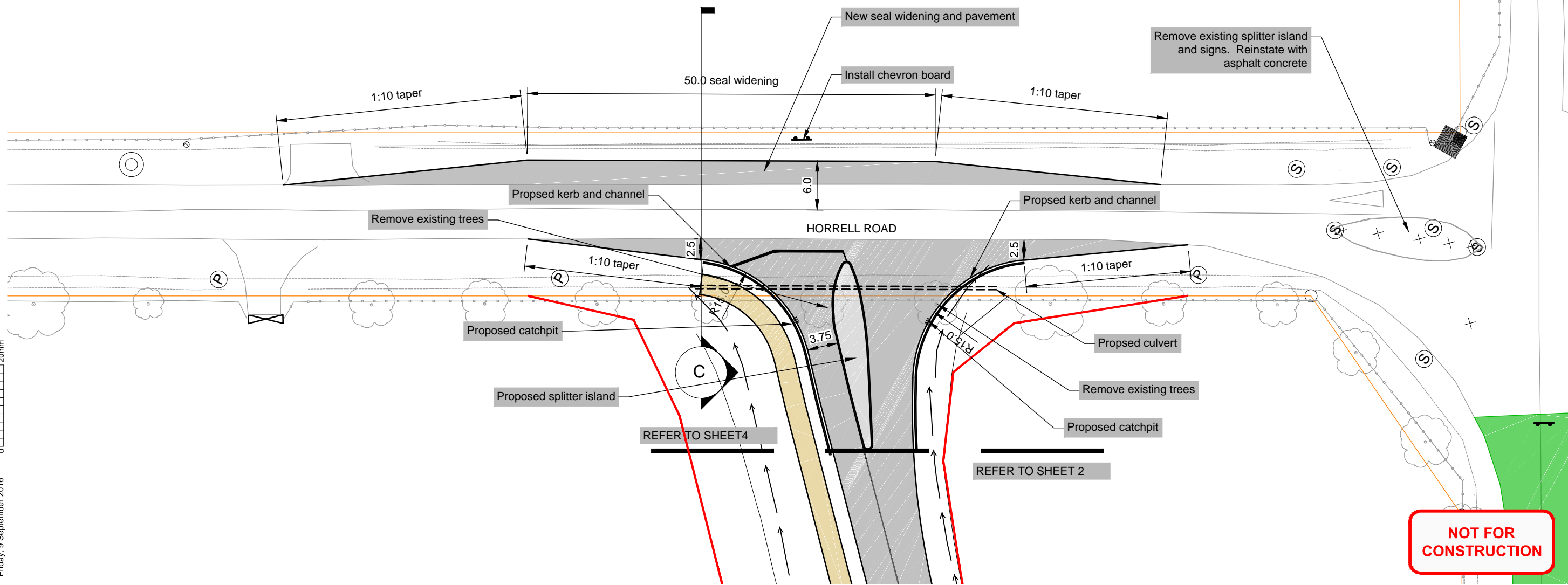
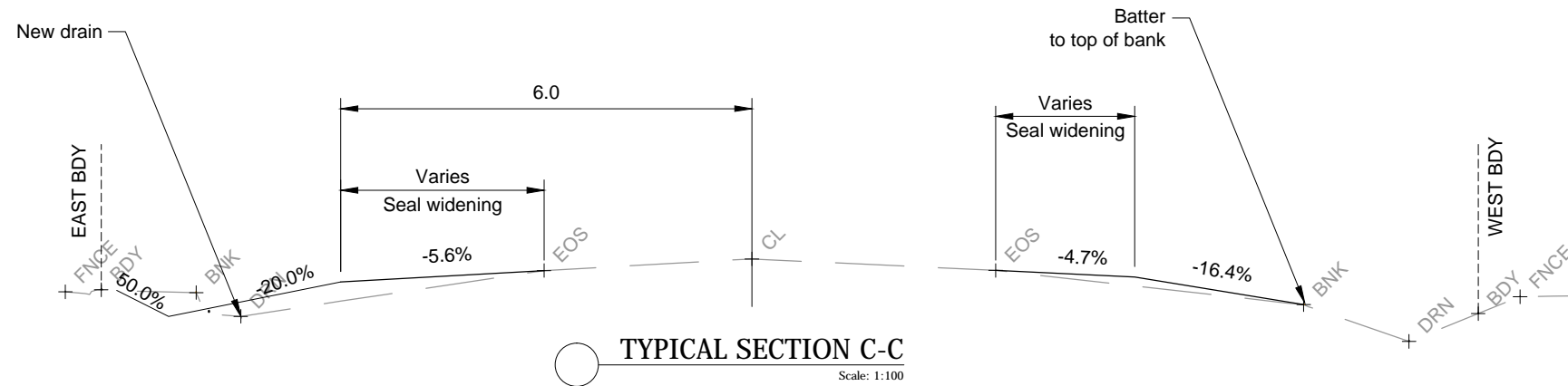
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MATAMATA PIAKO DISTRICT COUNCIL  
STRUCTURE PLANS  
PRELIMINARY DESIGN  
SH26 / NEW LINK ROAD INTERSECTION



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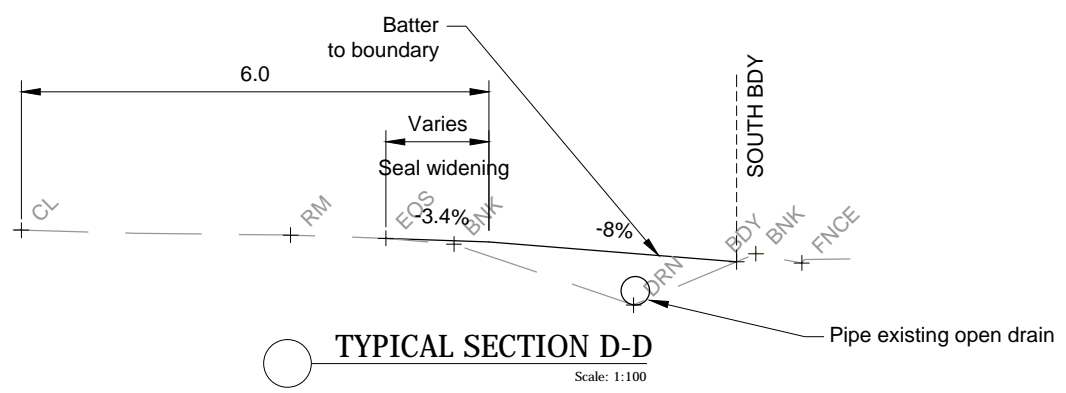
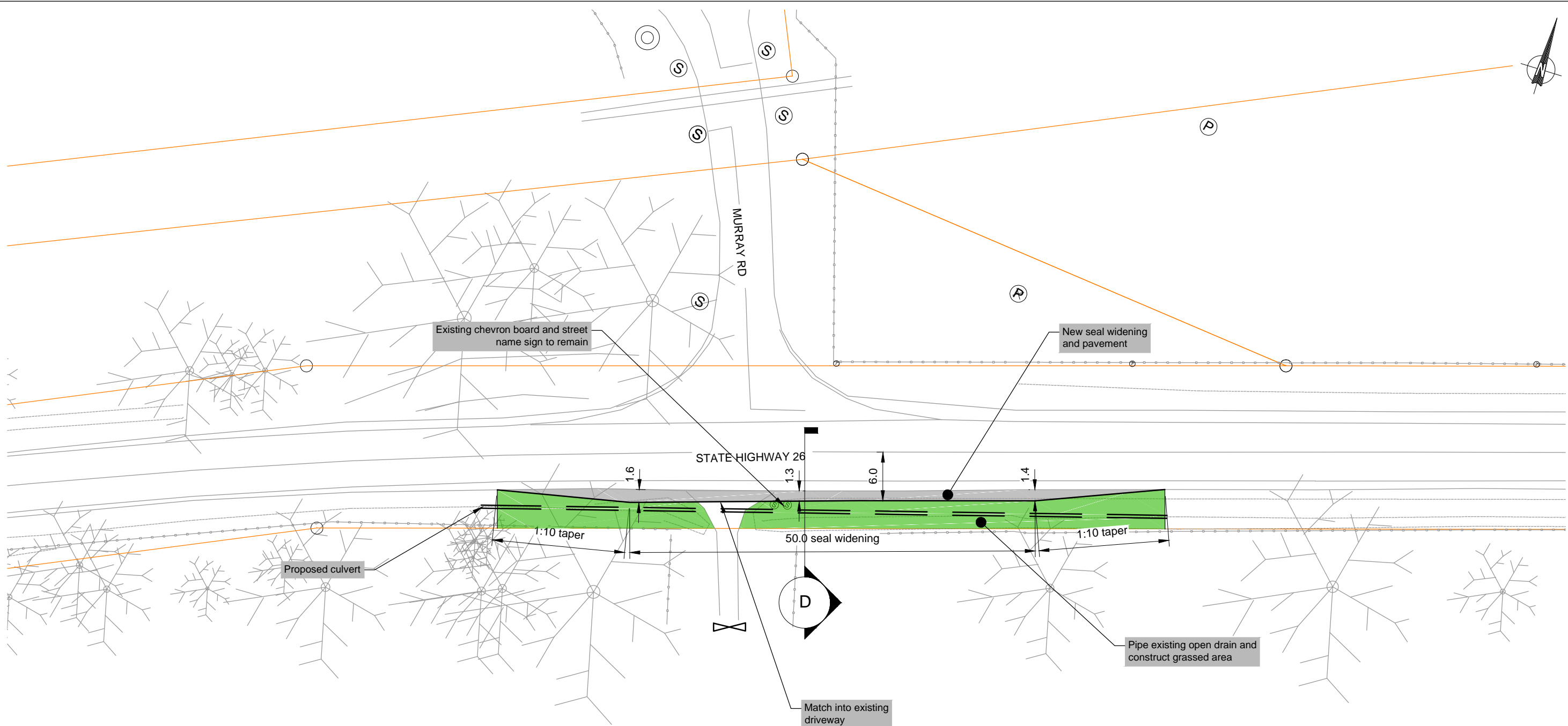
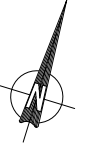
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**MATAMATA PIAKO DISTRICT COUNCIL**  
**STRUCTURE PLANS**  
**PRELIMINARY DESIGN**  
**NEW LINK ROAD / HORRELL ROAD INTERSECITON**



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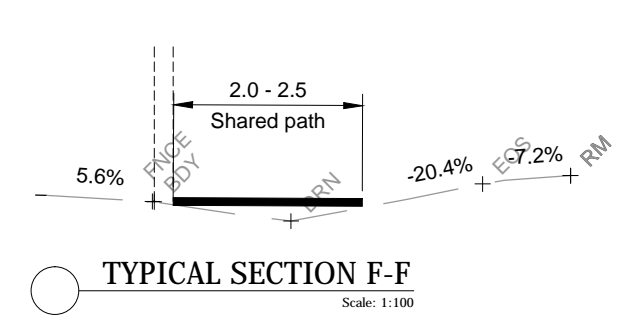
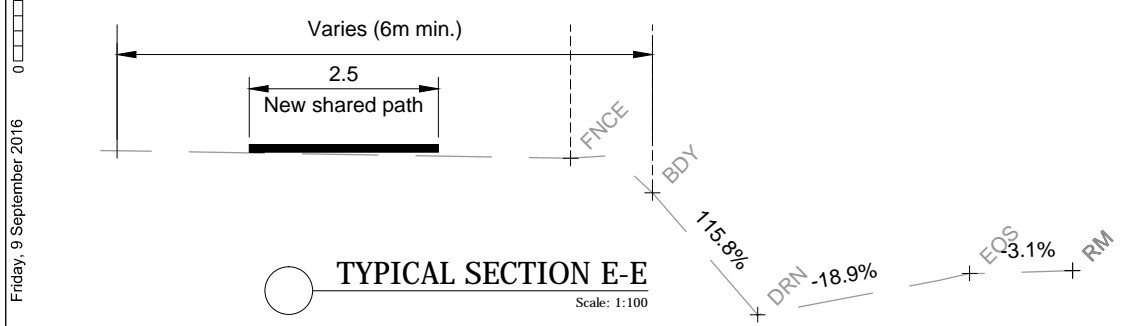
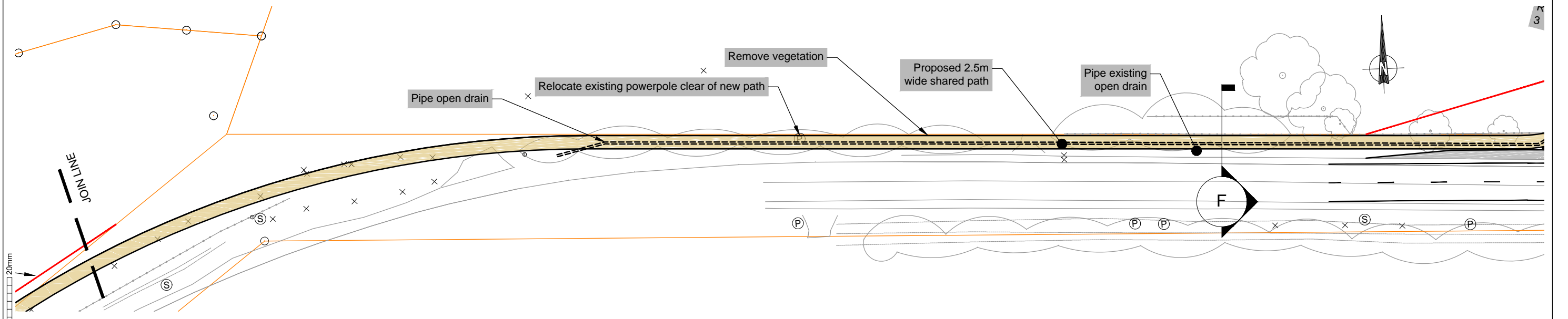
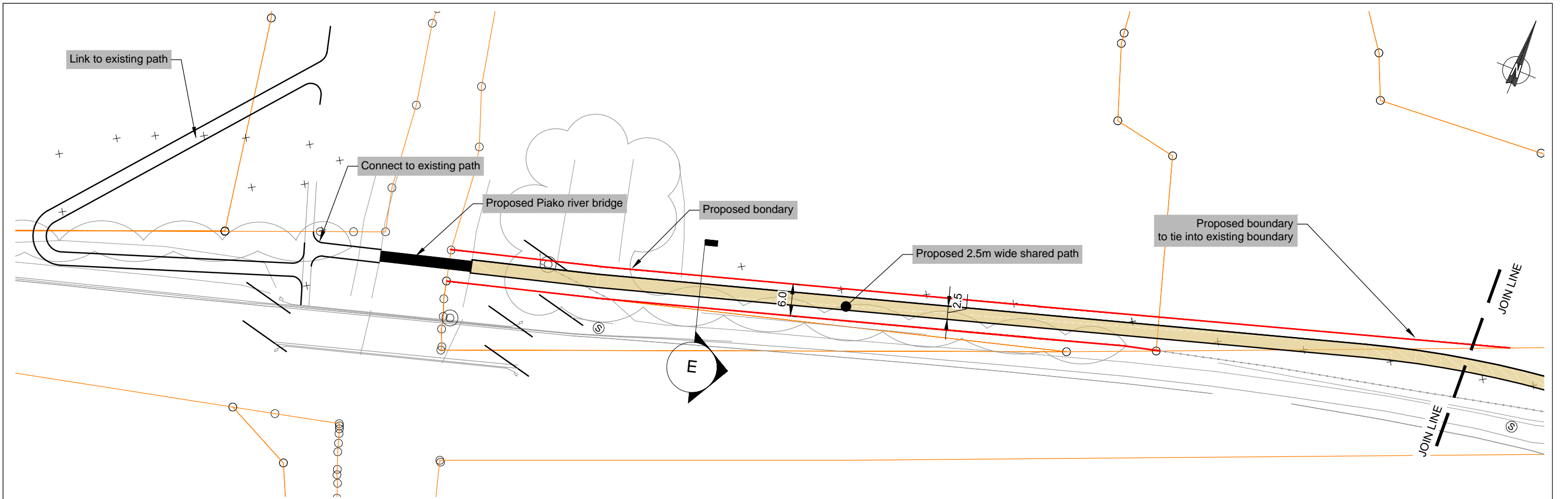
**MATAMATA PIAKO DISTRICT COUNCIL**  
**STRUCTURE PLANS**  
 PRELIMINARY DESIGN  
 SH26 / MURRAY ROAD INTERSECTION



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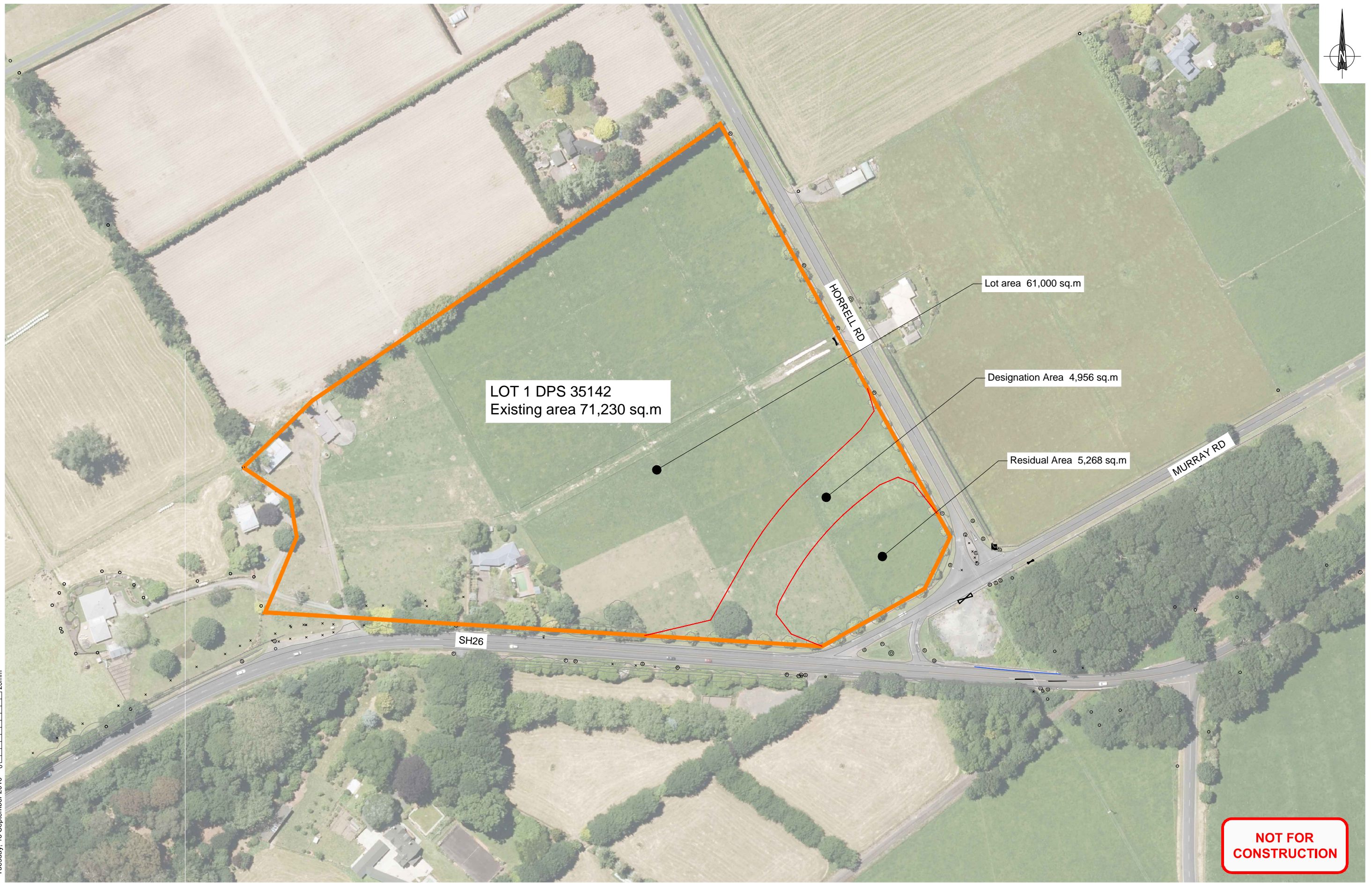
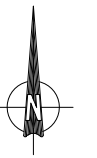
| REV | REVISION DESCRIPTION | DRAWN | CHECKED | APPROVED | DATE     |
|-----|----------------------|-------|---------|----------|----------|
| A   | Drawing Created      | JO    | GE      |          | 30/08/16 |

**MATAMATA PIAKO DISTRICT COUNCIL**  
**STRUCTURE PLANS**  
**PRELIMINARY DESIGN**  
**NEW SHARED PATH**

**TDG** 40 YEARS  
**ACENZ** ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND  
 ISO 9001 QUALITY ASSURED

|                           |     |
|---------------------------|-----|
| STATUS: WORKING PLOT      | REV |
| DATE: 9/09/2016           |     |
| SCALE: 1:### @ A3         |     |
| TDG DRAWING NO. 13711-N1A |     |
| SHEET NO. 6 of 6          | A   |

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Tuesday, 13 September 2016 0 20mm

| REV | REVISION DESCRIPTION | DRAWN | CHECKED | APPROVED | DATE     |
|-----|----------------------|-------|---------|----------|----------|
| A   | Drawing Created      | JO    | IC      |          | 13/09/16 |
|     |                      |       |         |          |          |
|     |                      |       |         |          |          |

**MATAMATA PIAKO DISTRICT COUNCIL**  
**HORRELL ROAD PLAN CHANGE**  
**DESIGNATION PLAN**



|                           |                  |
|---------------------------|------------------|
| STATUS: WORKING PLOT      | REV              |
| DATE: 13/09/2016          |                  |
| SCALE: 1:2000 @ A3        |                  |
| TDG DRAWING NO. 13711-N2A | SHEET NO. 1 of 1 |
|                           | A                |

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## Appendix C

### Preliminary Cost Estimate

**Withheld for reasons  
of commercial sensitivity**