

**APPENDIX B**  
**TRANSPORTATION SYSTEMS**

1996 MINT FARM TRAFFIC STUDY BY TRANSPO GROUP  
MINT FARM PHASE 2 RAIL STUDY BY TRANSPO GROUP

**Mint Farm - Task 1 Traffic Operations and Safety Analysis**  
**Technical Memorandum**

**Prepared for:**  
**Huitt-Zollars, Inc.**

**Prepared by:**  
**Erich Armbruster**

**Reviewed by:**  
**Hicham Chatila, PE PTOE**

**February 18, 2002**

**The Transpo Group, Inc.**  
**11730 118<sup>th</sup> Avenue NE, Suite 600**  
**Kirkland, WA 98034-7120**

**(425) 821-3665**

## TECHNICAL MEMORANDUM

|                 |   |              |                   |
|-----------------|---|--------------|-------------------|
| <b>To:</b>      | Joseph O'Leary<br>Huitt-Zollars                           | <b>Date:</b> | February 18, 2002 |
| <b>From:</b>    | Hicham Chatila PE, PTOE<br>Erich Armbruster <i>EA</i>     | <b>TG:</b>   | 01171.00          |
| <b>Subject:</b> | Mint Farm - Task 1 Traffic Operations and Safety Analysis |              |                   |

Task 1 of Transpo's current work scope on the Mint Farm development was developed to address specific traffic operations and safety concerns associated with the proximity of the at-grade rail crossing to the signalized intersection at Industrial Way (SR 432)/Prudential Way. These concerns have mainly focused on the potential impact of vehicles queuing onto Industrial Way as a train loading and/or unloading at the nearby Prudential Steel facility blocks Prudential Way, as well as safety of the railroad crossing. The purpose of this technical memorandum is to present the results of the traffic operations analysis and the associated recommendations. Toward that end, the following sections describe the methodologies and assumptions used in this analysis including the analysis tools, traffic volumes, intersection channelization, signal timing, analysis results, and recommendations.

### Approach and Analysis Tools

The main focus of this analysis is to evaluate the traffic-related impacts of the occasional train blockages on Prudential Way during the peak hour of traffic in the area for Phases 1 and 2 of the development. The potential queuing impacts on Industrial Way (SR 432) are of primary interest as they may present both operational inefficiencies as well as safety hazards. In order to evaluate and quantify these impacts, the Industrial Way (SR 432)/Prudential Way intersection and Prudential Way rail crossing were modeled for the key peak traffic periods for the development.

To help evaluate these impacts a Vissim micro-simulation model was assembled for use in analyzing queuing impacts of train blockages at this location. As a multimodal model, Vissim simulates the interaction of auto and rail traffic at grade crossings as well as signalized and unsignalized intersections. Vissim also provides a more detailed evaluation of queuing and potential lane blockages than other, more standard analysis tools such as the *Highway Capacity Software* (HCS). Inputs to the Vissim model include traffic volumes, intersection channelization and signal timing.

### Auto and Rail Volumes

Traffic volumes for this analysis were taken from the *Supplemental Traffic Study* (December 1996) conducted by The Transpo Group for the Mint Farm Industrial Park (see Attachment A). This study identified four separate phases of development for the site. Phase 1 of this development is complete. The remaining phases have been combined into an aggregate Phase 2. For the purposes of this

analysis, traffic volumes and the buildout year for the aggregate Phase 2 were assumed to be equal to the traffic volumes for the previous Phase 4 buildout.

The PM peak hour was selected as the basis for the analysis in order to evaluate the time period that experiences the highest overall traffic volumes on Industrial Way (SR 432). In addition to the PM peak hour (4 to 6 p.m.) analysis for Phases 1 and 2, the AM peak hour (6 to 8 a.m.) was also analyzed for Phase 1 to evaluate the peak inbound traffic period for the site.

One train blockage, lasting approximately seven minutes, was assumed for each analysis scenario. Based on discussions with Prudential Steel staff, approximately two trains serve the site daily. These trains typically visit the site between the times of 11:00 p.m. to 12:00 a.m. and 10:00 a.m. to 12:00 p.m. Therefore, the assumptions used for this analysis provide a worst-case evaluation of traffic impacts associated with the train blockage.

### **Intersection Channelization**

Existing intersection channelization was used for evaluation of both Phases (see Attachment B). The *Supplemental Traffic Study* identified various intersection channelization alternatives for each phase of development. In order to evaluate a worst-case scenario, this analysis assumes the existing channelization would be maintained through full site (Phase 2) buildout.

### **Signal Phasing and Timing**

The VISSIM model was coded to reflect the existing signal phasing for the Industrial Way (SR 432)/Prudential Way intersection. This phasing includes permitted left turns for Industrial Way (SR 432). Signal timing was determined for each scenario based on the optimized timings provided by the Synchro software package for fully actuated control.

### **Analysis Results**

The VISSIM model was run for each analysis period based on the parameters described above. Average and maximum queues were measured for the northwest bound right-turn and southwest bound left-turn from Industrial Way (SR 432). The resulting queues for each analysis period are summarized in Table 1.

**Table 1. Vehicle Queuing**

| <i>Analysis Period<br/>Turning Movement</i> | <i>Avg Queue/Queue<br/>Capacity (ft.)</i> | <i>Max Queue/Queue<br/>Capacity (ft.)</i> |
|---|---|---|
| <i>Phase 1 - AM Peak Hour</i>               |   |   |
| Northwest Bound Right-Turn                  | 122/450                                   | 1,035/450                                 |
| Southeast Bound Left-Turn <sup>1</sup>      | 19/—                                      | 194/—                                     |
| <i>Phase 1 - PM Peak Hour</i>               |   |   |
| Northwest Bound Right-Turn                  | 4/450                                     | 103/450                                   |
| Southeast Bound Left-Turn <sup>1</sup>      | 22/—                                      | 153/—                                     |
| <i>Phase 2 - PM Peak Hour</i>               |   |   |
| Northwest Bound Right-Turn                  | 52/450                                    | 277/450                                   |
| Southeast Bound Left-Turn <sup>1</sup>      | 27/—                                      | 207/—                                     |

**1. Queue capacity does not apply. Channelized left-turn lane is an extension of travel lane.**

Based on these results, the AM peak hour would experience queues spilling back approximately 585 feet beyond the channelized right-turn lane on Industrial Way (SR 432) after Phase 1 buildout. Although not explicitly analyzed, the AM peak hour after Phase 2 completion would likely exhibit even longer queues as project-generated traffic continues to grow in step with future development on the site. Figure 1 illustrates AM peak hour traffic conditions during a roadway blockage after Phase 1 development completion.

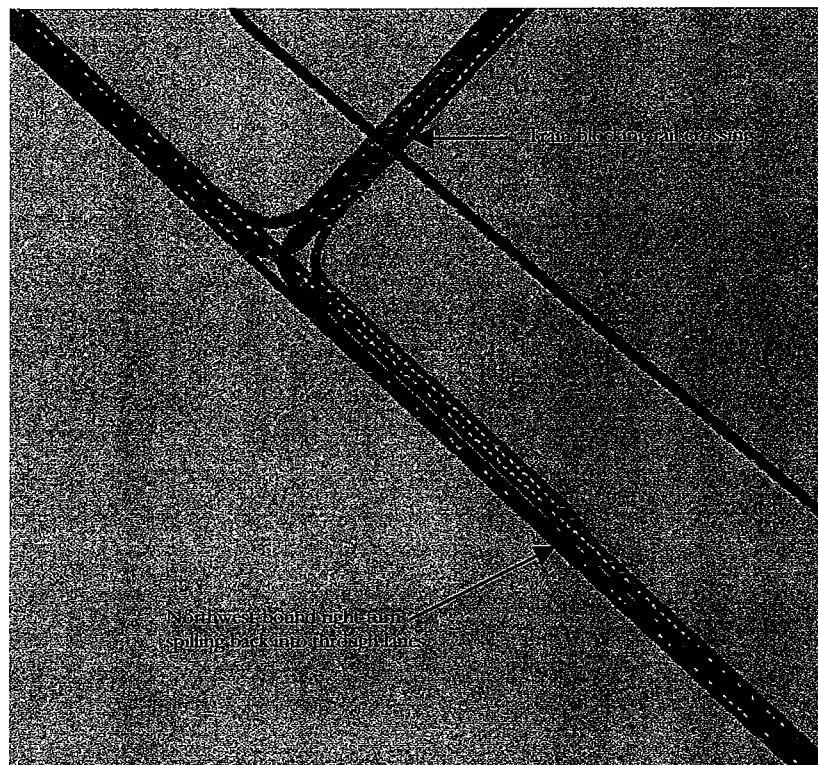


Figure 1. Phase 1 AM Peak Hour Vehicle Queuing

AM peak hour queues on the southeast-bound left-turn approach and PM peak hour queues on the northwest-bound approach would be adequately accommodated in the given turn lanes.

### **Recommendations**

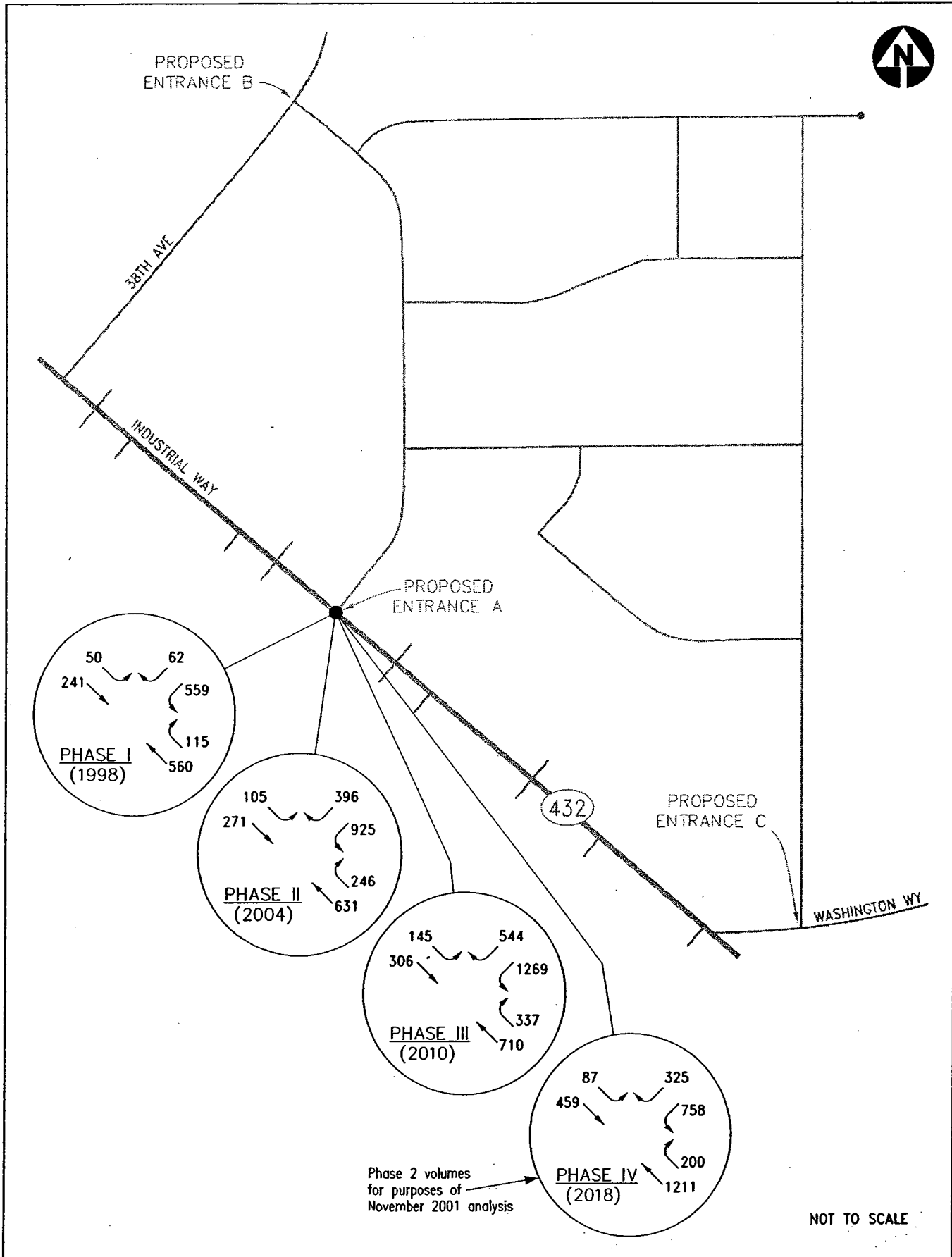
Interim recommendations for improving safety at the Industrial Way (SR 432)/ Prudential Way intersection and the Prudential Way railroad crossing include the following: (Dollar amounts shown are rough cost estimates for materials only.)

- Supplemental warning measures such as appropriate signage. Appropriate signage may include signs warning of the proximity of the rail crossing and the potential for stopped vehicles ahead as illustrated in Attachment C. (\$1,500 - \$2,000)
- Flashing yellow lights (flashers) on advanced warning signs that are triggered by the presence of a train blocking the Prudential Way railroad crossing. (\$5,500-\$8,000)
- Installation of gates and red flashers at the rail crossing. (\$10,000-\$30,000)

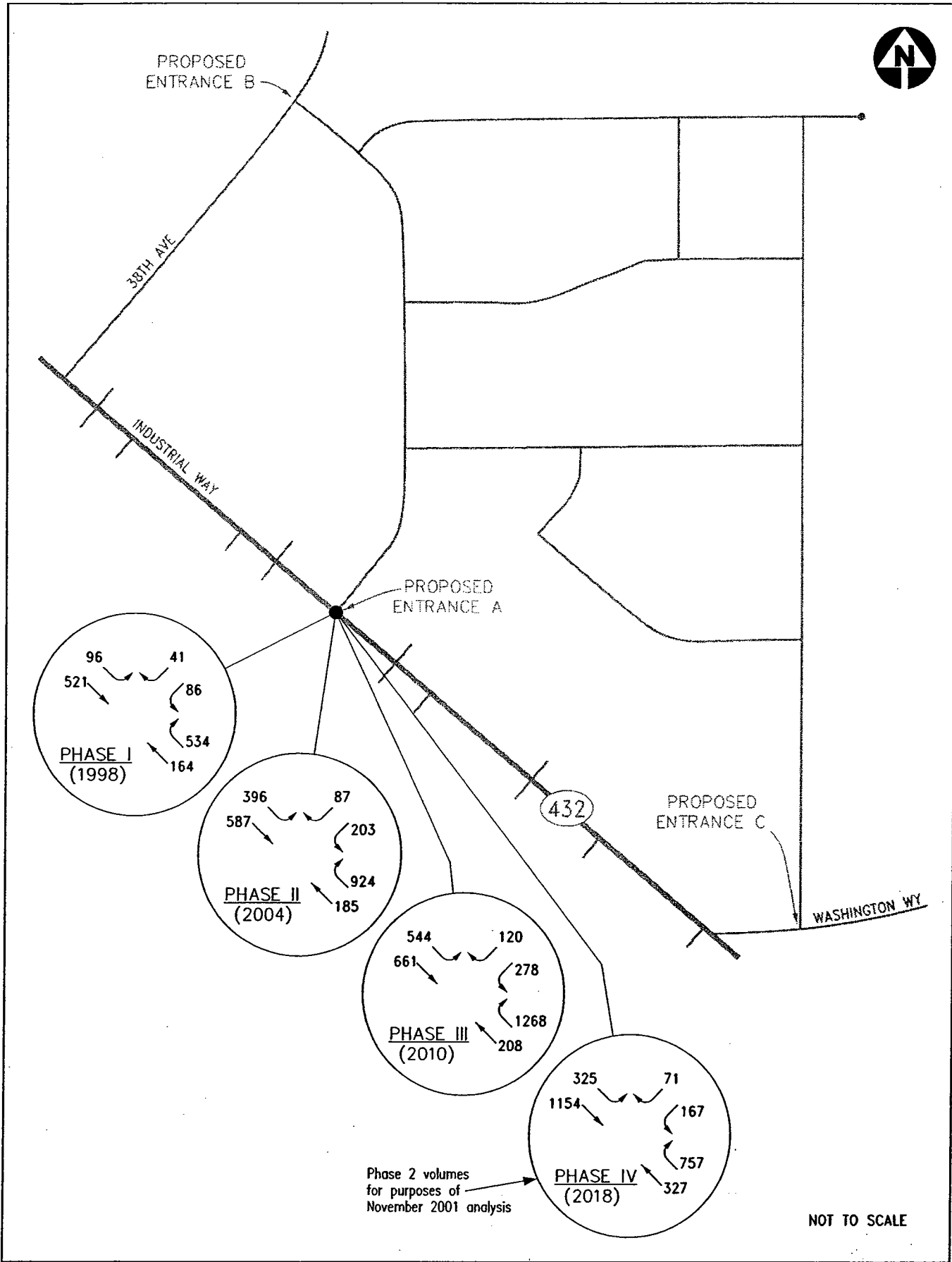
Long term safety and operational improvements at this location should include the following:

- Potential limitation of rail traffic during peak traffic hours. For example, limiting rail traffic between the hours of 6 a.m. to 6 p.m. could minimize much of the vehicular conflict at the rail crossing, as auto traffic is typically highest during these hours.

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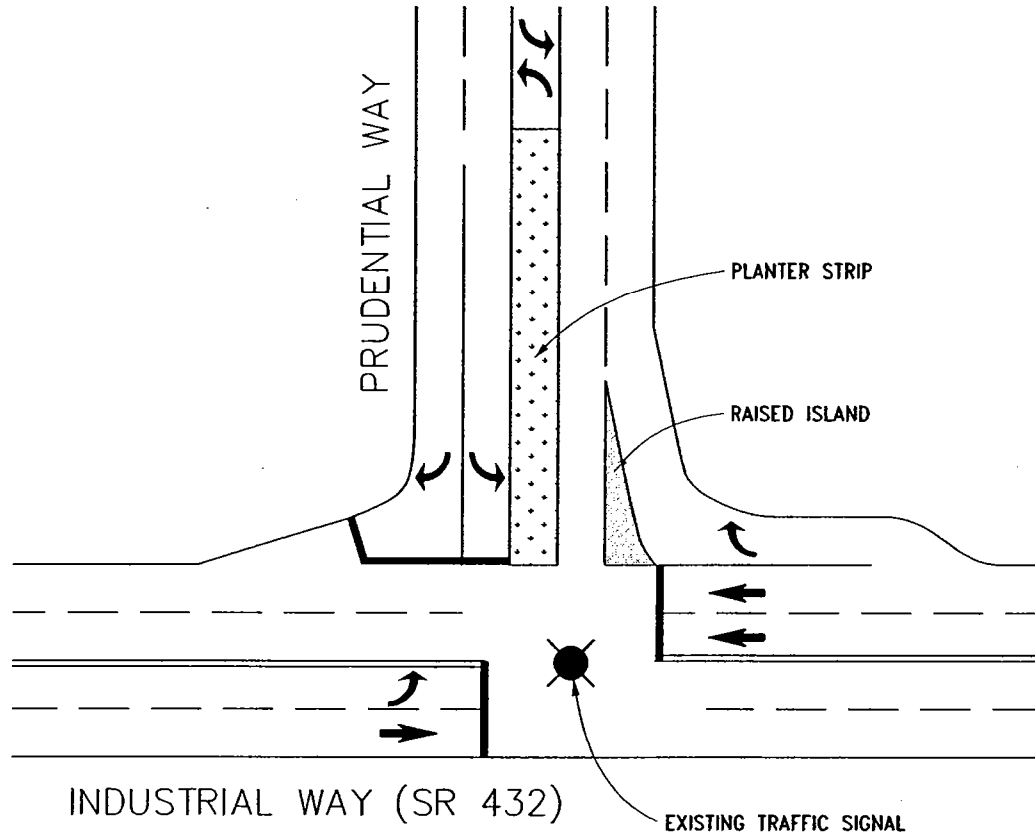


**Attachment A**  
With Project Traffic Volumes PM Peak Hour (By Development Phase)  
*The Mint Farm Industrial Park*



**Attachment A (Cont.)**  
With Project Traffic Volumes AM Peak Hour (By Development Phase)  
*The Mint Farm Industrial Park*





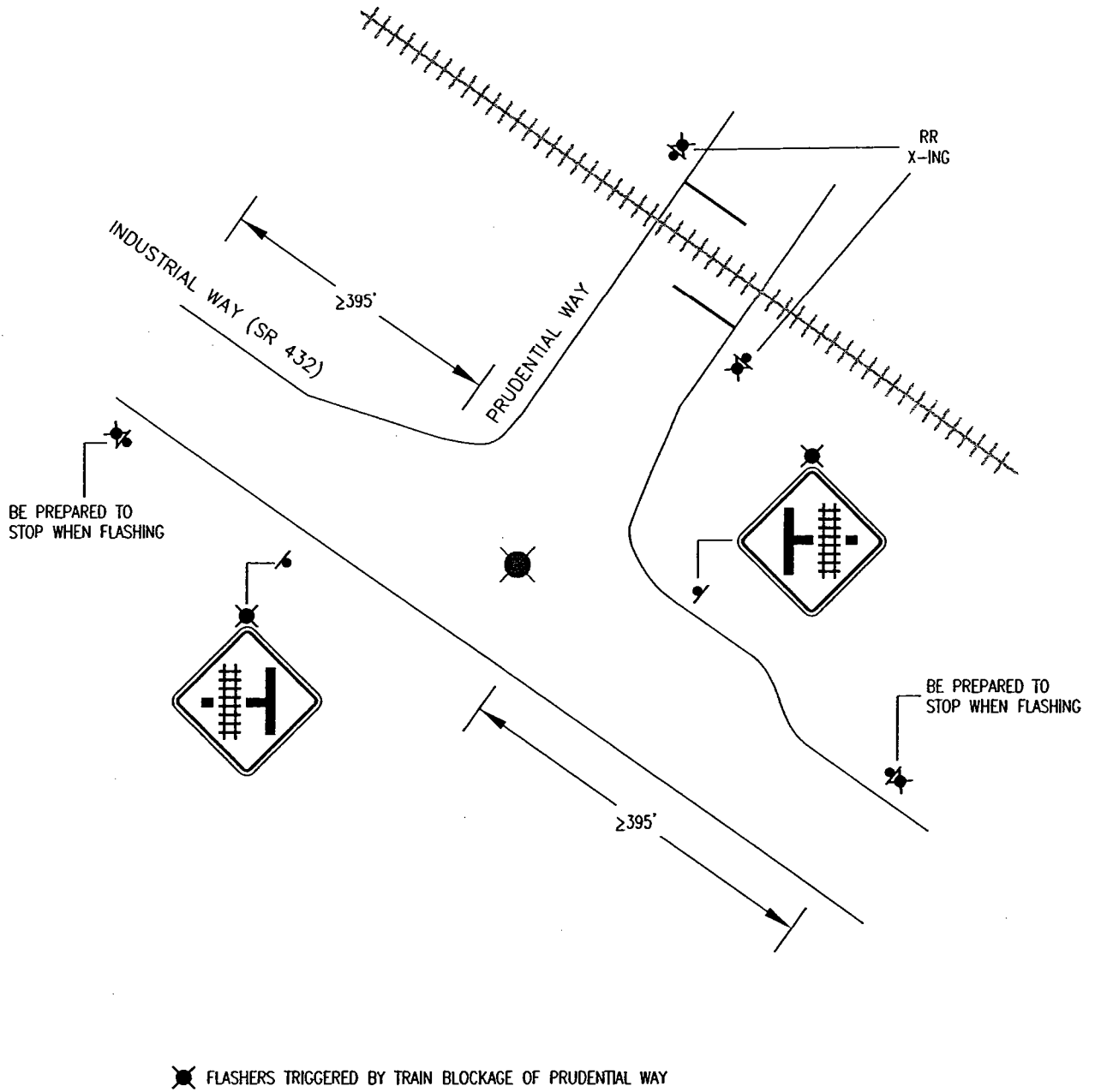
NOT TO SCALE  
NOT A STRIPING PLAN



**Attachment B**

Industrial Way/ Mint Farm Entrance "A" Initial Intersection Channelization

*The Mint Farm Industrial Park*



NOT TO SCALE  
NOT A STRIPING PLAN



### Attachment C

The Mint Farm Industrial Park