

## 5.0 IMPROVEMENT AND MITIGATION OPTIONS

The primary purpose of this chapter is to identify means to address, improve or mitigate potential significant operational impacts due to proposed mining operations identified in this TIS. In the following, the term “improvement” refers to any measure required to improve the transportation system due to impacts resulting from the background growth projections or the four planned land developments. The term “mitigation” refers to any measures required to correct impacts, specifically as a result of the proposed mining project.

The results of the traffic analysis indicated that significant roadway deficiencies are expected in the future, if improvements or mitigation measures are not implemented. However, the cause and magnitude of the traffic impacts need to be put in perspective. The analyses scenarios chosen for this traffic impact study were selected to evaluate cumulative impacts on the roadway network, as well as to highlight the primary contributing factors to operational impacts within the transportation system. By Year 2015, the four planned land developments are expected to add approximately 75,500 daily vehicles to the roadway system. The proposed mining project is expected to add 3,320 daily vehicles (9,660 projected daily mining vehicles minus the estimated 6,340 existing mining vehicles). By Year 2025, the four planned land developments are expected to add approximately 82,300 daily vehicles to the system. The proposed mining project is expected to add 6,490 daily vehicles (12,830 projected daily mining vehicles minus the estimated 6,340 existing mining vehicles). Comparatively, the four planned land developments are expected to account for approximately 93 percent of the new volume being added to the surrounding roadway network.

This section provides an evaluation of the improvements planned by others and specific mitigation measures needed for the Mining Area. It qualitatively discusses other infrastructure improvements that may be needed and provides an approximate timeline for implementation.

### 5.1 Improvements Required by Planned Residential Development Studies

The improvement measures refer to those items identified as part of the previous EAW and AUAR traffic studies completed for the Cobblestone Lake, Brandtjen and Genstar developments<sup>1</sup> to mitigate their individual impacts. Since the proposed Mining Area TIS has included the projected traffic volumes of Cobblestone Lake, Brandtjen, Heritage and Genstar, then it was assumed their previously required improvement measures would also be implemented. Section 2.4.3 previously listed these measures as reiterated in the following:

1. 160<sup>th</sup> Street at Aggregate Industries Mining Access (future Cobblestone Lake and Brandtjen Entrance)

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<sup>1</sup> An environmental review was not required for the Heritage development.  
Sand & Gravel Mining and Accessory Uses  
Traffic Impact Study

- On the north approach, provide one left turn lane and one shared through/right-turn lane.
  - On the south approach, provide one left turn lane and one shared through/right-turn lane.
  - Install a traffic signal.
2. 160<sup>th</sup> Street at Diamond Path
    - On the north approach, provide one left turn lane, one through lane and one right turn lane.
    - On the south approach, provide one left turn lane, one through lane and one right turn lane.
    - Extend Diamond Path southward to 170<sup>th</sup> Street.
    - Install a traffic signal.
  3. Pilot Knob Road at Dodd Boulevard
 

On the east approach, provide one shared through/left turn lane and one exclusive right turn lane. (The following section will provide an improvement to this approach).
  4. Construct the 195<sup>th</sup> Street extension.
  5. Construct the 208<sup>th</sup> Street extension
  6. On TH 3, provide a four-lane cross-section from north of Elm Street to approximately 500 feet north of 160<sup>th</sup> Street. (The following section will provide further improvement to TH 3).
  7. Provide an exclusive 300-foot left turn and right turn lane on both the northbound and southbound approaches at the TH 3/170<sup>th</sup> Street intersection.

**Figure 5-1** graphically illustrates the improvements required as a result of the planned residential development studies.

## **5.2 Additional Improvements Not Previously Identified**

The traffic analysis identified several significant deficiencies as a result of the background growth plus the planned land development scenarios that were not corrected by the previous development studies recommendations. To address these expected deficiencies, improvement measures were identified and evaluated for both the 2015 and 2025 No-Build (background growth plus planned land development) scenarios. **Figure 5-2** illustrates the additional improvement measures required to accommodate the planned residential developments by Year 2015 and 2025.

### **5.2.1 Year 2015 No-Build (Background Growth plus Planned Land Developments)**

In addition to the measures listed previously in Section 5.1, several additional improvement measures will be required by Year 2015 to accommodate traffic generated from the background growth and the four planned land developments (Brandtjen, Cobblestone Lake, Genstar and Heritage). Of the improvement measures illustrated in **Figure 5-2**, the following details the improvements required by 2015 to accommodate the planned residential developments.

1. Cedar Avenue at 160<sup>th</sup> Street (Refer to Section 5.2.3)
  - Reconstruct northbound and southbound to include three through lanes in each direction.
  - Add dual left turn lanes on all four approaches. The southbound left turn lanes should provide at least 400 feet of storage.
2. Pilot Knob Road

Reconstruct Pilot Knob Road to include three lanes of travel in both the northbound and southbound directions. The six-lane section should extend from 150<sup>th</sup> Street to south of 170<sup>th</sup> Street.
3. 150<sup>th</sup> Street

Reconstruct 150<sup>th</sup> Street to include three lanes of travel in both the eastbound and westbound directions. The six-lane section should begin and end at a point between TH 3 and Pilot Knob Road and then extend westward. Although the study area did not evaluate intersections west of Pilot Knob Road, it is expected the six-lane section would need to be continued west of Cedar Avenue into Burnsville.
4. 150<sup>th</sup> Street at Pilot Knob Road
  - In addition to the eastbound/westbound six lane section, construct a free right turn movement for eastbound-to-southbound. The eastbound-to-southbound right turn movement should be designed to allow a continuous right turn movement into its own dedicated lane of travel. The dedicated lane would be the start of the third southbound travel lane on Pilot Knob Road.
  - Add a second left turn lane on both the eastbound and westbound approaches.
5. 160<sup>th</sup> Street at Pilot Knob Road

In addition to the northbound/southbound six lane section, construct a second left turn lane on the southbound approach.
6. Pilot Knob Road at 170<sup>th</sup> Street
  - In addition to the northbound/southbound six lane roadway, reconstruct both the eastbound and westbound approaches to include one exclusive left turn lane, one through lane and one exclusive right turn lane. The westbound left turn lane and right turn lanes should include approximately 450 feet of storage.

- Change the eastbound and westbound signal phasing to a protected/permmissive left turn operation.
7. TH 3 at 170<sup>th</sup> Street  
Install a traffic signal with protected left turn phasing for northbound/southbound TH 3 and permmissive only phasing for eastbound and westbound left turn movements.
  8. TH 3 at Elm Street  
Extend the northbound left turn lane to include 300 feet of storage.

A traffic operation analysis was completed which evaluated the effectiveness of the above additional improvements in conjunction with the improvements required in Section 5.1. **Figures 5-3** and **5-4** illustrate the AM peak hour and PM peak hour turning movement LOS and overall intersection LOS, respectively for the 2015 No-Build (background growth plus planned land developments) scenario with the identified improvements implemented. The results of the analysis indicated that all intersections are expected to operate at acceptable levels (i.e., LOS D or better) during each peak hour. Although a few movements are still expected to operate at a LOS E or F, these movements are either low volume or do not serve to further degrade the transportation system, and therefore are considered acceptable. It should also be noted that 160<sup>th</sup> Street is expected to be operating near capacity for a four-lane roadway. Additional improvements to 160<sup>th</sup> Street (discussed in Section 5.2.2 and 5.2.3) could potentially be required by 2015 or shortly there after.

**5.2.2 Year 2025 No-Build (Background Growth plus Planned Land Developments)**

The traffic analysis identified several additional deficiencies expected under the 2025 No-Build (background growth plus planned land developments) scenario. To accommodate the traffic increase associated with increased background growth and the remainder of the Genstar development, several additional infrastructure improvements were identified and evaluated. In addition to the measures listed previously in Section 5.1, and Section 5.2.1, the following details the additional improvement measures required by 2025:

1. 160<sup>th</sup> Street  
Reconstruct 160<sup>th</sup> Street to include three lanes of travel in both the eastbound and westbound directions. The six-lane section should begin and end at a point just west of Diamond Path and then extend westward beyond Cedar Avenue. The transition point, west of Cedar Avenue, should be included in the scope of a future traffic study.
2. 160<sup>th</sup> Street at Galaxie Avenue
  - In addition to the eastbound/westbound six lane roadway, construct a second left turn lane on the southbound approach. The southbound

approach should consist of two left turn lanes and one shared through/right turn lane. The left most left turn lane should include approximately 300 feet of storage. The right most left turn lane should extend the full length of roadway.

- Re-stripe the northbound approach to include one exclusive left turn lane and one shared through/right turn lane.
- Change the northbound/southbound left turn phasing to protected only.

3. Pilot Knob Road at Dodd Boulevard

- Add a second left turn lane on the eastbound approach with approximately 300 feet of storage.
- Change the lane assignment on the westbound approach to one left turn lane and one shared through/right turn lane.
- Change the eastbound/westbound left turn phasing to protected only.

4. Pilot Knob Road at 170<sup>th</sup> Street

- Construct a second left turn lane on the southbound approach.
- To accommodate the southbound dual left turn lanes, a second eastbound lane, east of Pilot Knob Road, will need to be constructed. The eastbound second receiving lane should allow for a minimum of 500 feet prior to transitioning back to one lane of travel.

5. TH 3

Extend the four-lane roadway cross-section to north of 150<sup>th</sup> Street. The four-lane roadway should begin and end at approximately ¼ to ½ mile north of 150<sup>th</sup> Street.

6. TH 3 at CSAH 66

Evaluate the need and justification for constructing a traffic signal system.

A traffic operation analysis was completed which evaluated the effectiveness of the above additional suggested improvements in conjunction with the improvements suggested in Section 5.1 and Section 5.2.1. **Figures 5-5 and 5-6** illustrate the AM peak hour and PM peak hour turning movement LOS and overall intersection LOS, respectively for the 2025 No-Build (background growth plus planned land developments) scenario with the suggested improvements implemented. The results of the analysis indicated that all intersections are expected to operate at acceptable levels (i.e., LOS D or better) during each peak hour. Although a few movements are still expected to operate at a LOS E or F, these movements are either low volume or do not serve to further degrade the transportation system, and therefore are considered acceptable.

Both the Cedar Avenue/160<sup>th</sup> Street and 160<sup>th</sup> Street/Pilot Knob Road are expected to operate near capacity (several turning movements were reported to

operate at a LOS E or F), even with all the improvement measures previously identified. The eastbound right turn movement at the 160<sup>th</sup> Street/Pilot Knob Road intersection is expected to operate poorly, affecting the through travel lanes. The following section will discuss future infrastructure improvements, which may better these locations, and serve to further improve other intersections within the study region. None of the additional improvements identified in Section 5.2 for the No-Build conditions (2005, 2015 and 2025) are committed or required to be completed by any of the planned residential developments, the cities, Dakota County or Mn/DOT at this time.

### **5.2.3 Potential Regional Improvements**

This section discusses larger scale infrastructure needs that may be required to better facilitate the forecast background volumes in the long term. Several intersections including Cedar Avenue at 160<sup>th</sup> Street, Pilot Knob at 160<sup>th</sup> Street, and Pilot Knob at 150<sup>th</sup> Street will essentially be fully improved with the measures identified in the previous section. However, even with these improvements, near capacity operations are expected by Year 2025. Roadway widening was the only improvement strategy evaluated, because a more appropriate approach to managing the increase in future travel demand in this case may be to identify regional infrastructure improvements. Consistent with the 2025 Dakota County Transportation Plan, the following provides a few regional improvement strategies that should be considered and further studied:

- The feasibility and regional benefit of providing freeway design with grade separated interchanges along Cedar Avenue.
- The feasibility of providing a grade separated interchange at Pilot Knob Road and 160<sup>th</sup> Street.
- The feasibility and regional volume benefit of providing additional east/west collector roadways, providing access from the study area to west of Cedar Avenue. Dakota County has already identified 180<sup>th</sup> Street as a viable east/west alternative. Local agencies should continue working together to make necessary efforts to accelerate further planning and potentially its implementation.
- Improvement of Biscayne Avenue to a north/south collector arterial.
- Improvement of Flagstaff Avenue, south of 160<sup>th</sup> Street, to a collector arterial.

Managing the future increases in background travel demand through regional infrastructure improvement strategies, as listed above, are likely to lessen the need for widening the major arterials beyond their existing four-lane cross-sections. Providing additional east/west corridors (i.e., 180<sup>th</sup> Street extension) would be expected to lessen the volume demand along 160<sup>th</sup> Street, which would stand to benefit the Pilot Knob Road/160<sup>th</sup> Street intersection. A larger scale study would better identify the appropriate mix of east/west corridors, freeway facilities, grade separations and improvements actually required for the larger intersections (i.e., Pilot Knob Road at 160<sup>th</sup> Street – grade separation may no longer need to be

further studied if other east/west corridors attract traffic). Improving Biscayne Avenue to a north/south collector roadway would be expected to benefit both TH 3 and Pilot Knob Road. However, a study determining the actual benefit, feasibility, and its benefit to TH 3 and Pilot Knob traffic volumes should be conducted.

### **5.3 Mitigation Option 1**

For purposes of this analysis, the background improvements described in Sections 5.1, 5.2.1 and 5.2.2 were assumed to be in place to determine the specific improvements needed for mitigation of the Mining Area impacts. Mitigation Option 1 is defined by the identification of mitigation measures required to address impacts as a result of the proposed Mining Area project (mining phasing, plant location and access points as defined and detailed in Chapter 2.0 and evaluated in Chapter 4.0). Mitigation Option 1 is defined by actions required by 2015, plus additional actions required by 2015, which are described in the following sections.

The traffic analysis identified a few deficiencies as a result of the forecast mining operations under the 2015 and 2025 Build traffic volumes and improved geometric conditions. To address these expected deficiencies, mitigation measures were identified and evaluated for both the 2015 and 2025 Build scenarios. In general, the improvement measures identified to facilitate the forecast background plus planned land use traffic volumes are expected to accommodate the proposed project. However, several localized impacts are expected and will be addressed in the following sections. **Figure 5-7** illustrates the mitigation measures included in Mitigation Option 1.

#### **5.3.1 Mitigation Option 1 - Year 2015 Build**

Based on the traffic analysis results and expected deficiencies presented in Chapter 4.0, several localized traffic impacts are expected under the forecast 2015 Build scenario. The Mitigation Option 1 scenario evaluation included the 2015 Build forecast traffic volumes, all geometric improvements identified previously in Sections 5.1 and 5.2.1, and optimized signal operations. Under Mitigation Option 1, the following mitigation measures are required to maintain acceptable AM and PM peak hour traffic operations in Year 2015:

1. TH 3 at 160<sup>th</sup> Street

Construct a second northbound left turn lane. The northbound left turn lanes should include a minimum of 300 feet of storage.

2. TH 3 at 170<sup>th</sup> Street

- Reconstruct both the eastbound and westbound approaches to include one exclusive left turn lane, one through lane and one exclusive right

turn lane. The left turn lane and right turn lanes should include approximately 250 feet of storage.

- Construct a second left turn lane on the southbound approach.
- To accommodate the southbound dual left turn lanes, a second eastbound lane, east of TH 3, will need to be constructed. The eastbound second receiving lane should allow for a minimum of 500 feet prior to transitioning back to one lane of travel.
- The eastbound and westbound left turn movements should operate under protected/permissive signal operations.

A traffic operation analysis was completed which evaluated the effectiveness of the above mitigation measures. **Figures 5-8** and **5-9** illustrate the AM peak hour and PM peak hour turning movement LOS and overall intersection LOS, respectively for the 2015 Build scenario with the suggested mitigation implemented. The results of the analysis indicated that all intersections are expected to operate at acceptable levels (i.e., LOS D or better) during each peak hour.

The No-Build scenarios identified the need for a six-lane roadway facility along 160<sup>th</sup> Street by Year 2025. With the proposed project, the traffic analysis indicated that the need for a six-lane 160<sup>th</sup> Street is expected to be required prior to 2025. By Year 2015, with the mining companies in operation, several higher volume movements are expected to operate at a LOS E or F and have excessive queue lengths. However, with the additional improvement measures identified in Section 5.2.2, these movements would generally be corrected. The following section will illustrate this conclusion.

### **5.3.2 Mitigation Option 1 - Year 2025 Build**

Based on the traffic analysis results and expected deficiencies presented in Chapter 4.0, several additional localized traffic impacts are expected under the forecast 2025 Build scenario. The Mitigation Option 1 scenario evaluation included: the 2025 Build forecast traffic volumes, all geometric improvements identified previously in Sections 5.1, Section 5.2.1, Section 5.2.2, Section 5.3.1 and optimized signal operations. Under Mitigation Option 1, the following additional mitigation measures are required to maintain acceptable AM and PM peak hour traffic operations at the key intersections in Year 2025:

#### **1. TH 3 at 160<sup>th</sup> Street**

Construct a free right turn movement on the eastbound approach. The free right turn movement should be designed to provide an acceleration lane for turning vehicles to merge with the southbound traffic. Adequate distance and geometric design elements should be utilized to allow vehicles to flow freely, accelerate and merge safely with the southbound traffic flow, without coming to a stop or yield.

## 2. TH 3 at 170<sup>th</sup> Street

- Construct a second left turn lane on the northbound and southbound approaches.
- To accommodate the northbound dual left turn lanes, a second westbound lane, west of TH 3, will need to be constructed. The westbound second receiving lane should allow for a minimum of 500 feet prior to transitioning back to one lane of travel.

## 3. Pilot Knob Road at 170<sup>th</sup> Street

Provide a westbound right turn overlap signal phase.

A traffic operation analysis, evaluating the effectiveness of the above mitigation measures was completed. **Figures 5-10** and **5-11** illustrate the AM peak hour and PM peak hour turning movement LOS and overall intersection LOS, respectively for the 2025 Build scenario with the suggested mitigation implemented. The results of the analysis indicate that all intersections are expected to operate at acceptable levels (i.e., LOS D or better) during each peak hour, with the following exception.

The TH 3/170<sup>th</sup> Street intersection is expected to operate at a LOS F during the AM peak hour. Under the proposed project, mining phases, plant location and access location assumptions (Section 2.0), the majority of the mining traffic is expected to use the TH 3/170<sup>th</sup> Street intersection. This creates a high truck percentage at this location, greatly reducing the capacity of the intersection. All feasible intersection mitigation strategies were tested; however, the intersection is still expected to operate at a LOS F.

To address this issue a second mitigation option, Mitigation Option 2, was developed.

### 5.4 Mitigation Option 2

Mitigation Option 2 was developed to specifically reduce the number of trucks entering/exiting via the TH 3/170<sup>th</sup> Street intersection in an effort to improve the intersection LOS. To accomplish this, the proposed shared Aggregate Industries and McNamara access points were relocated to Biscayne Avenue. The relocated access points would be located on Biscayne Avenue, midway between 160<sup>th</sup> Street and 170<sup>th</sup> Street. As a result of this access point change, Aggregate Industries and McNamara mining traffic would be expected to use the 160<sup>th</sup> Street/Biscayne Avenue intersection rather than TH 3/170<sup>th</sup> Street, as it becomes a more direct and quicker route to their plants.

Mitigation Option 2 was analyzed only under the 2025 Build scenario. **Figure 5-12** illustrates the mitigation measures included in Mitigation Option 2. The previous sections found that Mitigation Option 1 accommodated the projected Year 2015 conditions.

### **5.4.1 Mitigation Option 2 - Year 2025 Build**

**Figures 5-13 and 5-14** illustrate the redistributed AM and PM peak hour forecast Year 2025 Build intersection turning movement volumes, respectively, for Mitigation Option 2.

The Mitigation Option 2 scenario evaluation included the re-distributed 2025 Build forecast traffic volumes, all geometric improvements identified previously in Sections 5.1, Section 5.2.1, Section 5.2.2 and optimized signal operations. Under Mitigation Option 2, the following details the mitigation measures required to maintain acceptable AM and PM peak hour traffic operations in Year 2025:

1. TH 3 at 160<sup>th</sup> Street  
Construct a second northbound left turn lane. The northbound left turn lanes should include a minimum of 300 feet of storage.
2. TH 3 at 170<sup>th</sup> Street
  - Reconstruct both the eastbound and westbound approaches to include one exclusive left turn lane, one through lane and one exclusive right turn lane. The left turn lane and right turn lanes should include a minimum of 250 feet of storage.
  - The eastbound and westbound left turn movements should operate under protected/permissive signal operations.
3. 160<sup>th</sup> Street  
Extend the four-lane roadway cross-section eastward, to transition to/from the two-lane cross-section east of Biscayne Avenue.
4. 160<sup>th</sup> Street at Biscayne Avenue
  - Install a traffic control signal system with protected left turn phasing for eastbound and westbound and protected/permissive phasing for southbound/northbound
  - Construct the northbound and southbound approaches to include one exclusive left turn and one shared through/right turn lane. The left turn lanes should include approximately 300 feet of storage.
  - In addition to the four-lane roadway cross-section and the existing exclusive left turn lanes, construct 300-foot exclusive right turn lanes on the eastbound and westbound approaches.
5. Biscayne Avenue at 170<sup>th</sup> Street
  - The eastbound and westbound approaches should operate under a stop control. The northbound and southbound movements would have the right-of-way.

A traffic operation analysis was completed which evaluated the effectiveness of the above mitigation measures and Mitigation Option 2. **Figures 5-15 and 5-16** illustrate the AM peak hour and PM peak hour turning movement LOS and overall intersection LOS, respectively for the 2025 Build scenario with the suggested mitigation implemented. The results of the analysis indicated that all intersections are expected to operate at acceptable levels (i.e., LOS D or better) during each peak hour. Although a few movements are still expected to operate at a LOS E or F, these movements are either low volume, operate poorly under the No-Build scenarios or do not serve to further degrade the transportation system, and therefore are considered acceptable.

Mitigation Option 2 is expected to better disperse the Mining Area site-generated traffic volumes throughout the roadway system, lessening the impact to the heavily traveled north/south arterials. Biscayne Avenue, which is currently an under utilized north/south roadway, can be more efficiently used to carry a portion of the proposed project traffic volumes. Better utilizing Biscayne Avenue provides a positive benefit to the transportation system, and alleviates several unresolved deficiencies defined under Mitigation Option 1.

## **5.5 Other Potential Mitigation**

In addition to the traffic operation impacts and the respective mitigation measures necessary to mitigate mining traffic (Mitigation Option 1 or Mitigation Option 2), the mining companies may be responsible for the reconstruction of two segments of roadway:

- 170<sup>th</sup> Street, between the railroad tracks and Biscayne Avenue; and
- Biscayne Avenue, between 160<sup>th</sup> Street and 180<sup>th</sup> Street.

If the roadways are lowered to gain access to material beneath the road surface and/or to provide reasonable access to properties adjacent to these roadways, then the mining operators benefiting from the material would need to participate in the reconstruction of the new lower roads. A few requirements may include:

- The mining companies collectively phase the mining of material at the location of the new roadway alignment, such that the new roadway can be built without altering traffic patterns
- Both 170<sup>th</sup> Street and Biscayne Avenue are to be built to Dakota County pavement and geometric design standards and accommodate the projected vehicle and truck volumes
- In addition, the intersection at Biscayne Avenue and 170<sup>th</sup> Street should be re-built to meet County standards and meet the intended functional classification of the roadways (i.e., exclusive turn lane requirements, etc.) at such time. The number of lanes required (i.e., 2-lane or 4-lane) along Biscayne will be determined in future studies

- The alignment of Biscayne Avenue is to coincide with the MSEC interceptor corridor

The Mining Consortium will need to coordinate with Empire Township and Dakota County on the timing and cost sharing for the reconstruction of the lowered road segments.