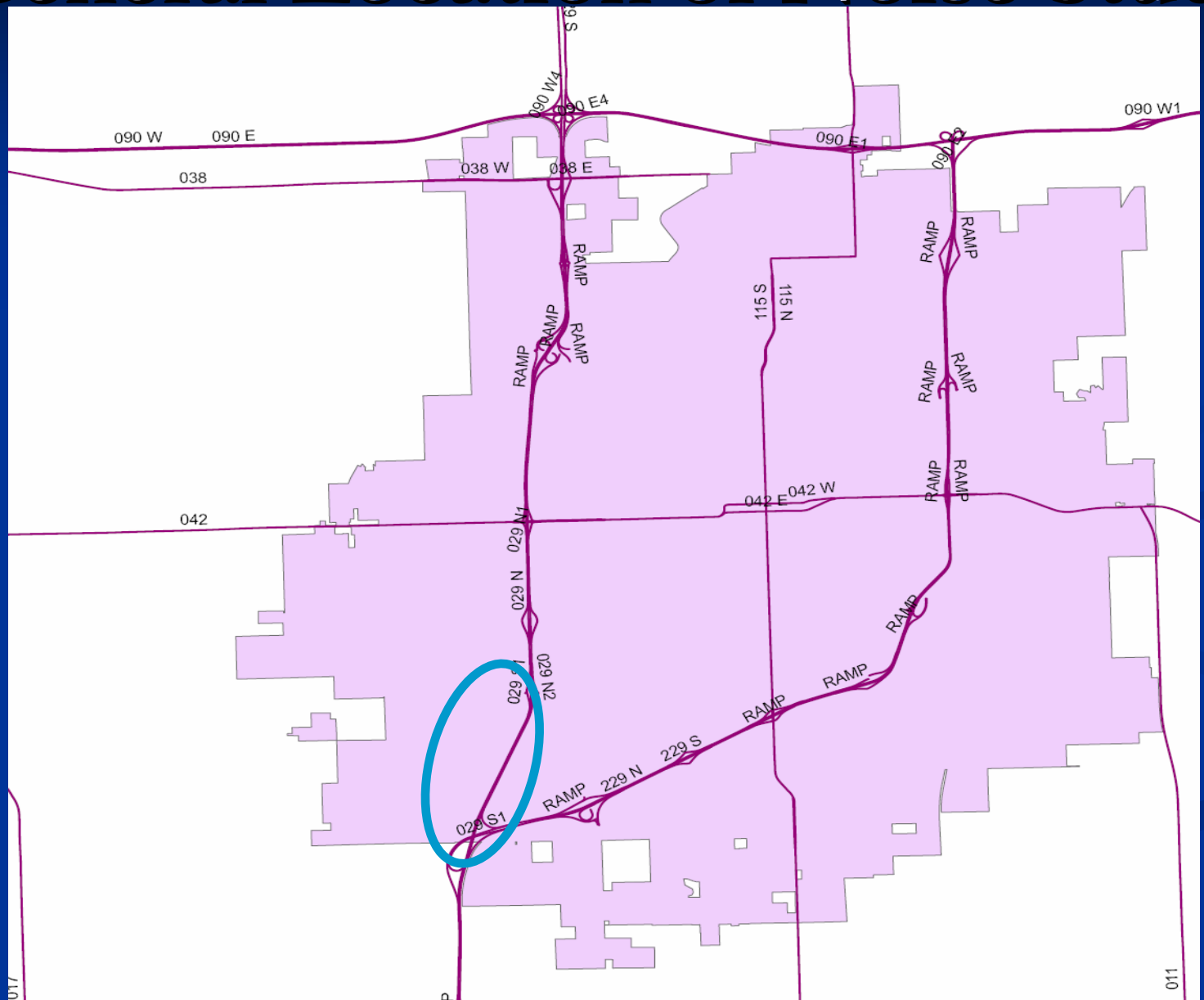
Noise Analysis Study along I - 29

Tim Bjorneberg
Project Development Program Manager
SDDOT

Meeting Format

- Very informal
- Meeting is not recorded
- General questions after presentations
- Specific questions with staff after
- Written comments official record
- Is there someone who did not know about this meeting that should have?

General Location of Noise Study



Existing & Future Noise Levels

Receptor ID	NAC (dBA)	Hourly Leq (h) dBA			Difference	Difference
		2005	2025	2025		
		Existing	"No-Build"	"Build"	Existing/Build	Build/No-Build
MonLoc1	67	70	70	70	0	0
MonLoc2	67	70	72	72	+2	0
MonLoc3	67	67	69	69	+2	0
MonLoc4	67	59	60	60	+1	0
Reciever1	67	59	59	59	0	0
Reciever2	67	59	63	63	+4	0
Reciever3	67	68	69	69	+1	0
Reciever4	67	69	69	70	+1	+1
Reciever5	67	67	68	69	+2	+1
Reciever6	67	65	65	66	+1	+1
Reciever7	67	70	70	70	0	0
Reciever8	67	68	69	69	+1	0

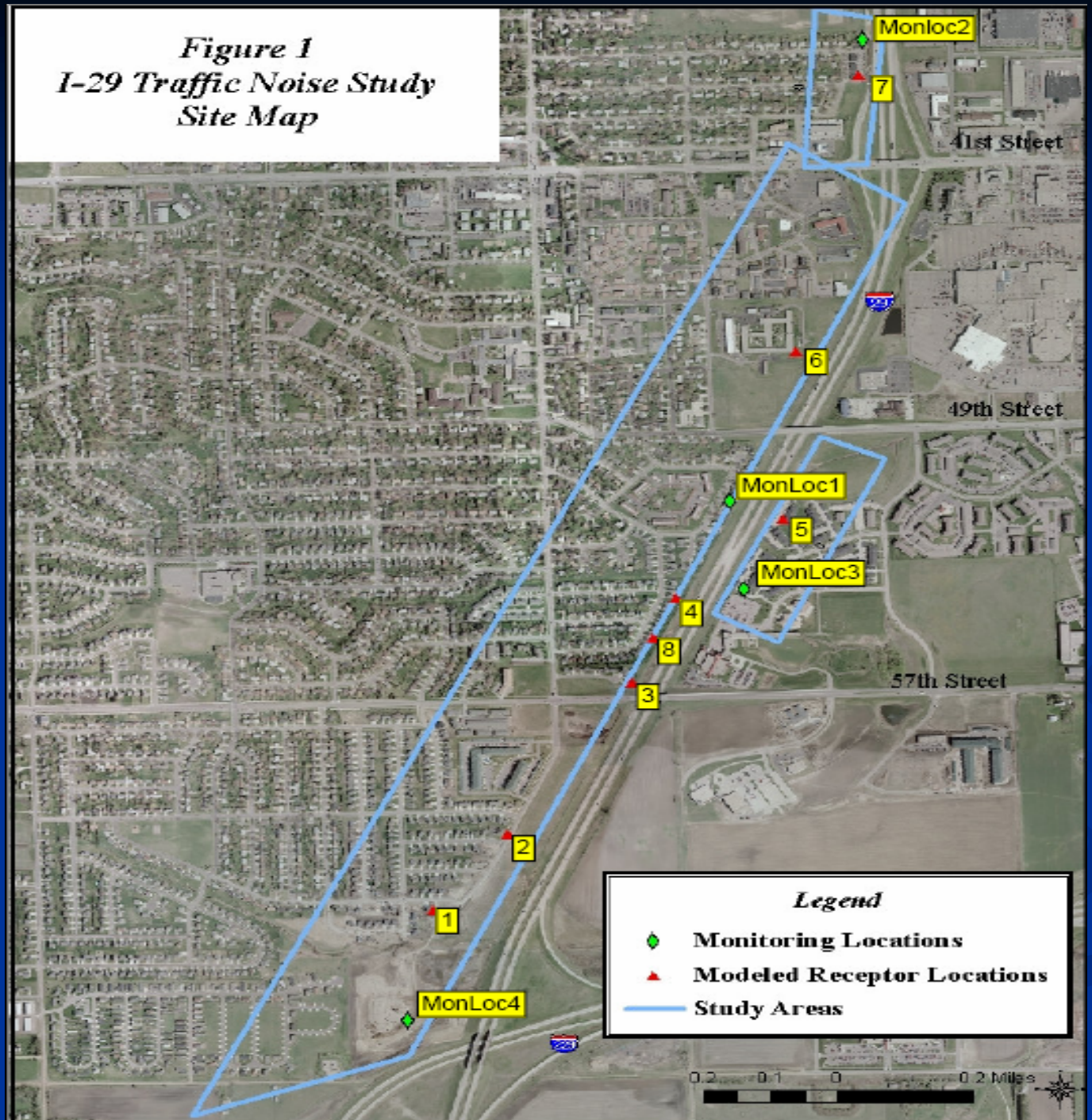


Figure 1
I-29 Traffic Noise Study
Site Map
Monloc2
7
41st Street
6
49th Street
MonLoc1
5
MonLoc3
4
8
3
57th Street
2
1
MonLoc4
Legend
Monitoring Locations
Modeled Receptor Locations
Study Areas
0.2
0.1
0
0.2 Miles

What does all this data mean?

- The current noise is above the 66 dBA criteria in eight locations
- The future noise projections do not show a substantial increase (15 dBA)
- The addition of the auxiliary lane has almost a negligible effect on the future noise.

Existing & Future Noise Levels

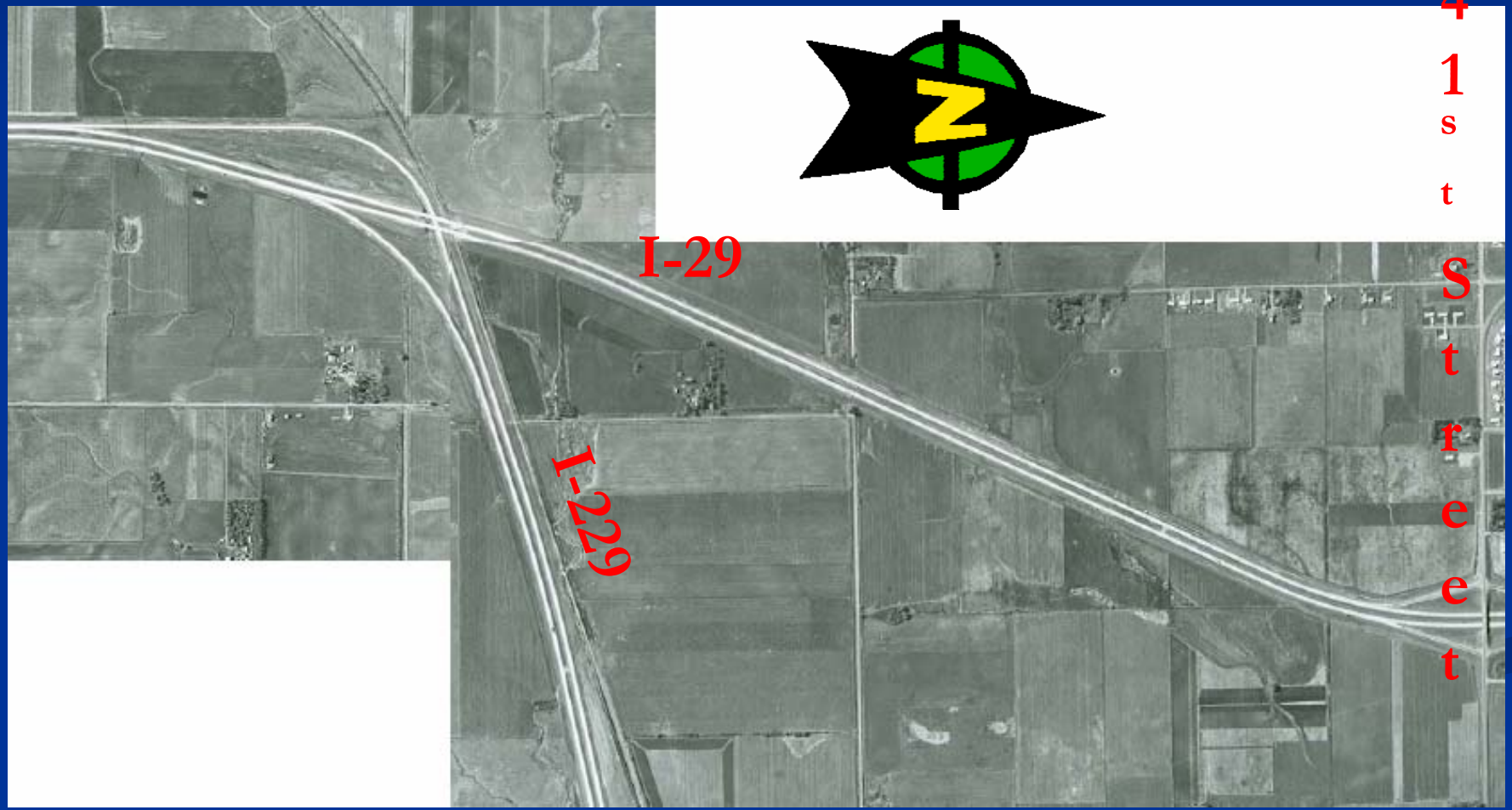
Receptor ID	NAC (dBA)	Hourly Leq (h) dBA			Difference	Difference
		2005	2025	2025		
		Existing	"No-Build"	"Build"	Existing/Build	Build/No-Build
MonLoc1	67	70	70	70	0	0
MonLoc2	67	70	72	72	+2	0
MonLoc3	67	67	69	69	+2	0
MonLoc4	67	59	60	60	+1	0
Reciever1	67	59	59	59	0	0
Reciever2	67	59	63	63	+4	0
Reciever3	67	68	69	69	+1	0
Reciever4	67	69	69	70	+1	+1
Reciever5	67	67	68	69	+2	+1
Reciever6	67	65	65	66	+1	+1
Reciever7	67	70	70	70	0	0
Reciever8	67	68	69	69	+1	0

History of Study Area

- The interstate was constructed in 1960

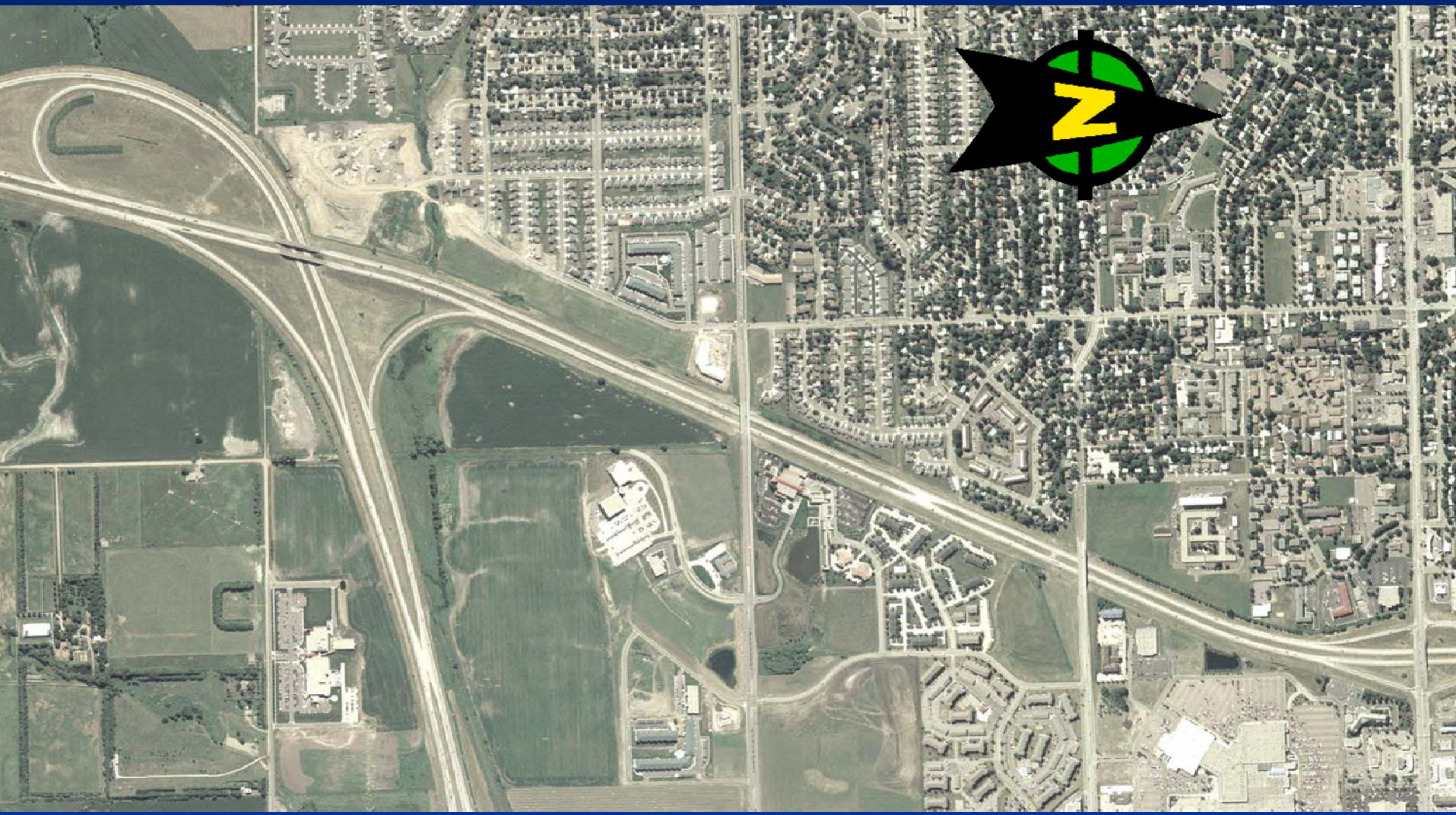
- Although noise data does not exist for this segment when it was developed, the majority of residences built/purchased their property knowing their close proximity to the interstate and its' traffic capacity.

Aerial Photo (1962)



Aerial Photo (1991)

Aerial Photo (2004)



State and Federal Policy Regarding Noise Analysis & Mitigation

- Federal Policy: Code of Federal Regulations (CFR)Title 23 Part 772

- State Policy: PD-2004-02

Federal Policy

- Defines the procedure for abatement of highway traffic noise and construction noise
  - Provides definitions
  - Defines what is applicable
  - Abatement – measures used to reduce traffic noise levels. (7dBA)
  - Federal Participation
  - Analysis procedure
  - Traffic noise prediction
  - Local official information

State Policy

- Noise analysis & abatement guidelines/policy
  - Defines locations to be considered
  - Outlines how data should be collected and future level predictions
  - Defines "Traffic Noise Impact"
  - Explains abatement considerations
  - Outlines the public involvement
  - Gives guidance on coordination with public officials
  - Supplies definitions of terms

Noise Sensitive Land uses Locations

- Homes
- Schools
- Churches
- Hospitals
- Libraries

Data Collection & Future Projections

- Data was collected according to FHWA "Sound Procedures for Measuring Highway Noise, Final Report"

- Future projections were determined using the FHWA Traffic Noise Model Version 2.1

Identification of Traffic Noise Impacts

- "A traffic noise impact occurs when the predicted levels approach or exceed the NAC when predicted traffic noise levels substantially exceed the existing noise level, even though the predicated levels may not exceed the NAC. "Approach" shall mean at least 1dBA less than the NAC and "substantially exceed the existing noise levels" shall mean an increase of at least 15 dBA noise levels."

Consideration of Abatement

- Abatement measures must be feasible and reasonable.
  - Feasible – substantial noise reduction, topographically possible, no present safety or maintenance issues
  - Reasonable – 7 dBA noise reduction, Abatement shall not exceed $15,000 / benefited residence, public hearings shall be held, future noise level must approach or exceed the NAC, timing of development adjacent to the highway.

Public Involvement & Coordination with Local Officials

- Public hearings shall be held to gain public opinion

- DOT's & local officials' responsibilities: "Highway traffic noise should be reduced through a program of shared responsibility. Local government should use their power to regulate land development in such a way that noise sensitive land uses are either prohibited from being located adjacent to a highway or that the developments are planned, designed and constructed in such a way that noise impacts are minimized."

Interpretation of DOT Policy for this project

- In many locations the existing and future noise levels approach or exceed the NAC

Abatement Options

Options Considered to be Impractical

- Modify horizontal and/or vertical alignments of the roadway (Too expensive)
- Traffic management measures (speed limits, restrict truck traffic) (Not viable)
- Acquisition of property rights for construction of noise barriers (Too expensive)
- Acquisition of property to serve as buffer zone (Too expensive)
- Noise insulation of public use or nonprofit institutional structures (All structures are privately owned)

Abatement Options (contd)

Options considered for further review

- Construction of noise barrier along or within ROW
- Roadway surface type
- Vegetation

Noise Barrier Locations

- North Barrier
  - Located near apartment building north of 41st street on the west side of I-29
- South Barrier
  - Located near houses on between 57th & 49th street on west side of I-29
- East Barrier
  - Located near apartment buildings between 57th & 49th street on the east side of I-29

Figure 5

I-29 Traffic Noise Study

North Noise Barrier

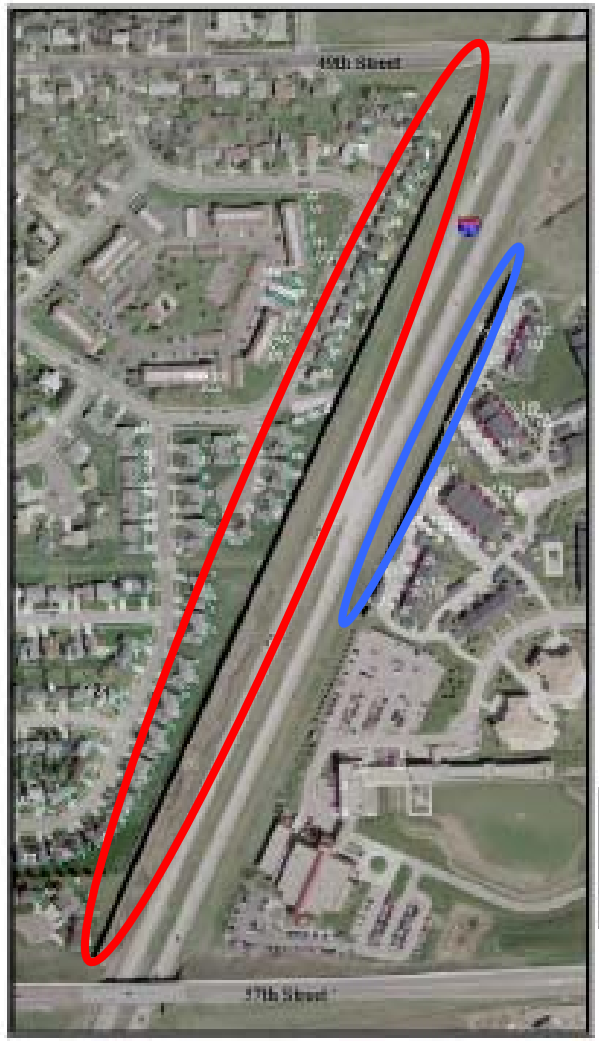


Figure 4

I-29 Traffic Noise Study

South & East Noise Barriers

North Barrier

Barrier Wall/ Receptor	Barrier Length (ft)	Average Barrier Height (ft)	Insertion Loss (dBA)	Total Number of Shielded Receptors	Total Number of Impacted Receptors	Number of Benefited Receptors [1]
North Barrier	624	16	1-9	27	31	20

[1] Receptors where the noise level reduction from the barrier is at least 5 dBA.

Wall Cost = $574,080
Number Benefited = 20
Cost/Number Benefited = $28,704

South Barrier

Barrier	Barrier Length (ft)	Average Barrier Height (ft)	Insertion Loss (dBA)	Total Number of Shielded Receptors	Total Number of Impacted Receptors	Number of Benefited Receptors [1]
South Barrier	2,671	19	4-13	106	48	103

[1] Receptors where the noise level reduction from the barrier is at least 5 dBA.

Wall Cost = $2,918,067
Number Benefited = 103
Cost/Number Benefited = $28,330

East Barrier

Barrier	Barrier Length (ft)	Average Barrier Height (ft)	Insertion Loss (dBA)	Total Number of Shielded Receptors	Total Number of Impacted Receptors	Number of Benefited Receptors [1]
East Barrier	1,039	16	4-8	60	52	58

[1] Receptors where the noise level reduction from the barrier is at least 5 dBA.

Wall Cost = $955,880
Number Benefited = 58
Cost/Number Benefited = $16,480

Feasibility and Reasonableness of Constructing Noise Walls

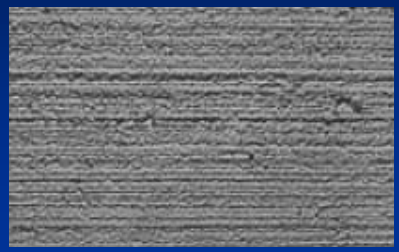
- Noise walls are a feasible option
  - Meaning there would be a substantial noise reduction, topographically possible, no present safety or maintenance issues
- Noise walls are not a reasonable option
  - There would be a 7 dBA reduction, but the construction cost must be below $15,000 per number benefited, therefore none of the options are reasonable

Abatement – Surface Type

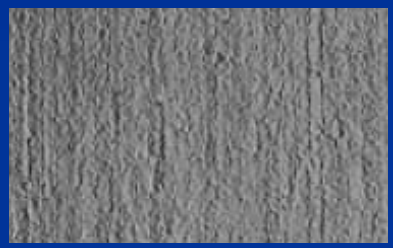
- If noise is taken into consideration when designing the surface of the new roadway the noise levels can be reduced by 4-7 dBA
  - Asphalt
    - Results in a smoother pavement and therefore a quieter ride
  - Concrete
    - Can be tined differently in order to maintain vehicle control and produce a quieter surface
    - Size and location of joints may be modified

Concrete Textures

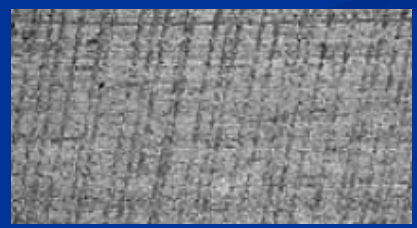
- Broomed Surface



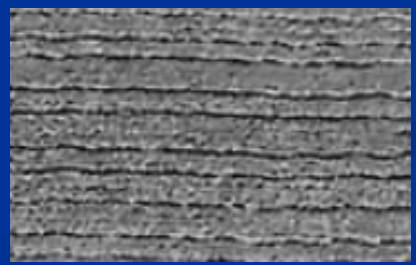
- Buralp Drag



- Transverse Tine



- Longitudinal Tine



Asphalt Options

- Asphalt over Concrete

Surface Feasibility

- Alter the surface pattern on concrete
  - Cost = $0
  - Possible Number Benefited = 181
  - Cost / Number Benefited = $0
- Asphalt over Concrete (57th St to 41st St)
  - Cost = $433,000
  - Possible Number Benefited = 181
  - Cost / Number Benefited = $2,400

Abatement – Surface type

- Feasibility
  - Meaning there would be a substantial noise reduction, topographically possible, no present safety or maintenance issues
- Reasonableness
  - A 7 dBA reduction is possible, and cost is below $15,000 per number benefited.

Abatement – Vegetation

Approximately 100’ of dense vegetation would be needed for a 3dBA loss

- Feasible
  - There would not be a substantial noise reduction, not topographically possible, it might present safety or maintenance issues (snow, animal hits)
- Reasonableness
  - A 7 dBA reduction is not possible, and cost to purchase additional property to provide for dense vegetation would be above $15,000 per number benefited. (Additional 100’ – 300’ of Right of Way would be needed)

Where does this leave us?

- Modify horizontal and/or vertical alignments of the roadway (Not Reasonable)
- Traffic management measures (speed limits, restrict truck traffic) (Not Feasible or Reasonable)
- Acquisition of property rights for construction of noise barriers (Not Reasonable)
- Acquisition of property to serve as buffer zone (Not Reasonable)
- Noise insulation of public use or nonprofit institutional structures (All structures are privately owned)
- Construction of noise barrier along or within ROW (Feasible but not Reasonable due to cost)
- Alter the Surface type or texture (Feasible and Might be Reasonable)
- Vegetation (Not Reasonable or Feasible)

DOT's Recommendation

- Reconstruct segment and utilize noise conscious surfacing design to reduce noise 4-7dBA.
- Measure the traffic noise after construction to see how we did.

Questions????