

Höfðabakki/Bæjarháls intersection

Operational performance, road safety and recommended improvements

Capacity Analysis

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Executive summary

Current issue

The junction performs satisfactorily in the morning peak, but the afternoon peak is characterized by major queues and several movements at LOS F.

Best-performing option

Scenario 2 extends critical lane storage and restores two eastbound through lanes. Overall PM performance improves from LOS E to LOS D.

Recommendation

Proceed with Scenario 2. It improves operations and safety without reintroducing additional unsignalized conflicts for pedestrians and cyclists.

Why the intersection was studied

Observed congestion

Operational problems are particularly evident during the afternoon peak, with significant queuing on Bæjarhóls.

Assessment scope

Signal optimization, road markings, lane allocation, lane extensions and potential geometric improvements.

Study objective

Identify practical solutions that provide substantial operational benefits with limited physical intervention.

Observed operational challenges

1 Afternoon peak

Significant queue build-up on Bæjarháls reduces accessibility and junction performance.

2 Short downstream merge

The southbound merge lane provides limited storage and discourages balanced lane use.

3 Blocking back

Vehicles may enter without sufficient downstream space and become stranded in the intersection.

4 Safety exposure

Collision records show a concentration of crashes near the merge area south of the junction.

Four scenarios were tested

Sc. 0 - Baseline

Existing conditions

Currently geometry, signal settings and observed traffic demand.

Sc. 1 - Reference

Pre-reconstruction layout

Former north and east slip lanes are reinstated; previous lane allocation is restored.

Sc. 2 - Preferred

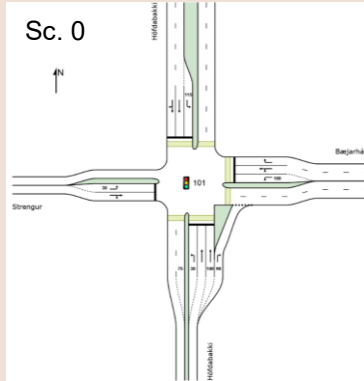
Optimized geometry

Longer storage and exit lanes plus two through lanes from the west.

Sc. 3 - Additional

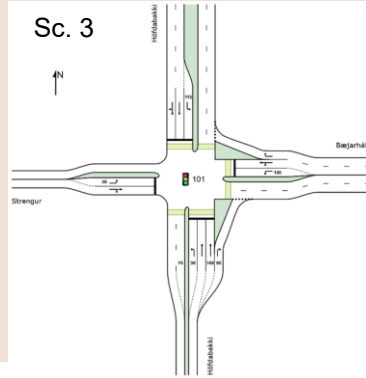
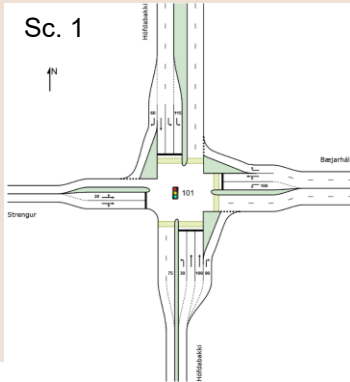
Right-turn slip lane From Bæjarháls reinstated

Scenario 0 and 1: Layout comparison



Scenario 0 - Existing

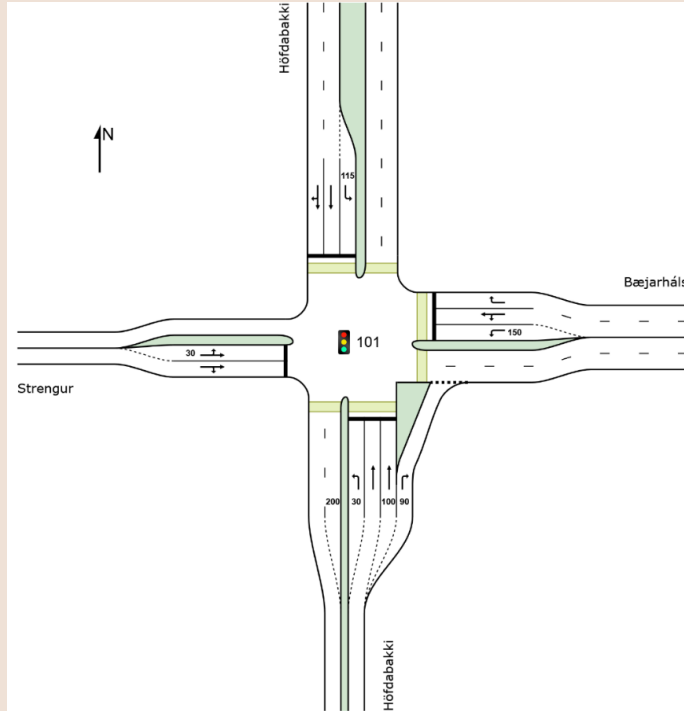
Mainly signalized layout with fewer unsignalized conflict points. The short southbound merge remains a key constraint.



Scenario 1 – Pre-reconstruction Scenario 3 – Right-turn slip lane

Slip lanes improve selected vehicle movements but create additional conflict points and less favorable conditions for vulnerable road users.

Scenario 2 targets the critical bottlenecks



Left-turn lane on Bæjarháls

150 m

Extended from 100 m to increase storage capacity.

Southbound exit lane

200 m

Extended from 75 m to promote balanced lane use and improve downstream storage.

West approach

2 lanes

Two through lanes restored from Strengur

Study basis and key assumption

Drone survey

April 2026

Two survey days for the morning and afternoon periods.

AM peak

07:35 – 08:35

Peak-hour volumes used as model input.

PM peak

15:35 – 16:35

Critical period for observed congestion.

Heavy vehicles

5 %

Adopted from the previous 2024 analysis.

Signal control

Up to 150 sec.

Variable cycle time with four main phases.

Calibration

Drone observations

Model adjusted to reproduce observed queues, especially in the PM peak.

Operational assessment methodology

Level of Service [LOS]	Performance Description
A	Free-flow operating conditions with minimal delay and unrestricted manoeuvrability. At signalised intersections, stopped delay is negligible.
B	Reasonably free-flow conditions with only minor restrictions on manoeuvrability. Delays are minimal and generally not perceived as disruptive by motorists.
C	Stable operating conditions with noticeable restrictions on manoeuvrability compared to LOS B. Drivers experience occasional delays and increased interaction with other vehicles.
D	Operating conditions approaching instability, where small increases in traffic demand can result in substantial increases in delay and reductions in travel speed. Driver comfort and freedom to manoeuvre become significantly constrained.
E	Operations at or near capacity, characterised by significant delays at junction approaches, limited manoeuvrability, and low average travel speeds.
F	Oversaturated conditions with severe congestion, extremely low speeds, excessive delays, and long queues. Traffic progression is poor, and demand exceeds available capacity.

Model framework

SIDRA Intersection 9.1, applying HCM 2010 principles

Primary performance measures

Average control delay and 95th-percentile maximum queue length

Interpretation

LOS A–D is generally acceptable. LOS F movements require mitigation

Morning peak: Satisfactory in all scenarios

AM

Traffic operations are satisfactory under existing conditions and in both alternative scenarios.

Scenario 0

Satisfactory

Scenario 1

Satisfactory

Scenario 2

Satisfactory

Scenario 3

Satisfactory

The afternoon peak therefore determines the design decision.

Afternoon peak: Scenario 2 drives the outcome

Scenario 0, 1 and 3

LOS E

Several movements at
LOS F

Scenario 2

LOS D

Substantial operational
improvements

Preferred

Scenario 2 improves queues, but resilience is limited

< 170 m

Calculated maximum queues for the two high-volume LOS E movements.

- Left turn from north
- Left turn from east

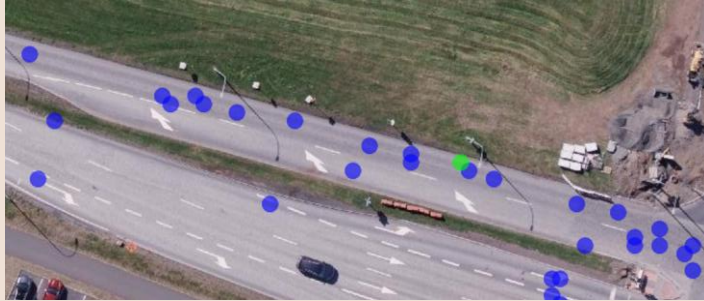
The queue from east is substantially reduced compared with Scenario 0.

> 80 %

Saturation on some movements during the PM peak

Relatively small increases or fluctuations in traffic demand may cause the junction to become unsatisfactory again.

Road safety findings support Scenario 2



Existing critical location

Collision history and drone footage identify the short southbound merge lane as a key operational and safety concern.

Slip-lane trade-off

Reinstated slip lanes add unsignalized conflicts and require pedestrians and cyclists to cross additional traffic streams.

Scenario 2 advantage

A longer merge lane addresses the documented problem while avoiding new unsignalized conflict points.

Recommended solution

Proceed with Scenario 2 as the preferred operational and road safety solution

1

Extend left-turn lane from east

100 m → 150 m

2

Extend southbound exit lane

75 m → 200 m

2

Restore two eastbound through lanes

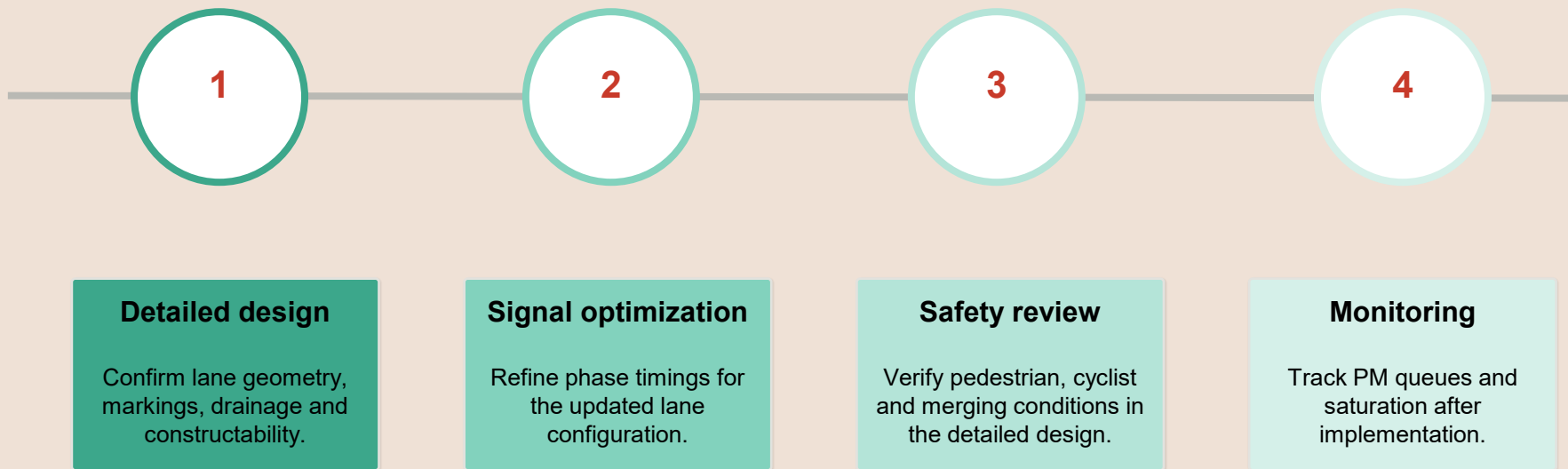
From Strengur

4

Do not reinstate slip lane on Bæjarháls

Marginal benefit; Safety concern

Implementation focus and next steps



Key caution: Scenario 2 meets current demand, but provides limited buffer for traffic growth