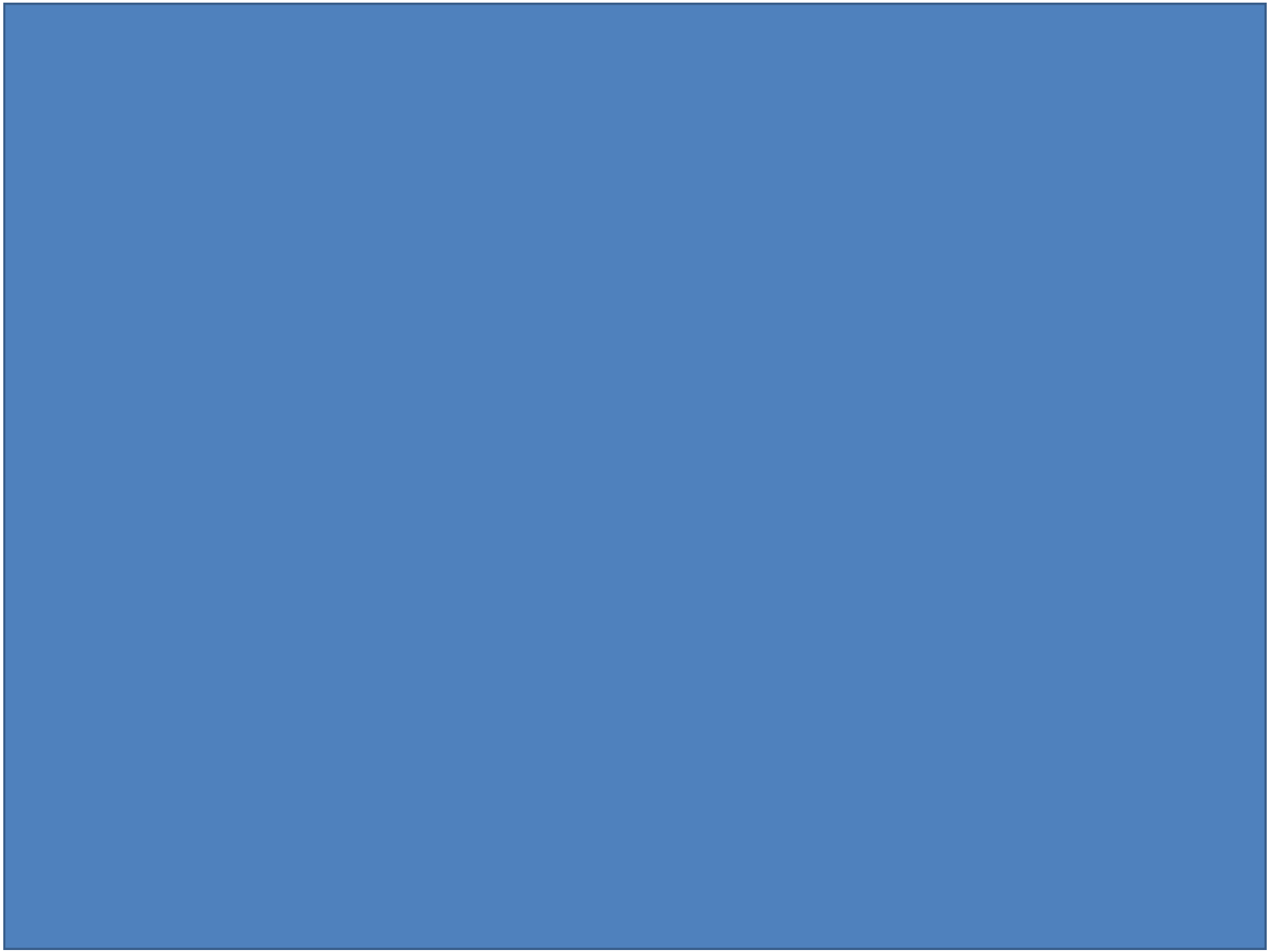

QUICK-LAUNCH BRIDGES:
For Safer Smoother Traffic on Hill Roads

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by

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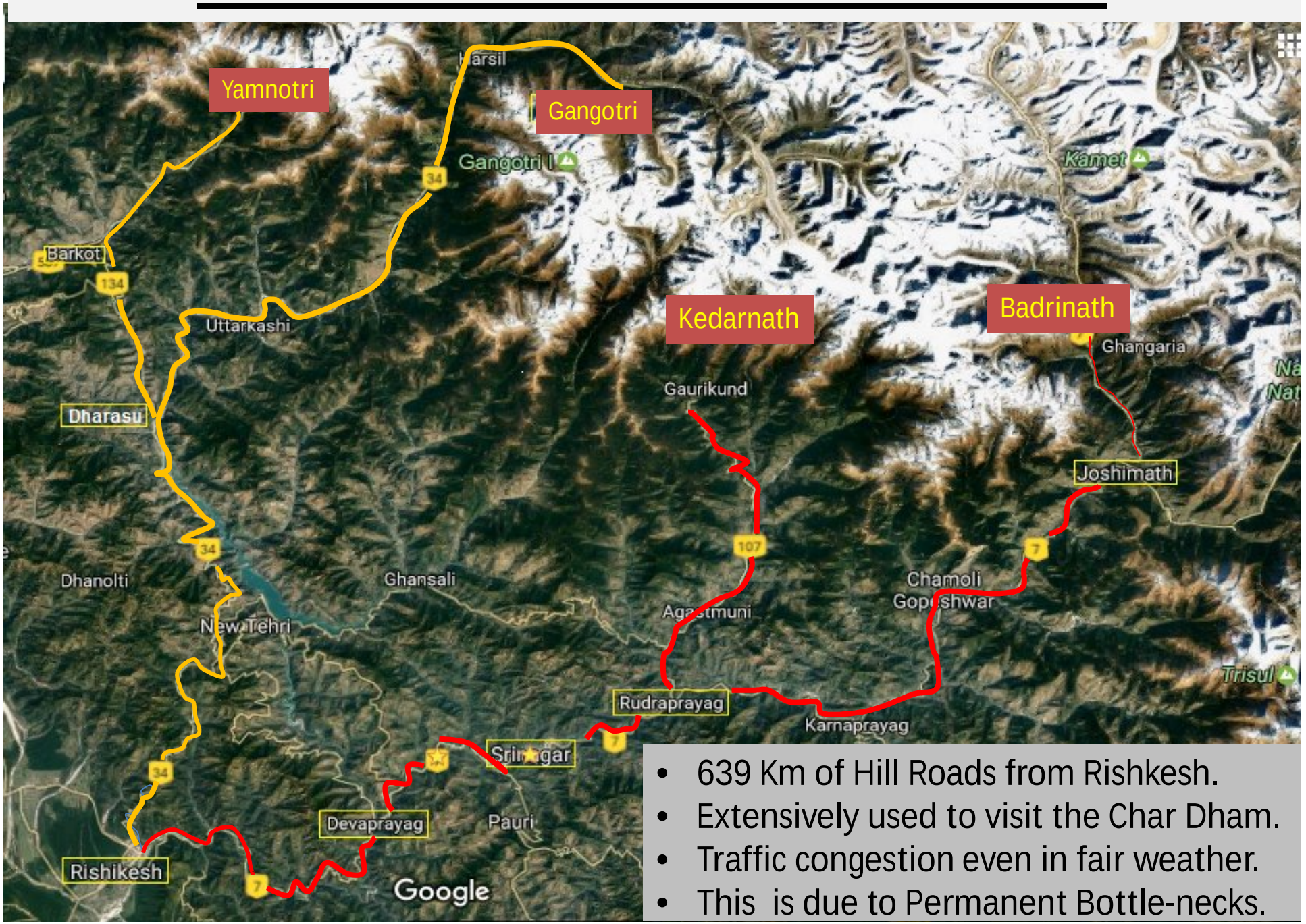
Lt Gen S Ravi Shankar (Retd)

PVSM, VSM

- State of Bridges on NHs along Northern Borders.
- Sub-optimal Bridges on NHs- & the Cause.
- New Generation Quick Launch Bridges.

UTTARAKHAND : CHAR DHAM ROUTE



- 639 Km of Hill Roads from Rishkesh.
- Extensively used to visit the Char Dham.
- Traffic congestion even in fair weather.
- This is due to Permanent Bottle-necks.

State of Bridges: Char Dham Routes

	National Highway (NH)	NO OF MAJOR BRIDGES, & LOAD CLASS											Total
		Class 70R		Class B		Class 40 R		Class 24 R		18 T and Below		Total SL	
		D L	SL	DL	SL	DL	SL	DL	SL	DL	SL		
1	NH 134: Dharasu - Yamnotri	01	-	-	-	-	-	-	-	-	13	13	14
2	NH 34: Dharasu - Gangotri	18	-	-	02	-	-	-	01	-	02	05	23
3	NH 107: Rudraprayag -Gaurikund	12	-	-	-	-	-	-	-	-	08	08	20
4	NH 7: Rishikesh - Badrinath	38	-	-	-	-	01	-	02	-	03	06	44
	Total	69	-	-	02	-	01	-	03	-	26	32	101

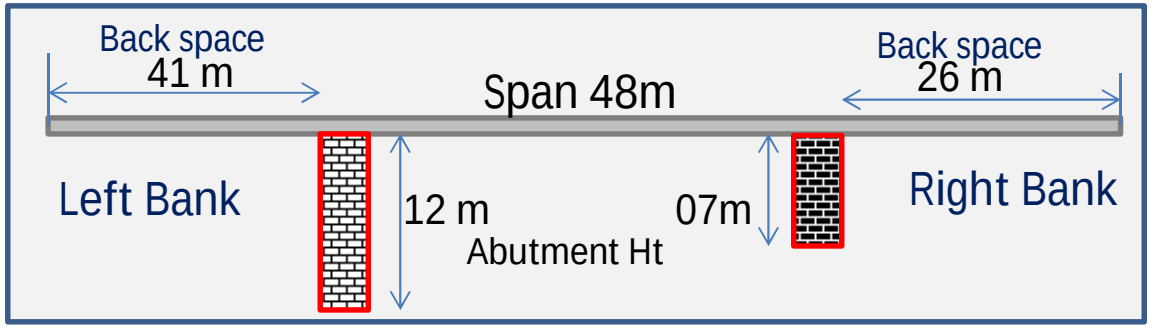
DL: Double Lane ; SL: Single Lane

32 of 101 Bridges are Sub-optimal: single lane , below 70 R loading

Data collected by Team from ICT

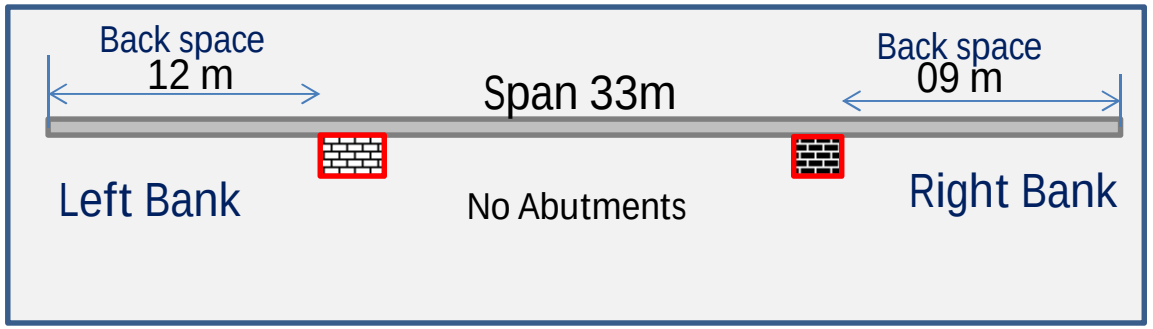
1. Yamuna River Bridge on Dharasu- Yamnotri Road –Km 189 (NH-134)

- Type - Steel Truss
- Width - 4.25 m
- Load Class - 16.5 T



2. Swari Gaad Bridge on Dharasu- Gangotri Road at Km 59.54 (NH-34)

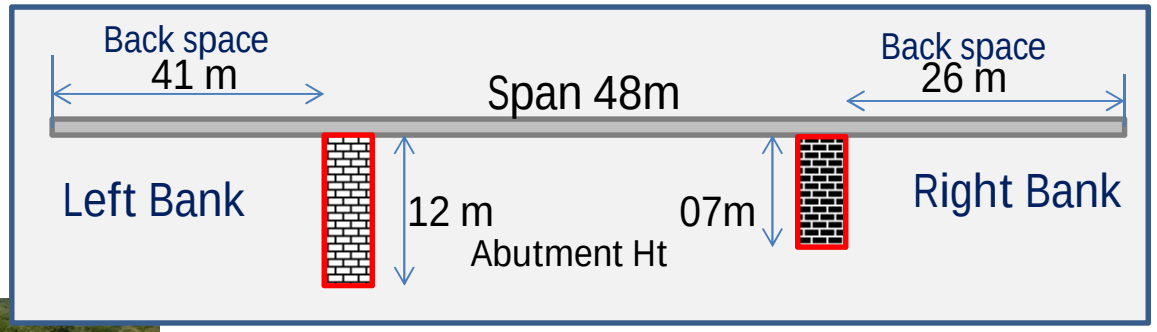
- Type - 110 Ft TSBB
- Width - 4.2 m
- Load Class - 24 T



Since 2012

3. Lambagar Bridge on Rishikesh- Badrinath Road at Km 506.66 (NH-7)

- Type - 160 Ft DDRBB
- Width - 4.2 m
- Load Class – 18 R



Effect of Sub-Optimal Bridges on NHs

- Development and Commercial Activity.
  - Loads restricted by weakest bridge.
  - Heavy equipment cannot reach construction sites.
  - Increased transportation costs.
- Environmental Impact.
  - Slow Traffic.
  - Smaller and more vehicles.
- Safety Implications.
  - Concertina Effect.
  - Requires policing at Bridges.
  - More stress while travelling.

Underutilization of NHs effect development and revenue

Strategic Roads

Bailey Bridges under BRO

Border State	Total	Total Length (Km)
Arunachal Pradesh	160	4.71
J&K	105	3.32
Sikkim	53	1.85
Himachal Pradesh	35	1.03
Uttara-khand	31	1.05
Nagaland	31	0.84
Manipur	25	0.79
Mizoram	20	0.61
Assam	8	0.14
Bhutan	3	0.08
Manipur/Nagaland	0	0.00
Total	**471**	**14.43**

Bridges - 47 Nos

35 Bridges are single lane.

Dhar - Udhampur Road Two Lane (130 Km)

Bridges - 47 Nos

Cl 70-3 Nos
Cl 40-43 Nos
Cl 24-1 No

35 Bridges are single lane.

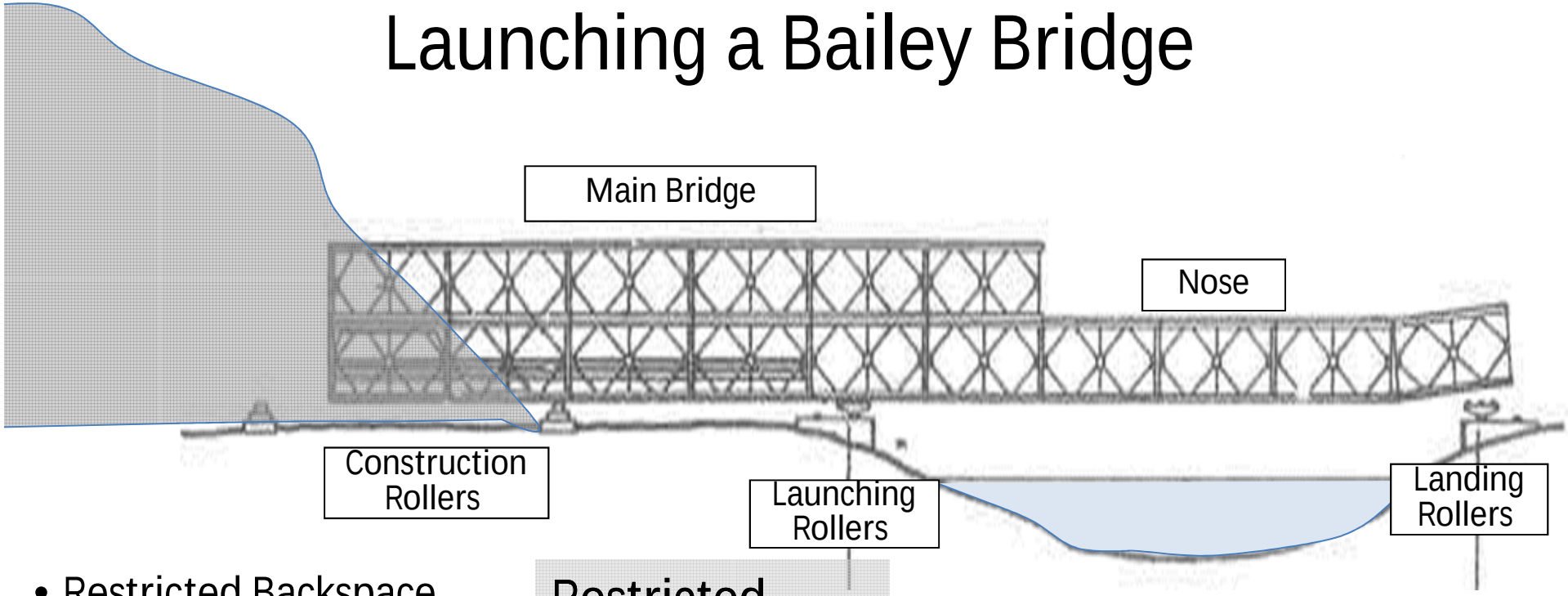
- Bailey Bridges are Single Lane.
- Loading restricted to 9 -30 Tons.

Why so many Sub-Optimal Bridges on NHs?

- Problems of launching bridges in the mountains.
  - Deep crossings require single span.
  - Lack of Back Space.
  - Deployment of heavy machinery restricted.
- Use of Bailey Bridges during road construction.
- Delay in upgrading bridges after widening roads.
  - Bridges cannot be closed for long periods.
  - Finding alternate sites where traffic is high.
- Replacement of Bridges due to Natural Disasters.
- No planning of double lane bridges.
  - For disaster management.
  - For quicker construction in the mountains.

Over reliance on Bailey Bridges to speed up construction.
Use of New Generation Quick Launch Bridges is long overdue.

Launching a Bailey Bridge



- Restricted Backspace
- Quick Launch
- Modular Robust Design

Restricted
- Roadway
- Span
- Loads
- Life – 20 years

Vintage WW II

QUICK LAUNCH BRIDGES

New Gen Bridges Vs The Bailey Bridge

Specification	Bailey Bridge	New Generation Quick Launch Bridges
Roadway	3.25m and 4.2m Only Single lane	3.7m,4.2m,5.5m, 7.35m, 9.1m, 11m & 12.8m (Up to 4 or 5 lanes).
Span	54 m with Load Class 24	60 m +; 70 R, Double Lane
Life	20 years	Over 70 years with Dip galvanised surface finish.
Construction	Normaly manual	Normally Plant Assisted
Time for launch	One to two weeks	One to four weeks

Four fold advantage at 1.75 times the cost (DL and 70 R)

Bridge at Sonprayag Enroute to Kedernath

(superstructure completed in 30 days – 17 Mar 2016)


Need:
• Existing Bridge on NH 107 washed away in Jun 2013 floods.
• Replacement washed away in Jun 2015.
• 36m BB one way & limited to 9 T loading.
• 60 m, two way, 70 R bridge a must for Yatra.
NEW LOCATION

EQUIPMENT ON SITE

- **Solution**
  - New Gen Bridge planned through WB Aid by State Govt.
  - Bridge delivered from NJ, USA in two months in Oct 15.
  - Approaches, Abutments & Protection works by Feb 16.
  - Bridge launched in 30 days.

LAUNCH IN PROGRESS

- **Technical Challenges**
  - Approaches.
  - Limited Backspace for launch.
  - Logistics of move of bridge from NJ, USA.
  - First launch in India– ACROW Supervisor, with local crew.


BEFORE


AFTER

Special Uses

Railway Bridge

Moveable Bridge for ship passage

Bio River, Chile
after 2010 earthquake

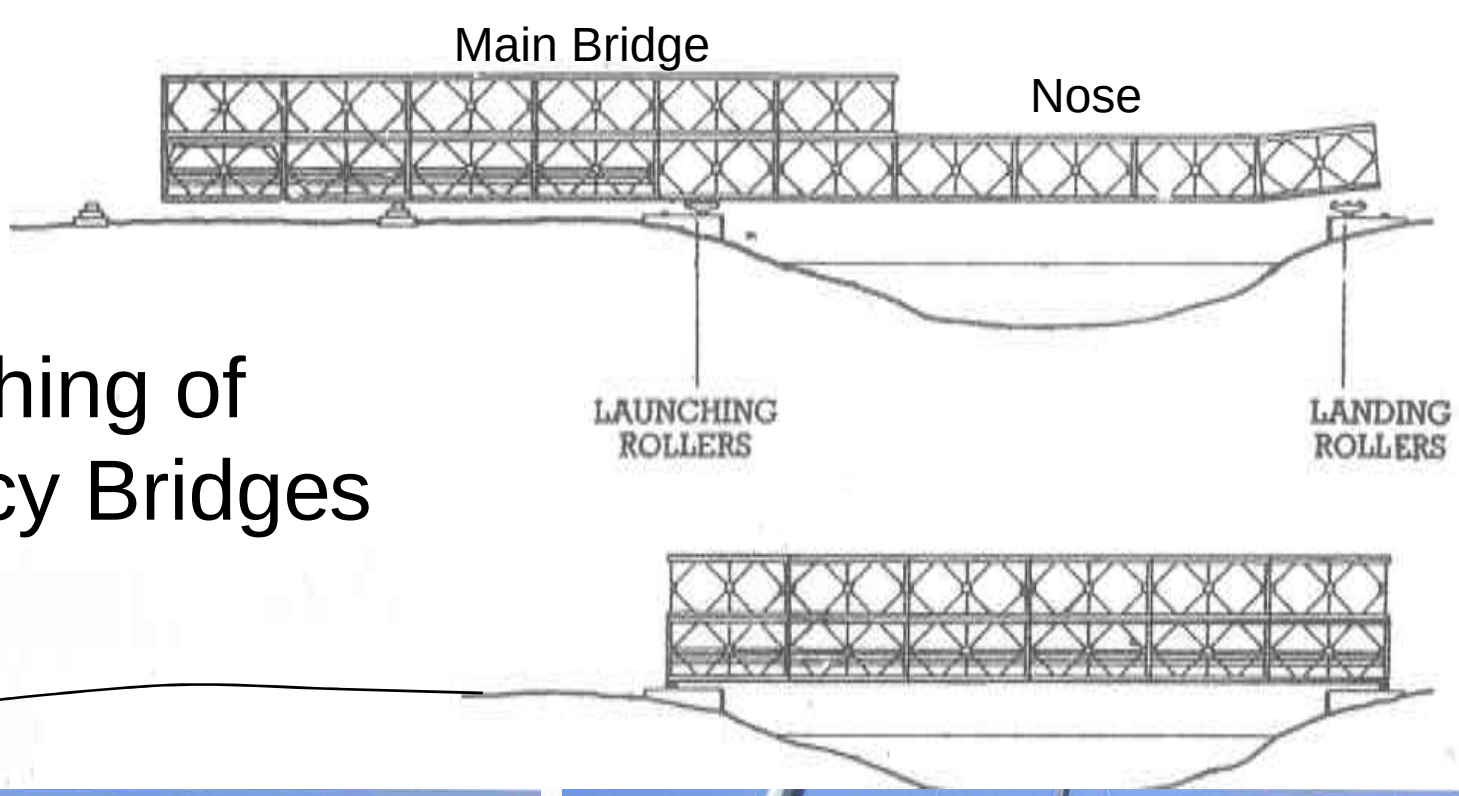
Disaster Relief

New York
World Trade Center
Recovery operations

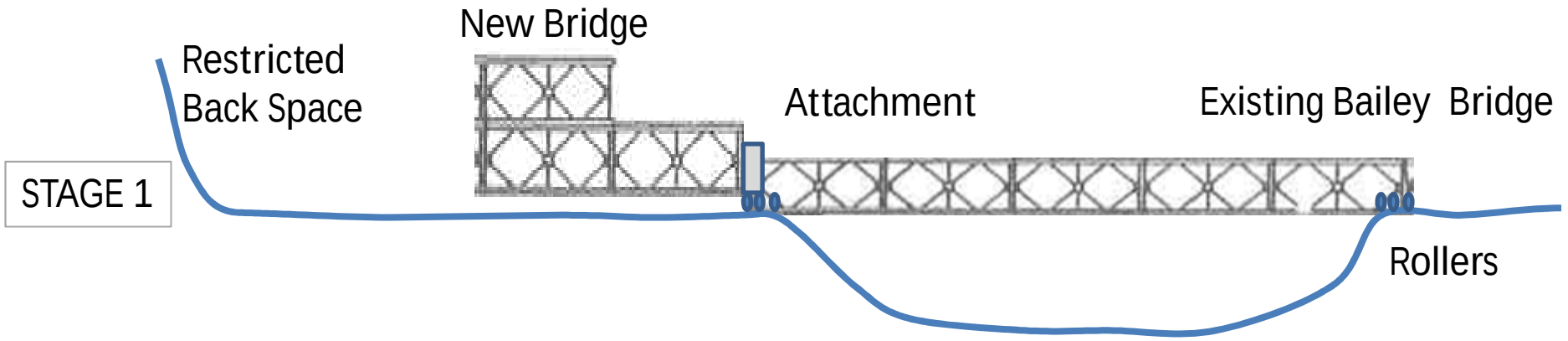
New Orleans, Louisiana
Acrow restores major causeway
Hurricane Katrina

Pittsfield, Vermont
Replacement of bridge washed away during
Hurricane Irene

Launching of Emergency Bridges



Special Launch: Using existing BB as Nose



STAGE 2

STAGE 3

New Gen Bridges on Hill Roads

- Quick upgradation of existing sub-par bridges.
  - Optimal utilization of NHs.
  - Improved safety and carbon footprint.
  - Helps development and commerce in hilly regions.
- Reserve Bridges for Disasters.
  - Avoid half-solutions in replacing bridges.
  - Prevent increase of single lane bridges.
- Use by BRO and construction agencies in hills.
  - Speedy construction.
  - Prevent need to replace Bailey with DL bridges.
  - Huge cost savings.
  - Near zero maintenance
  - May be reused where necessary.

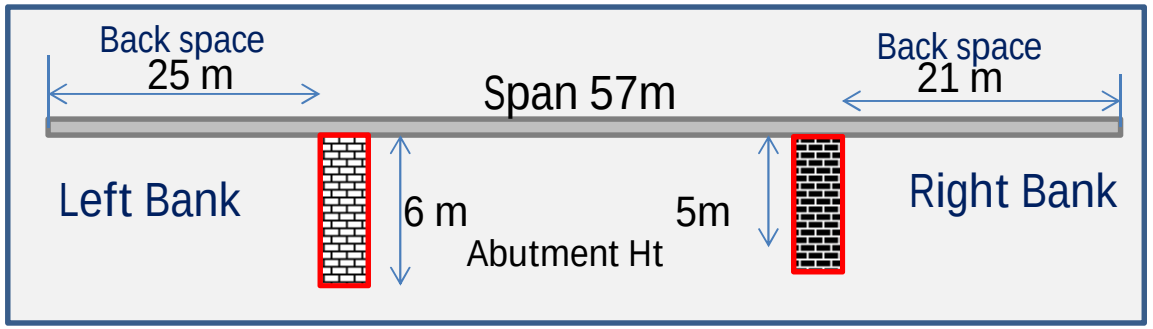
Underutilization of NHs effect development and revenue.

- State of Bridges on NHs along Northern Borders.
- Sub-optimal Bridges on NHs- Cause & Effect.
- New Generation Quick Launch Bridges.

Thank You

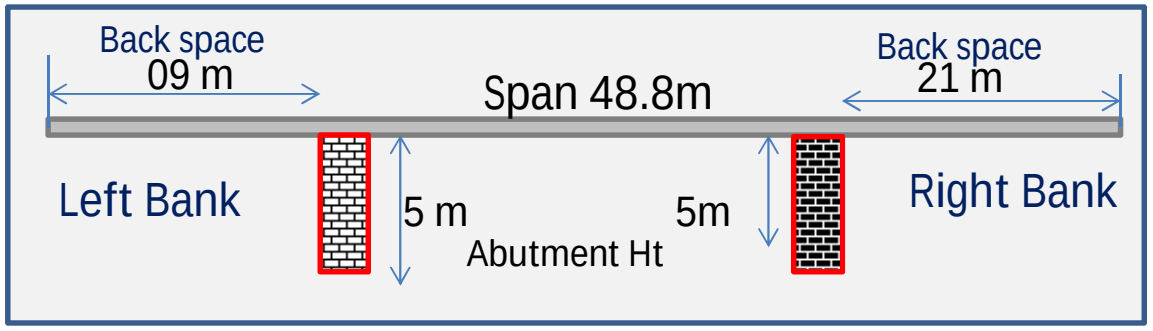
4. Gangori Gaad Bridge on Dharasu- Gangotri Road: Km 31.05 Km (NH-34)

- Type - 190 Ft DDR BB
- Width - 4.20 m
- Load Class – 18 T



5. Kund Bridge on Rudraprayag- Gaurikund Road at Km 34.60(NH-107)

- Type - Steel Truss
- Width - 4.25 m
- Load Class – 16.5 T



6. Taya Bridge on Rishikesh- Badrinath Road at Km 494.22 (NH- 7)

- Type - Steel Trusss
- Span - 60 m
- Width - 7.0 m
- Load Class - 10 T