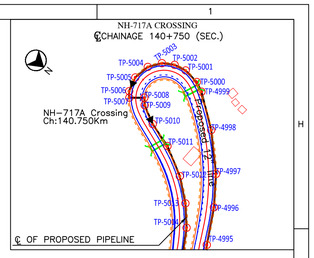
SILIGURI

GANGTOK

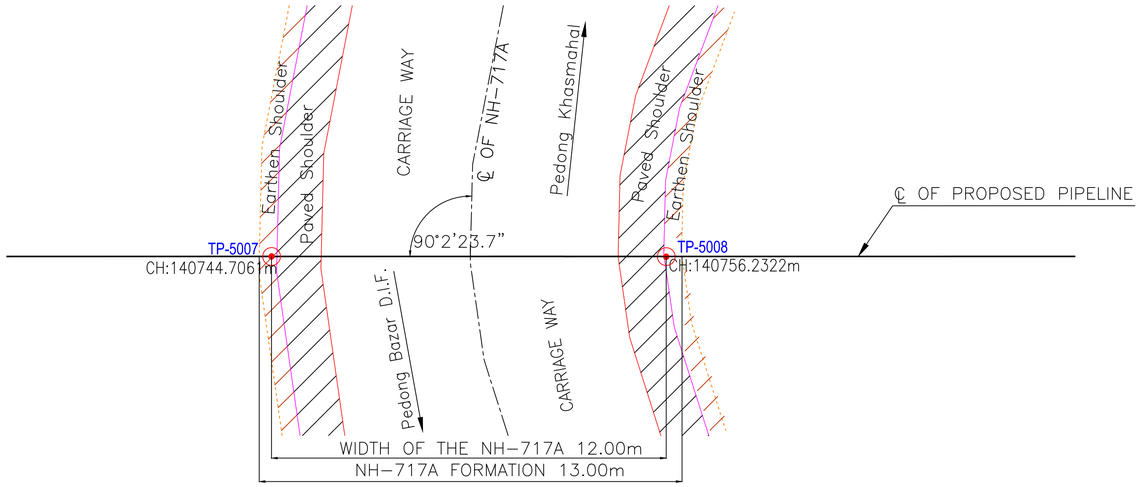
## NH-717A CROSSING
℄CHAINAGE :140+750(SEC.)




KEY PLAN
NOT TO SCALE

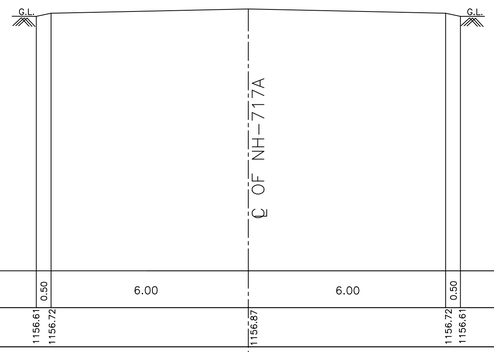
### PLANIMETRY

SCALE
ALONG THE ALIGNMENT 1:100
ACROSS THE ALIGNMENT 1:100




### GROUND PROFILE
SCALE :
HORIZONTAL 1:100
VERTICAL 1:100

DATUM -1148.0m




| | |
|---|---|
| DISTANCE BETWEEN LEVEL POINTS (m) | 0.50, 6.00, 6.00, 0.50 |
| REDUCED LEVEL IN m ABOVE MSL | 1156.61, 1156.72, 1156.87, 1156.72, 1156.61 |
| ℄ CHAINAGE | SEC. CH: 140+750Km |
| SOIL STRATIFICATION | |

### TOPOGRAPHIC SYMBOLS

- PROPOSED PIPELINE
- EXISTING PIPELINE
- TURNING POINT
- INTERMEDIATE POINT
- METALLED ROAD
- CART TRACK
- FOOTPATH
- RAILWAY
- DRAIN/CANAL/RIVER
- WATER TANK, LAKE OR RESERVOIR
- BRIDGE, CULVERT
- HOUSE
- TEMPLE
- COMPOUND WALL WITH GATE
- FENCING
- FOREST
- TREE
- HIGHTEHSION POLE
- ELECTRIC POLE
- TELEPHONE POLE
- STREET LIGHT
- TRANSFORMER
- PYLON
- MANHOLE
- OFC
- TRAFFIC SIGNAL
- DGPS STATION
- OIL STONE
- NFS STONE
- GROUND PROFILE

### APPROVING AUTHORITY

NAME OF THE ROAD :- NH-717A CROSSING

NOTES:-
1. All dimensions are in metre unless otherwise mentioned.
2. All levels are with respect to M.S.L.
3. Ground Level(MSL)-1156.61m
4. Crossing Length-13.00m

| DRAWING TITLE | DRG.NO. |
|---|---|
| ALIGNMENT DRAWING | SILIGURI-ALN-81 |
| ROUTE MAP | SILIGURI-ROUTEMAP-05 |

REFERENCE DRAWINGS

ISSUE RECORD

| NO | DATE | DESCRIPTION | BY | VERIFIED |
|---|---|---|---|---|
| 3 | 14-12-22 | Submission-Reroute | D.Krishna | Rajkumar |
| 2 | 29-7-22 | Final Submission | D.Krishna | Rajkumar |
| 1 | 07-6-22 | Final Copy | K.J.J | P.B.RAO |
| 0 | 13-4-22 | Draft Copy | K.J.J | P.B.RAO |

CITY GAS DETAILED SURVEY FOR NORTH EASTERN GAS GRID PIPELINE PROJECT
SECTION : SILIGURI TO GANGTOK

CLIENT: INDRADHANUSH GAS GRID LIMITED

SURVEY CONSULTANT: INDIAN RESOURCES INFORMATION & MANAGEMENT TECHNOLOGIES LTD. (IN-RIMT)
HYDERABAD - 81
Email:mail@inrimt.com

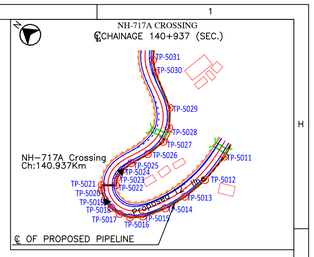
NH-717A CROSSING AT (PEDONG KHASMAHAL) CHAINAGE 140.750 Km

SCALE: 1:100 | DRAWING NUMBER: SGPL-CRS-NH-84 | R 3

SILIGURI

GANGTOK

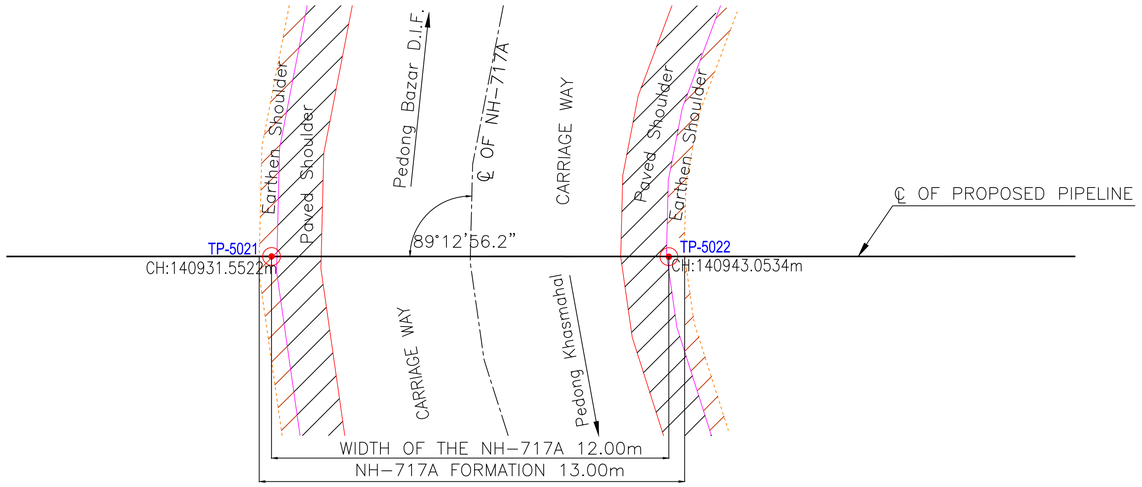
## NH-717A CROSSING
℄ CHAINAGE :140+937(SEC.)




KEY PLAN
NOT TO SCALE

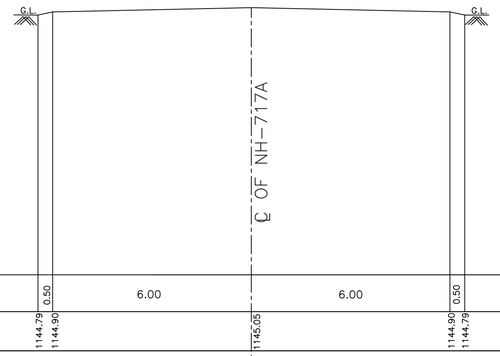
### PLANIMETRY

SCALE
ALONG THE ALIGNMENT 1:100
ACROSS THE ALIGNMENT 1:100




### GROUND PROFILE
SCALE :
HORIZONTAL 1:100
VERTICAL 1:100

DATUM -1136.0m




| | |
|---|---|
| DISTANCE BETWEEN LEVEL POINTS (m) | 0.50, 6.00, 6.00, 0.50 |
| REDUCED LEVEL IN m ABOVE MSL | 1144.79, 1144.90, 1145.05, 1144.90, 1144.79 |
| ℄ CHAINAGE | SEC. CH: 140+937Km |
| SOIL STRATIFICATION | |

### TOPOGRAPHIC SYMBOLS

- PROPOSED PIPELINE
- EXISTING PIPELINE
- TURNING POINT
- INTERMEDIATE POINT
- METALLED ROAD
- CART TRACK
- FOOTPATH
- RAILWAY
- DRAIN/CANAL/RIVER
- WATER TANK, LAKE OR RESERVOIR
- BRIDGE, CULVERT
- HOUSE
- TEMPLE
- COMPOUND WALL WITH GATE
- FENCING
- FOREST
- TREE
- HIGHTEHSION POLE
- ELECTRIC POLE
- TELEPHONE POLE
- STREET LIGHT
- TRANSFORMER
- PYLON
- MANHOLE
- OFC
- TRAFFIC SIGNAL
- DGPS STATION
- OIL STONE
- NFS STONE
- GROUND PROFILE

### APPROVING AUTHORITY

NAME OF THE ROAD :- NH-717A CROSSING

NOTES:-
1. All dimensions are in metre unless otherwise mentioned.
2. All levels are with respect to M.S.L.
3. Ground Level(MSL)-1144.79m
4. Crossing Length-13.00

| ALIGNMENT DRAWING | SILIGURI-ALN-81 |
|---|---|
| ROUTE MAP | SILIGURI-ROUTEMAP-05 |
| DRAWING TITLE | DRG.NO. |

REFERENCE DRAWINGS

ISSUE RECORD

| NO | DATE | DESCRIPTION | BY | VERIFIED |
|---|---|---|---|---|
| 3 | 14-12-22 | Submission-Reroute | D.Krishna | Rajkumar |
| 2 | 29-7-22 | Final Submission | D.Krishna | Rajkumar |
| 1 | 07-6-22 | Final Copy | K.J.J | P.B.RAO |
| 0 | 13-4-22 | Draft Copy | K.J.J | P.B.RAO |

CITY GAS DETAILED SURVEY FOR NORTH EASTERN GAS GRID PIPELINE PROJECT
SECTION : SILIGURI TO GANGTOK

CLIENT: IGGL — INDRADHANUSH GAS GRID LIMITED

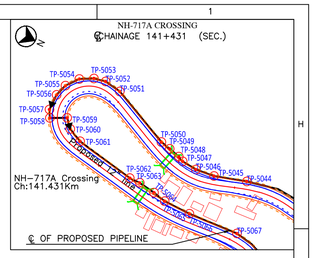
SURVEY CONSULTANT: IN-RIMT — INDIAN RESOURCES INFORMATION & MANAGEMENT TECHNOLOGIES LTD. (IN-RIMT) HYDERABAD - 81 Email:mail@inrimt.com

NH-717A CROSSING AT (PEDONG KHASMAHAL) CHAINAGE 140.937 Km

SCALE: 1:100 | DRAWING NUMBER: SGPL-CRS-NH-85 | R 3

SILIGURI ← → GANGTOK

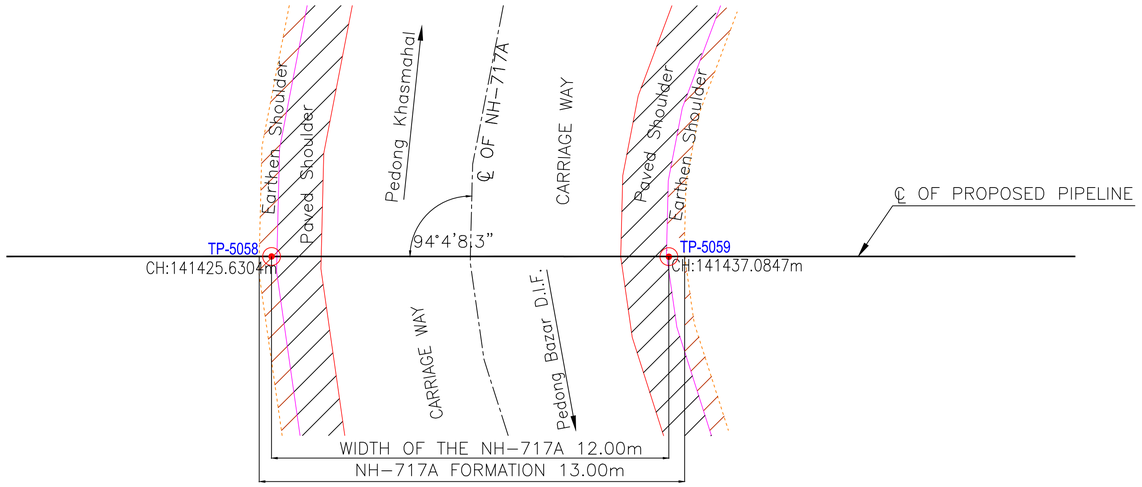
## NH-717A CROSSING
℄ CHAINAGE :141+431(SEC.)




KEY PLAN
NOT TO SCALE

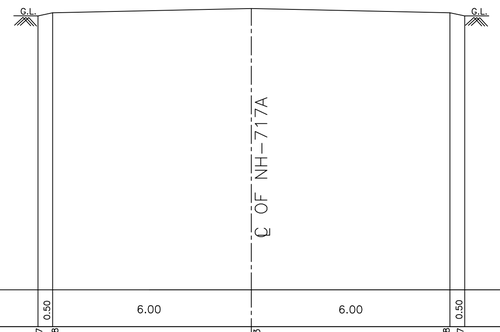
### PLANIMETRY

SCALE
ALONG THE ALIGNMENT 1:100
ACROSS THE ALIGNMENT 1:100




### GROUND PROFILE
SCALE :
HORIZONTAL 1:100
VERTICAL 1:100

DATUM -1118.0m




| | | | |
|---|---|---|---|
| DISTANCE BETWEEN LEVEL POINTS (m) | 0.50 | 6.00 | 6.00 | 0.50 |
| REDUCED LEVEL IN m ABOVE MSL | 1127.27 1127.38 | 1127.53 | 1127.38 1127.27 |
| ℄ CHAINAGE | | SEC. CH: 141+431Km | |
| SOIL STRATIFICATION | | | |

### TOPOGRAPHIC SYMBOLS

- PROPOSED PIPELINE
- EXISTING PIPELINE
- TP TURNING POINT
- IP INTERMEDIATE POINT
- METALLED ROAD
- CART TRACK
- FOOTPATH
- RAILWAY
- DRAIN/CANAL/RIVER
- WATER TANK, LAKE OR RESERVOIR
- BRIDGE, CULVERT
- HOUSE
- TEMPLE
- COMPOUND WALL WITH GATE
- FENCING
- FOREST
- TREE
- HIGHTEHSION POLE
- ELECTRIC POLE
- TELEPHONE POLE
- STREET LIGHT
- TRANSFORMER
- PYLON
- MANHOLE
- OFC
- TRAFFIC SIGNAL
- DGPS STATION
- OIL STONE
- NFS STONE
- GROUND PROFILE

### APPROVING AUTHORITY

NAME OF THE ROAD :- NH-717A CROSSING

NOTES:-
1. All dimensions are in metre unless otherwise mentioned.
2. All levels are with respect to M.S.L.
3. Ground Level(MSL)-1127.27m
4. Crossing Length-13.00m

| DRAWING TITLE | DRG.NO. |
|---|---|
| ALIGNMENT DRAWING | SILIGURI-ALN-81 |
| ROUTE MAP | SILIGURI-ROUTEMAP-05 |

REFERENCE DRAWINGS

ISSUE RECORD

| NO | DATE | DESCRIPTION | BY | VERIFIED |
|---|---|---|---|---|
| 3 | 14-12-22 | Submission-Reroute | D.Krishna | Rajkumar |
| 2 | 29-7-22 | Final Submission | D.Krishna | Rajkumar |
| 1 | 07-6-22 | Final Copy | K.J.J | P.B.RAO |
| 0 | 13-4-22 | Draft Copy | K.J.J | P.B.RAO |

CITY GAS DETAILED SURVEY FOR NORTH EASTERN GAS GRID PIPELINE PROJECT
SECTION : SILIGURI TO GANGTOK

CLIENT: INDRADHANUSH GAS GRID LIMITED

SURVEY CONSULTANT: INDIAN RESOURCES INFORMATION & MANAGEMENT TECHNOLOGIES LTD. (IN-RIMT) HYDERABAD - 81 Email:mail@inrimt.com

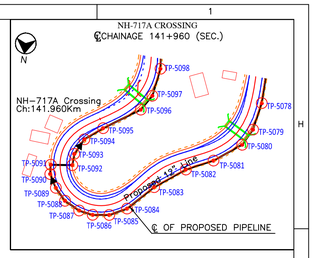
NH-717A CROSSING AT (PEDONG KHASMAHAL) CHAINAGE 141.431 Km

SCALE: 1:100 | DRAWING NUMBER: SGPL-CRS-NH-86 | R 3

SILIGURI

GANGTOK

## NH-717A CROSSING
℄ CHAINAGE :141+960(SEC.)

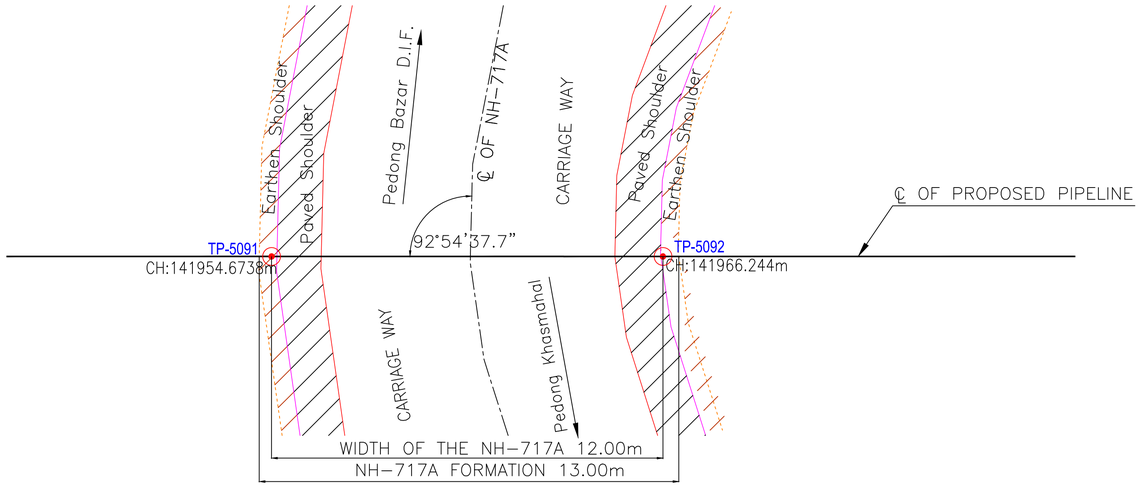



KEY PLAN
NOT TO SCALE

N

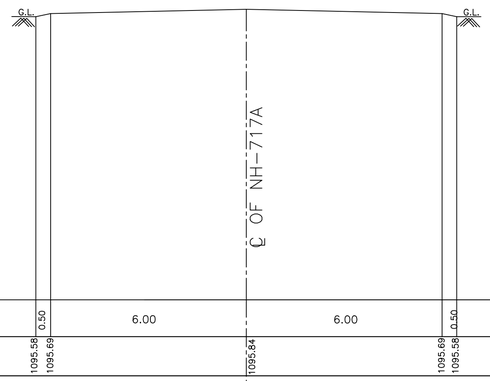
### PLANIMETRY

SCALE
ALONG THE ALIGNMENT 1:100
ACROSS THE ALIGNMENT 1:100




### GROUND PROFILE
SCALE :
HORIZONTAL 1:100
VERTICAL 1:100

DATUM -1086.0m




| | |
|---|---|
| DISTANCE BETWEEN LEVEL POINTS (m) | 0.50, 6.00, 6.00, 0.50 |
| REDUCED LEVEL IN m ABOVE MSL | 1095.58, 1095.69, 1095.84, 1095.69, 1095.58 |
| ℄ CHAINAGE | SEC. CH: 141+960Km |
| SOIL STRATIFICATION | |

### TOPOGRAPHIC SYMBOLS

- PROPOSED PIPELINE
- EXISTING PIPELINE
- TP TURNING POINT
- IP INTERMEDIATE POINT
- METALLED ROAD
- CART TRACK
- FOOTPATH
- RAILWAY
- DRAIN/CANAL/RIVER
- WATER TANK, LAKE OR RESERVOIR
- BRIDGE, CULVERT
- HOUSE
- TEMPLE
- COMPOUND WALL WITH GATE
- FENCING
- FOREST
- TREE
- HIGHTEHSION POLE
- ELECTRIC POLE
- TELEPHONE POLE
- STREET LIGHT
- TRANSFORMER
- PYLON
- MANHOLE
- OFC
- TRAFFIC SIGNAL
- DGPS STATION
- OIL STONE
- NFS STONE
- GROUND PROFILE

### APPROVING AUTHORITY

NAME OF THE ROAD :- NH-717A CROSSING

NOTES:-
1. All dimensions are in metre unless otherwise mentioned.
2. All levels are with respect to M.S.L.
3. Ground Level(MSL)-1095.58m
4. Crossing Length-13.00m

| ALIGNMENT DRAWING | SILIGURI-ALN-81 |
|---|---|
| ROUTE MAP | SILIGURI-ROUTEMAP-05 |
| DRAWING TITLE | DRG.NO. |

REFERENCE DRAWINGS

ISSUE RECORD

| NO | DATE | DESCRIPTION | BY | VERIFIED |
|---|---|---|---|---|
| 3 | 14-12-22 | Submission-Reroute | D.Krishna | Rajkumar |
| 2 | 29-7-22 | Final Submission | D.Krishna | Rajkumar |
| 1 | 07-6-22 | Final Copy | K.J.J | P.B.RAO |
| 0 | 13-4-22 | Draft Copy | K.J.J | P.B.RAO |

CITY GAS DETAILED SURVEY FOR NORTH EASTERN GAS GRID PIPELINE PROJECT
SECTION : SILIGURI TO GANGTOK

CLIENT: INDRADHANUSH GAS GRID LIMITED

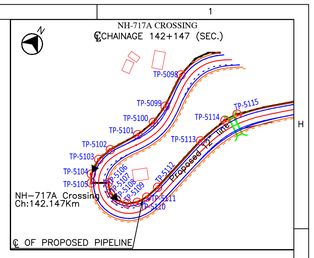
SURVEY CONSULTANT: INDIAN RESOURCES INFORMATION & MANAGEMENT TECHNOLOGIES LTD. (IN-RIMT) HYDERABAD - 81 Email:mail@inrimt.com

NH-717A CROSSING AT (PEDONG KHASMAHAL) CHAINAGE 141.960 Km

SCALE: 1:100 | DRAWING NUMBER: SGPL-CRS-NH-87 | R 3

SILIGURI ← → GANGTOK

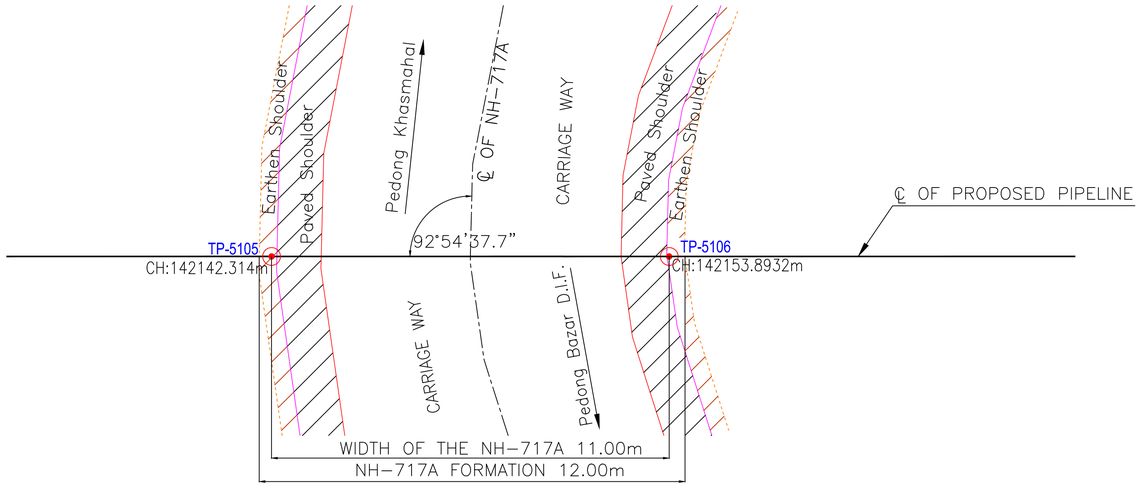
## NH-717A CROSSING
℄CHAINAGE :142+147(SEC.)




KEY PLAN
NOT TO SCALE

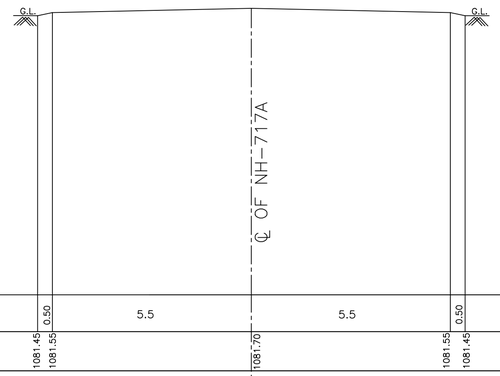
### PLANIMETRY

SCALE
ALONG THE ALIGNMENT 1:100
ACROSS THE ALIGNMENT 1:100




### GROUND PROFILE
SCALE :
HORIZONTAL 1:100
VERTICAL 1:100

DATUM -1072.0m




| | |
|---|---|
| DISTANCE BETWEEN LEVEL POINTS (m) | 0.50, 5.5, 5.5, 0.50 |
| REDUCED LEVEL IN m ABOVE MSL | 1081.45, 1081.55, 1081.70, 1081.55, 1081.45 |
| ℄ CHAINAGE | SEC. CH: 142+147Km |
| SOIL STRATIFICATION | |

### TOPOGRAPHIC SYMBOLS

- PROPOSED PIPELINE
- EXISTING PIPELINE
- TP TURNING POINT
- IP INTERMEDIATE POINT
- METALLED ROAD
- CART TRACK
- FOOTPATH
- RAILWAY
- DRAIN/CANAL/RIVER
- WATER TANK, LAKE OR RESERVOIR
- BRIDGE, CULVERT
- HOUSE
- TEMPLE
- COMPOUND WALL WITH GATE
- FENCING
- FOREST
- TREE
- HIGHTEHSION POLE
- ELECTRIC POLE
- TELEPHONE POLE
- STREET LIGHT
- TRANSFORMER
- PYLON
- MANHOLE
- OFC
- TRAFFIC SIGNAL
- DGPS STATION
- OIL STONE
- NFS STONE
- GROUND PROFILE

### APPROVING AUTHORITY

NAME OF THE ROAD :- NH-717A CROSSING

NOTES:-
1. All dimensions are in metre unless otherwise mentioned.
2. All levels are with respect to M.S.L.
3. Ground Level(MSL)-1081.45m
4. Crossing Length-12.00m

| ALIGNMENT DRAWING | SILIGURI-ALN-82 |
|---|---|
| ROUTE MAP | SILIGURI-ROUTEMAP-05 |
| DRAWING TITLE | DRG.NO. |

REFERENCE DRAWINGS

ISSUE RECORD

| NO | DATE | DESCRIPTION | BY | VERIFIED |
|---|---|---|---|---|
| 3 | 14-12-22 | Submission-Reroute | D.Krishna | Rajkumar |
| 2 | 29-7-22 | Final Submission | D.Krishna | Rajkumar |
| 1 | 07-6-22 | Final Copy | K.J.J | P.B.RAO |
| 0 | 13-4-22 | Draft Copy | K.J.J | P.B.RAO |

CITY GAS DETAILED SURVEY FOR NORTH EASTERN GAS GRID PIPELINE PROJECT
SECTION : SILIGURI TO GANGTOK

CLIENT: INDRADHANUSH GAS GRID LIMITED

SURVEY CONSULTANT: INDIAN RESOURCES INFORMATION & MANAGEMENT TECHNOLOGIES LTD. (IN-RIMT) HYDERABAD - 81 Email:mail@inrimt.com

NH-717A CROSSING AT (PEDONG KHASMAHAL) CHAINAGE 142.147 Km

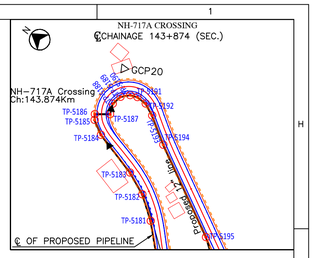
SCALE: 1:100 | DRAWING NUMBER: SGPL-CRS-NH-88 | R 3

SILIGURI

GANGTOK

# NH-717A CROSSING

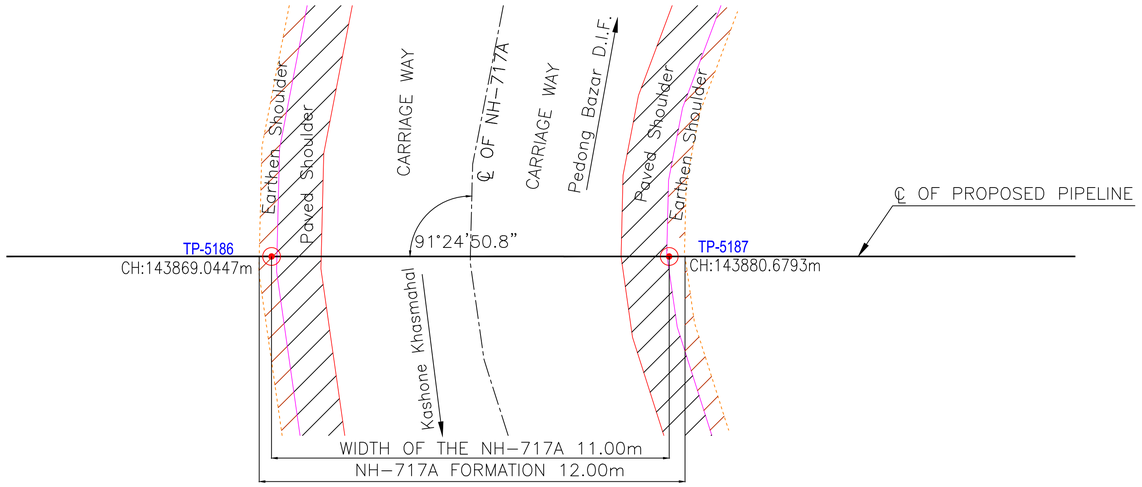
℄CHAINAGE :143+874(SEC.)




KEY PLAN
NOT TO SCALE

## PLANIMETRY

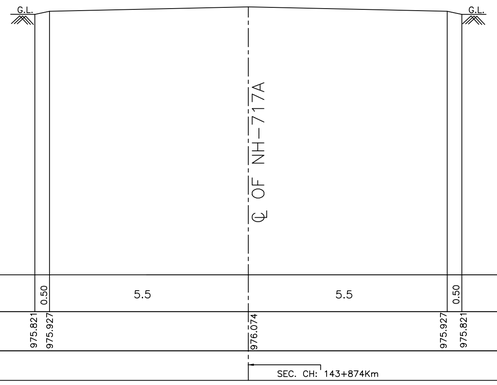
SCALE
ALONG THE ALIGNMENT 1:100
ACROSS THE ALIGNMENT 1:100




## GROUND PROFILE

SCALE :
HORIZONTAL 1:100
VERTICAL 1:100

DATUM - 967.0m




| | |
|---|---|
| DISTANCE BETWEEN LEVEL POINTS (m) | 0.50, 5.5, 5.5, 0.50 |
| REDUCED LEVEL IN m ABOVE MSL | 975.821, 975.927, 976.674, 975.927, 975.821 |
| ℄ CHAINAGE | SEC. CH: 143+874Km |
| SOIL STRATIFICATION | |

## TOPOGRAPHIC SYMBOLS

- PROPOSED PIPELINE
- EXISTING PIPELINE
- TP TURNING POINT
- IP INTERMEDIATE POINT
- METALLED ROAD
- CART TRACK
- FOOTPATH
- RAILWAY
- DRAIN/CANAL/RIVER
- WATER TANK, LAKE OR RESERVOIR
- BRIDGE, CULVERT
- HOUSE
- TEMPLE
- COMPOUND WALL WITH GATE
- FENCING
- FOREST
- TREE
- HIGHTEHSION POLE
- ELECTRIC POLE
- TELEPHONE POLE
- STREET LIGHT
- TRANSFORMER
- PYLON
- MANHOLE
- OFC
- TRAFFIC SIGNAL
- DGPS STATION
- OIL STONE
- NFS STONE
- GROUND PROFILE

## APPROVING AUTHORITY

NAME OF THE ROAD :- NH-717A CROSSING

NOTES:-
1. All dimensions are in metre unless otherwise mentioned.
2. All levels are with respect to M.S.L.
3. Ground Level(MSL)-975.821m
4. Crossing Length-12.00m

| ALIGNMENT DRAWING | SILIGURI-ALN-83 |
|---|---|
| ROUTE MAP | SILIGURI-ROUTEMAP-05 |
| DRAWING TITLE | DRG.NO. |

REFERENCE DRAWINGS

ISSUE RECORD

| NO | DATE | DESCRIPTION | BY | VERIFIED |
|---|---|---|---|---|
| 3 | 14-12-22 | Submission-Reroute | D.Krishna | Rajkumar |
| 2 | 29-7-22 | Final Submission | D.Krishna | Rajkumar |
| 1 | 07-6-22 | Final Copy | K.J.J | P.B.RAO |
| 0 | 13-4-22 | Draft Copy | K.J.J | P.B.RAO |

CITY GAS DETAILED SURVEY FOR NORTH EASTERN GAS GRID PIPELINE PROJECT
SECTION : SILIGURI TO GANGTOK

CLIENT: INDRADHANUSH GAS GRID LIMITED

SURVEY CONSULTANT: INDIAN RESOURCES INFORMATION & MANAGEMENT TECHNOLOGIES LTD. (IN-RIMT) HYDERABAD - 81 Email:mail@inrimt.com

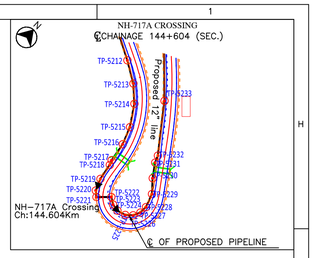
NH-717A CROSSING AT (KASHONE KHASMAHAL) CHAINAGE 143.874 Km

SCALE: 1:100 | DRAWING NUMBER: SGPL-CRS-NH-89 | R 3

SILIGURI

GANGTOK

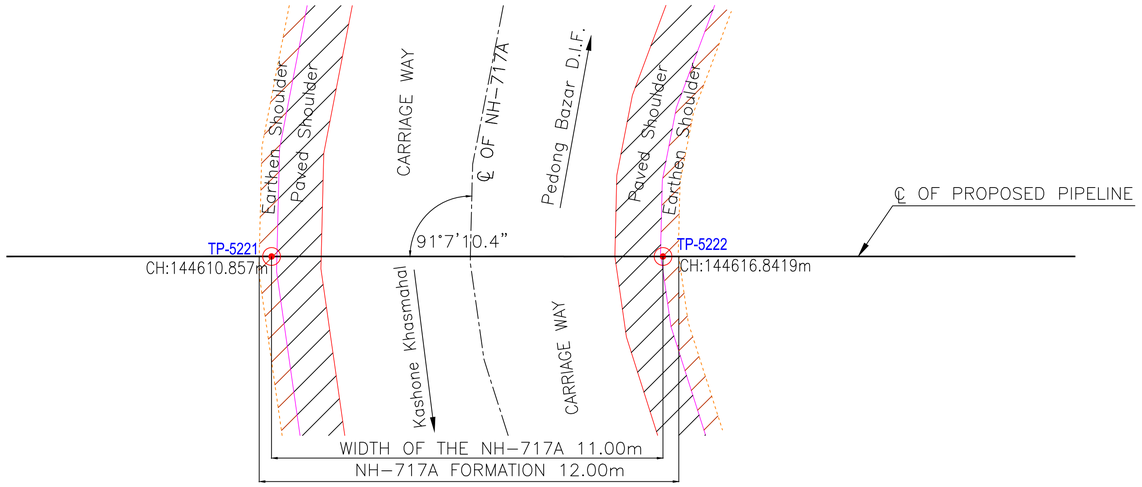
## NH-717A CROSSING
℄ CHAINAGE :144+604(SEC.)




KEY PLAN
NOT TO SCALE

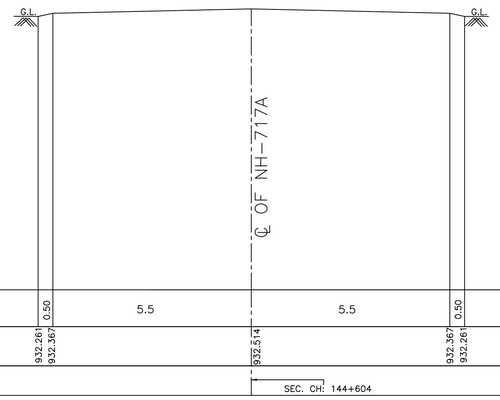
### PLANIMETRY

SCALE
ALONG THE ALIGNMENT 1:100
ACROSS THE ALIGNMENT 1:100




### GROUND PROFILE
SCALE :
HORIZONTAL 1:100
VERTICAL 1:100

### DATUM - 923.0m




| | |
|---|---|
| DISTANCE BETWEEN LEVEL POINTS (m) | 0.50, 5.5, 5.5, 0.50 |
| REDUCED LEVEL IN m ABOVE MSL | 932.261, 932.367, 932.514, 932.367, 932.261 |
| ℄ CHAINAGE | SEC. CH: 144+604 |
| SOIL STRATIFICATION | |

### TOPOGRAPHIC SYMBOLS

- PROPOSED PIPELINE
- EXISTING PIPELINE
- TP TURNING POINT
- IP INTERMEDIATE POINT
- METALLED ROAD
- CART TRACK
- FOOTPATH
- RAILWAY
- DRAIN/CANAL/RIVER
- WATER TANK, LAKE OR RESERVOIR
- BRIDGE, CULVERT
- HOUSE
- TEMPLE
- COMPOUND WALL WITH GATE
- FENCING
- FOREST
- TREE
- HIGHTEHSION POLE
- ELECTRIC POLE
- TELEPHONE POLE
- STREET LIGHT
- TRANSFORMER
- PYLON
- MANHOLE
- OFC
- TRAFFIC SIGNAL
- DGPS STATION
- OIL STONE
- NFS STONE
- GROUND PROFILE

### APPROVING AUTHORITY

NAME OF THE ROAD :- NH-717A CROSSING

NOTES:-
1. All dimensions are in metre unless otherwise mentioned.
2. All levels are with respect to M.S.L.
3. Ground Level(MSL)-932.261m
4. Crossing Length-12.00m

| ALIGNMENT DRAWING | SILIGURI-ALN-83 |
|---|---|
| ROUTE MAP | SILIGURI-ROUTEMAP-05 |
| DRAWING TITLE | DRG.NO. |

REFERENCE DRAWINGS

ISSUE RECORD

| NO | DATE | DESCRIPTION | BY | VERIFIED |
|---|---|---|---|---|
| 3 | 14-12-22 | Submission-Reroute | D.Krishna | Rajkumar |
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| 1 | 07-6-22 | Final Copy | K.J.J | P.B.RAO |
| 0 | 13-4-22 | Draft Copy | K.J.J | P.B.RAO |

CITY GAS DETAILED SURVEY FOR NORTH EASTERN GAS GRID PIPELINE PROJECT
SECTION : SILIGURI TO GANGTOK

CLIENT: INDRADHANUSH GAS GRID LIMITED

SURVEY CONSULTANT: INDIAN RESOURCES INFORMATION & MANAGEMENT TECHNOLOGIES LTD. (IN-RIMT) HYDERABAD - 81 Email:mail@inrimt.com

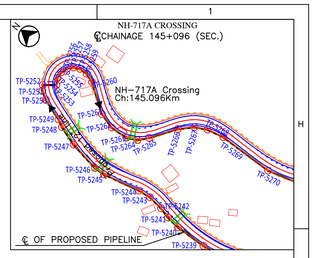
NH-717A CROSSING AT (PEDONG BAZAR D.I.F.) CHAINAGE 144.604 Km

SCALE: 1:100 | DRAWING NUMBER: SGPL-CRS-NH-90 | R 3

SILIGURI

GANGTOK

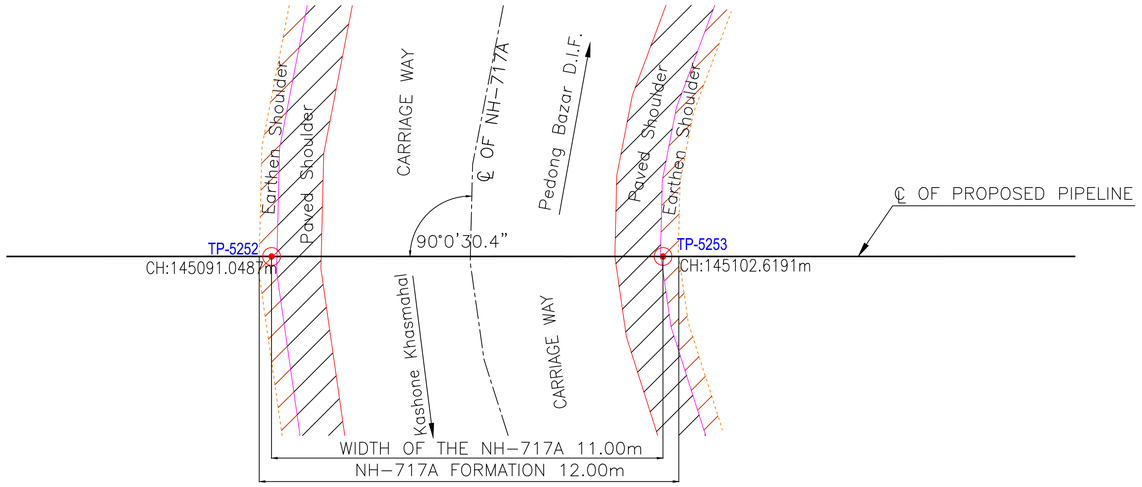
# NH-717A CROSSING
℄ CHAINAGE :145+096 (SEC.)




KEY PLAN
NOT TO SCALE

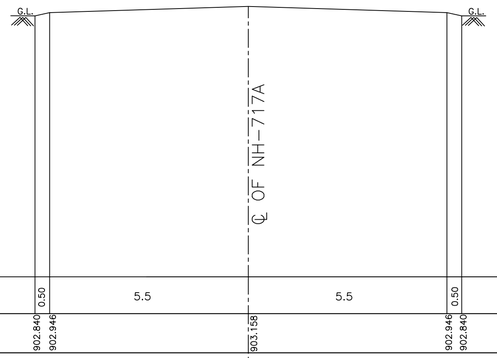
## PLANIMETRY

SCALE
ALONG THE ALIGNMENT 1:100
ACROSS THE ALIGNMENT 1:100




## GROUND PROFILE
SCALE :
HORIZONTAL 1:100
VERTICAL 1:100

DATUM - 894.0m




| | |
|---|---|
| DISTANCE BETWEEN LEVEL POINTS (m) | 0.50, 5.5, 5.5, 0.50 |
| REDUCED LEVEL IN m ABOVE MSL | 902.840, 902.946, 903.158, 902.946, 902.840 |
| ℄ CHAINAGE | SEC. CH: 145+096Km |
| SOIL STRATIFICATION | |

## TOPOGRAPHIC SYMBOLS

- PROPOSED PIPELINE
- EXISTING PIPELINE
- TP TURNING POINT
- IP INTERMEDIATE POINT
- METALLED ROAD
- CART TRACK
- FOOTPATH
- RAILWAY
- DRAIN/CANAL/RIVER
- WATER TANK, LAKE OR RESERVOIR
- BRIDGE, CULVERT
- HOUSE
- TEMPLE
- COMPOUND WALL WITH GATE
- FENCING
- FOREST
- TREE
- HIGHTEHSION POLE
- ELECTRIC POLE
- TELEPHONE POLE
- STREET LIGHT
- TRANSFORMER
- PYLON
- MANHOLE
- OFC
- TRAFFIC SIGNAL
- DGPS STATION
- OIL STONE
- NFS STONE
- GROUND PROFILE

## APPROVING AUTHORITY

NAME OF THE ROAD :- NH-717A CROSSING

NOTES:-
1. All dimensions are in metre unless otherwise mentioned.
2. All levels are with respect to M.S.L.
3. Ground Level(MSL)-902.840m
4. Crossing Length-12.00m

| ALIGNMENT DRAWING | SILIGURI-ALN-83 |
|---|---|
| ROUTE MAP | SILIGURI-ROUTEMAP-05 |
| DRAWING TITLE | DRG.NO. |

REFERENCE DRAWINGS

ISSUE RECORD

| NO | DATE | DESCRIPTION | BY | VERIFIED |
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| 1 | 07-6-22 | Final Copy | K.J.J | P.B.RAO |
| 0 | 13-4-22 | Draft Copy | K.J.J | P.B.RAO |

CITY GAS DETAILED SURVEY FOR NORTH EASTERN GAS GRID PIPELINE PROJECT
SECTION : SILIGURI TO GANGTOK

CLIENT: INDRADHANUSH GAS GRID LIMITED

SURVEY CONSULTANT: INDIAN RESOURCES INFORMATION & MANAGEMENT TECHNOLOGIES LTD. (IN-RIMT)
HYDERABAD - 81
Email:mail@inrimt.com

NH-717A CROSSING AT (KASHONE KHASMAHAL) CHAINAGE 145.096 Km

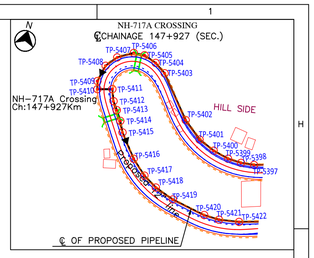
SCALE: 1:100 | DRAWING NUMBER: SGPL-CRS-NH-91 | R 3

SILIGURI

GANGTOK

# NH-717A CROSSING

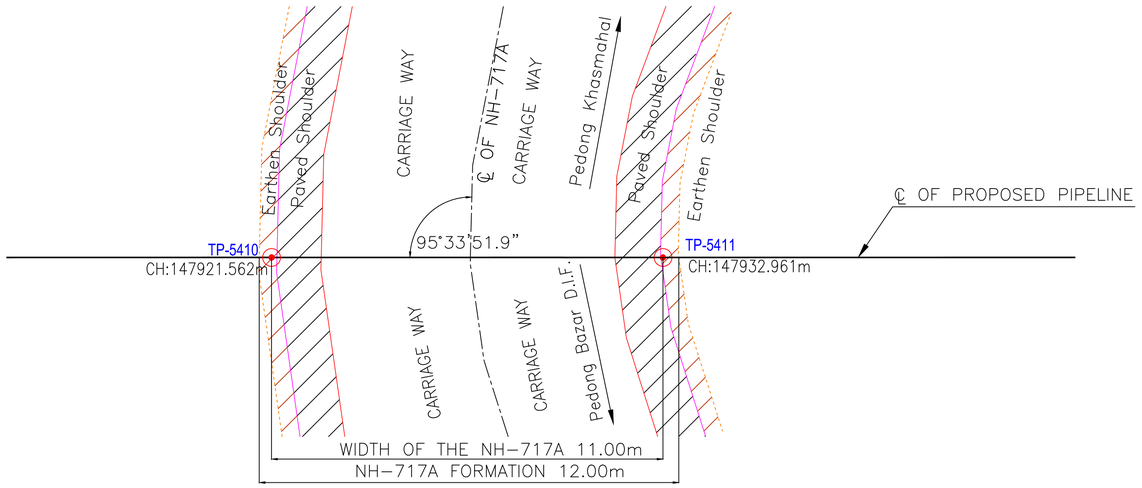
℄CHAINAGE :147+927(SEC.)




KEY PLAN
NOT TO SCALE

## PLANIMETRY

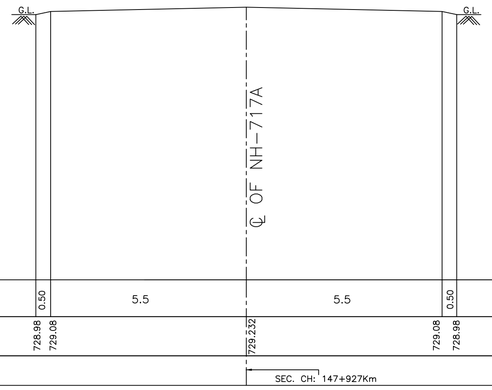
SCALE
ALONG THE ALIGNMENT 1:100
ACROSS THE ALIGNMENT 1:100




## GROUND PROFILE

SCALE :
HORIZONTAL 1:100
VERTICAL 1:100

DATUM - 720.0m




| | |
|---|---|
| DISTANCE BETWEEN LEVEL POINTS (m) | 0.50, 5.5, 5.5, 0.50 |
| REDUCED LEVEL IN m ABOVE MSL | 728.98, 729.08, 729.232, 729.08, 728.98 |
| ℄ CHAINAGE | SEC. CH: 147+927Km |
| SOIL STRATIFICATION | |

## TOPOGRAPHIC SYMBOLS

- PROPOSED PIPELINE
- EXISTING PIPELINE
- TP TURNING POINT
- IP INTERMEDIATE POINT
- METALLED ROAD
- CART TRACK
- FOOTPATH
- RAILWAY
- DRAIN/CANAL/RIVER
- WATER TANK, LAKE OR RESERVOIR
- BRIDGE, CULVERT
- HOUSE
- TEMPLE
- COMPOUND WALL WITH GATE
- FENCING
- FOREST
- TREE
- HIGHTEHSION POLE
- ELECTRIC POLE
- TELEPHONE POLE
- STREET LIGHT
- TRANSFORMER
- PYLON
- MANHOLE
- OFC
- TRAFFIC SIGNAL
- DGPS STATION
- OIL STONE
- NFS STONE
- GROUND PROFILE

## APPROVING AUTHORITY

NAME OF THE ROAD :- NH-717A CROSSING

NOTES:-
1. All dimensions are in metre unless otherwise mentioned.
2. All levels are with respect to M.S.L.
3. Ground Level(MSL)-728.98m
4. Crossing Length-12.00m

| | |
|---|---|
| ALIGNMENT DRAWING | SILIGURI-ALN-85 |
| ROUTE MAP | SILIGURI-ROUTEMAP-05 |
| DRAWING TITLE | DRG.NO. |

REFERENCE DRAWINGS

| NO | DATE | DESCRIPTION | BY | VERIFIED |
|---|---|---|---|---|
| 3 | 14-12-22 | Submission-Reroute | D.Krishna | Rajkumar |
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| 1 | 07-6-22 | Final Copy | K.J.J | P.B.RAO |
| 0 | 13-4-22 | Draft Copy | K.J.J | P.B.RAO |

ISSUE RECORD

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SECTION : SILIGURI TO GANGTOK

CLIENT: IGGL — INDRADHANUSH GAS GRID LIMITED

SURVEY CONSULTANT: INDIAN RESOURCES INFORMATION & MANAGEMENT TECHNOLOGIES LTD. (IN-RIMT)
HYDERABAD - 81
Email:mail@inrimt.com

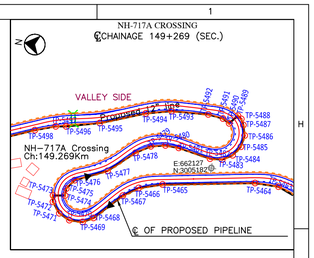
NH-717A CROSSING AT (PEDONG KHASMAHAL) CHAINAGE 147.927 Km

SCALE: 1:100 | DRAWING NUMBER: SGPL-CRS-NH-92 | R 3

SILIGURI

GANGTOK

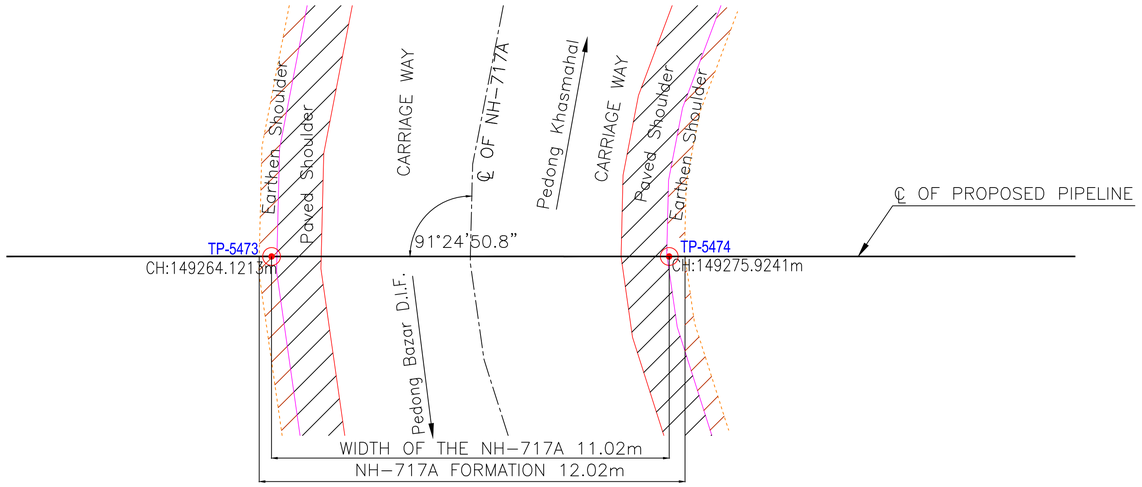
## NH-717A CROSSING
℄CHAINAGE :149+269(SEC.)




KEY PLAN
NOT TO SCALE

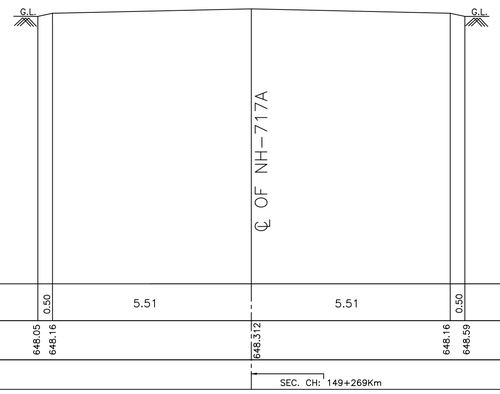
### PLANIMETRY

SCALE
ALONG THE ALIGNMENT 1:100
ACROSS THE ALIGNMENT 1:100




### GROUND PROFILE
SCALE :
HORIZONTAL 1:100
VERTICAL 1:100

### DATUM - 639.0m




| | |
|---|---|
| DISTANCE BETWEEN LEVEL POINTS (m) | 0.50, 5.51, 5.51, 0.50 |
| REDUCED LEVEL IN m ABOVE MSL | 648.05, 648.16, 648.312, 648.16, 648.59 |
| ℄ CHAINAGE | SEC. CH: 149+269Km |
| SOIL STRATIFICATION | |

### TOPOGRAPHIC SYMBOLS

- PROPOSED PIPELINE
- EXISTING PIPELINE
- TP TURNING POINT
- IP INTERMEDIATE POINT
- METALLED ROAD
- CART TRACK
- FOOTPATH
- RAILWAY
- DRAIN/CANAL/RIVER
- WATER TANK, LAKE OR RESERVOIR
- BRIDGE, CULVERT
- HOUSE
- TEMPLE
- COMPOUND WALL WITH GATE
- FENCING
- FOREST
- TREE
- HIGHTEHSION POLE
- ELECTRIC POLE
- TELEPHONE POLE
- STREET LIGHT
- TRANSFORMER
- PYLON
- MANHOLE
- OFC
- TRAFFIC SIGNAL
- DGPS STATION
- OIL STONE
- NFS STONE
- GROUND PROFILE

### APPROVING AUTHORITY

NAME OF THE ROAD :- NH-717A CROSSING

NOTES:-
1. All dimensions are in metre unless otherwise mentioned.
2. All levels are with respect to M.S.L.
3. Ground Level(MSL)-648.05m
4. Crossing Length-12.02m

| DRAWING TITLE | DRG.NO. |
|---|---|
| ALIGNMENT DRAWING | SILIGURI-ALN-86 |
| ROUTE MAP | SILIGURI-ROUTEMAP-05 |

REFERENCE DRAWINGS

| NO | DATE | DESCRIPTION | BY | VERIFIED |
|---|---|---|---|---|
| 3 | 14-12-22 | Submission-Reroute | D.Krishna | Rajkumar |
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| 1 | 07-6-22 | Final Copy | K.J.J | P.B.RAO |
| 0 | 13-4-22 | Draft Copy | K.J.J | P.B.RAO |

ISSUE RECORD

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SECTION : SILIGURI TO GANGTOK

CLIENT: INDRADHANUSH GAS GRID LIMITED

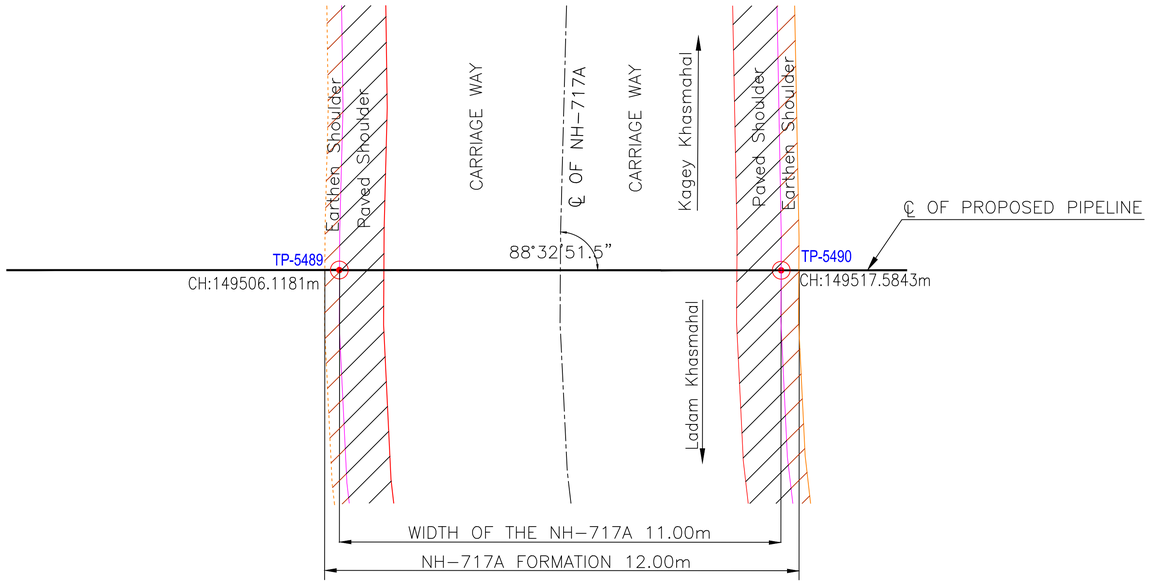
SURVEY CONSULTANT: INDIAN RESOURCES INFORMATION & MANAGEMENT TECHNOLOGIES LTD. (IN-RIMT)
HYDERABAD - 81
Email:mail@inrimt.com

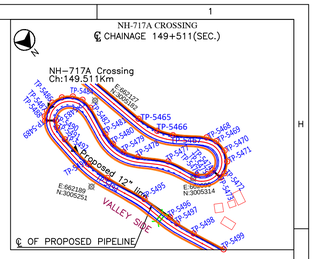
NH-717A CROSSING AT (PEDONG BAZAR D.I.F.) CHAINAGE 149.269 Km

SCALE: 1:100 | DRAWING NUMBER: SGPL-CRS-NH-93 | R 3

## NH-717A CROSSING
℄ CHAINAGE :149+511(SEC.)

SILIGURI ← → GANGTOK




KEY PLAN
NOT TO SCALE

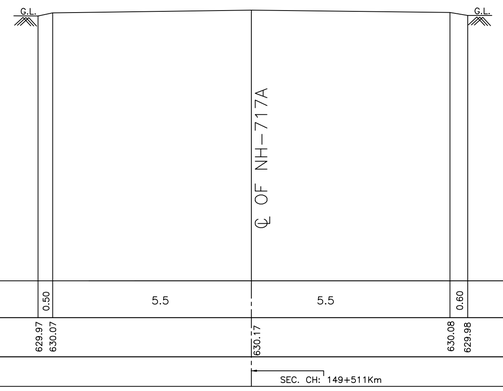
### PLANIMETRY

SCALE
ALONG THE ALIGNMENT 1:100
ACROSS THE ALIGNMENT 1:100

### GROUND PROFILE

SCALE :
HORIZONTAL 1:100
VERTICAL 1:100

DATUM - 621.0m




| | |
|---|---|
| DISTANCE BETWEEN LEVEL POINTS (m) | 0.50, 5.5, 5.5, 0.60 |
| REDUCED LEVEL IN m ABOVE MSL | 629.97, 630.07, 630.17, 630.08, 629.98 |
| ℄ CHAINAGE | SEC. CH: 149+511Km |
| SOIL STRATIFICATION | |

### TOPOGRAPHIC SYMBOLS

- PROPOSED PIPELINE
- EXISTING PIPELINE
- TP TURNING POINT
- IP INTERMEDIATE POINT
- METALLED ROAD
- CART TRACK
- FOOTPATH
- RAILWAY
- DRAIN/CANAL/RIVER
- WATER TANK, LAKE OR RESERVOIR
- BRIDGE, CULVERT
- HOUSE
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- OFC
- TRAFFIC SIGNAL
- DGPS STATION
- OIL STONE
- NFS STONE
- GROUND PROFILE

### APPROVING AUTHORITY

NAME OF THE ROAD :- NH-717A CROSSING

NOTES:-
1. All dimensions are in metre unless otherwise mentioned.
2. All levels are with respect to M.S.L.
3. Ground Level(MSL)-629.97m
4. Crossing Length-12.00m

| ALIGNMENT DRAWING | SILIGURI-ALN-86 |
|---|---|
| ROUTE MAP | SILIGURI-ROUTEMAP-05 |
| DRAWING TITLE | DRG.NO. |

REFERENCE DRAWINGS

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SURVEY CONSULTANT: INDIAN RESOURCES INFORMATION & MANAGEMENT TECHNOLOGIES LTD. (IN-RIMT)
HYDERABAD - 81
Email:mail@inrimt.com

NH-717A CROSSING AT (KAGEY KHASMAHAL) CHAINAGE 149.511 Km

SCALE: 1:100 | DRAWING NUMBER: SGPL-CRS-NH-94 | R 3

# VOLUME IV OF IV

## PDI DATA FOR
## SILIGURI PIPELINE SECTION

**(APPLICABLE FOR ALL SPREAD OF PART C, D & E )**

**BIDDER TO IDENTIFIED THEIR SPREAD WISE SCOPE AS PER SPREAD WISE CHAINAGE SHOWN IN SCHEMATIC.**

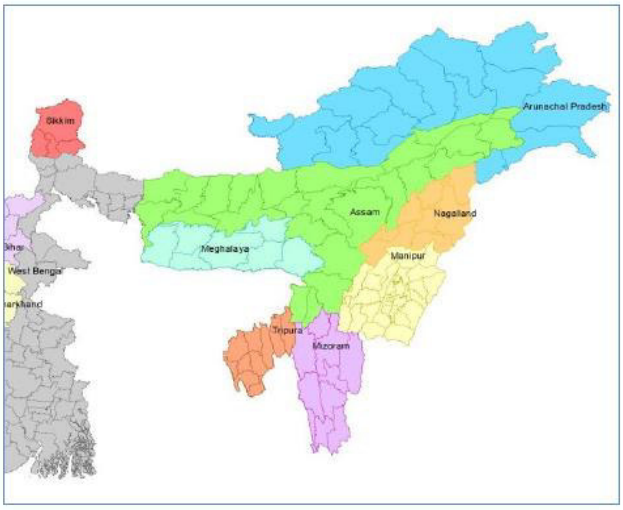
# DETAILED ENGINEERING ROUTE SURVEY WORKS FOR PROPOSED NORTH EAST GAS GRID PIPELINE PROJECT – PHASE - III

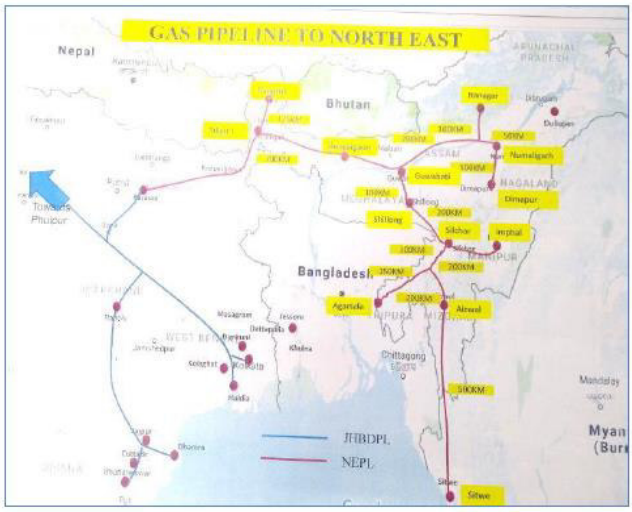
## GROUP – D

## SILIGURI - GANGTOK (NEW) NATURAL GAS PIPELINE

## POPULATION DENSITY INDEX

## DRAFT REPORT – V1




*Submitted to*

Engineer–in–Charge

**INDRADHANUSH GAS GRID LIMITED (IGGL)**

**(A JV OF IOCL, ONGC, GAIL, OIL & NRL)**

**5th Floor, Central Mall, G. S. Road, Christian Basti**

**Guwahati - 781005**

*Submitted by*


**INDIAN RESOURCES INFORMATION & MANAGEMENT TECHNOLOGIES LTD. (IN-RIMT)**

#39, Ananth Info Park, Hitec City, Phase-II, Madhapur, **HYDERABAD - 500 081**

Ph:040-6615 6615 Fax:040-66156531

E-mail: mail@inrimt.com web-site: www.inrimt.com

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1.1. Scope of work ..... 5
2. ROUTE DESCRIPTION ..... 9
2.1. Description of Route ..... 9
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4.0. METHODOLOGY ADOPTED ..... 14
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6.0 CONCLUSIONS .....26

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# DETAIL ROUTE SURVEY AND POPULATION DENSITY INDEX REPORT FOR SILIGURI to GANGTOK - NEW PIPELINE

## 1.0. INTRODUCTION :

Natural Gas has become a key resource for global energy needs and is an abundant, versatile and clean burning fuel. It is a naturally occurring hydrocarbon gas mixture consisting primarily of methane and is a fossil fuel used as a source of energy for heating, cooking, electricity generation, fuel for vehicles, raw material in petro-chemical industries, etc. Natural Gas satisfies most of the requirements for fuel in a modern day industrial society - being efficient, non-polluting and relatively economical. The periodic uncertainties and volatility in both the price and supply of oil have also helped Natural Gas emerge as a major fuel in the energy basket across countries.

Natural gas has been playing a vital role in all aspects of development and is poised to occupy a significant share in the energy mix. The Natural Gas is widely transported in the gaseous state through gas pipelines or by means of Natural Gas carriers in the liquid state (LNG). Gas pipelines allow the transportation of large quantity of natural gas directly from place of production to the place of consumption without any loading or storing operation. Piped Natural Gas is safer as compared to LPG due to its light weight nature and in the event of leakage; it dissipates immediately in the air. However, as Natural Gas is combustible, flammable and explosive, handling of this fuel require utmost care with highly efficient transportation system and least loss during transit. Therefore, transportation of gas through pipeline is a safe, economic and environmentally sound alternative to most other modes of energy transport. For selecting the pipeline route, the main challenge is to select the most optimum route in terms of distance, environment and economic interests keeping safety in mind.

With a vision to develop North East region as a dominant hydrocarbon hub at the forefront of India's energy economy – "Hydrocarbon Vision 2013 of North East India", has been developed by the Ministry of Petroleum and Natural Gas. One of

the objectives of the vision is the development of natural gas grid and CNG highways that will interconnect the States in the North East region as well as with natural gas grid. Towards this, Indradhanush Gas Grid Limited (IGGL), is now planning to laying natural gas pipelines in the North Eastern States and had called for tender vide Tender Notification No. PLCC/NEGPL/CL/18022. The work envisaged under this contract included conducting Reconnaissance survey, Detailed Engineering survey, Soil surveys & Population Density Index surveys for the proposed Natural Gas Pipelines in North-East India. The pipeline segments have been divided into 4 groups i.e., Group-A, Group-B, Group-C and Group-D. Indian Resources Information & Management Technologies Ltd., (IN-RIMT), Hyderabad had participated in the tender process and is entrusted the task of carrying out the studies and investigations of Group-D consisting of:

1. Dimapur – Imphal Section, &
2. Siliguri - Gangtok Section.

This report pertains to the Desk top study, Reconnaissance survey and Detailed Engineering Survey carried out at the site to study and identify options for laying the pipeline along the above mentioned routes.

The take-off point of the Siliguri-Gangtok section is proposed from the existing Barauni – Guwahati gas pipeline of GAIL (India) Ltd., which runs in an east-west direction towards the south of Siliguri-Jalpaiguri cities in West Bengal. The SV-13 is taken as starting point for this Pipeline Route. This pipeline is proposed to be terminated near Ranipool in Gangtok, Sikkim State.

The Siliguri – Gangtok pipeline would cater to the demands along the route especially the cities of Siliguri, Jalpaiguri and Gangtok. The take-off is from the SV-13 station on the Belacoba Road near Belacoba village. The line passes through agriculture fields, tea plantations and river area before crossing NH-31 and takes the national highway NH-717A all along till it reaches the terminal point near Saramsa Garden at Ranipool.

Most of the line runs near to Teesta River from Belacoba to Bagrakote. The road is quite good from Bagrakote up to Gangtok. The width of the road is 6-8 m up to the Sikkim border with no much space between the blacktop portion and the drain. From there onwards, all along, up to Ranipool the road is wide (8-10 m) with berm at most places. Along the alignment, the proposed pipeline crosses 3 Railway lines, 119 National Highways, 11 Major / Minor rivers and 10 stream / nala / canal crossings. It passes through the RoW of the NH which is within Forest limits for a length of 136.084 km both in West Bengal and Sikkim State whereas the length of 49.534 Km is in plain areas in West Bengal state. The total length of pipeline runs in West Bengal is about 142.636 Km and in Sikkim is about 42.982 Km.

Pipeline transportation of gas offers a safe, economic and environmentally sound alternative to most other modes of energy transport.

The main challenge is to select most optimum route in terms of distance, environment and economic interests and construction of the pipeline keeping its safety in mind.

Further, the scope of the work is divided into the following parts:

- Reconnaissance Survey
- Detailed Engineering Survey
- Population Density Index Survey
- Soil Resistivity Survey
- Soil Chemical Analysis Survey
- Soil Stratification Survey
- Data Generation

The present report embodies the information on the Detailed Engineering Survey including the Population Density Index, conducted along the Route proposed from Siliguri to Gangtok.

**I. Reconnaissance Survey**

Reconnaissance survey has been conducted and IN-RIMT suggested three suitable options for which the take-off point of the Siliguri-Gangtok section is proposed from the existing Barauni – Guwahati gas pipeline of GAIL (India) Ltd., which runs in an east-west direction towards the south of Siliguri-Jalpaiguri cities in West Bengal. This pipeline is proposed to be terminated near Ranipool in Gangtok, Sikkim State.

The three route options proposed in the original Reccee Survey are –

The total lengths of Option-1, Option-2 & Option-3 are 115 km, 180 km & 182 km, respectively. Major curves/ hair-pin bends along Option-1, Option-2 & Option-3 are 8, 124 & 133, respectively. The minimum & maximum elevation along Option-1 is 101 m & 900 m; along Option-2, it is 101 m & 2226 m and along Option-3, it is 98m & 2226 m.

Because of the above considerations, the following are the preferences:

1st Preference is Option-1. This alignment has the shortest distance of about 115 km (about 65 km less than Option-2 and 67 km less than Option-3), gradual gradient, less number of sharp curves and road crossings. Narrow road and heavy traffic is the major hurdle.

The Option-1 has the issues with the permissions from the NH authorities as the Road is having heavy traffic and not possible to divert the traffic as Gagtok is a Tourism hub. So the Option-2 was considered as an alternative for the survey. There is also a possibility of the Expansion of the Road in future as an alternative route to Gangtok. This route has the partial length going through the cross country and the remaining is going through the high way roads.

**II. Detailed Route Survey:**

Thus, the present report covers the study of route on detail engineering survey for the Siliguri to Gangtok Pipeline. On the basis of the desktop study as well as field survey, Option 2 has been selected by IGGL to conduct the Detailed Engineering Survey based on various factors, merits and demerits and finally the route approved by IGGL was taken up for detailed engineering survey and thus the present report.

## 1.1. Scope of work

The scope of work for this work as specified by IGGL in the tender documents in brief is as under;

The take-off point of the Siliguri-Gangtok section is proposed from the existing Barauni – Guwahati gas pipeline of GAIL (India) Ltd., at SV-13 which is on the side of Belacoba Road near Belacoba Village. This route runs in a North – South direction from the take-off point which is towards the South East of Siliguri city in West Bengal. This pipeline is proposed to be terminated near Ranipool in Gangtok, Sikkim State.

The Siliguri – Gangtok pipeline would cater to the demands along the route especially the cities of Siliguri-Jalpaiguri and Gangtok. The take-off is from the SV-13 of GAIL pipeline near Belacoba village and passes through agriculture fields, tea plantations and River area before crossing NH-31. The alignment then goes through the NH-717A from Bagrakote.

After crossing the Railway track near Bagrakote, it goes all along the NH-717A (Siliguri-Gangtok road) till Saramsa Garden, Ranipool in Gangtok.

The owner wants to lay the new pipeline in this route and for this new RoU is to be acquired. Hence, a fresh detail survey is carried out.

The approved techno-commercial feasible route has been taken up for detail engineering survey. Detailed Engineering survey has to be taken up all along the existing route and drawings are to be prepared accordingly.

A population density index survey has also been conducted for the entire section and the details of habitations; public places etc. have been collected as per the technical specification.

All along the route alignment, auger boring has been conducted and details of stratification have been collected along with the soil resistivity survey at specified intervals.

A route map, crossing drawings and alignment sheets are prepared using the surveyed data as per the specified scale, dimensions etc. which are specified in the technical specification.

A detail survey report is prepared and submitted to the client for approval.

In the end a GIS module is prepared and submitted as per the IGGL GIS standards using the survey data / records / drawings.

A check list as per tender documents is filled up with required information as under;

**CHECK LIST** :

| Sr. No. | Activities | Status / Remarks |
|---|---|---|
| 1 | Re-confirmation and Fixing of start and end locations of survey. | IGGL wants to lay the Siliguri to Gangtok Natural Gas Pipeline from the take-off is from the SV-13 of GAIL pipeline near Belacoba village. The end point is near Saramsa Garden, Ranipool in Gangtok. |
| 2 | Transfer of nearby benchmarks (with reference to MSL). Fixing of Co-ordinates of start/ end locations. | We have carried all the existing Bench Marks from the corridor and at some places established bench marks with the help of DGPS. A statement of list of bench mark is annexed with this report. |
| 3 | Check for calibration / accuracy/ performance of Total station & other instruments used for Survey. Indicate details of instruments used. | Total Station instruments, Leica - Model - TS06 Plus 1", Serial No. 1389363, Topcon - Model - GTS 233N 3", Serial No. X10099, Gowin - Model - TKS202 2", Serial No. 8E6484, Leica - Model - TS06 Plus 1", Serial No. 1389363 make, DGPS - Leica, Model - GX1220, Serial No.470505 & Model GSX-2 of SOKKIA and pipeline locator DIGICAT 200 of Leica are deployed for the survey work. The instruments are duly calibrated. |
| 4 | Check for the Surveyor experience and their operating skills of survey instruments. | We have deployed sufficient numbers of graduate / diploma civil engineers, I.T.I. surveyors having ample experience of carrying out the route survey with the latest electronic survey instruments. |
| 5 | Certification for route not passing through CRZ/ National Park/ Sanctuary / Coral Reef/ Ecologically sensitive areas including LNG terminals. | The route alignment does not pass through the CRZ / National Park / Sanctuary / Coral Reef / Ecologically sensitive areas including LNG terminals. |
| 6 | Certification for route not | The route alignment does not pass through |

| Sr. No. | Activities | Status / Remarks |
|---|---|---|
| | passing through Critically Polluted areas as per MoEF Notification dated 15.03.2012. | Critically Polluted areas as per MoEF Notification dated 15.03.2012. |
| 7 | Check to avoid major obstacles / dense plantation / permanent structures/ very hilly terrain etc. | The route alignment avoids major obstacles / dense plantation / permanent structures / very hilly terrain etc. to the maximum extent. |
| 8 | Major Highlights of the Pipeline route. | |
| a | Major Highlights of the Pipeline route. | The route alignment of Siliguri to Gangtok Natural Gas Pipeline from take-off is from the SV-13 of GAIL pipeline near Belacoba village. The end point is near Sarmsa Garden, Ranipool in Gangtok. It caters the CGD requirements for Siliguri and Gangtok cities. |
| b | Co-ordinates of Starting Point. | Longitude Latitude<br>88° 34' 41.827" E 26° 34' 52.785" N |
| c | Co-ordinates of Terminating Point. | Longitude Latitude<br>88° 35' 46.018" E 27° 16' 35.583" N |
| d | Total Chainage | 185.618 km |
| e | Total IP points. | --- |
| f | Total TP Points. | 3690 |
| g | Major Crossings Rly/ NH /SH /MDR/River/ Canal/ Forest. | Railway Crossings – 3 Nos., NH Crossings – 119 No., SH Crossing- 0 Nos., Major District roads – 0 Nos., Other Roads – 142 Nos., River Crossing- 11 Nos., Canal Crossings – 3 Nos. Nala & Drains – 7 Nos. and Tower lines – 2 Nos. |

## 2. ROUTE DESCRIPTION

Indradhanush Gas Grid Limited (IGGL) is developing a natural gas terminal at Siliguri in West Bengal and Ranipool in Sikkim for catering the needs of CGD requirements for Siliguri and Gangtok Cities. The regasified- liquefied natural gas is to be transported to various consumers in Siliguri and Gangtok cities by developing North Eastern Gas Grid pipelines infrastructure in the states of West Bengal and Sikkim to cater to the needs in those areas.

Hence, a detailed engineering survey from Siliguri to Gangtok pipeline is carried out and presented in this report. The description of the route alignment is as under;

### 2.1. Description of Route

The take-off is from the SV-13 station of GAIL pipeline near Belacoba village and passes through agriculture fields, tea plantations and through River area before crossing NH-31.The starting point is located to the South east of Siliguri city and runs in the northern direction.

This pipeline, if implemented, would cater to the demands along the route especially the cities of Siliguri-Jalpaiguri and Gangtok. The pipeline route traverses through the agricultural lands, Tea Estates and then crosses the Teesta River. The line then passes through the Tea estates till it crosses the NH-31. It also crosses the Railway line at Bagrakote. After crossing the Railway track near Bagrakote, it goes all along the NH-717A (Siliguri-Gangtok road) and continues up to the Terminal point near Ranipool in Gangtok.

The study of the Toposheets has indicated that except for the plain areas near Siliguri-Jalpaiguri cities, the major portion of the region is hilly / mountainous and along with the NH roads. Therefore, major portion of the alignment have been proposed along the existing National Highway connecting Siliguri and Gangtok cities.

The proposed pipeline, in general runs in South- North Direction from Siliguri to Gangtok. It passes near / through the major settlements of Belacoba, Odlabari, Bagrakote, Ladam Khasmahal, Rhenak, Yangtam, Namli and Nandok.

The alignment also passes through several villages viz., Belacoba, Odlabari, Bagrakote, Ladam Khasmahal, Rhenak, Yangtam, Namli, Nandok and Ranipool are the villages through which the proposed alignment passes through before it gets terminated at Chainage of 185.618 km.

Most of the line runs parallel to Teesta River at the starting. The road is quite good from Bagrakote up to Gangtok. From Bagrakote, the width of the road is 6-8 m up to the Sikkim border with no much space between the blacktop portion and the drain.

On the valley side, it is a cliff at most stretches. From Sikkim border onwards, the road is slightly better (around 10 m. RoW). Even though the proposed pipeline runs in the Ghats along the NH, the gradient is observed to be always within 8° throughout the length. The pipeline, on its way, comes across several small villages. The villages are located along the NH. Because of the hilly terrain, the road has to negotiate many curves and the road pinches and swells at many locations. There is a moderate traffic along the highway during most parts of the day. The lowest elevation along the stretch is 93.313 m near the tap-off point and the highest elevation is 2203.456 m at a Chainage of 108.202 Km, near Lava Forest / Kolbong Forest Ranges in West Bengal.

Several Bridges have been constructed to cross the rivers/ streams. These are meant for vehicle movement only and pipeline may be laid by constructing the bridges parallel to the existing ones. The existing highway road is laid along the foot hills, and therefore there is no much variation in the gradient along this route.

It is observed that all along the Ghat section, on one side of the road high rise hill ranges having more than 75° angle and on the other side deep valleys with more than 75° angle. Therefore, it is very difficult to take the pipeline either on the ridges or in the valleys. The Total Length of the proposed alignment in this option is 185.618 km. About 75% of the alignment passes through the ghat roads within the hilly areas. It passes through the RoW of the NH which is within Forest limits for a length of 136.084 km both in West Bengal and Sikkim State whereas the length of 49.534 Km is in plain areas in West Bengal state. The total length of pipeline runs in West Bengal is about 142.636 Km and in Sikkim is about 42.982 Km.

## 3.0 GENERAL DETAILS ABOUT THE PIPELINE

The route alignment runs through Dimapur & Kohima districts of Nagaland and Senapati & Imphal districts of Manipur.

A brief about the districts is as under;

**Table 1 : District wise Length of Route**

| S.NO | STATE | DISTRICT | TEHSIL | FROM CHAINGE (KM) | TO CHAINGE (KM) | Distance (KM) |
|---|---|---|---|---|---|---|
| 1 | WEST BENGAL | JALPAIGURI | RAJGANJ | 0.000 | 5008.446 | 5008.446 |
| 2 | WEST BENGAL | JALPAIGURI | JALPAIGURI | 5008.446 | 5483.141 | 474.695 |
| 3 | WEST BENGAL | JALPAIGURI | RAJGANJ | 5483.141 | 5993.994 | 510.852 |
| 4 | WEST BENGAL | JALPAIGURI | JALPAIGURI | 5993.994 | 15464.169 | 9470.175 |
| 5 | WEST BENGAL | JALPAIGURI | MAL | 15464.169 | 52316.252 | 36852.083 |
| 6 | WEST BENGAL | DARJILING | KALIMPONG - 1 | 52316.252 | 93052.594 | 40736.342 |
| 7 | WEST BENGAL | DARJILING | KALIMPONG - 2 | 93052.594 | 142636.757 | 49584.163 |
| 8 | SIKKIM | EAST DISTRICT | RONGLI | 142636.757 | 148381.775 | 5745.018 |
| 9 | SIKKIM | EAST DISTRICT | PAKYONG | 148381.775 | 150637.209 | 2255.434 |
| 10 | SIKKIM | EAST DISTRICT | RONGLI | 150637.209 | 151644.168 | 1006.959 |
| 11 | SIKKIM | EAST DISTRICT | PAKYONG | 151644.168 | 185618.385 | 33974.217 |

**State / District wise Length Summary**

| S.No | State | District | Length (in Kms) |
|---|---|---|---|
| 1 | West Bengal | Jalpaiguri | 52.316 |
| 2 | West Bengal | Darjeeling | 90.321 |
| 3 | Sikkim | East District | 42.982 |

## 4.0. METHODOLOGY ADOPTED

The population density index and class location survey is conducted as per ANSI B31.8 "Gas transmission and Distribution piping System" and OISD Standard 141 (Design and Construction Requirements for cross country hydrocarbon pipelines) and is recorded along with the Chainage at Change points of each location. The methodology adopted for the survey is as per the above referred Standards.

The survey is carried out in a zone of 200 m width on either side along the route of the pipeline with pipeline as the center-line of this zone. The entire route of the pipeline has been divided into lengths of approximately 1600 m (one mile) such that the individual lengths included the maximum number of dwelling which is intended for human occupancy. Within each 1600 m zone, such dwellings has been counted and reported. For this purpose, each separate dwelling unit in a multiple dwelling unit building has been counted as a separate building intended for human occupancy.

**CLASS LOCATION**: The areas have been classified based on above guidelines, as given below:

**Location Class – 1**: A Location Class – 1 is any 1600 m (one mile) section that has 10 or fewer dwellings intended for human occupancy.

**Location Class – 2**: A Location Class – 2 is any 1600 m (one mile) section that has more than 10 but less than 46 dwellings intended for human occupancy.

**Location Class – 3**: A Location Class – 3 is any 1600 m (one mile) section that has 46 or more dwellings intended for human occupancy, except when a location class 4 prevails.

**Location Class – 4**: A Location Class – 4 includes areas where multistory buildings are located intended for

human occupancy. This class includes the areas where traffic is heavy or dense and where there may be numerous other utilities underground. Multistory buildings have 4 or more floors above ground including the first or ground floor. The depth of basements or number of basement floors is not considered. A class - 4 location ends 220 meters from the nearest building with 4 or more stories above ground.

In addition to the above, while classifying areas, additional consideration is also given to the areas where a concentration of people is likely (temple, church, school, multiple dwelling unit, hospital, recreational areas, places of assembly, places of worship, etc. in Location Class 1 or 2). If one or more of these facilities are present in Location Class 1 or 2, the area is classified as Location Class – 3. Concentrations of people referred herewith, includes congregation of not fewer than 20 people per instance in an outside area as well as in a building.

While determining the Location Class of an area, due consideration has also been given to the possibility of future development of the area.

## 5.0. POPULATION DENSITY INDEX AND CLASS LOCATION ALONG THE PIPELINE ROUTE

In a zone of 200m on either side of the pipeline with pipeline route as center-line, the dwellings were recorded. The entire route of the pipeline was divided into lengths of 1600m such that individual lengths will include the maximum number of dwellings intended for human occupancy. The class location is assigned as follows:

| | | |
|---|---|---|
| Class 1 location | - | 10 or less dwellings intended for human occupation |
| Class 2 location | - | >10 but <46 dwellings |
| Class 3 location | - | > 46 dwellings |
| Class 4 location | - | Areas where multi-storey buildings are prevalent and where traffic is heavy or dense. |

The details are presented in the table given below.

**Table 2 : Population Density Index Survey Data**

| S. No. | Chainage | Chainage | Dwellings – With in Corridor | | | | | | Total Dwellings | Whether >20 people assemble during normal course (Yes / No) PP | Class | Remarks | Village / Locality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | From(m) | To(m) | Left(15) | Right(15) | Left(50) | Right(50) | Left(200) | Right(200) | | | | | |
| 1 | 0 | 1600 | 1 | 2 | 4 | 4 | 25 | 31 | 67 | YES | Class-3 | School | Sahebbari |
| 2 | 1600 | 3200 | 5 | 2 | 8 | 1 | 20 | 9 | 45 | YES | Class-2 | Market | Guzrimari |
| 3 | 3200 | 4800 | 7 | 9 | 25 | 11 | 48 | 100 | 200 | | Class-3 | | |
| 4 | 4800 | 6400 | | | 2 | 4 | 9 | 19 | 34 | | Class-2 | | |
| 5 | 6400 | 8000 | 2 | 1 | | 1 | 10 | 23 | 37 | | Class-2 | | |
| 6 | 8000 | 9600 | 14 | 17 | 47 | 22 | 70 | 44 | 214 | | Class-3 | | |
| 7 | 9600 | 11200 | 9 | 11 | 23 | 15 | 17 | 37 | 112 | YES | Class-3 | Temple, Market | |
| 8 | 11200 | 12800 | | | | 2 | | 30 | 32 | YES | Class-2 | Resort | |
| 9 | 12800 | 14400 | | | | | | | | | Class-1 | Teesta River | |
| 10 | 14400 | 16000 | | | | | | | | | Class-1 | Teesta River | |
| 11 | 16000 | 17600 | 6 | 4 | 11 | 11 | 26 | 43 | 101 | | Class-3 | Part of River | Chengmari hat |
| 12 | 17600 | 19200 | | | 1 | 1 | | 56 | 58 | | Class-3 | | Gangadebi |
| 13 | 19200 | 20800 | 1 | | | 1 | 11 | 23 | 36 | | Class-2 | Tea Garden | |
| 14 | 20800 | 22400 | | | | | | 73 | 73 | YES | Class-3 | Tea Garden, | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Masjid, Church | |
| 15 | 22400 | 24000 | | 2 | 1 | 1 | | 36 | 40 | YES | Class-2 | Temple | Uttar Majhgram |
| 16 | 24000 | 25600 | | 1 | 6 | 3 | 19 | 52 | 81 | YES | Class-3 | School | Dhalabari |
| 17 | 25600 | 27200 | 3 | 1 | 14 | 9 | 49 | 56 | 132 | YES | Class-3 | Masjid | |
| 18 | 27200 | 28800 | 1 | 6 | 4 | 11 | 68 | 60 | 150 | YES | Class-3 | Mandir, Masjid | Bara Gharia |
| 19 | 28800 | 30400 | | | | 1 | | 26 | 27 | | Class-2 | Part of River | |
| 20 | 30400 | 32000 | | | | | | | | | Class-1 | River Bank | |
| 21 | 32000 | 33600 | | | | | | | | | Class-1 | River Bank | Purba Damdim |
| 22 | 33600 | 35200 | 1 | | 1 | | | | 2 | | Class-1 | Tea Garden | |
| 23 | 35200 | 36800 | | 3 | 2 | 10 | 9 | 32 | 56 | | Class-3 | Tea Garden | Damdimha t |
| 24 | 36800 | 38400 | | | | | 2 | | 2 | | Class-1 | Tea Garden | Damdimha t |
| 25 | 38400 | 40000 | | | 3 | 2 | 33 | 11 | 49 | | Class-3 | Tea Garden | Damdimha t |
| 26 | 40000 | 41600 | | | | | | 22 | 22 | | Class-2 | Tea Garden | Damdimha t |
| 27 | 41600 | 43200 | | | | 1 | | 6 | 7 | | Class-1 | Tea Garden | |
| 28 | 43200 | 44800 | | 2 | 10 | 17 | 55 | 26 | 110 | YES | Class-3 | School | |
| 29 | 44800 | 46400 | 13 | 26 | 39 | 26 | 105 | 42 | 251 | | Class-3 | | Oodlabari |
| 30 | 46400 | 48000 | 13 | 20 | 92 | 60 | 271 | 95 | 551 | | Class-3 | | Oodlabari |
| 31 | 48000 | 49600 | 1 | | 6 | 9 | 63 | 2 | 81 | YES | Class-3 | Temple | Uttar Phulbari |
| 32 | 49600 | 51200 | | | | | | | | | Class-1 | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33 | 51200 | 52800 | | | | | | | | | Class-1 | | |
| 34 | 52800 | 54400 | 2 | | | | | | 2 | YES | Class-1 | Army School - near by | |
| 35 | 54400 | 56000 | | | | | | | | | Class-1 | | |
| 36 | 56000 | 57600 | | | | | | | | | Class-1 | | |
| 37 | 57600 | 59200 | | | | | | | | | Class-1 | | |
| 38 | 59200 | 60800 | | 1 | | 2 | | | 3 | | Class-1 | | |
| 39 | 60800 | 62400 | | | | | | | | | Class-1 | | |
| 40 | 62400 | 64000 | | | | | 3 | | 3 | | Class-1 | | |
| 41 | 64000 | 65600 | | | 4 | | 4 | | 8 | | Class-1 | | |
| 42 | 65600 | 67200 | | | | | 9 | | 9 | | Class-1 | | Nobgaon Khasmahal |
| 43 | 67200 | 68800 | | 2 | 2 | 7 | 5 | | 16 | | Class-2 | | |
| 44 | 68800 | 70400 | | | 3 | 1 | 4 | 5 | 13 | YES | Class-2 | Church, Play Ground | |
| 45 | 70400 | 72000 | 8 | 1 | | 8 | 4 | 16 | 37 | | Class-2 | | Paringar Khasmahal |
| 46 | 72000 | 73600 | 8 | 1 | 19 | 16 | 39 | 15 | 98 | YES | Class-3 | School | |
| 47 | 73600 | 75200 | | 4 | 5 | 4 | 4 | 19 | 36 | | Class-2 | | |
| 48 | 75200 | 76800 | 5 | 2 | 14 | | 6 | 1 | 28 | YES | Class-2 | Play Ground | |
| 49 | 76800 | 78400 | | | | 3 | | | 3 | | Class-1 | | |
| 50 | 78400 | 80000 | | 4 | | 1 | | 1 | 6 | | Class-1 | | |
| 51 | 80000 | 81600 | | | | | | | | | Class-1 | | |
| 52 | 81600 | 83200 | | | | | | | | | Class-1 | | |
| 53 | 83200 | 84800 | | | | | | | | YES | Class-1 | View Point | Lolegaon |
| 54 | 84800 | 86400 | | | | | | | | | Class-1 | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 55 | 86400 | 88000 | 6 | 3 | 10 | 2 | 19 | 2 | 42 | YES | Class-2 | Market | Bokhim Khasmahal |
| 56 | 88000 | 89600 | | | | | | | | | Class-1 | | |
| 57 | 89600 | 91200 | | | | | | | | | Class-1 | | |
| 58 | 91200 | 92800 | 1 | | 1 | 2 | | 11 | 15 | YES | Class-2 | Church | |
| 59 | 92800 | 94400 | | | | | | | | | Class-1 | | |
| 60 | 94400 | 96000 | | | | 2 | | 14 | 16 | | Class-2 | | |
| 61 | 96000 | 97600 | | 1 | | 4 | | 2 | 7 | | Class-1 | | |
| 62 | 97600 | 99200 | | | | | | | | | Class-1 | | |
| 63 | 99200 | 100800 | | | | | | | | | Class-1 | | |
| 64 | 100800 | 102400 | 2 | | 1 | 1 | 1 | 6 | 11 | | Class-2 | | Jomoolung Ma |
| 65 | 102400 | 104000 | | 2 | | | | 21 | 23 | | Class-2 | | |
| 66 | 104000 | 105600 | | | | | | | | | Class-1 | | |
| 67 | 105600 | 107200 | | | | | | | | | Class-1 | | |
| 68 | 107200 | 108800 | | | | | | | | | Class-1 | | Lava |
| 69 | 108800 | 110400 | | | | | | | | | Class-1 | | |
| 70 | 110400 | 112000 | | | | | | | | | Class-1 | | |
| 71 | 112000 | 113600 | 6 | 10 | | 7 | | 1 | 24 | | Class-2 | Hotel | |
| 72 | 113600 | 115200 | | | | | | | | | Class-1 | | |
| 73 | 115200 | 116800 | 1 | | | | 19 | | 20 | | Class-2 | | |
| 74 | 116800 | 118400 | 6 | 6 | 28 | 7 | 53 | 2 | 102 | | Class-3 | Hotels | |
| 75 | 118400 | 120000 | | | 3 | | 15 | | 18 | | Class-2 | Restaurant | Algarah |
| 76 | 120000 | 121600 | | | | | | | | | Class-1 | Play Ground | |
| 77 | 121600 | 123200 | 3 | 7 | 6 | 12 | 11 | 50 | 89 | | Class-3 | | |
| 78 | 123200 | 124800 | 24 | 46 | 15 | 22 | 11 | 32 | 150 | | Class-3 | | |
| 79 | 124800 | 126400 | 14 | 29 | 61 | 34 | 131 | 64 | 333 | | Class-3 | | |
| 80 | 126400 | 128000 | 21 | 28 | 52 | 94 | 141 | | 336 | | Class-3 | | Pedong |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 128000 | 129600 | 11 | 7 | 13 | 25 | 16 | 237 | 309 | | Class-3 | | Pedong |
| 82 | 129600 | 131200 | 31 | 26 | 22 | 27 | 11 | 26 | 143 | | Class-3 | | Pedong |
| 83 | 131200 | 132800 | 7 | 3 | 16 | 11 | 8 | 9 | 54 | | Class-3 | | Pedong |
| 84 | 132800 | 134400 | 6 | 9 | 3 | 4 | | 15 | 37 | YES | Class-2 | Mandir | Pedong |
| 85 | 134400 | 136000 | 2 | 2 | 1 | 7 | 3 | 18 | 33 | | Class-2 | | pedong |
| 86 | 136000 | 137600 | 3 | 4 | 13 | 3 | 15 | 3 | 41 | | Class-2 | Restaurant | |
| 87 | 137600 | 139200 | 2 | 3 | 1 | 6 | 7 | 7 | 26 | | Class-2 | Restaurant | |
| 88 | 139200 | 140800 | 5 | 7 | 5 | 6 | | 8 | 31 | YES | Class-2 | Market | |
| 89 | 140800 | 142400 | | | 3 | | 8 | 1 | 12 | YES | Class-2 | Border Check Post | |
| 90 | 142400 | 144000 | 2 | 1 | 3 | 1 | 16 | 2 | 25 | | Class-2 | Hotels | |
| 91 | 144000 | 145600 | 6 | 3 | 9 | 14 | 6 | 19 | 57 | | Class-3 | Resort | |
| 92 | 145600 | 147200 | 4 | 11 | 12 | 11 | 9 | 78 | 125 | | Class-3 | | |
| 93 | 147200 | 148800 | | 8 | 30 | 6 | 42 | 19 | 105 | YES | Class-3 | School | |
| 94 | 148800 | 150400 | | | 6 | 5 | 5 | 3 | 19 | YES | Class-2 | Temple | |
| 95 | 150400 | 152000 | 7 | 3 | 5 | 8 | 5 | 4 | 32 | | Class-2 | | |
| 96 | 152000 | 153600 | | 1 | 2 | 5 | 1 | 11 | 20 | YES | Class-2 | Market | Rorathang |
| 97 | 153600 | 155200 | 5 | 2 | 8 | 7 | | 23 | 45 | | Class-2 | Rorathang Bridge | |
| 98 | 155200 | 156800 | 2 | 2 | 8 | 8 | | 13 | 33 | | Class-2 | | |
| 99 | 156800 | 158400 | 2 | 1 | 5 | 5 | 9 | 1 | 23 | | Class-2 | | |
| 100 | 158400 | 160000 | 2 | 1 | 9 | 5 | 3 | | 20 | YES | Class-2 | Temple | |
| 101 | 160000 | 161600 | 2 | 8 | 5 | 2 | | 10 | 27 | | Class-2 | | |
| 102 | 161600 | 163200 | 2 | 4 | 9 | 7 | 3 | 6 | 31 | | Class-2 | | |
| 103 | 163200 | 164800 | 4 | 3 | 12 | 3 | 9 | 5 | 36 | | Class-2 | | Pacheykhani |
| 104 | 164800 | 166400 | 5 | 2 | 11 | 12 | 14 | 12 | 56 | YES | Class-3 | Temple | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 105 | 166400 | 168000 | 4 | | 5 | 14 | 4 | 14 | 41 | YES | Class-2 | Temple | Dikling |
| 106 | 168000 | 169600 | 5 | | 6 | 10 | 6 | 7 | 34 | | Class-2 | | |
| 107 | 169600 | 171200 | 5 | 7 | 11 | 12 | 6 | 11 | 52 | | Class-3 | | Pakyong |
| 108 | 171200 | 172800 | 13 | 13 | 15 | 18 | 40 | 4 | 103 | YES | Class-3 | School Play GroundAirport near by | Kartok |
| 109 | 172800 | 174400 | 16 | 17 | 19 | 28 | 35 | 22 | 137 | YES | Class-3 | Pakyong Market | |
| 110 | 174400 | 176000 | 6 | 13 | 6 | 20 | 1 | 25 | 71 | | Class-3 | | |
| 111 | 176000 | 177600 | 3 | 16 | 10 | 1 | 4 | | 34 | YES | Class-2 | School | |
| 112 | 177600 | 179200 | 9 | 9 | 10 | 5 | 23 | | 56 | | Class-3 | | |
| 113 | 179200 | 180800 | 1 | 2 | 7 | 7 | 6 | 2 | 25 | | Class-2 | | |
| 114 | 180800 | 182400 | 6 | 5 | 1 | 4 | | 7 | 23 | | Class-2 | | Yangtam |
| 115 | 182400 | 184000 | 12 | 7 | 11 | 14 | 16 | 29 | 89 | | Class-3 | | |
| 116 | 184000 | 185600 | 6 | 5 | 13 | 10 | 34 | 20 | 88 | | Class-3 | | |
| 117 | 185600 | 185618 | | 4 | 2 | 3 | 10 | 17 | 36 | YES | Class-2 | Resort Garden | Namli |
| | | Grand Total | **380** | **463** | **850** | **786** | **1764** | **1904** | **6147** | | | | |

**Table 3 : Population Density Index – Class Location**

| S. No. | Chainage From(ch) | Chainage To(Ch) | Total Dwellings | Class | Remarks | Village / Locality |
|---|---|---|---|---|---|---|
| 1 | 0 | 1600 | 67 | Class-3 | School | Sahebbari |
| 2 | 1600 | 3200 | 45 | Class-2 | Market | Guzrimari |
| 3 | 3200 | 4800 | 200 | Class-3 | | |
| 4 | 4800 | 6400 | 34 | Class-2 | | |
| 5 | 6400 | 8000 | 37 | Class-2 | | |
| 6 | 8000 | 9600 | 214 | Class-3 | | |
| 7 | 9600 | 11200 | 112 | Class-3 | Temple, Market | |
| 8 | 11200 | 12800 | 32 | Class-2 | Resort | |
| 9 | 12800 | 14400 | | Class-1 | Teesta River | |
| 10 | 14400 | 16000 | | Class-1 | Teesta River | |
| 11 | 16000 | 17600 | 101 | Class-3 | Part of River | Chengmarihat |
| 12 | 17600 | 19200 | 58 | Class-3 | | Gangadebi |
| 13 | 19200 | 20800 | 36 | Class-2 | Tea Garden | |
| 14 | 20800 | 22400 | 73 | Class-3 | Tea Garden, Masjid, Church | |
| 15 | 22400 | 24000 | 40 | Class-2 | Temple | Uttar Majhgram |
| 16 | 24000 | 25600 | 81 | Class-3 | School | Dhalabari |
| 17 | 25600 | 27200 | 132 | Class-3 | Masjid | |
| 18 | 27200 | 28800 | 150 | Class-3 | Mandir, Masjid | Bara Gharia |
| 19 | 28800 | 30400 | 27 | Class-2 | Part of River | |
| 20 | 30400 | 32000 | | Class-1 | River Bank | |
| 21 | 32000 | 33600 | | Class-1 | River Bank | Purba Damdim |
| 22 | 33600 | 35200 | 2 | Class-1 | Tea Garden | |
| 23 | 35200 | 36800 | 56 | Class-3 | Tea Garden | Damdimhat |
| 24 | 36800 | 38400 | 2 | Class-1 | Tea Garden | Damdimhat |
| 25 | 38400 | 40000 | 49 | Class-3 | Tea Garden | Damdimhat |
| 26 | 40000 | 41600 | 22 | Class-2 | Tea Garden | Damdimhat |
| 27 | 41600 | 43200 | 7 | Class-1 | Tea Garden | |
| 28 | 43200 | 44800 | 110 | Class-3 | School | |
| 29 | 44800 | 46400 | 251 | Class-3 | | Oodlabari |
| 30 | 46400 | 48000 | 551 | Class-3 | | Oodlabari |
| 31 | 48000 | 49600 | 81 | Class-3 | Temple | Uttar Phulbari |
| 32 | 49600 | 51200 | | Class-1 | | |
| 33 | 51200 | 52800 | | Class-1 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 34 | 52800 | 54400 | 2 | Class-1 | Army School - near by | |
| 35 | 54400 | 56000 | | Class-1 | | |
| 36 | 56000 | 57600 | | Class-1 | | |
| 37 | 57600 | 59200 | | Class-1 | | |
| 38 | 59200 | 60800 | 3 | Class-1 | | |
| 39 | 60800 | 62400 | | Class-1 | | |
| 40 | 62400 | 64000 | 3 | Class-1 | | |
| 41 | 64000 | 65600 | 8 | Class-1 | | |
| 42 | 65600 | 67200 | 9 | Class-1 | | Nobgaon Khasmahal |
| 43 | 67200 | 68800 | 16 | Class-2 | | |
| 44 | 68800 | 70400 | 13 | Class-2 | Church, Play Ground | |
| 45 | 70400 | 72000 | 37 | Class-2 | | Paringar Khasmahal |
| 46 | 72000 | 73600 | 98 | Class-3 | School | |
| 47 | 73600 | 75200 | 36 | Class-2 | | |
| 48 | 75200 | 76800 | 28 | Class-2 | Play Ground | |
| 49 | 76800 | 78400 | 3 | Class-1 | | |
| 50 | 78400 | 80000 | 6 | Class-1 | | |
| 51 | 80000 | 81600 | | Class-1 | | |
| 52 | 81600 | 83200 | | Class-1 | | |
| 53 | 83200 | 84800 | | Class-1 | View Point | Lolegaon |
| 54 | 84800 | 86400 | | Class-1 | | |
| 55 | 86400 | 88000 | 42 | Class-2 | Market | Bokhim Khasmahal |
| 56 | 88000 | 89600 | | Class-1 | | |
| 57 | 89600 | 91200 | | Class-1 | | |
| 58 | 91200 | 92800 | 15 | Class-2 | Church | |
| 59 | 92800 | 94400 | | Class-1 | | |
| 60 | 94400 | 96000 | 16 | Class-2 | | |
| 61 | 96000 | 97600 | 7 | Class-1 | | |
| 62 | 97600 | 99200 | | Class-1 | | |
| 63 | 99200 | 100800 | | Class-1 | | |
| 64 | 100800 | 102400 | 11 | Class-2 | | Jomoolung Ma |
| 65 | 102400 | 104000 | 23 | Class-2 | | |
| 66 | 104000 | 105600 | | Class-1 | | |
| 67 | 105600 | 107200 | | Class-1 | | |
| 68 | 107200 | 108800 | | Class-1 | | Lava |
| 69 | 108800 | 110400 | | Class-1 | | |
| 70 | 110400 | 112000 | | Class-1 | | |
| 71 | 112000 | 113600 | 24 | Class-2 | Hotel | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 72 | 113600 | 115200 | | Class-1 | | |
| 73 | 115200 | 116800 | 20 | Class-2 | | |
| 74 | 116800 | 118400 | 102 | Class-3 | Hotels | |
| 75 | 118400 | 120000 | 18 | Class-2 | Restaurant | Algarah |
| 76 | 120000 | 121600 | | Class-1 | Play Ground | |
| 77 | 121600 | 123200 | 89 | Class-3 | | |
| 78 | 123200 | 124800 | 150 | Class-3 | | |
| 79 | 124800 | 126400 | 333 | Class-3 | | |
| 80 | 126400 | 128000 | 336 | Class-3 | | Pedong |
| 81 | 128000 | 129600 | 309 | Class-3 | | Pedong |
| 82 | 129600 | 131200 | 143 | Class-3 | | Pedong |
| 83 | 131200 | 132800 | 54 | Class-3 | | Pedong |
| 84 | 132800 | 134400 | 37 | Class-2 | Mandir | Pedong |
| 85 | 134400 | 136000 | 33 | Class-2 | | pedong |
| 86 | 136000 | 137600 | 41 | Class-2 | Restaurant | |
| 87 | 137600 | 139200 | 26 | Class-2 | Restaurant | |
| 88 | 139200 | 140800 | 31 | Class-2 | Market | |
| 89 | 140800 | 142400 | 12 | Class-2 | Border Check Post | |
| 90 | 142400 | 144000 | 25 | Class-2 | Hotels | |
| 91 | 144000 | 145600 | 57 | Class-3 | Resort | |
| 92 | 145600 | 147200 | 125 | Class-3 | | |
| 93 | 147200 | 148800 | 105 | Class-3 | School | |
| 94 | 148800 | 150400 | 19 | Class-2 | Temple | |
| 95 | 150400 | 152000 | 32 | Class-2 | | |
| 96 | 152000 | 153600 | 20 | Class-2 | Market | Rorathang |
| 97 | 153600 | 155200 | 45 | Class-2 | Rorathang Bridge | |
| 98 | 155200 | 156800 | 33 | Class-2 | | |
| 99 | 156800 | 158400 | 23 | Class-2 | | |
| 100 | 158400 | 160000 | 20 | Class-2 | Temple | |
| 101 | 160000 | 161600 | 27 | Class-2 | | |
| 102 | 161600 | 163200 | 31 | Class-2 | | |
| 103 | 163200 | 164800 | 36 | Class-2 | | Pacheykhani |
| 104 | 164800 | 166400 | 56 | Class-3 | Temple | |
| 105 | 166400 | 168000 | 41 | Class-2 | Temple | Dikling |
| 106 | 168000 | 169600 | 34 | Class-2 | | |
| 107 | 169600 | 171200 | 52 | Class-3 | | Pakyong |
| 108 | 171200 | 172800 | 103 | Class-3 | School Play Ground, Airport near by | Kartok |
| 109 | 172800 | 174400 | 137 | Class-3 | Pakyong | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | Market | |
| 110 | 174400 | 176000 | 71 | Class-3 | | |
| 111 | 176000 | 177600 | 34 | Class-2 | School | |
| 112 | 177600 | 179200 | 56 | Class-3 | | |
| 113 | 179200 | 180800 | 25 | Class-2 | | |
| 114 | 180800 | 182400 | 23 | Class-2 | | Yangtam |
| 115 | 182400 | 184000 | 89 | Class-3 | | |
| 116 | 184000 | 185600 | 88 | Class-3 | | |
| 117 | 185600 | 185618 | 36 | Class-2 | Resort Garden | Namli |

**Table 4: Details of Total Length and Percentage of Each Class of Population Density Index**

| S.No | Population Density Class location | Total Length in km | % |
|---|---|---|---|
| 1 | Class – 1 | 59.200 | 31.89 |
| 2 | Class – 2 | 68.618 | 37.08 |
| 3 | Class – 3 | 57.600 | 31.03 |
| 4 | Class – 4 | 0 | 0 |

## 6. CONCLUSIONS

The population density index and class location survey has been carried out for the proposed Siliguri - Gangtok pipeline. The take-off is from the SV-13 Station of GAIL pipeline near Belacoba village, on the outskirts of Siliguri in West Bengal State and is terminating near Ranipool in Gangtok, Sikkim State.

The survey was commenced from Siliguri at the existing SV-13 Station of GAIL pipeline, Siliguri, West Bengal State and ended near Saramsa Garden in Ranipool, Gangtok, Sikkim.

The population density survey of the pipeline route revealed that most of the alignment of section lies in Class 2 (37.08%) followed by Class 1 (31.89%), Class 3 (31.03%) and Class 4 (0.0%) respectively.

**ACKNOWLEDGEMENT**:

We hereby extend our sincere thanks to all the officials IGGL, Guwahati for their kind and able guidance extended to us during the Population Density survey and expects the same in future also.

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# PHOTOGRAPHS