

Structural Design Challenges for Plaza 66 Tower 2.

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Abstract:

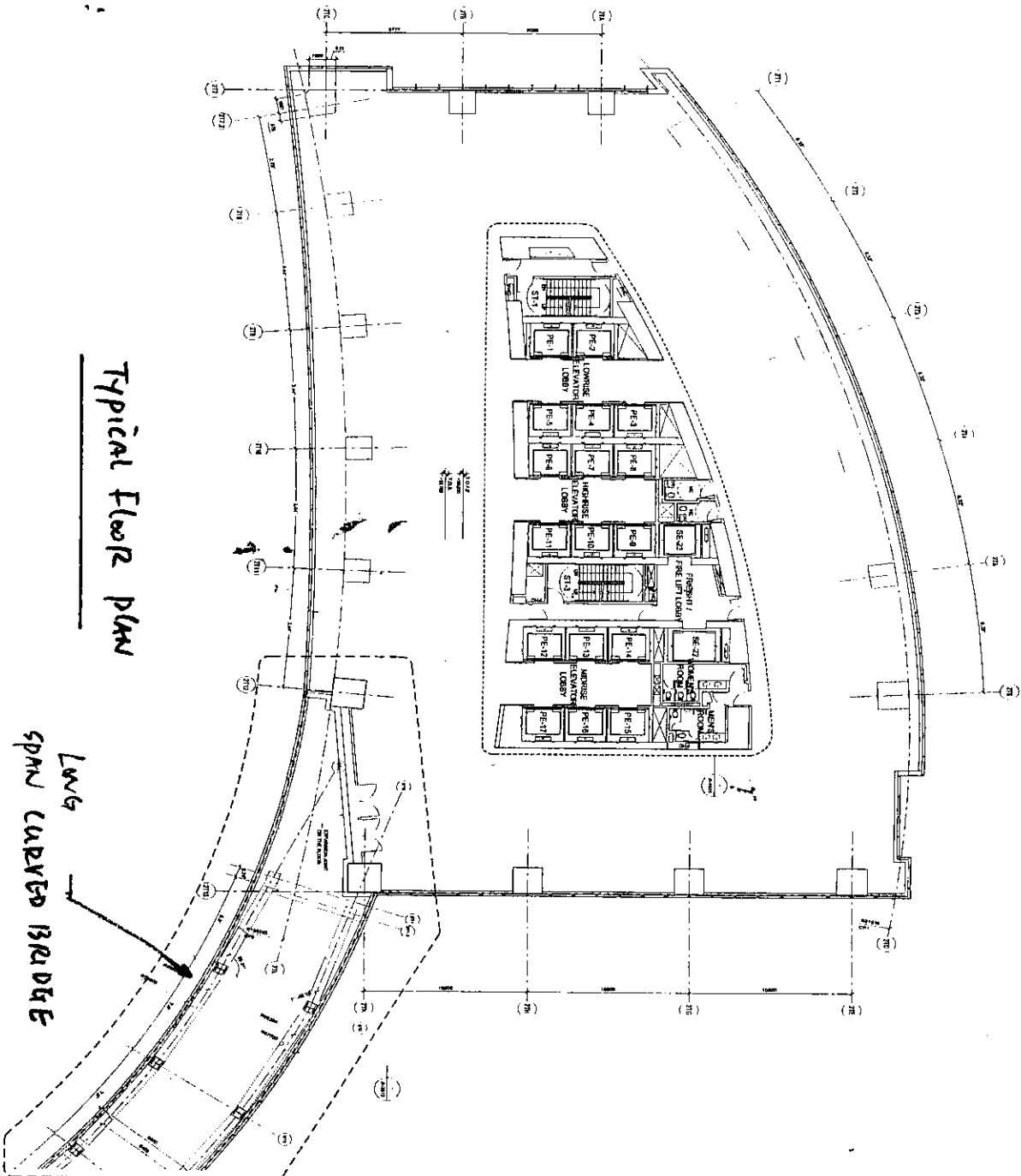
The Plaza 66 Tower 2, recently completed in Shanghai, China, is a complex balance and compromise of structural engineering, architectural desire, construction, and client's interest. This is a 45-story concrete moment frame and core wall resisting structure. The innovative US-style architectural designs by world famous Architect KPF makes this building so unique that provides many engineering challenges. The structural solution is a complex multi-disciplinary process with the objective to discover, detail and construct a system to fulfill a given set of performance requirements. Although the modern engineering computer technology allows for precise analyses and design of various systems for high-rise buildings, it does not readily provide insight for choosing among alternatives of these systems to arrive at the best overall design.

This paper presents the design and analysis from conceptual to detail design due to the following engineering challenges: (1). Simulated FEA models are presented for stage studies of differential settlement of pile mat foundation: early construction, later construction, and service phase. (2). Multiple alternate structural systems are studied by using approximate analysis and cost comparison database, and a cost-effective structural system is developed. (3). As an important architectural feature, the design and analysis of connection point supporting a curved 65m (215ft) long span steel bridge between two towers is presented. (4). As another important architectural feature, a 3D **SIM**(structural information model) model of a two-way sloped steel cantilever thin steel lantern is developed not only to help analysis but also to provide accurate connections to benefit all of the parties.

TYPICAL Floor Plan

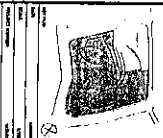
LONG SPAN CURVED BRIDGE

NOTE: EDGE OF SLAB IS 5MM PROJECE OF GLASS AT ALL LOCATIONS



A-1260

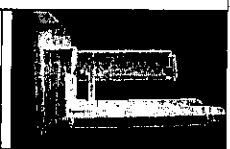
BRIDGE LEVEL 13 PLAN
ELEVATOR TRANSFER



| NO. | REVISION | DATE | BY | CHECKED |
|-----|----------|------|----|---------|
| | | | | |
| | | | | |
| | | | | |

PLAZA 66 TOWER II

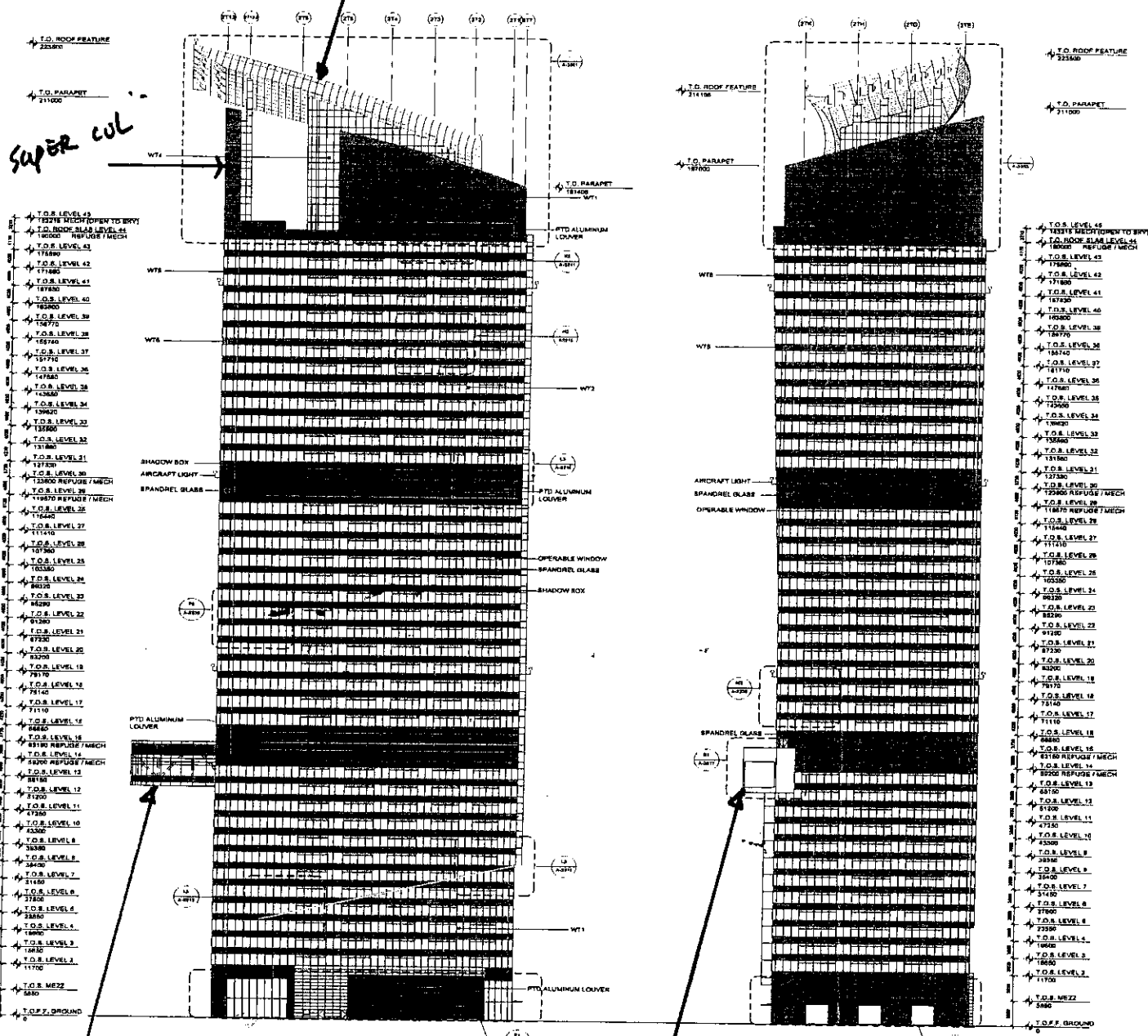
1266 NAN JING XI ROAD, SHANGHAI P.R.C.



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ROOF LANTERN

SUPER COL



NORTH ELEVATION

EAST ELEVATION

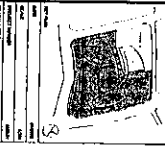
BRIDGE

BRIDGE.

NOTES:
 1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
 2. FINISHES ARE AS SHOWN ON THE DRAWINGS.
 3. REFER TO THE ARCHITECT'S SPECIFICATIONS FOR MATERIALS AND METHODS OF CONSTRUCTION.

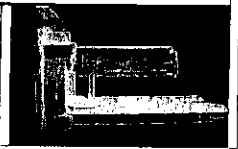
A-2002

NORTH AND EAST ELEVATION



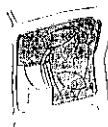
PLAZA 66 | TOWER II

1266 NAN JING XI ROAD, SHANGHAI P.R.C.



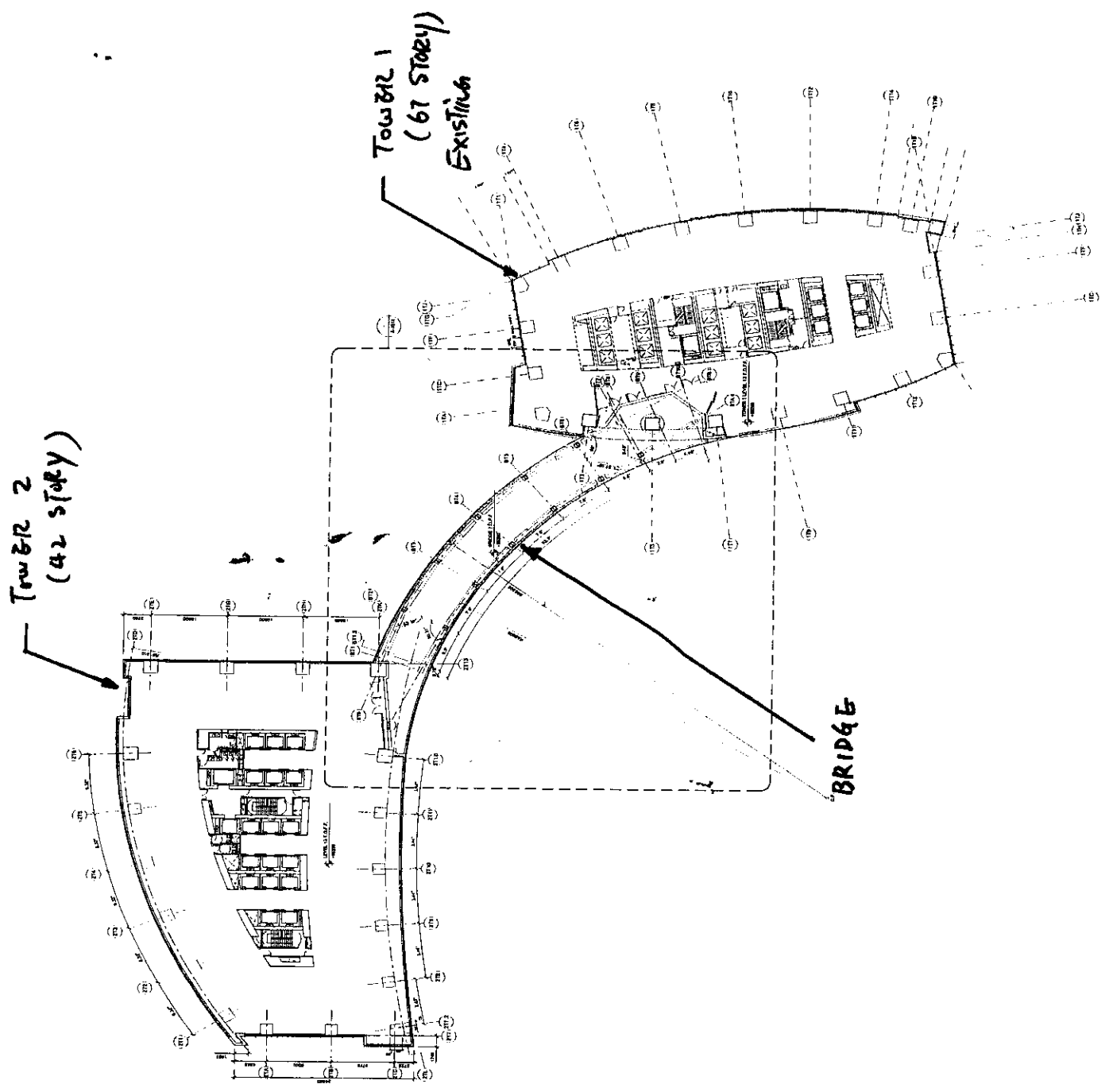
PLAZA 66 | TOWER II

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BRIDGE LEVEL
PLAN (LEVEL 13)

A-3510

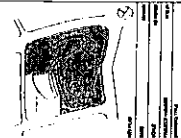


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PLAZA 66 TOWER II

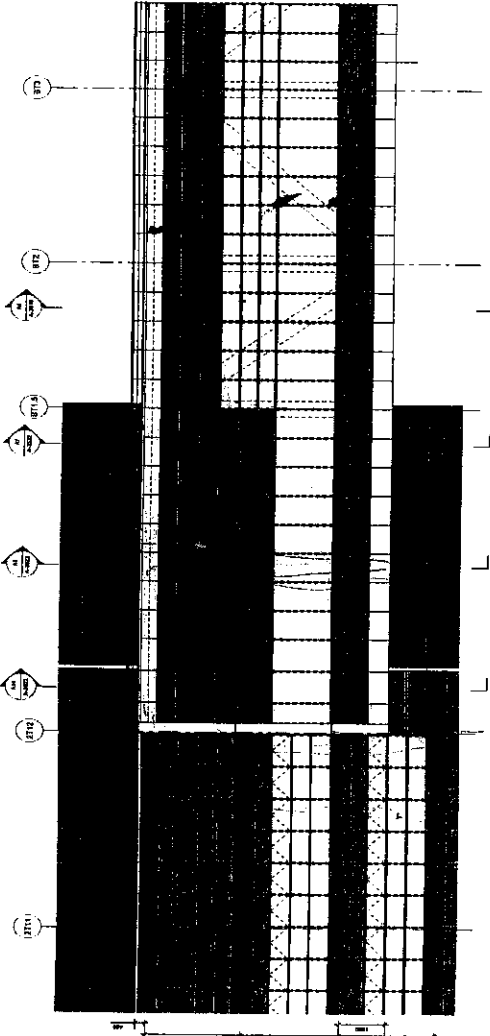
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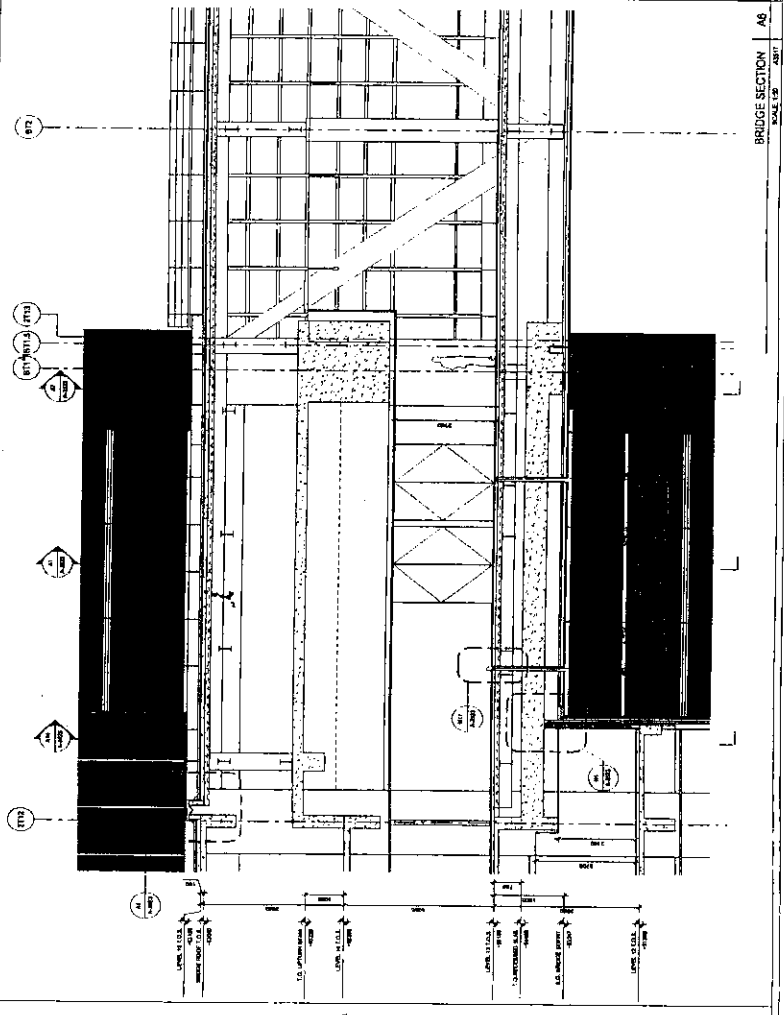
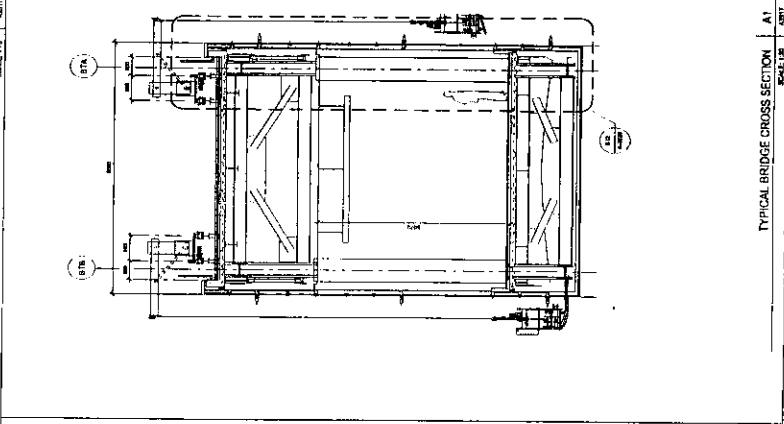
BRIDGE
 DEVELOPED
 ELEVATIONS/SECTIONS

A-3519

BRIDGE CONNECTION

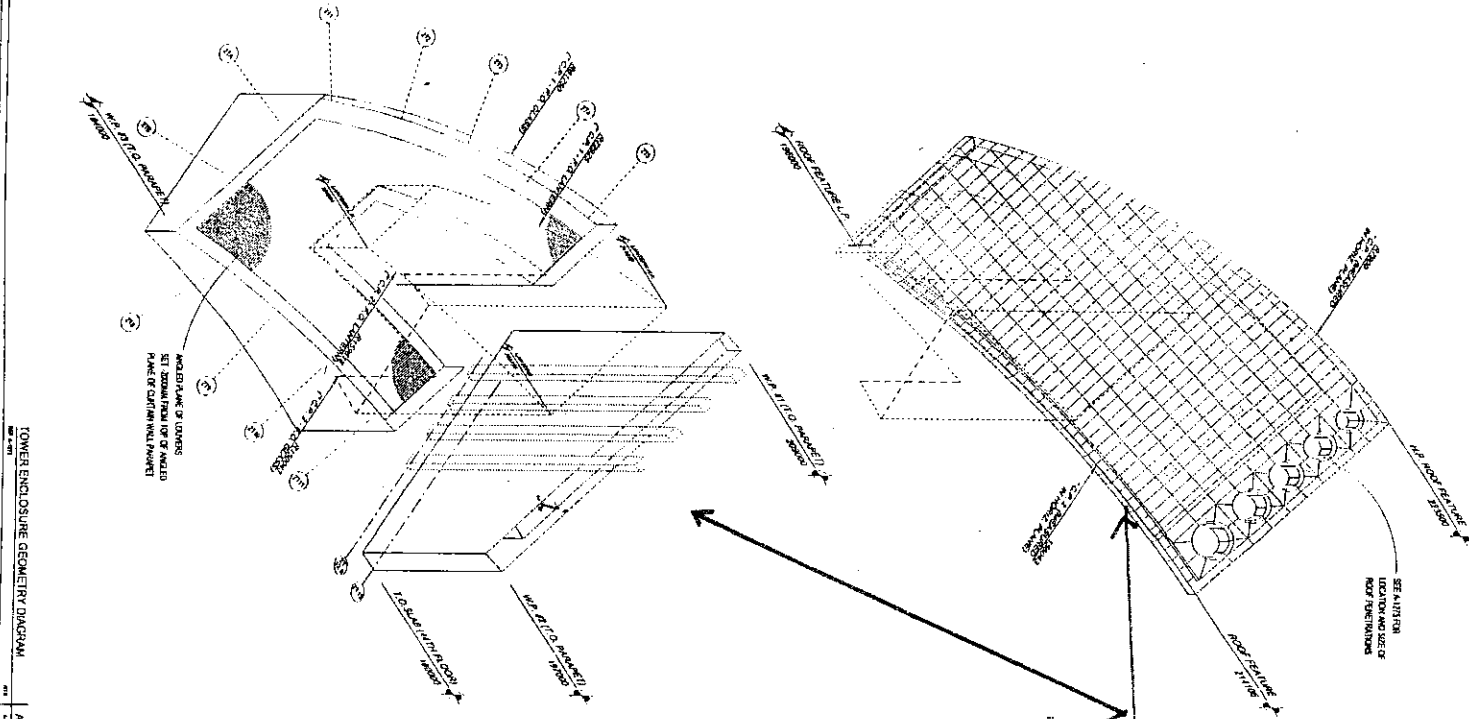


BRIDGE SOUTH DEVELOPED ELEVATION
 SCALE: 1/20



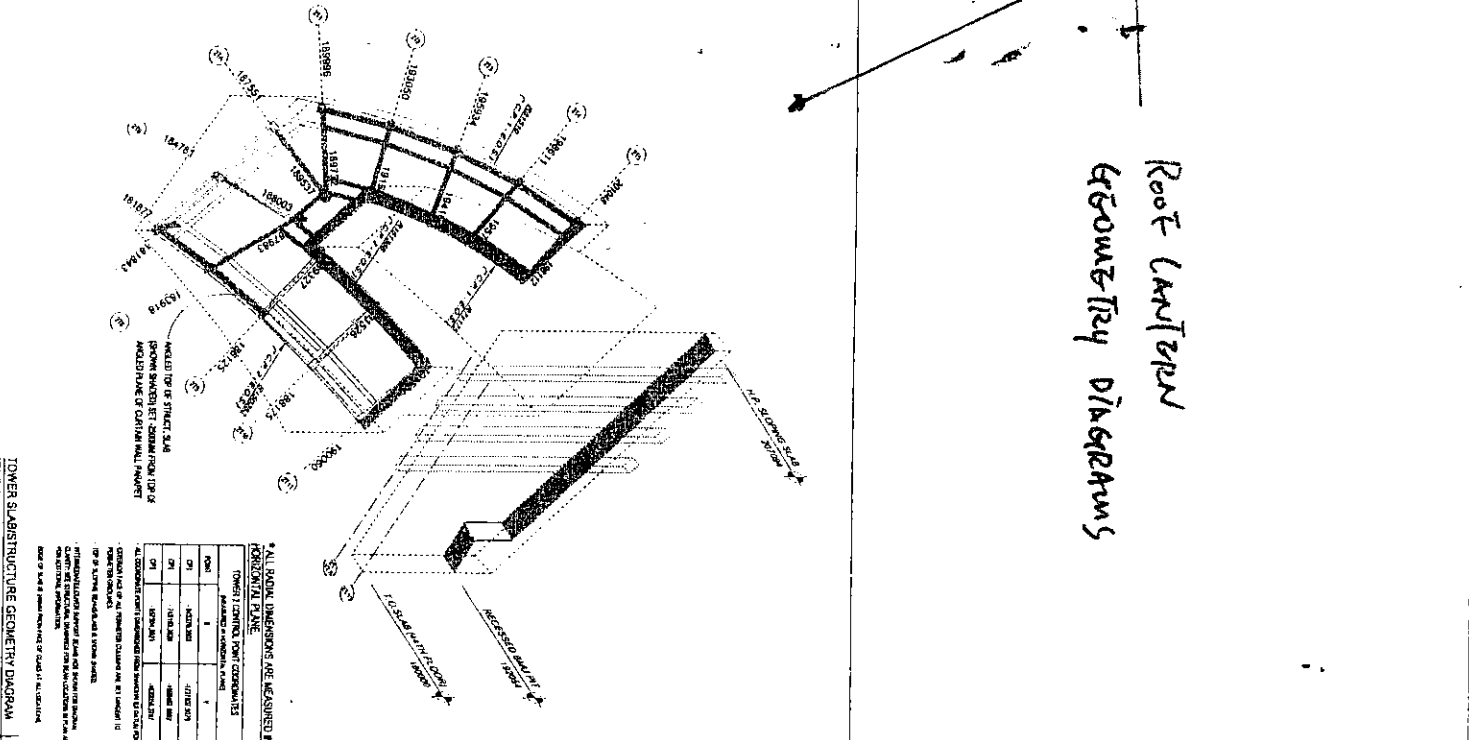
BRIDGE SOUTH DEVELOPED ELEVATION SCALE: 1/20
 TYPICAL BRIDGE CROSS SECTION SCALE: 1/20
 BRIDGE SECTION SCALE: 1/20

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TOWER ENCLOSURE GEOMETRY DIAGRAM

A10



TOWER SUBSTRUCTURE GEOMETRY DIAGRAM

A10

Roof Cantilever
Geometry Diagrams

ALL DIMENSIONAL DIMENSIONS ARE MEASURED IN METERS UNLESS OTHERWISE SPECIFIED.

| NO. | DESCRIPTION | UNIT | VALUE |
|-----|-------------------------|------|-------|
| 01 | ROOF SLAB THICKNESS | mm | 100 |
| 02 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 03 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 04 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 05 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 06 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 07 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 08 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 09 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 10 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 11 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 12 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 13 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 14 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 15 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 16 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 17 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 18 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 19 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 20 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 21 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 22 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 23 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 24 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 25 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 26 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 27 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 28 | ROOF SLAB REINFORCEMENT | mm | 12 |
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| 30 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 31 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 32 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 33 | ROOF SLAB REINFORCEMENT | mm | 12 |
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| 40 | ROOF SLAB REINFORCEMENT | mm | 12 |
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| 44 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 45 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 46 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 47 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 48 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 49 | ROOF SLAB REINFORCEMENT | mm | 12 |
| 50 | ROOF SLAB REINFORCEMENT | mm | 12 |

A-1003



TOWER GEOMETRY DIAGRAMS

