The bridge viaduct is divided into small segments, that are prefabricated in the good quality control casting yard, then, delivered to install by good erection equipment.
**External and Internal Prestressing**

1. **External Tendon**
   - Reduce friction losses
   - Easily construction
   - Slim web, Light weight
   - Good maintenance

2. **Internal Tendon**
   - High ductility
   - Difficult in construction
   - Thicker web, heavy weight

**Span-by-Span Precast Segment**

*Bang Na - Bang Phi - Bang Pakong Expressway, Bangkok*

The span-by-span precast segmental erection w/ main span of 45.5 meters (m) long and out-to-out width of 27.60 m. Max weight segment is 90 tonf.

**Structural Configuration**

D6 Precast Segmental Box Girder

- Typical Span for D6 Segments:
  - Span Length = 45.50 m
- Width of Segment = 27.60 m for 6 lanes of traffic
- Height of Segment = 2.60 m
- Length of Segment = 2.55 m for typical segment = 1.775 m for pier segments
- Weights of Segment = 85 tones for typical segment = 100 tones for pier segments
- External longitudinally pre-stressed tendons = 22 tendons
- Bearing = 2: Inclined Bearing on Pier Column
Rangsit Interchange Improvement

Key Components

Structural Components of Precast Segmental Box Girder Bridge

Advantages and Benefits

Precast Segmental Construction
(w/ externally prestressing)

1. Construction Simplicity
   • no cast in-situ concreting such as diaphragm, topping
     => reduce complication of in-place formwork and rebar fixing
1. Construction Simplicity
   - easier installation of external post-tensioned tendons

2. Time Savings/Cost Effectiveness
   - precast segment to be prefabricated and stored at casting yard while foundation and sub-structure are being built.
   - by using efficient erection method and equipment ==> the rapid installation of viaduct can be achieved.

3. Quality Control - QA/QC
   - precast segment to be produced in factory-manner condition w/ good quality control.
   - minimum interruption natural impacts such as bad weather, rain.
   - minimum waste of material
   - good precision in production
4. Inspection and Maintenance
- external prestressing tendons can be easily inspected and repaired if required.
- maintenance program can be scheduled.

Advantages and Benefits

Drawbacks and Special Requirements
- Seismic Resistance
- Special tool for geometry control during segment casting and erection
- Required minimum volume of work because of high initial investment cost on casting yard and erection equipment.

Key Components
Precast Segmental Box Girder w/ External Tendons

Segment Casting Yard Components
1. Short-Line Match Casting and Casting Mould Units
2. Production and Working Space
   - Rebar Assembly
   - Prestressing Work
   - Segment Touch-up/ Repair
   - Ready-mixed Concrete Plant
3. Lifting Equipments
4. Storage Area

Casting Yard Layout
Overview of Casting Yard

Segment Casting Yard Layout

Casting Yard Equipments and Facilities

Concrete Plant
Storage Area
Production Area
Service Bridge
Gantry Crane

Segment Storage
Segment Production Area
Service Bridge
Lifting Gantry Cranes

Rebar Cages Production
Short-line Match Cast Operation

Geometry Control
Software

Bridge Co-ordinate system

Casting yard Co-ordinate system

Casting Yard Layout

Span Layout for Precast Segment

SPAN LAYOUT

Geometry Control for Short-line Match Casting

Casting Mould Unit
Segment Concrete Casting

Geometry Control of Match Casting

Adjustment of Segment Geometry during Casting

As-Cast Data for Span Erection
Casting Data and Record of As-Cast Data for Span Erection/Installation

Main Components for Segment Erection

1. Method of Erection
2. Erection Truss and Lifting Equipment
Method of Segment Erection

CONSTRUCTION PROJECT
RANGSIT INTERCHANGE PROJECT

Bridge Segment Installation

Bridge Segment Installation
Lifting Equipment and Launching Facilities

Hydraulic Jack System for Temporary Support

Completion of Segment Installation

Completion of Construction
RESEARCH AND DEVELOPMENT (R&D) 
PRECAST SEGMENTAL COLUMN 
ASIAN INSTITUTE OF TECHNOLOGY (A.I.T.)

Precast Column (Precast Segment)

Precaution Column (Segment)

Viaduct Column footing

Sub-Structure Systems

Pot Bearing

Continuous, span by span

Single Bored Pile Dia.1.50 m

Double Bored Pile Dia.1.50 m

R&D for Precast Segmental Column

Strain Distribution at joint
FIRST IMPLEMENTED PROJECT
FOR
FULLY PRECAST BRIDGE CONSTRUCTION
IN THAILAND
ORIGINAL DESIGNED DRAWINGS
ROAD CROSS-SECTION

NEW DESIGNED DRAWINGS
ROAD CROSS-SECTION

TRAFFIC MANAGEMENT AND DETOUR

COLUMN INSTALLATION

STEP 1 3D-Model

STEP 2 3D-Model
Segment Installation for Viaduct
Segment Installation for Viaduct

Project Completion

Construction of MRTA-Blue Line

PRECAST SEGMENTAL CROSSBEAM FOR MASS TRANSIT PASSENGER STATION BLUE LINE MRT PROJECT

STATION CHARACTERISTIC

TYPICAL STATION: BS15, BS17, BS18, BS19 AND BS20

STATION OVERVIEW:
- Consist of 6 Grid Line, 5 spans @ 30.00m = 150.00m Length
- 2 Level; Concourse & Platform
- Sliding Platform System
STATION CHARACTERISTIC

Alternative Design and Construction
Precast Crossbeam as Formwork
for Concourse Level

CROSSBEAM CONSTRUCTION
REVISED CROSSBEAM FOR ORIGINAL DESIGN TO PRECAST ELEMENT WITH SHEAR KEY:

Step of Construction

Construction of Platform Level on Concourse Crossbeam
Question – Answer

Thank you

Dr. Songkiat Matupayont  
www.casethai.com  
songkiat@casethai.com  
+66(81) 869-8926