

PRESENTATION OUTLINE

Cast in-situ

On-site Construction

- Supported on Falsework (Shoring)
- Balanced Cantilever using Form Traveller (FT)
- Incremental Launching Method (ILM)
- Moveable Scaffolding System (MSS)



Precast

Off-site Prefabrication

- Precast Girders
 - Thin Girder
 - Full Span Girder
- Precast Segments
 - Balanced Cantilever Method (BCM)
 - Span by Span Method (SBS)



Cast in-situ Supported on Falsework (Shoring)

- Labour intensive to erect falsework
- Slow cycle time due to excessive manual operation
- Finished concrete surface may not be good if formwork quality is not taken care of
- Difficult to construct at area where ground access and support is not available



Cast in-situ

Supported on Falsework (Shoring)



Staging onto river bed



Staging supported by piers

Cast in-situ

Supported on Falsework (Shoring)



Cantilever suspension



Traffic diversion is required

Cast in-situ Balanced Cantilever using Form Traveller (FT)

- Useful for long span bridge with access constraints
- Cranage capacity requirement is minimized, crew efficiency is optimized
- Flexible system allows forming of varying segment depth and length
- Short cycle time from 7 to 14 days for every pair



Cast in-situ

Balanced Cantilever using Form Traveller (FT)



Four-framed form traveller

Lowering bottom platform onto pontoon



Cast in-situ

Balanced Cantilever using Form Traveller (FT)



Stabilising with fictitious columns

Resisting unbalanced moment



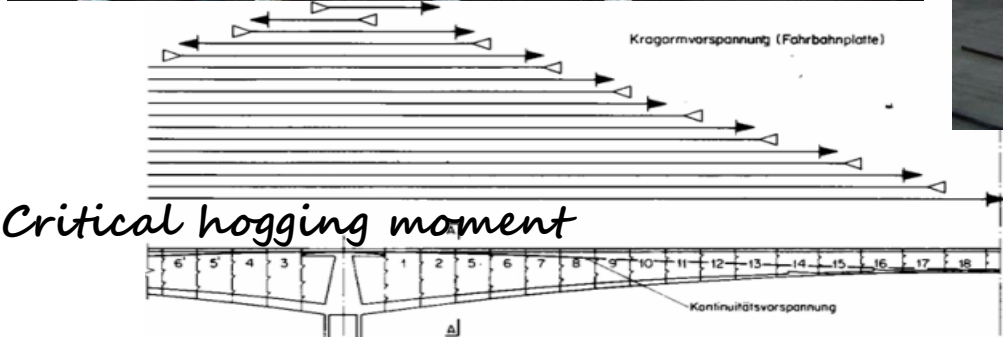
Cast in-situ

Balanced Cantilever using Form Traveller (FT)

Longitudinal and transverse tendons



Post-tensioning before launching of FT



Cast in-situ

Underslung Form Traveller and Stay Cables



Project Record of Associating Company, Dywitech & DSI

Cast in-situ Incremental Launching Method (ILM)

- Elimination of extensive falsework and shoring
- Stationary casting location under weather proof shelter, higher productivity, better QC
- Can accommodate constant vertical and horizontal curvatures
- Cycle time from 10 to 12 days for every segment, i.e. 12m



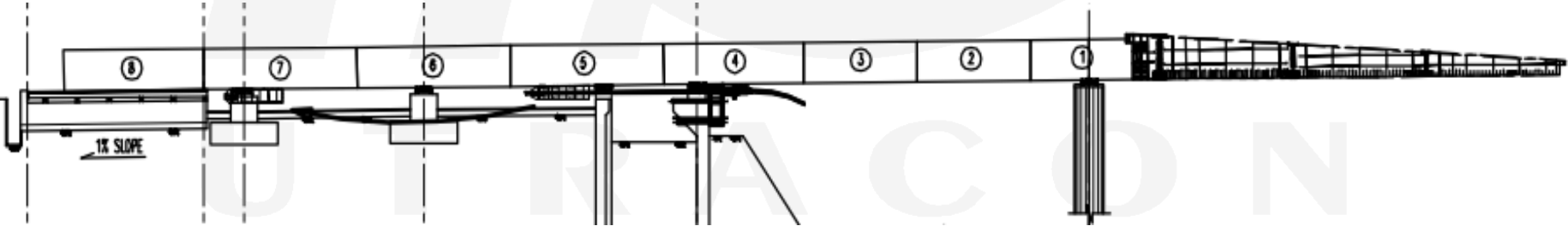
Cast in-situ

Incremental Launching Method (ILM)

Launching Nose

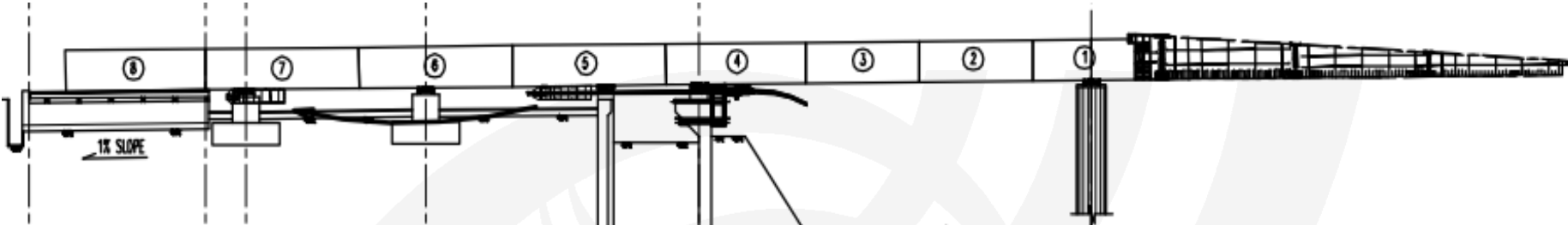


Sliding Pad



Cast in-situ

Incremental Launching Method (ILM)



Pulling mechanism



Load transfer

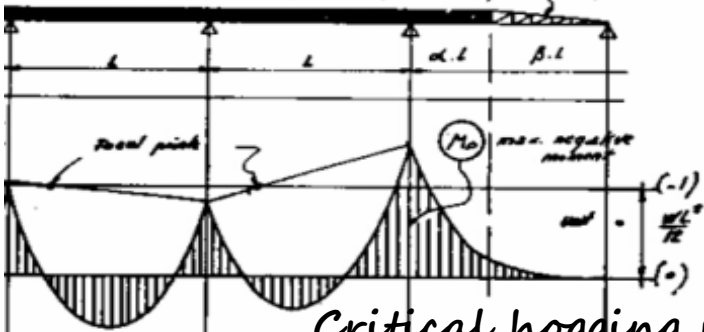
Cast in-situ

Incremental Launching Method (ILM)

Stressing of top PC bars



Longitudinal tendons



Critical hogging moment

Precast

Why Precast

- Increased labour cost in cast in-situ works due to intensive manual activities
- Need rapid completion of project to ease traffic problems
- Construction over water, over traffic, built-up areas or mountainous terrain
- Higher quality control under factory condition in precast yards



Precast

Longitudinal & transverse slicing

- Bridge deck is segmentalised or sliced into smaller pieces
- Longitudinal slices, i.e. precast girders can span temporarily between piers
- Transverse slices, i.e. precast segments are not self-supporting, need to be temporarily supported or hung and require temporary stressing



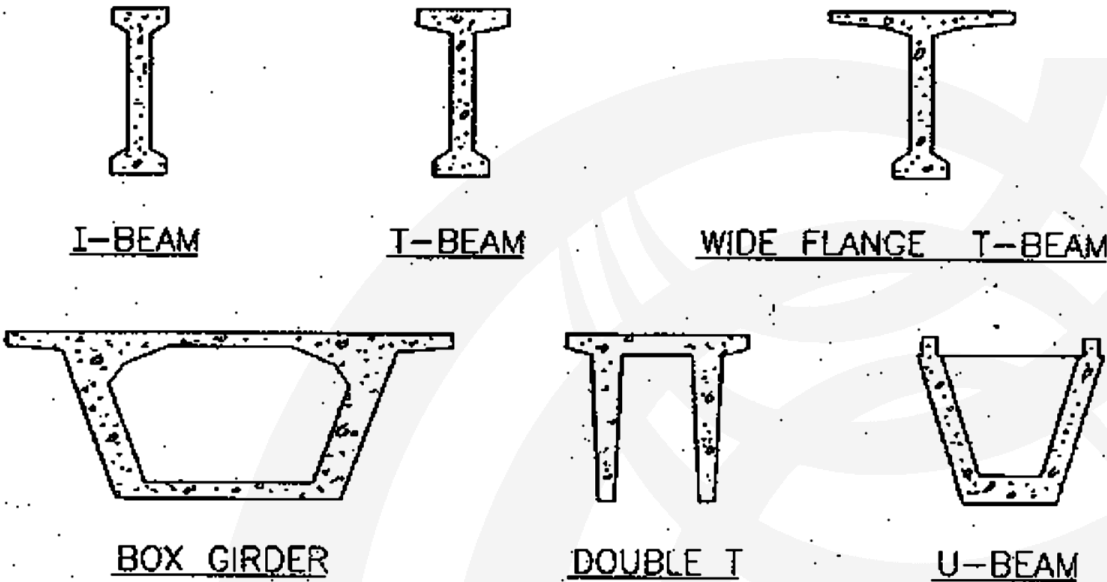
Longitudinal slicing



Transverse slicing

Precast

Precast Girders - Types



Precast

Precast girders – launched by cranes

- Minimal temporary works, optimized crew size
- Fast pace of erection, multiple work fronts are possible
- Cranes are generally available in the market at affordable rental cost
- Ground access and proper ground preparation are required



Tandem lifting



Single crane lifting

Precast

Precast girders–launched by Launching Gantry (LG)

- Optimized crew size
- Fast pace of erection, multiple work fronts are possible with multiple LG
- Ground crane support is required for initial set-up of LG and for dismantling
- Temporary loads are introduced to permanent structures



Double truss LG



Single truss LG

Precast

Precast girders-launched by LG-“rear feeding”



Delivery of girder by locomotive and railcar on temporary railway

Precast

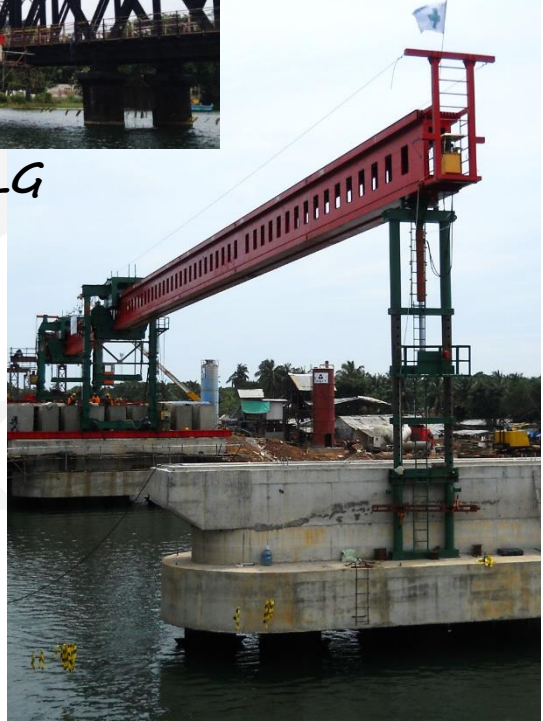
Precast girders-launched by LG-“rear feeding”



Launching of precast girder



Launching of LG



Precast

Precast girders-launched by LG-“side feeding”



Lifting of girders from the side



Long transverse sliding



Precast

Precast girders-launched by LG-special LG features



Narrow pier head



Everything done on the narrow pier head

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Precast girders-launched by LG-special LG features



Slim supports, widely spaced truss

Precast

Precast full span girders—launched by LG



Full span girder for Singapore MRT – maximum 270 ton

Precast

Precast full span girders—launched by LG



Loading gantries

Uploading of full span girder



Precast

Precast full span girders—launched by LG



Transporting girders on erected decks



Transporting through curvature

Precast

Precast full span girders—launched by LG



Launching of truss using PC girders as counterweight

Precast

Precast full span girders—launched by LG



Feeding in of full span girder



Lowering of full span girder

Precast

Precast Segments – Types



Precast

Precast Segments – perfect finishing and alignment



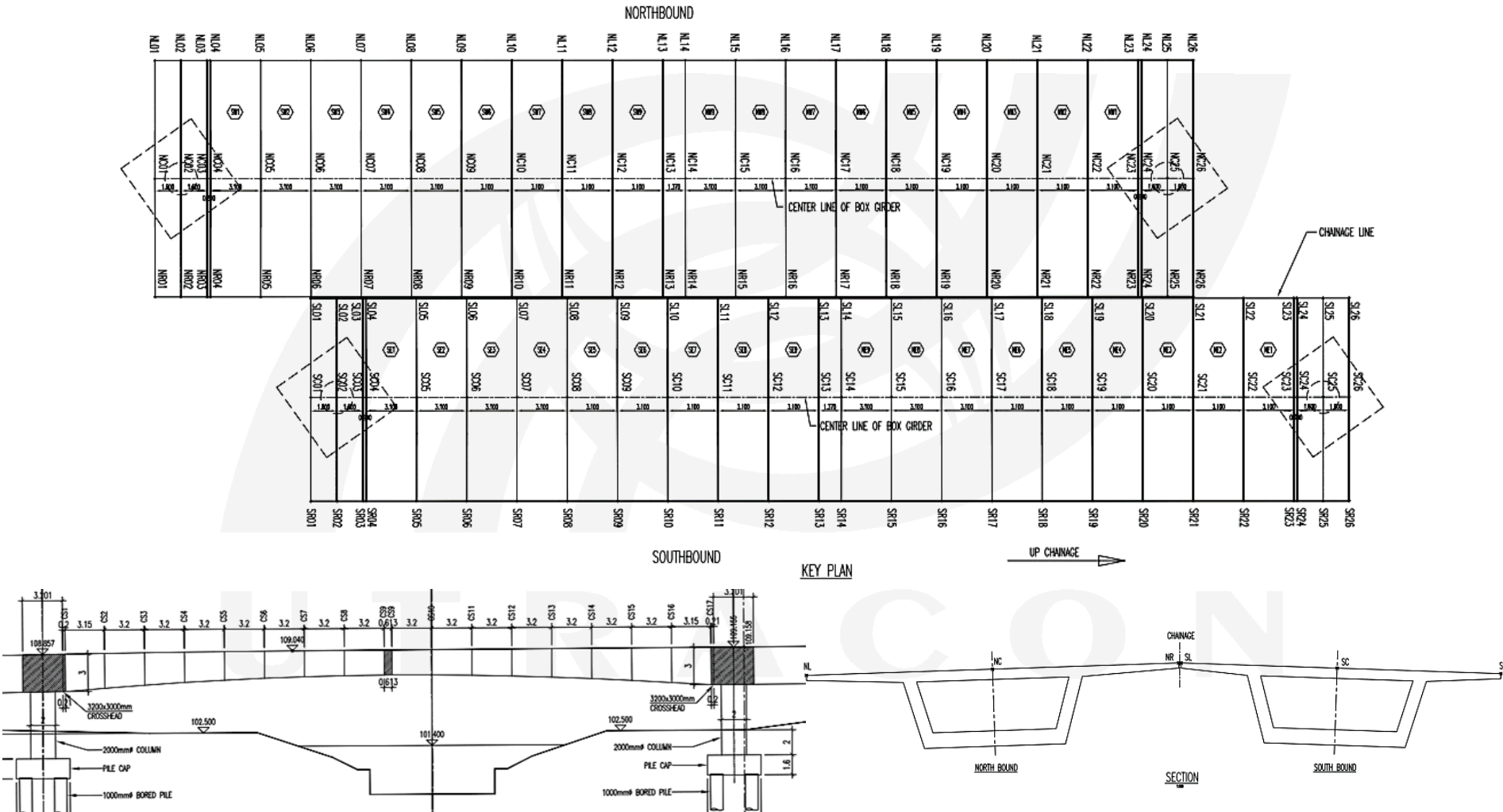
“seamless” finishing

perfect profiling



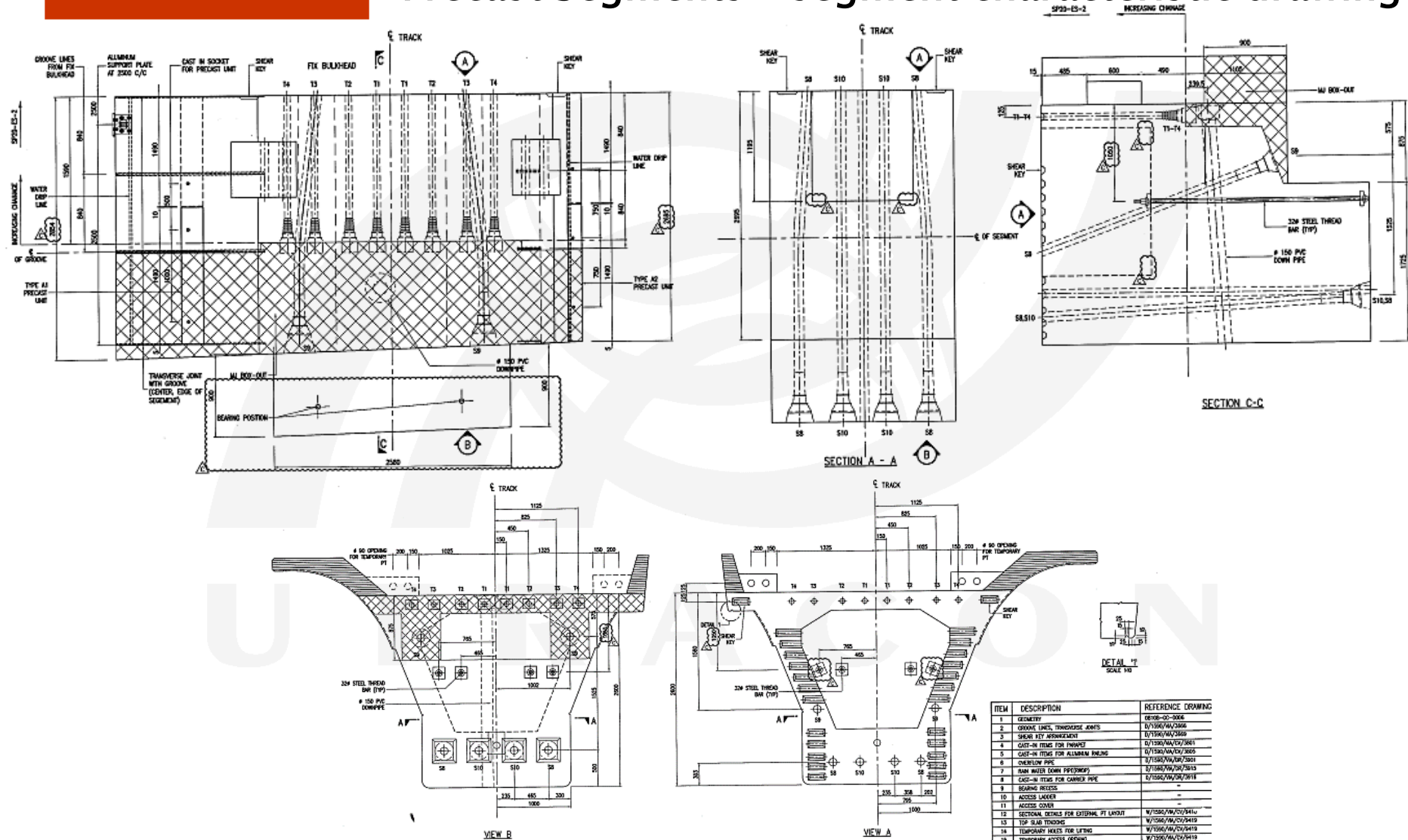
Precast

Precast Segments–slicing, segmentation, coordinate listing



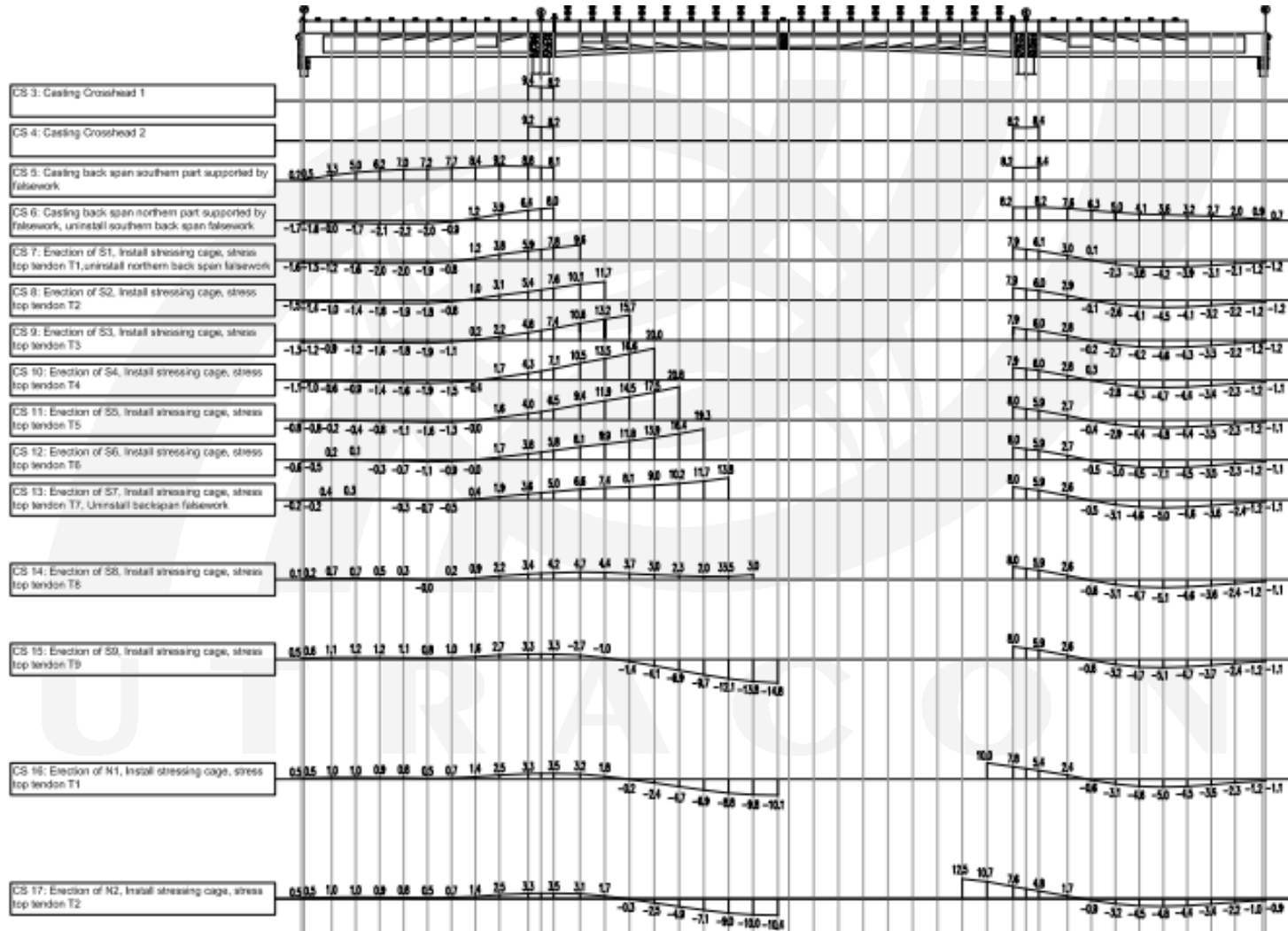
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Precast Segments – segment characteristic drawing



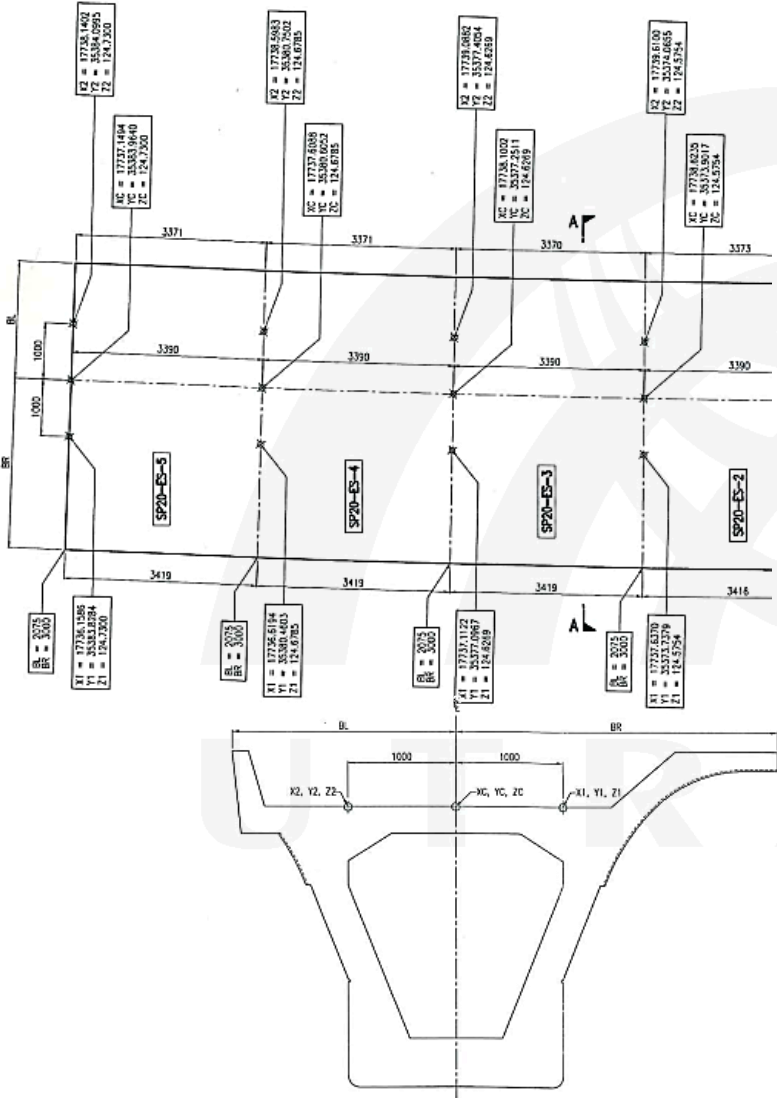
Precast

Precast Segments – precamber analysis



Precast

Precast Segments – geometry control (GC)



GC during precasting



GC during erection

Precast

Precast Segments – short line precasting

Segment casting yard



Segment matched casting



Precast

Precast Segments – long line precasting



Full length precasting bed

Separation of segments



Precast

Precast Segments – storage & logistics



Segment storage yard

Straddle carrier



Precast

Precast Segments – temporary stressing



Bottom concrete blister



top concrete blister



Temporary shear bracket

Precast

Precast Segments – BCM – launched by cranes



Segment casting yard

Launching of cantilever segment

Launching of closure segment



Precast

Precast Segments – BCM – launched by lifters

Self-launching lifters



Precast

Precast Segments – BCM – in-situ stitching



Starter segment stitching

Mid-span stitching



Segment matched casting

Precast

Precast Segments – BCM – erected cantilevers



Precast

Precast Segments – BCM – additional supports



Stabilizing props



Shoring for end span segments

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Precast Segments – SBS – launched by LG

Erected span rested on pier heads



LG's supports on pier heads



Longitudinal prestressing

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Precast Segments – SBS – launched by LG



Full span stressing before lowering



Erected span rested on temporary support while being stitched



Thank you for your attention

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