



RETAINING SEA WALL

CASE STUDY THAT CAN BE APPLIED WORLD-WIDE

VANCOUVER, BC

OCTOBER 2008

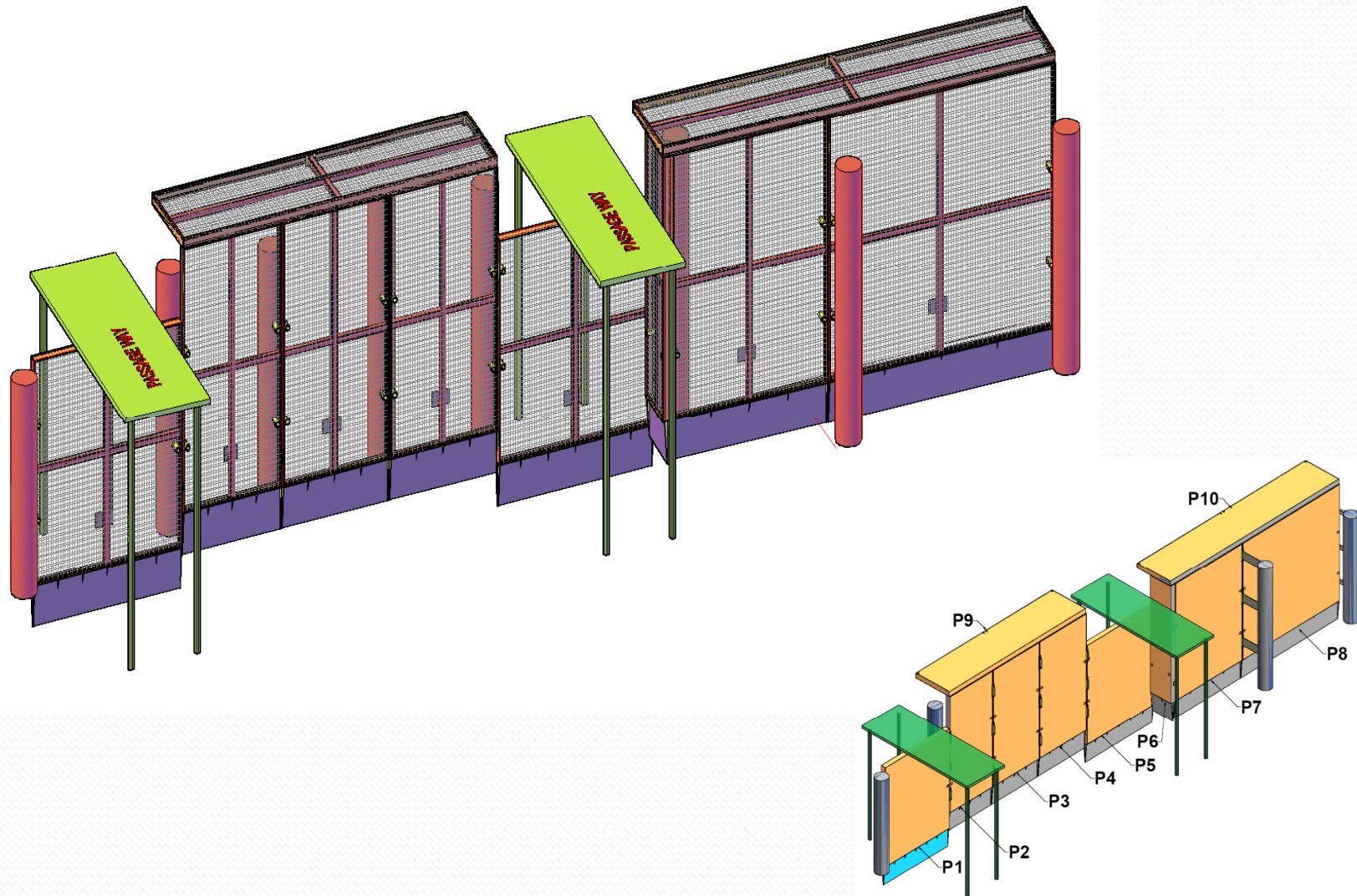
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RETAINING SEA WALL – ISOMETRIC VIEW ILLUSTRATING THE 3-DIMENSIONAL PANEL ASSEMBLY



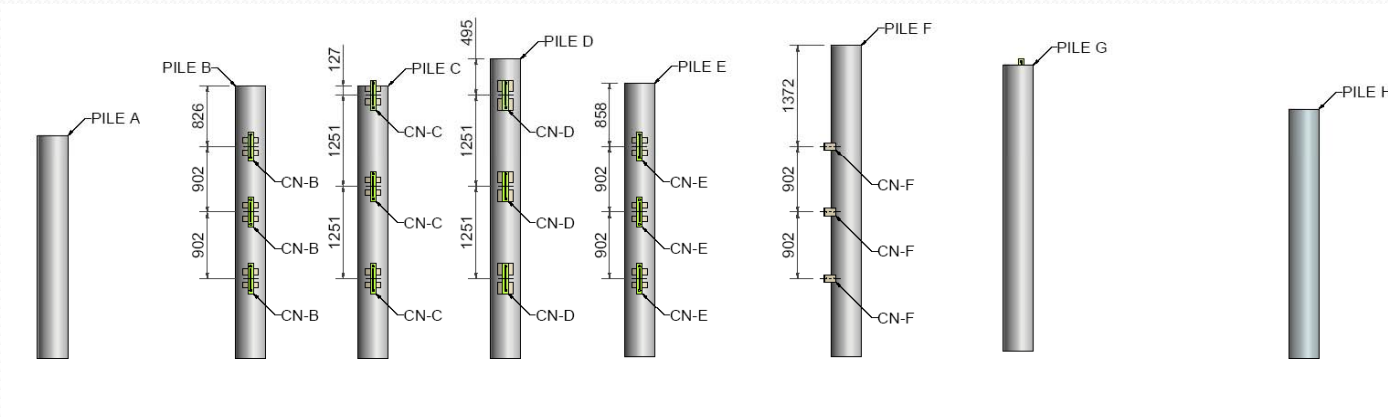
IHI HEAVY DUTY STEEL FRAME PANEL



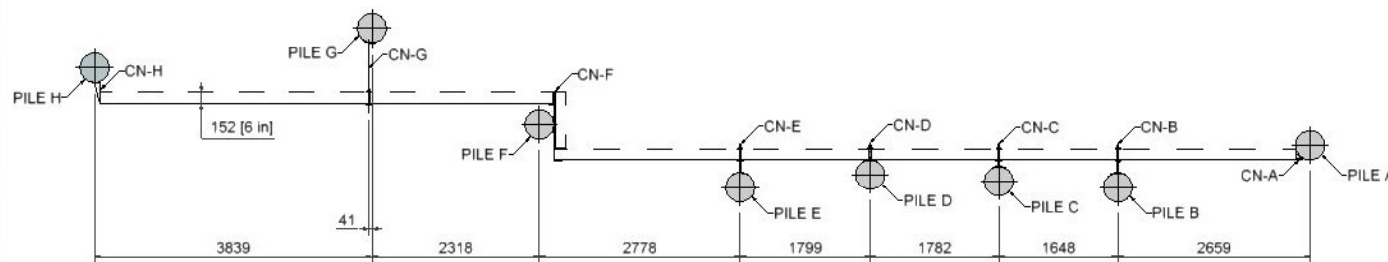
FINE FINISHING OF THE 12,000 PSI
CONCRETE IHI PANEL



COATED STEEL SECTION TO BE EMBEDDED
UNDER WATER

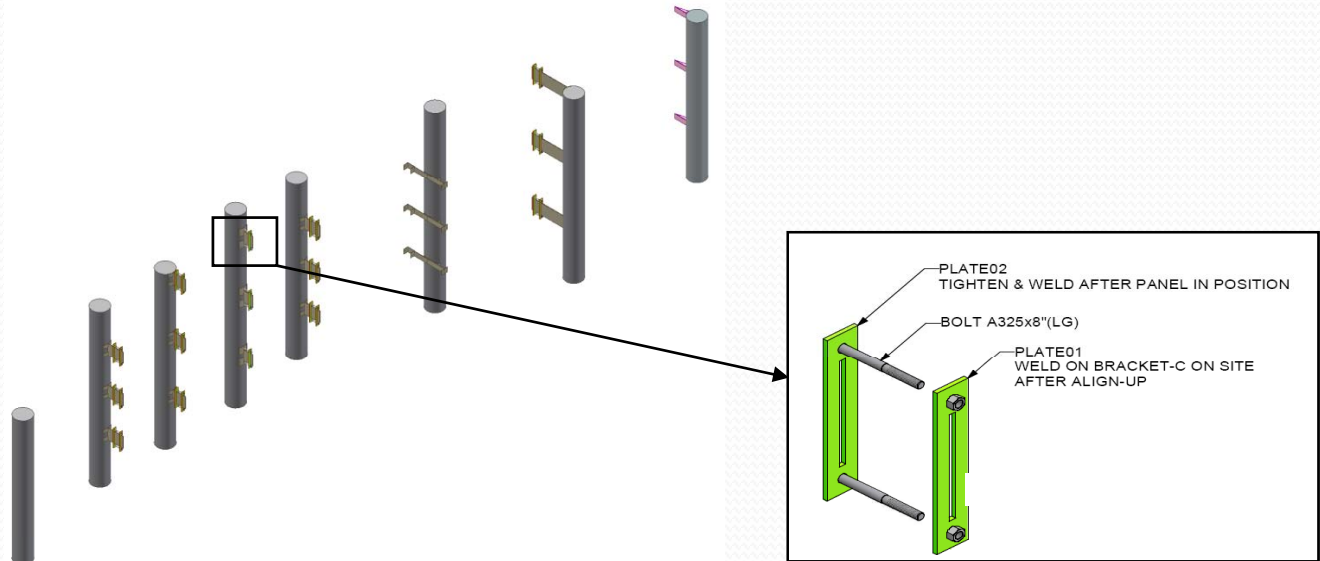


ELEVATION OF PILES LAYOUT WITH WELDED BRACKETS



PLAN OF PILES LAYOUT

PILES IRREGULARLY SPACED TO FIT OLD EXISTING INFRASTRUCTURE. IHI OPTIMIZED THE PANEL SIZE IN LAYOUT TO MAKE THE SEA WALL LOOK GOOD AND MAINTAIN ITS MAXIMUM STRENGTH AFTER INTEGRATING TOGETHER THE VARIOUS THIN PANELS ACTING 3-D PLATES.



EACH IHI BRACKET WAS DIFFERENT DUE TO THE IRREGULARS FILE SPACING TO ACCOMMODATE THE OLD EXISTING INFRASTRUCTURE. TO OPTIMIZE THE INSTALLATION SPEED AND ACCURACY, SPECIAL VARIABLE AND ADJUSTABLE IHI BRACKETS WERE DEVELOPED AND MANUFACTURES AND UTILIZED.



PICTURES OF THE SITE BEFORE SITE PREPARATION AND PRIOR TO THE INSTALLATION OF THE RETAINING SEA WALL

THE SOIL EROSION WAS ON-GOING, AND THE WOODEN WALLS WITH THE OLD PILING SYSTEM WAS AT AN END. THE KEY ISSUE WAS THAT WITHOUT INTERRUPTING THE EXISTING OPERATIONS A NEW VERY THIN IHI PANELIZED PLATES WERE INTRODUCED VERY SWIFTLY.



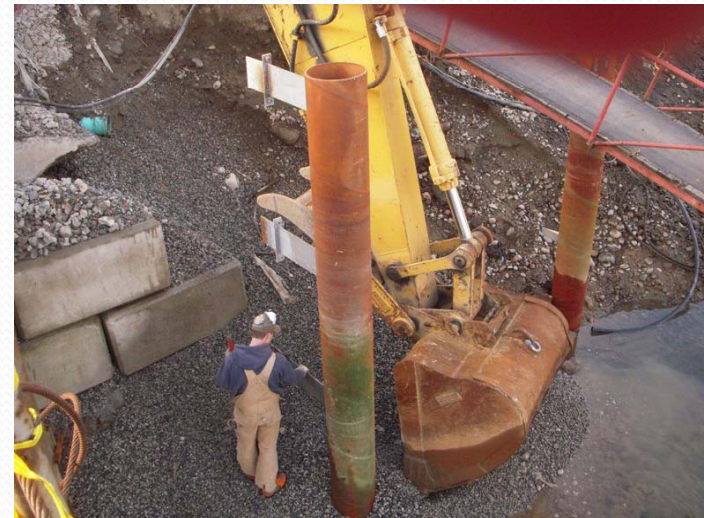
PHOTO OF SURROUNDING ENVIRONMENT SHOWING THE ON-GOING EROSION



ARRIVAL OF STEEL PILES TO SITE



DRIVING PILES TO OCEAN BED



TO OPTIMIZE WORKING SPACE AND AVOID DISTURBING THE EXISTING OPERATION

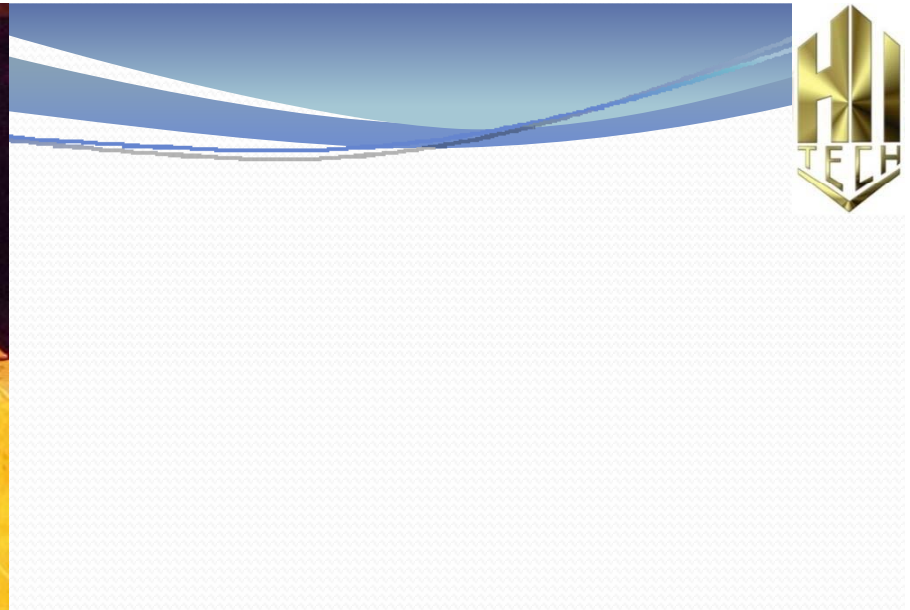


INSTALLATION OF STEEL PILES WITH SPECIAL WELDED BRACKETS, THIN AND ADJUSTABLE IHI BRACKETS TO CONNECT THE IHI PANELIZED PLATES.





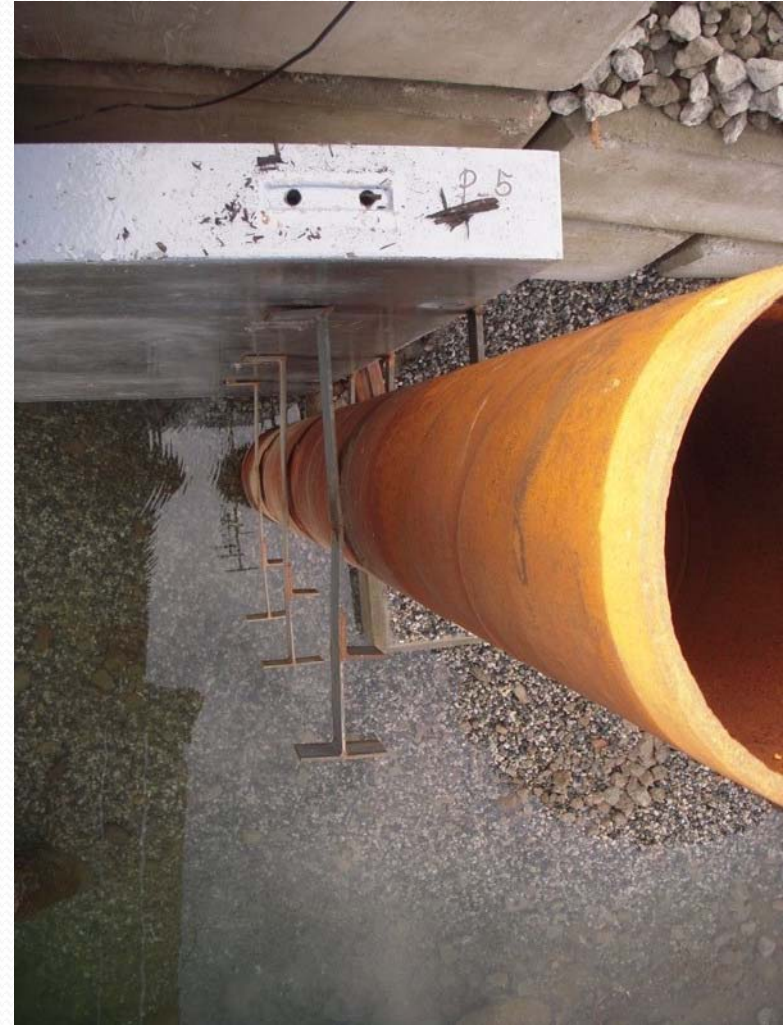
IN SPITE OF THE FACT THAT THE STEEL PILES (AS PREVIOUSLY MENTIONED) WERE NOT ALIGNED, PLUMBED AD UNIFORMLY SPACED, THE IHI PANELIZED PLATES WERE STRUCTURALLY CONNECTED AND ARCHITECTURALLY FIT.



PHOTOS SHOW CREW WORKING AT NIGHT WHEN THE WATER TIDE IS LOW.



THE PROJECT WAS URGENT, FAST TRACK, FULLY OPTIMIZED, AND MOST ECONOMICAL. ALL PARTIES WERE VERY ENTHUSED AND HAPPY.



DUE TO THE SOFT GROUND AND THE IHI LIGHT WEIGHT PANELS THERE WAS NO NEED FOR A FOUNDATION RESULTING IN A FASTER INSTALLATION AND A LOWER BUDGET.



PHOTOS SPEAK FOR THEMSELVES



DUE TO THE FLEXIBILITY OF THE IHI SYSTEM, A BACKHOE WAS UTILIZED ON SITE TO INSTALL THE PANELS.



SAME AS BEFORE



SAME AS BEFORE



PROPER FILLED COMPACTION BEHIND THE IHI PANELIZED PLATES AFTER PLACING REINFORCED CONCRETE INTO THE THIN PILES FOR EXTRA RIGIDITY.



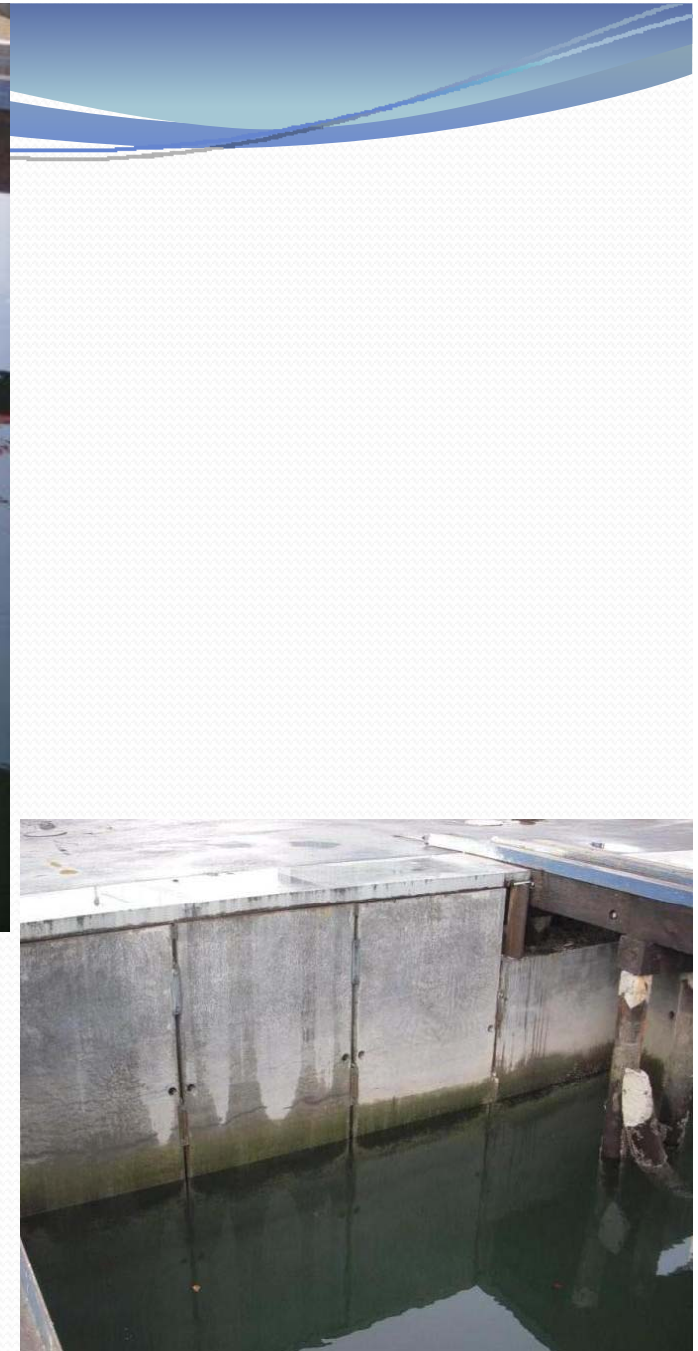
SAME AS BEFORE

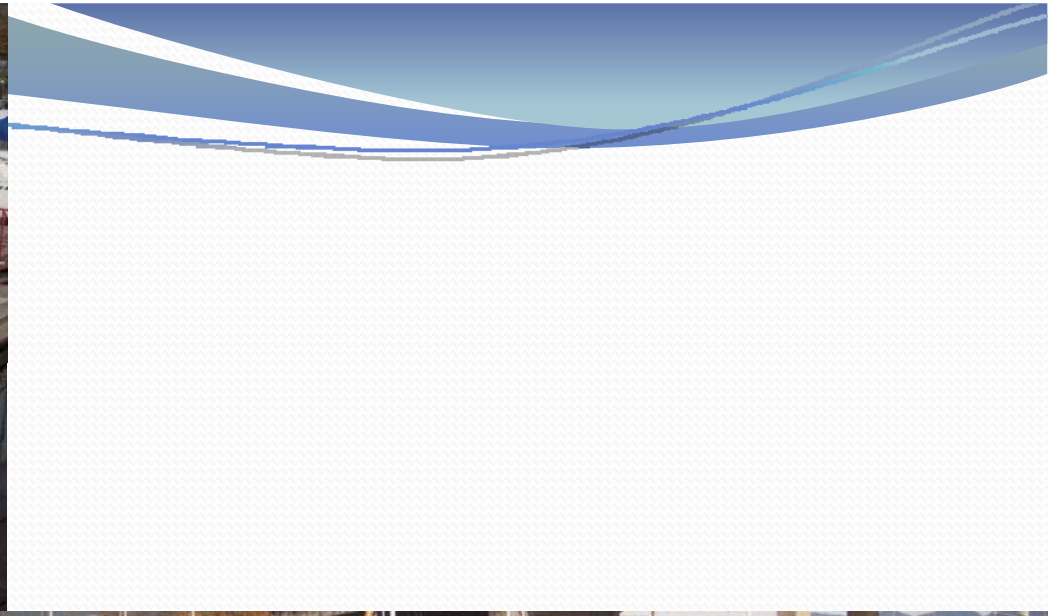


A NICE IHI HORIZONTAL PANELIZED PLATE WAS CAPPED ON TOP TO STIFFEN FURTHER THE VERTICAL PANELIZED PLATES. ELEGANT DRAINAGE SLOTS WERE INTEGRATED TO ALLOW FOR FAST WATER DRAINAGE BETWEEN HIGH AND LOW TIDE THAT CAN REACH APPROXIMATELY 5 METERS VERY RAPIDLY.



ONE YEAR AFTER COMPLETION, NO SIGN OF ANY RUST OR CONCRETE DETERIORATION DUE TO THE OCEAN (HIGH/LOW TIDES) SALTY WATER . EVERYTHING IS STILL AS IS FROM DAY ONE AFTER COMPLETION.





THOUGH THE IHI PLATES ARE VERY THIN, AND EVEN AFTER ONE YEAR, THERE HAS BEEN NO SIGN OF ANY DIFFERENTIAL SETTLEMENT IN SPITE OF THE FACT THAT THERE WAS NO FOUNDATION PLACED UNDERNEATH AS PER PREVIOUS SLIDE.





SAME AS BEFORE