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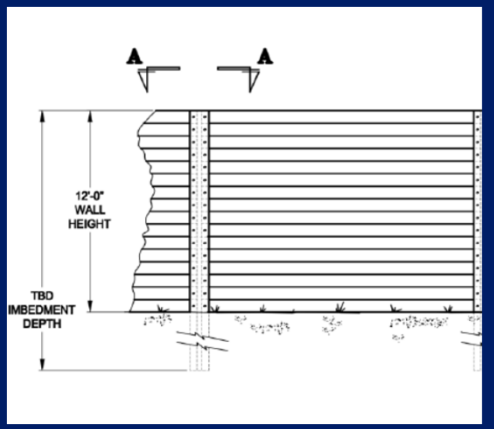

Recycled Plastic Composite for Noise Barriers

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RBF CONSULTING jma THE LPA GROUP TRANSPORTATION CONSULTANTS KASEMAN ///SALLYPORT

- What is the Material? –
  - The recycled structural plastic composite is made up of high-density polyethylene with polypropylene-encapsulated glass fibers. This material was first used for railway cross-ties but more recently its application has been extended to bridges and structural members. These structural material offers a number of environmental, economic and construction advantages over steel, wood or concrete.

- Background on material
  - Rutgers University developed this material
  - First it was applied to railroad crossties and later bridges

- The steps we're taking
  - Perform all required tests for this innovative and sustainable material
  - Develop standard design for sound walls
  - Introduce it to the owners of sound walls

- Where has it been used?
  - Currently used in variety of infrastructures
    - Bridges
    - Rail Ties
    - Construction Mats
    - Commercial Boardwalks

- So why should I care?
  - Uses consumer and industrial waste
  - Not only made from recycled materials but fully recyclable at end of usefulness
  - All components, including and posts can be made from this material
  - Allows for use of lighter equipment, and accelerated constructions
  - Save on long term maintenance costs
  - Lower costs

Material	Cost	Expected Life
Wood	$450,000	8-12 years + maintenance
Steel/Concrete	$600,000	50+ years + maintenance
RSPC	$300,000	**100** + years, minimal or no maintenance

- Other similar Materials?
  - No – at least not approved in Virginia
  - Atlantic Industries Limited Silent Protector
    - Made from recycled PVC
    - RSPC is made from consumer and industrial recycled plastics
  - Eco Sound Barrier
    - Made of 23% recycled materials
    - RSPC is nearly 100% recycled materials!

- Literature Review
  - Hard to find definitive guidance
  - Wanted to determine what testing needed to be conducted
  - Guidelines for Selection and Approval of Noise Barrier Materials – 2008 NCHRP Report 25-25
    - According to NCHRP no unified specifications
    - Specifications vary by state
    - Looked through to determine most important factors
    - Based on Table 1 in NCHRP, over 60% of barriers are concrete (precast or masonry block) in terms of SF constructed (based on 2010 data)
    - Less than 1% uses plastic
  - Most documents found refer to outdated AASHTO Guidance
    - Current Guidance 2010 – Application of AASHTO LRFD Specifications to Design of Sound Barriers

- Most Important Issues:
  - Durability
  - Acoustical properties
  - Materials and installation costs
  - Maintenance issues
  - Aesthetics
  - Public opinion
  - Other material properties
  - Graffiti resistance

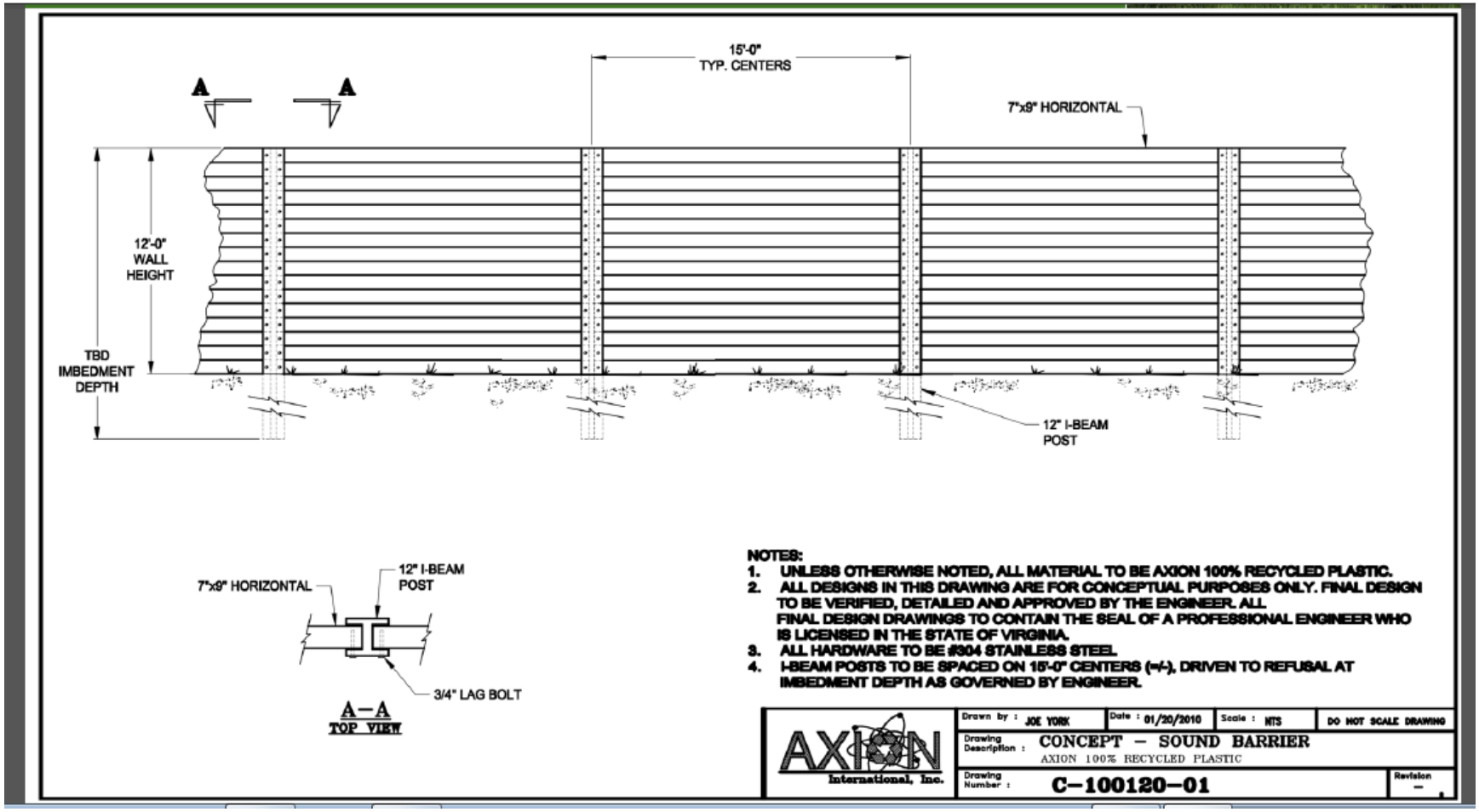
- Durability
  - Non-porous
  - Doesn't conduct electricity
  - Impervious to elements
  - Does not:
    - Rot
    - Rust
    - Splinter
    - Crumble
    - Absorb moisture
    - Leach chemicals

- Cost info (Bridges and Railroad Ties)

Material	Cost	Expected Life
Wood	$450,000	8-12 years + maintenance
Steel/Concrete	$600,000	50+ years + maintenance
RSPC	$300,000	100 + years, minimal or no maintenance

Material	Initial Cost	Life-Cycle Cost
Wood	$255,000	$1,275,000
Steel/Concrete	$375,000	$1,875,000
RSPC	$435,000	$435,000

- Testing Already Conducted
  - ASTM D696-91 for Thermal Expansion
  - ASTM D6108-97 for Compression Test
  - ASTM D6109-97 for Flexural Test
  - ASTM D6111-97 for Specific Gravity
- That leaves (At a Minimum)
  - ASTM E90 -Airborne Sound Transmission Loss of Building Partitions and Elements
  - ASTM C423 – Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method


15'-0"
TYP. CENTERS
A
A
7"x9" HORIZONTAL
12'-0"
WALL
HEIGHT
TBD
IMBEDMENT
DEPTH
12" I-BEAM
POST
7"x9" HORIZONTAL
12" I-BEAM
POST
3/4" LAG BOLT
A–A
TOP VIEW
NOTES:
1. UNLESS OTHERWISE NOTED, ALL MATERIAL TO BE AXION 100% RECYCLED PLASTIC.
2. ALL DESIGNS IN THIS DRAWING ARE FOR CONCEPTUAL PURPOSES ONLY. FINAL DESIGN TO BE VERIFIED, DETAILED AND APPROVED BY THE ENGINEER. ALL FINAL DESIGN DRAWINGS TO CONTAIN THE SEAL OF A PROFESSIONAL ENGINEER WHO IS LICENSED IN THE STATE OF VIRGINIA.
3. ALL HARDWARE TO BE #304 STAINLESS STEEL.
4. I-BEAM POSTS TO BE SPACED ON 15'-0" CENTERS (+/-), DRIVEN TO REFUSAL AT IMBEDMENT DEPTH AS GOVERNED BY ENGINEER.
AXION International, Inc.
Drawn by : JOE YORK
Date : 01/20/2010
Scale : NTS
DO NOT SCALE DRAWING
Drawing Description : CONCEPT – SOUND BARRIER
AXION 100% RECYCLED PLASTIC
Drawing Number : C–100120–01
Revision –