



## Marketing Opportunities for Asphalt Pavements

Key Elements in designing, constructing and marketing porous asphalt pavements with stone reservoirs

Tom Clayton, SET  
Director of Training  
Colorado Asphalt Pavement Association  
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The project: Ball Aerospace & Technologies Corp., a Boulder-based subsidiary of Ball Corporation, Boulder, Colorado



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Ball Aerospace & Technologies Corp., a Boulder-based subsidiary of Ball Corporation, Boulder, Colorado

- In planning since 2004, involves construction of 90,000 sf of building space with approximately 3.6 acres of surface parking.
- Based in a community that has pioneered sustainable living, the plant's location just east of Boulder Creek created concerns regarding immediate run-off flowing into the creek from the new development, further justifying the company's decision to look for an environmentally-friendly way of managing storm runoff from the new parking lot.

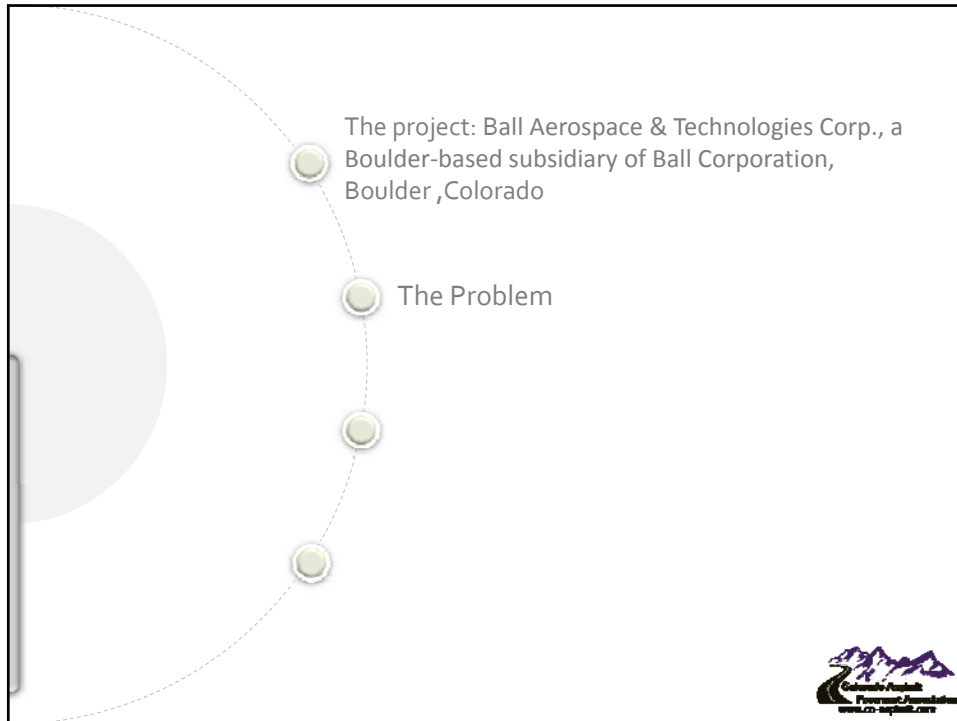



The project:

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- "About three-quarters of the new parking lot location required fill to be imported to raise the lot's elevation to the code-allowed elevation in the floodplain,"
- "Because we were expecting some costs for the grade change, we were open to looking at alternative designs."
- "A water quality and detention pond would require an area of 12,000 square-feet which translates into the loss of up to 40 of the 288 parking spaces"
- An additional cost the owner would incur is the City "Storm water plant investment fee" for discharging water from the site. This fee is \$1.78 per square foot or \$279132.48 for the site discharge permit





- The problem:  
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- The City of Boulder Colorado would not allow for the underground storage of runoff.
  - Ball, the City and Martin/Martin studied the project thoroughly, beginning with commissioning soil studies to determine permeability.
  - Lakewood based, Martin/Martin Consulting Engineers, Project Engineer during the initial stages of discussion and design, Ms. Debbie Fisher, requested help from the Colorado Asphalt Pavement Associations' Tom Clayton.
- 

The problem:

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- Tom, Debbie and Guy Fromme, P.E the program Manager from Ball began discussions with the City of Boulder for them to allow the construction of the lot.
- Several meetings were held to show the City representatives no water would be “stored” only detained, no differently than an a detention pond.



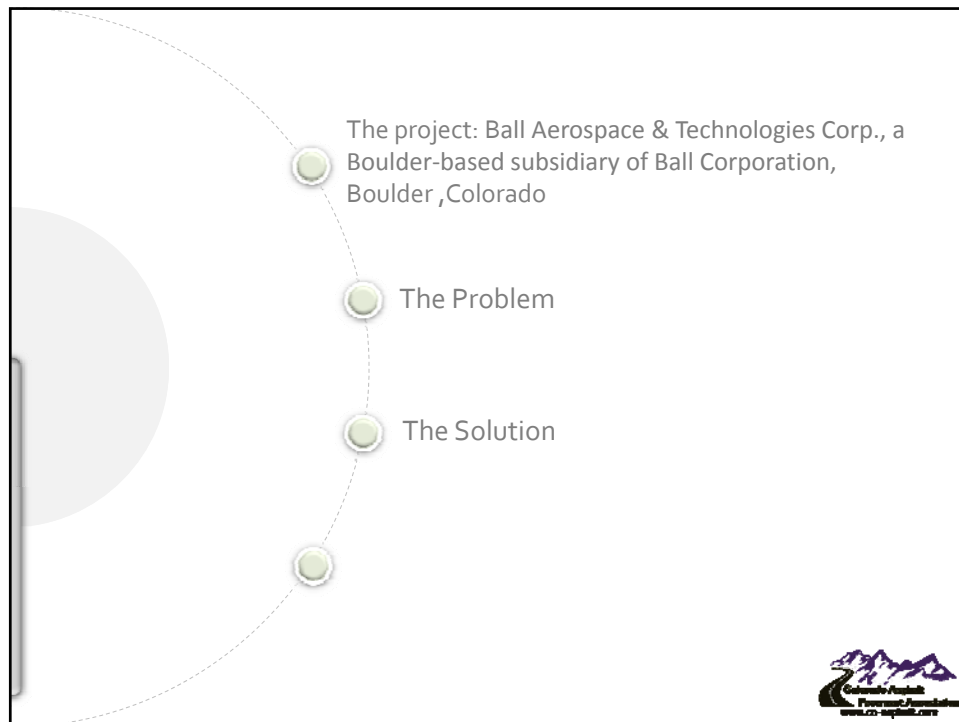
The problem:

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In 2006, Englewood based, Ground Engineering Consultants completed its study of subgrade conditions and determined that “materials encountered in our test holes consist of fine to coarse-grained sand in the upper 5 feet. According to the National Asphalt Pavement Association (IS-131), these materials appear to be suitable for a porous pavement section.”





The solution:

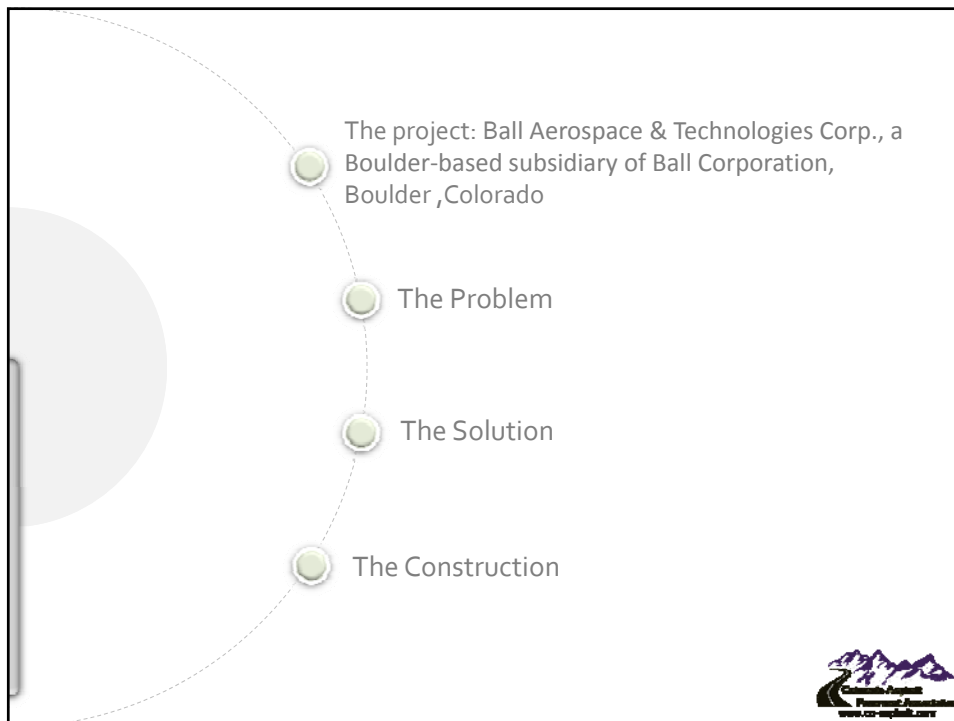
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- Based on the information presented by the Geotechnical Engineer, the Owner and Consultant requested the City reconsider their stand on prohibiting the use of a “Free Draining” pavement system
- With porous asphalt mix design guidelines and reservoir design specifications provided by provided by NAPA through the Colorado Asphalt Pavement Association, the City and Martin/Martin were comfortable that such a sustainable vision could be achieved in this instance.

Colorado Asphalt Pavement Association  
www.co-apfa.org

The solution:  
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- The last hurdle was cleared when officials agreed that the porous asphalt pavement system would suffice to provide the required water quality treatment, and the City issued the necessary permits.
- Design continued and based on the recommendations from the Geotechnical Engineer “the porous asphalt should consist of approximately 4 inches with a void space of at least 16 percent.”



The construction:  
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- General contractor GH Phipps Construction Company
- Project over site was accomplished by CPI Group



The construction:  
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- Site excavation, fill placement, scarification and placement of filter fabric, sand and #2 gravel was performed by Denver-based Gilbert Contracting Inc.



The construction:  
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- Cut and fill placement brought elevations for the parking lot to grade before curb, gutter and were poured, creating islands for trees and other vegetation in accordance with the overall design.



The construction:  
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of Ball Corporation, Boulder, Colorado

- All landscaping was completed before commencing construction of the porous pavement section to minimize contamination of the pavement by soil.





The construction:

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- Installation of the recharge bed began with scarifying the subgrade to a minimum 12-inch depth to ensure ground permeability
- Geotextile filter fabric was then placed over the scarified subgrade and covered with a 6-inch lift of sand.



The construction:

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- The next step involved importing and placement of a 26-inch-deep layer of large rock (#2 gravel) followed by placement of a 3-in. deep choker course of a smaller rock (#57 gravel).



The construction:

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- The choker course was placed by CAPA member, Brannan Sand and Gravel Co. utilizing an asphalt paver to “provide the best opportunity to maintain the required grade,” according to Brannan Project Manager Brian Moon.



The construction:

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- Paving of the 3-in. section of 1/2" NMAS porous asphalt pavement by Brannan Sand and Gravel completed the porous pavement system. By design, porosity of the total pavement section increases from the wearing course down.



The construction:

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- There will be signs throughout the parking lot that tout the parking lot design as sustainable

*The Hot Mix Asphalt placed in this parking lot is "POROUS ASPHALT". This is an environmentally sustainable product.*

*The open nature of this surface allows for the re-introduction of storm run-off back into the natural water table.*

- *USE NO SAND for winter maintenance!*
- *Avoid tracking clay or clay like materials on to the surface as it may clog the working structure of the asphalt which has been designed to allow for the free flow of water back to the water table*
- *Avoid vehicle maintenance in the lot where fluids from the vehicle will be spilled onto the surface*



The construction:

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- The pavement design also includes an emergency overflow drain in the lowest corner of the combined parking area. Should successive storm events exceed the percolation ability of the underlying soils, or should the pavement become seriously plugged, water will drain through a pipe installed within the sand filter into a nearby storm sewer.



The construction:  
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The conclusions:  
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- “I see this as a very viable parking lot paving method,” said Debbie Fisher, PE, “This Porous Asphalt lot is an environmental prize, as it provides very important reintroduction of water into the water table and saves the owner from the need to obtain additional land for detention and water quality ponds.”



The conclusions:

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- “Run-off demonstrations already conducted on the lot have been impressive and clearly will address keeping the rainwater events on the site,”



The conclusions:

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- “But we are also looking forward to all of the performance benefits that we expect to see regarding maintenance and accelerated passive snow melt.”



The conclusions:

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- Pavement marking and signage:

- “We found the striping of a porous asphaltic surface to be really no different than that of a smoother asphaltic surface.” “We applied 2 coats of paint with a lower pressure to keep the mill thickness of the paint to a minimum so we could keep the surface as pervious as possible.” Troy Beer, Precise Striping



The conclusions:

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- Pavement marking and signage:

- As for the signage and parking blocks installed on this project “we found no difference during installation except for the containment of the slurry from running down the surface while coring of the sign posts. When coring, we would recommend a wet & dry vacuum to properly contain & clean-up the slurry mix produced from this procedure.”





The conclusions:

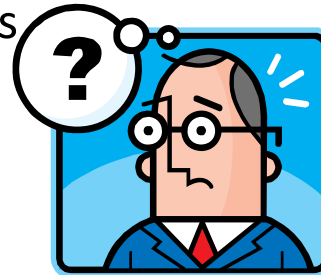
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- If this project were attempting to achieve LEED accreditation, it would be eligible for several LEED points.
- Utilizing Porous Asphalt Pavement would allow for points for drainage, innovative technology. Runoff and more.
- Using the points available may allow a one or two category upgrade.
- LEED points can be determined from a chart at [http://www.co-asphalt.com/documents/LEED-HMA\\_contribution\\_points-CAPA.pdf](http://www.co-asphalt.com/documents/LEED-HMA_contribution_points-CAPA.pdf)



## Marketing Opportunities for Asphalt Pavements

- Questions?



References:

Ball Aerospace and Technologies Corp, Boulder, CO  
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 Gilbert Construction, Denver, CO  
 Brannan Sand and Gravel CO Denver, CO  
 Precise Striping, Commerce City, CO  
 Debbie Fisher, P.E.  
 NAPA publication, IS 131



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