



Trimble Alignment Planning Solutions

Between vision and viability there are important decisions to make



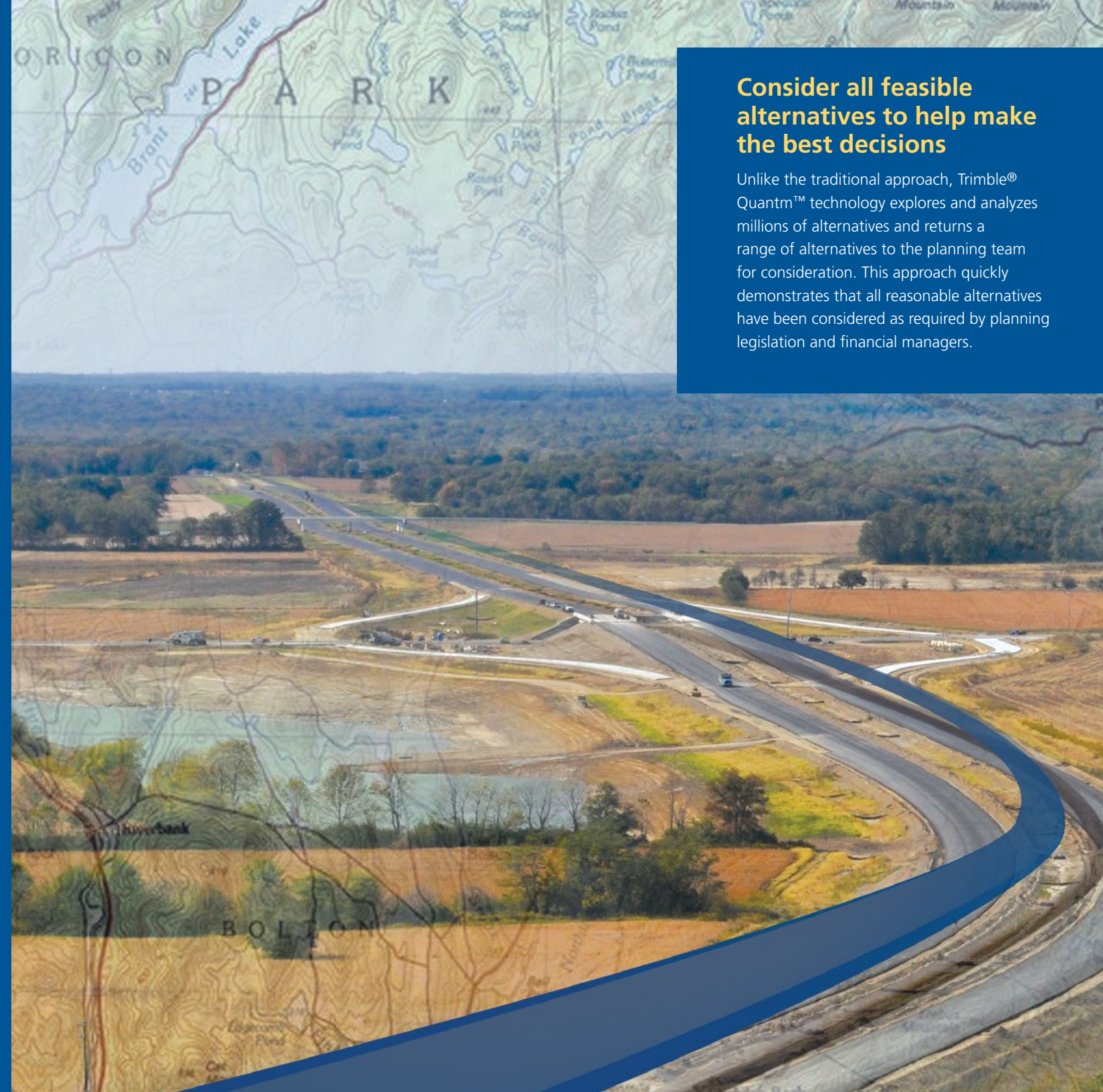


Trimble applies technology to make businesses and government significantly more productive. Solutions are focused on applications requiring spatial information including surveying, construction, agriculture, fleet and asset management, public safety and mapping. Though best known for GPS technology, Trimble integrates a wide range of positioning technologies including GPS, laser, optical and inertial technologies with application software, wireless communications, and services to provide complete commercial solutions. Its integrated solutions allow customers to collect, manage and analyze complex information faster and easier, making them more productive, efficient and profitable.

Founded in 1978, Trimble is a publicly traded company with over \$1 billion dollars in revenue, and is headquartered in Sunnyvale, California. Trimble products are used in over 100 countries around the world. Employees in more than 21 countries, coupled with a highly capable network of dealers and distribution partners, serve and support our customers. The Company's portfolio of over 900 patents is the basis for the broadest positioning solutions portfolio in the industry.

Consider all feasible alternatives to help make the best decisions

Unlike the traditional approach, Trimble® Quantm™ technology explores and analyzes millions of alternatives and returns a range of alternatives to the planning team for consideration. This approach quickly demonstrates that all reasonable alternatives have been considered as required by planning legislation and financial managers.





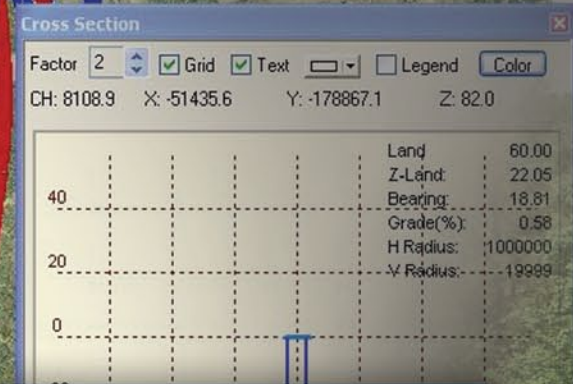
Plan for sustainability with better environmental and public outcomes

Rapidly consider new environmental or social constraints as the project progresses and demonstrate to stakeholders that their input has been integrated into the study. Planners can be more responsive to public feedback and re-evaluate alternatives within days instead of weeks or months.

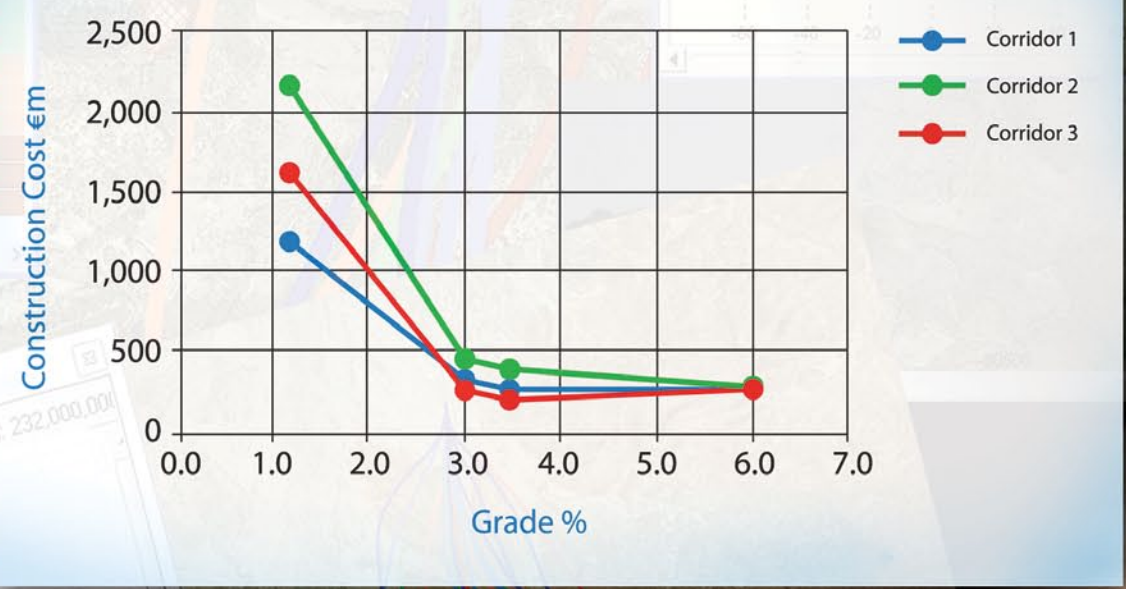




Length	\$	Color
35,856	27,400,000	
35,718	28,400,000	
36,409	29,900,000	
36,185	31,000,000	
36,730	31,400,000	
36,270	33,100,000	
36,208	33,200,000	
36,676	33,400,000	
36,494	33,400,000	
36,535	34,100,000	
36,271	34,800,000	
36,205	36,700,000	
36,384	37,400,000	
36,649	38,500,000	
37,628	43,000,000	
36,506	45,000,000	
36,462	49,100,000	



Grade vs Cost Sensitivity



Culvert (m)	Bridge (m)	Tunnel (m)	Fill (m³)	Cut (m³)	Pavement Mass Haul (m³ km)
0	0	0	0	0	0
0	0	0	517	1054	160
0	0	0	962	2401	320
0	0	0	1357	3851	480
0	0	0	1807	5236	641
0	0	0	2359	6532	801
0	0	0	2982	7756	961
0	0	0	3583	8940	1121
0	0	0	4117	10119	1281
0	0	0	4555	11278	1441
0	0	0	4881	12437	1601
0	0	0	5146	13633	1761
0	0	0	5411	14762	1921
0	0	0	5708	15765	2081
0	0	0	6080	16690	2241
0	0	0	6496	17552	2401
0	0	0	6967	18336	2561
0	0	0	7527	19036	2721
0	0	0	8176	19674	2881
0	0	0	8900	20263	3041
0	0	0	10083	20878	3201
0	0	0	11351	21520	3361
0	0	0	12741	22184	3521
0	0	0	14264	22864	3681

Alignment name	Length	\$	Color
~ Scoping_A_03_U_1_01	8 058	30 100 000	
~ Scoping_A_03_U_1_04	8 013	31 900 000	
~ Scoping_A_03_U_1_06	8 138	33 100 000	
~ Scoping_A_03_U_1_07	8 123	33 700 000	
~ Scoping_A_03_U_1_09	8 062	35 300 000	
~ Scoping_A_03_U_1_10	8 246	35 900 000	
~ Scoping_A_03_U_1_10	8 256	36 200 000	
~ Scoping_A_03_U_1_25	8 174	36 300 000	
~ Scoping_A_03_U_1_23	8 865	36 500 000	
~ Scoping_A_03_U_1_14	8 439	36 500 000	
~ Scoping_A_03_U_1_24	8 566	38 000 000	
~ Scoping_A_03_U_1_21	8 721	39 300 000	
~ Scoping_A_03_U_1_15	8 543	40 600 000	
~ Scoping_A_03_U_1_15	8 543	42 800 000	



Invest for a better future by reducing capital and operating expenses

Conduct a sensitivity analysis to balance capital construction costs with ongoing operating expenses, and identify alignments with the lowest total cost of ownership. Accelerate your return on investment and improve value with the Trimble Quantm Alignment Planning system.



Every project begins with planning

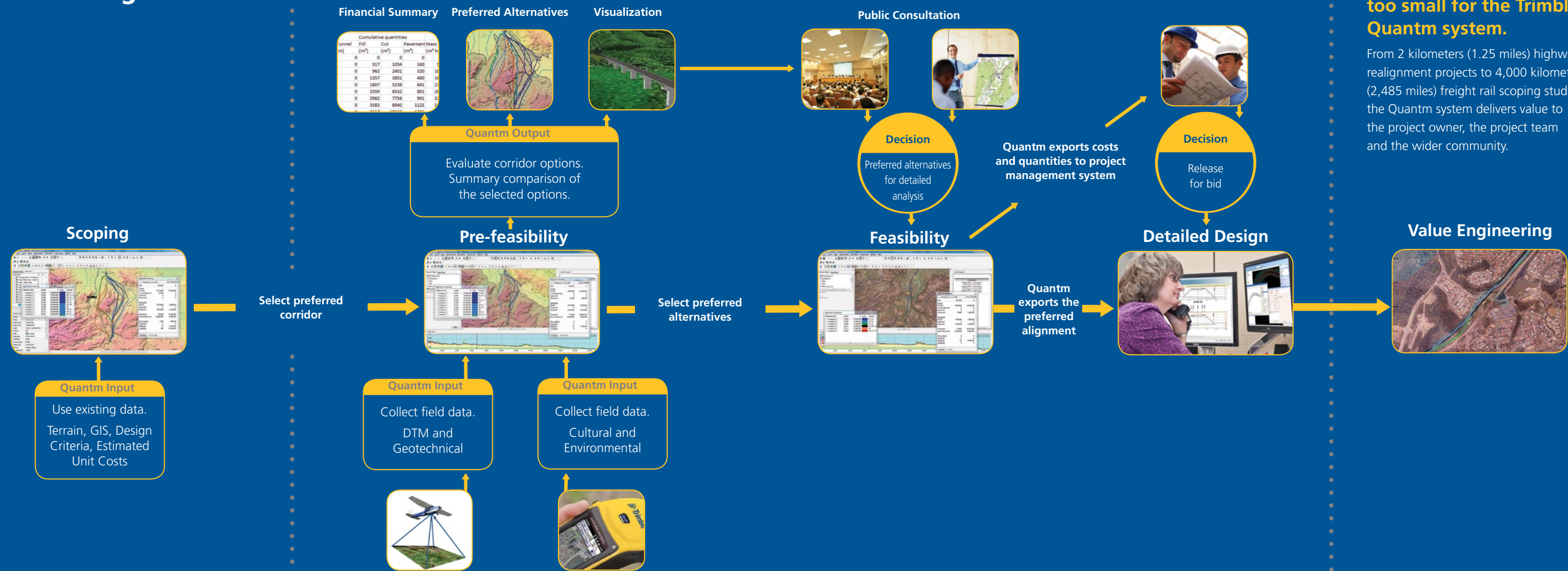
In today's complex world increased legislative, environmental and community constraints combined with limited budgets make good planning critical to the viability of any project.

Trimble Planning Solutions, a wholly owned subsidiary of Trimble Navigation Limited, transforms the way planning is done. Innovative Trimble Quantum technology integrates engineering, environmental, social and economic factors into a simultaneous analysis of alternatives. This holistic approach to planning new infrastructure results in rapid decision-making and lower construction costs.

Using proven Trimble Quantum technology, planners and designers now have the ability to minimize the environmental and social impact of road and rail projects, while reducing construction and operating costs for tax payers and project owners. The solutions are utilized at every stage of the planning process from initial scoping through feasibility, detailed planning and pre-bid, and post-bid award value engineering studies.

Projects of all types and sizes can take advantage of the benefits of the Trimble Quantum technology. Examples range from regional, state and national transportation infrastructure planning to small bypasses and road realignments. In addition, the system can be used for mining, forestry and utility industry infrastructure.

The Planning Process



No project is too large or too small for the Trimble Quantum system.

From 2 kilometers (1.25 miles) highway realignment projects to 4,000 kilometers (2,485 miles) freight rail scoping studies, the Quantum system delivers value to the project owner, the project team and the wider community.

Scoping

Quickly identify the cost corridor options for consideration using existing terrain and feature data.

Pre-feasibility

Help with macro viability decision-making by generating multiple alignments in primary corridors and producing data for evaluation and consideration.

Feasibility/Planning

Validate and select feasible alignments, optimize and refine alignment trends, add and evaluate the effects of new constraints based on data collection, social and environmental factors.

Construction

Evaluate and fine-tune construction alternatives during bid preparation and design-build where applicable.

Case Studies

Trimble Planning Solutions has helped companies and governments in every corner of the world save time and money, and improve relationships with the communities they serve.

To see all our customer stories, please visit:
www.trimble-productivity.com/quantm

High Speed Rail

The Quantm technology has been used worldwide for planning over 5,500 kilometers (3,417 miles) of high speed rail. For a complete list of Quantm high speed rail projects, please visit: www.trimble.com/quantmhsr

Portugal

Following the successful application of the Quantm system on the Northern Line, the Portuguese high speed rail authority (RAVE), chose the Trimble Quantm technology to plan the complete national network of high speed rail.

For details on this project, visit:
www.trimble-productivity.com/portugalhsr

California

After the application of the Quantm system during Programmatic Studies, Quantm technology was subsequently applied again during the detailed alternatives analysis to incorporate emerging constraints as they were identified in the field.

For details on this project, visit:
www.trimble-productivity.com/californiatransport



“Quantm was able to greatly improve the collaboration between the engineering and environmental project teams.”

- Transport Corridor Agencies
California, USA

“The studies by Quantm specialists in optimizing stretches of rail, will keep tunnel and viaduct construction to a minimum, reducing investment by 10% of the infrastructure cost.”

- Ana Paula Vitorino, Portuguese
State Secretary of Transport

Regional and Statewide Planning

The Quantm technology is used from preliminary scoping at a regional level to the development of full statewide transportation planning. The 1000 mile Trans-Texas Corridor Study greatly benefited from the Quantm system during the corridor alternatives evaluation process. Quantm enabled the planners and engineers to consider an extensive range of options. They were able to review various “what if” scenarios and test a series of geometric parameters quickly, to consider numerous planning alternatives, and avoid, minimize or mitigate the impacts on sensitive environmental resources.

For details on this project, visit:
www.trimble-productivity.com/texastransport

“Quantm, in conjunction with EPA GISST Data, was extremely effective in preliminary corridor development during the corridor alternatives evaluation process. The large number of alternatives generated by Quantm provided extensive and consistent options throughout a large and diverse study area.”

- David Bacon - I-69/TTC Corridor Study GEC

Small Road Projects

The Quantm system has helped planners find big cost savings on small road projects. The rapid generation of alternatives and the ability to determine environmental impacts are also valuable benefits of the Quantm system for smaller projects.

Idaho

The Idaho Transportation Department and their local engineering consultant applied the Quantm system to screen alternatives and selected two highway corridors for further National Environmental Policy Act (NEPA) evaluation. In doing so, they developed a process to screen alternatives that addresses the challenges for determining new highway corridor alternatives. This was achieved by the ability of the Quantm system to ensure comparisons on location, impact on environment, cost and compliance with engineering criteria and to generate new alternatives rapidly.

For details on this project, visit:
www.trimble-productivity.com/goosecreekbypass

New Zealand

The Okarahia Realignment project was a 2km (1.25 mile) section of State Highway 1 in New Zealand. The Quantm system was used to improve both the horizontal and vertical alignments of the road. In addition to meeting all defined environmental situations and avoiding constraints, the Quantm-generated alignment cut construction cost by 13%.

For details on this project, visit:
www.trimble-productivity.com/okarahia

“The Idaho Transportation Department supported the use of the Quantm system to define highway corridors, limit the areas of intensive environmental field work, and still provide a product that would comply with NEPA.”

- Idaho Transportation Department - USA

“We achieved a 13% saving on alignment construction cost even though the tightly constrained corridor limited options.”

- Opus International Consultants



Mining Freight Rail

The Quantm system was commissioned for application on more than 280 kilometers (175 miles) of open-access, heavy-haulage rail infrastructure for Fortescue Metals Group in Western Australia, Australia. Quantm enabled the Fortescue team to take a quantitative and iterative approach to planning the most cost-effective and desirable alignment of the railway, taking into consideration environmental impacts and maintenance costs. With the help of the Quantm system, Fortescue was able to complete the railway in only nine months.



Modernizing National Infrastructure

High quality, efficient transportation infrastructure is key to support economic growth. In a rapidly changing world the application of the Quantm system is enabling nations around the world to efficiently plan for the modernization and addition of new national and regional infrastructure.

By using the Quantm system for planning Quantm users are delivering better quality studies, addressing the social and environmental concerns associated with modernization and new infrastructure. The studies are completed with more accurate cost estimates and are delivered in a shorter time.

The Trimble Quantm technology has been successfully applied to over 8,000 kilometers (4,970 miles) of road and railway projects in China, from scoping studies and pre-feasibility studies to feasibility studies.

For details on this project, visit:

www.trimble-productivity.com/chinainfrastructure

“The application of the Quantm system enabled the project team to gain greater depth of information on which to make their recommendations and to present alternatives and the rationale for decisions to stakeholders and the community.”

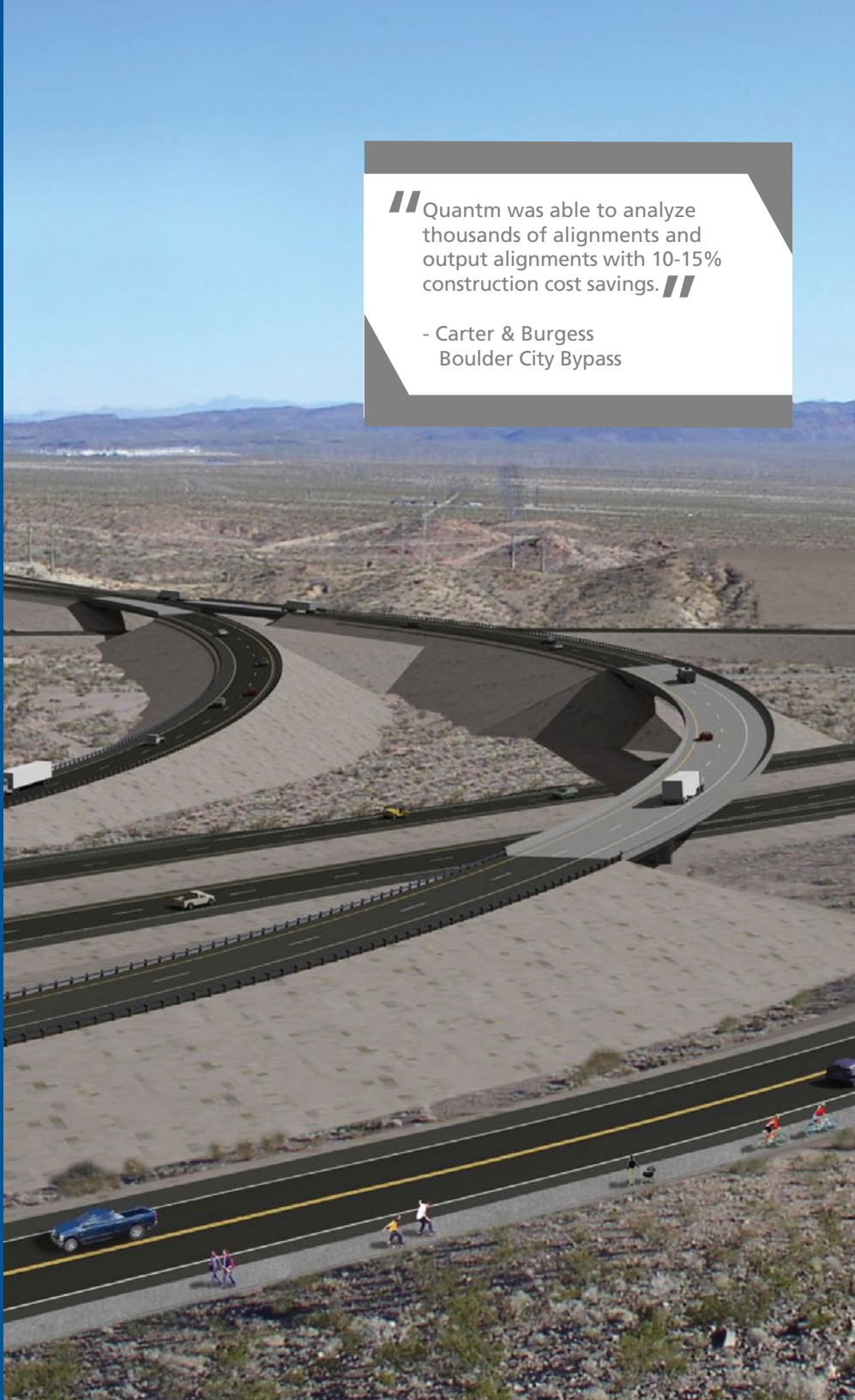
- The Third Railway Survey and Design Institute Group Corporation (TSDI)



Value Engineering

As the construction phase approaches, the Trimble Quantm Alignment Planning system can be used to refine the alignment within a defined corridor or refine the vertical geometry to reduce earthworks and other construction costs. The Nevada Department of Transportation used the Quantm system to successfully reduce construction costs on an 11.8 mile (19km) bypass of Boulder City, Nevada.

For details on this project, visit:
www.trimble-productivity.com/valueengineering



// Quantm was able to analyze thousands of alignments and output alignments with 10-15% construction cost savings. //

- Carter & Burgess
Boulder City Bypass

Planning is just the beginning

Trimble's solutions span the entire life cycle of a project, from the initial concept through the construction and maintenance of the asset. The integrated work processes throughout your organization provide benefits that include:

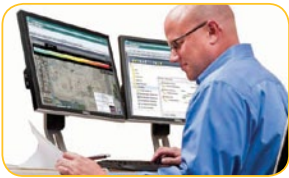
- Increased productivity
- Higher quality
- Increased safety
- Lower costs

Trimble Connected Site

Trimble's Connected Site™ digital construction solutions have an integrated workflow that data shares across all phases of the project. By applying Trimble solutions to the whole project, data can be seen

and exchanged in real-time among all stakeholders from the field staff to the engineer, project managers, and project owners. The project benefits from improved collaboration, fewer mistakes and rework, faster processing of design changes, better change-order management, improved project

safety and lower environmental impact. These benefits provide faster project completion, improved construction project management, and lower overall project costs, resulting in a higher quality and more sustainable infrastructure. To learn more about how Trimble can help you connect your site, please visit trimble-productivity.com



Road & Rail - Productivity Solutions for Construction

Project Management
Better quality and cost control



Asset Management
Better machine utilization



Road & Rail - Site Preparation



Earthmoving
Stakeless grade control for improved productivity and reduced rework

Grade Checking
Quality control and progress reporting



Fine Grading
Automated fine grade control for better material utilization

Compaction
Intelligent compaction for a better quality base



Road - Finish

Paving
Automated paving for better smoothness and rideability



Rail - Finish

Precision Alignment
Provides improved rideability and lower operating costs



Digital Leveling
Elimination of human error



Trimble Solutions for the Construction Lifecycle

Trimble solutions unlock new levels of productivity and cost savings from the initial planning phase through the finished project.

Alignment Planning

Trimble's Quantm technology gives planners and designers the ability to minimize the environmental and social impact of road and rail projects, while reducing construction and operating costs for tax payers and project owners. The solutions can be utilized at every stage of the planning process from initial scoping through feasibility and post-bid award value engineering.

Survey

Trimble's range of surveying solutions, including GNSS receivers, total stations and precise digital levels, consistently deliver reliable and accurate positioning performance in the most challenging environments. Trimble survey solutions combine the world's most advanced technology with practical, integrated designs to simplify daily work, while making data collection more accurate and able to be delivered in less time. The wireless communication tools built into Trimble survey systems allow instant and automatic synchronization with the home office.

Detailed Design

Design, manage, analyze and process site and highway construction data and designs with Trimble's office software solutions. Powerful Trimble software integrates with your design software and manages data between the office and the field. Easily combine and manage data from multiple sources to generate accurate, integrated results. These results can be shared with the entire project team to decrease costly mistakes and increase productivity in the office and on the job site.

Earthmoving

One of the most revolutionary changes in the way earthworks are performed was the introduction of 3D systems by Trimble in 1995. The cutting-edge Trimble earthmoving system puts design surfaces, grades and alignments inside the cab. The system uses GPS, laser or total station to accurately position the blade or bucket in real-time. This significantly reduces rework and machine operating cost while dramatically improving productivity in the earthmoving phase of the project.

Fine Grading

Trimble enables high-precision grading by using total station and other sensor technology to compute the exact position, accurate cross slope, and heading of the blade. The on-board computer uses this position information and compares it to the design elevation to compute cut or fill to grade. The accuracy of the Trimble system allows for better material yields and a more consistent surface which reduces material costs and produces a higher quality surface.

Compaction

Trimble compaction systems eliminate much of the guess work from soil and paving compaction operations. You will achieve more consistent compaction to target design density over the entire material layer. The operator is able to roll a more efficient pattern, increase productivity, save fuel and create uniform compaction which reduces on-going maintenance and operating costs.

Paving

By leveraging design surfaces, grades and alignments on the machine, operators can pave more accurately and achieve the design specifications for thickness without material waste. Trimble's paving technology eliminates staking and produces a higher quality, smoother road with better pavement rideability.

Asset Management

Trimble asset management solutions ensure that all assets are optimized for maximum productivity. This includes the entire fleet of machines, other site equipment and even people. By knowing where assets are and what they are doing, scheduling is more effective, reducing idle time and eliminating inefficient cycle times. Additionally, preventative maintenance can be scheduled, all from a centralized software interface, resulting in more machine uptime and faster project completion.

Project Management

Trimble's project management software helps you track and manage your project, from planning through construction and operation, to maximize your return on investment over the whole lifecycle of the asset.

Vision to Viability

Start your project off right with the Trimble Quantm Alignment Planning system, and keep it on the right track with Trimble's range of solutions for transportation infrastructure. Beginning with your vision and ending with a viable infrastructure product, Trimble supports you with the most advanced productivity solutions in the industry.

To find out more about the Trimble Quantm system or other Trimble products and services, please visit our website at www.trimble.com.



**For more information about Trimble Planning Solutions,
please contact one of the offices below**

Regional Offices

Australia (HEADQUARTERS)

Trimble Planning Solutions, Pty Ltd
Level 4
333 Flinders Lane
Melbourne VIC 3000
Australia
Tel: +61 3 8680 7200
Fax: +61 3 9620 3446

North America

Trimble Navigation Ltd.
935 Stewart Drive
Sunnyvale, CA 94085
USA
Tel: +1 408 481 8000

Latin America

7063 NW 115 Court
Miami, FL 33178
USA
Tel: +1 512 970 8096

Europe, Middle East & Africa

P.O. Box 17760
Jebel Ali Free Zone
Dubai UAE
Tel: +971 4 8865410

China

Trimble Alignment Planning
Room 2009, 20F,
Central Tower, China Overseas Plaza,
No.8 Yard, Guang Hua dong Li,
Chao Yang District, Beijing
100020, PRC
Tel: +86 10 8857 5458
Fax: +86 10 8857 5457

Data Processing and Support

Asia Pacific

Level 4, 333 Flinders Lane
Melbourne VIC 3000
Australia
+61 3 8680 7200 Phone
+61 3 9620 3446 Fax

Trimble Corporate Headquarters

935 Stewart Drive
Sunnyvale, California 94085
USA