

# CLARIAN HEALTH PEOPLE MOVER FROM CONCEPT TO COMPLETION IN TWO YEARS



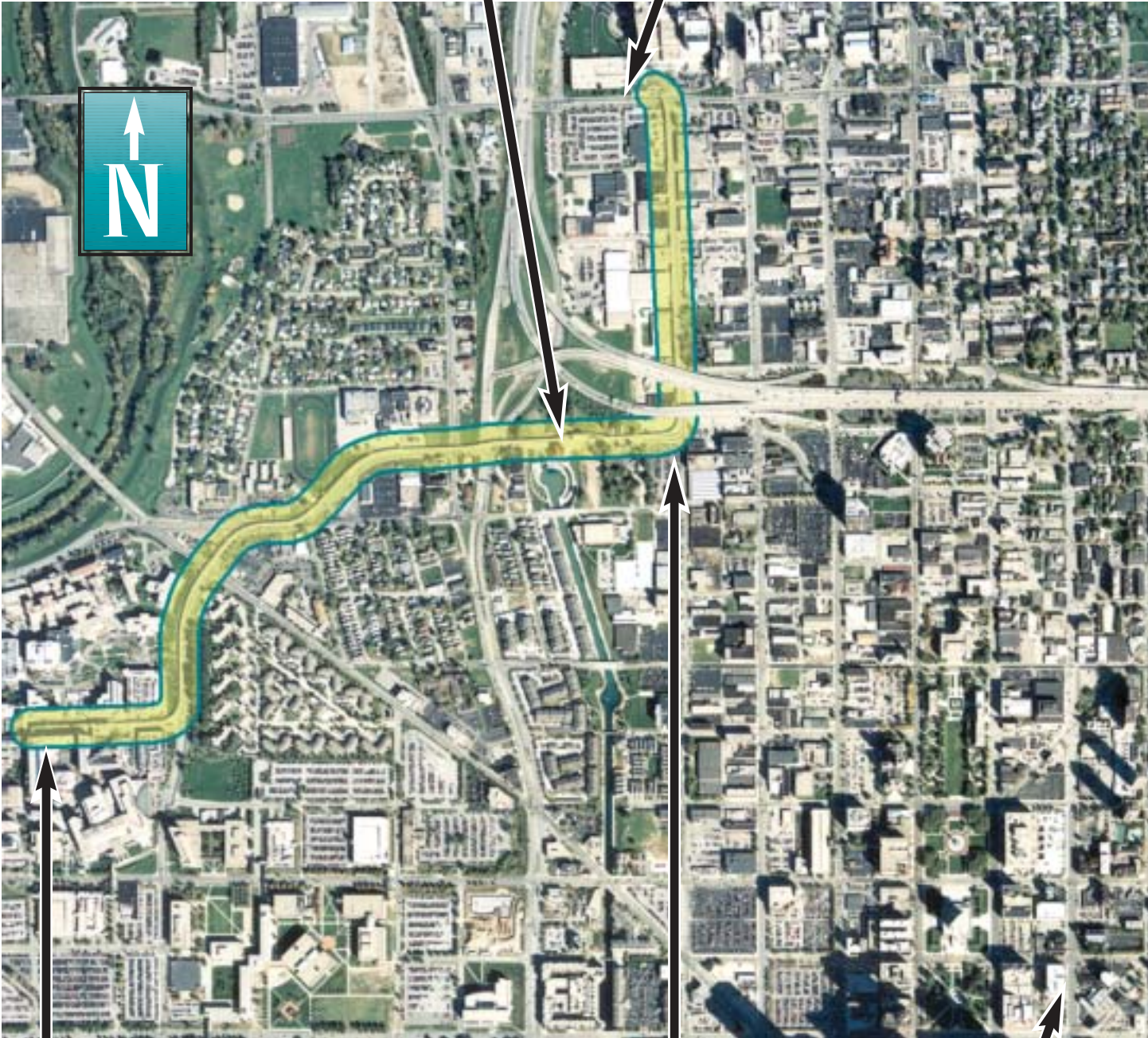
A DESIGN/BUILD PROJECT OF



# Clarian People Mover System

11th Street Station

Methodist Hospital Station



*Photo courtesy of Woolpert, LLP, Indianapolis, Indiana*

IU/Riley Station

I-65 Underpass

Downtown Indianapolis (partial)





For the transportation industry, it is a one-of-a-kind achievement: the nation's first privately-funded elevated transit system to operate over public right-of-way.

For its owner, Clarian Health Partners, it is an innovative solution to the problem of moving physicians, medical staff and equipment among three hospitals without the personal inconvenience and loss of productivity associated with urban traffic congestion.

For its city, it serves as both a focus of civic pride and a symbol of continuing progress, spurring economic development while also helping to improve air quality and revitalize neighborhoods.

And, for its designer/builder, Schwager Davis, Inc. (SDI) of San Jose, CA, it is the most recent proof of the firm's pre-imminence in the field of Automated People Mover (APM) systems. Drawing on more than 23 years experience,

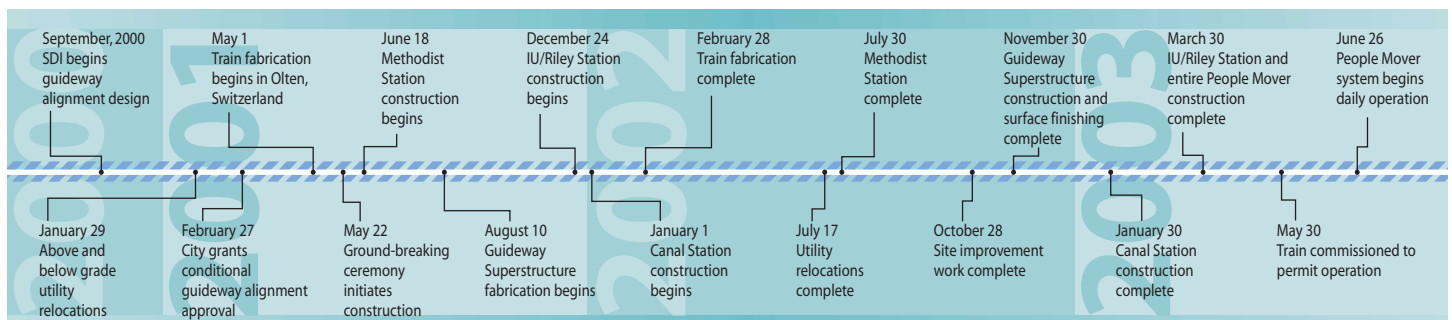


and ten previous APM projects, SDI brought the design and construction of the Clarian People Mover in on the fast-track; just two years after breaking ground. Under separate contract, the firm now continues to oversee system operations and maintenance.

Founded in 1982, SDI designs and builds APM systems and special mechanized structures. In addition, the company is a

much sought after concrete specialist for commercial buildings, major highway bridges and other civil engineering projects. SDI is a licensed A, B and C-Plus Contractor, is fully compliant with all Buy America and Disadvantaged Business Enterprise compliance requirements, and is bonded and licensed in 26 states.

## People Mover Timeline





## THE NEED



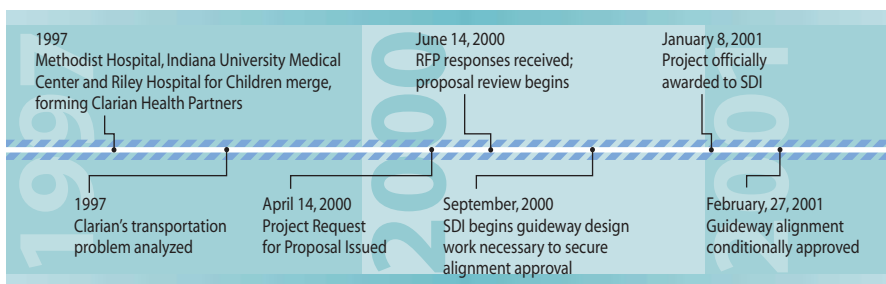
hough now recognized for its significance in the areas of public/private cooperation, regional economic development, neighborhood revitalization and future transportation planning, the Clarian People Mover started out simply as a solution to a problem.

It all began in 1997 when three existing urban hospitals – Methodist Hospital, Indiana University Medical Center, and Riley Hospital for Children — merged to form Clarian Health Partners, the second largest employer in Indianapolis with more than 11,000 employees. “We had to find a more

efficient, economical way to transport personnel among our hospitals than the shuttle buses we’d been using,” explains Methodist Chief Operating Officer and Clarian Senior Vice President Samuel L. Odle. In 1997, a preliminary analysis of the problem was conducted by Jakes Associates, Inc., Clarian’s transportation consultant and a recognized authority in the field. “Jakes recommended an elevated automated rail system, but we were initially skeptical,” Odle says. “Still, the projected productivity benefits motivated us to try.”

On April 14, 2000, Clarian issued a Request For Proposal (RFP) that required respondents to bid the project as a turn-key design/build. Jakes led the review of proposals and recommended Schwager Davis, Inc. as the preferred contractor. “I felt SDI’s UniTrak technology and experience on similar, elevated urban systems gave them the edge,” says Andrew Jakes. “Also, they are well regarded concrete engineers and post-tensioning specialists – skills I thought would

### Need/Solution Timeline







*The need to find an efficient way of moving personnel and equipment among three urban hospitals prompted Clarian Health Partners to think outside the box, and to select SDI as turn-key designer/builder for everything from traffic control to construction supervision.*

be crucial to the system's guideway construction."

SDI was brought into the project in September, 2000, months before a contract was signed, to provide Clarian Health Partners with technical assistance during its early negotiations with the City of Indianapolis. To make the People Mover a reality, the City-County Council passed special legislation and mandated a "franchise agreement" between Clarian and the City which stipulated certain conditions for the project.

One such condition was that private citizens be allowed to ride the People Mover for free. Another, that the system be responsive to the region's transit needs, including the possibility of accommodating future links. A third, major stipulation concerned the incorporation of significant public

outreach efforts into the project. These efforts eventually consisted of two years of meetings that focused on environmental, aesthetic, safety and property value concerns.

"Preliminary project proposals outlined at least three different guideway routes and eight alignments," explains Jim Shackelford, Infrastructure Development Manager for the Indianapolis Department of Public Works. "SDI prepared all of these variations to address concerns that ranged from potential business losses to visual clutter."

SDI was officially awarded the project as designer/builder on January 8, 2001. The City-County Council conditionally approved a guideway alignment just 50 days later thanks, in part, to the firm's design virtuosity.



# THE CONCEPT



**T**he concept for what an APM should be is well realized in the Clarian People Mover: swift, clean, quiet, as economical to build as it is to operate, visually elegant, technically advanced, operationally reliable.

Schwager Davis, Inc. refined this vision during the design and construction of ten earlier rubber-tired transit systems that have already traveled four million miles, carried 400 million passengers and logged more than eleven million trips. Nine of ten are still in operation today\*, offering their owners and riders an exceptional performance efficiency rating, meaning that unexpected maintenance or repair interferes with

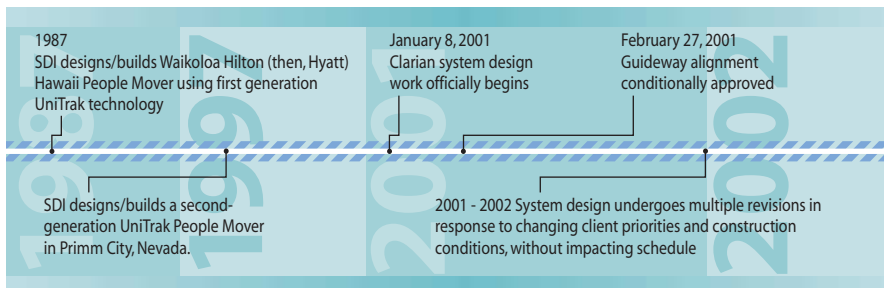
system operation less than one-half of one percent of the time.

SDI conceived UniTrak technology in 1987. For the last five years, its reliability has been demonstrated seven days a week in Primm City, Nevada, where the firm was chosen to design and build a 96-passenger UniTrak system after successfully retrofitting an existing cable-propelled People Mover to double its passenger capacity. The new system was constructed in just 15-months. During its first year of operation, it carried 5,400,000 passengers in 83,173 trips during its 19-hour work day without a single incident. Trouble-free operation is part of the concept.

The Clarian system uses the newest generation of SDI UniTrak technology and incorporates several significant refinements in guideway design, propulsion technology, control automation and vehicle styling. The pre-stressed, post-tensioned concrete guideway superstructure is the first design of its kind, reducing civil construction costs while directly addressing its owners aesthetic concerns. It maintains the 4-foot track gauge used in Primm, but incorporates an open superstructure that allows snow to fall through rather than accumulate. This design innovation, inspired by the region's weather cycles, assures trouble-free operation during Indiana's temperamental winters.

Other SDI conceptual innovations involved not what was built, but how it was built. The entire project was implemented using fast-track, cost-effective strategies, leading to a better return-on-investment ratio and superior overall project image for its owner. To assure these considerations, and superior subcontractor cooperation and work quality, SDI made local investment part

## Concept Timeline





The SDI-designed and built UniTrak People Mover in Primm, Nevada, was completed in 1998.



SDI built the Waikoloa Hilton (then, Hyatt) Hawaii People Mover in 1987 using first generation UniTrak technology.

of the system concept, as did Clarian in its RFP goals. Nearly 95% of all People Mover construction was performed by Indiana companies. In addition, SDI made specific safety practices and construction procedures part of the project concept. As a result, worker safety was rated at just 1.76 Lost Time Accident (LTA), based on project 226,240 hours.

“Tailoring our UniTrak technology to meet Clarian’s projected use parameters, and addressing their and the City’s infrastructure and environmental concerns, is really where our final project vision came from,” says Guido Schwager, SDI President. “The whole concept is a solution to a unique set of concerns, including pedestrian and vehicular traffic interference, impacts on local businesses and utilities, constructability, and public support.”

For example, SDI had to consider existing property lines, roadways, pedestrian and driver lines-of-sight, and proximity to established structures when designing the system guideway. “Our final guideway concept was designed to *improve* street functionality and traffic flow, rather than just *maintain* them,” notes Schwager. “With

the nearby highway overpasses, on/off ramps and complex intersections, we all wanted to go that extra mile. Through our cooperative partnership, Clarian, the City and SDI approached this as responsible citizens working for the common good. That’s why our final design features things like traffic attenuators and green spaces.”

The Clarian People Mover is an innovative dual track urban transit system operating two, three-car trains on an elevated guideway over public land. It can accommodate 81 passengers per train per trip and quietly covers its 1.4 mile route in approximately 5 minutes despite prevailing weather and traffic conditions – just as conceived.

### Clarian People Mover Specs

Horizontal Length	7,400 feet (1.4 miles)
Minimum Guideway Curve Radius	100 feet
Guideway Construction	Elevated concrete, dual track guideway
Guideway Spans	80 feet typical, 110 feet maximum
Track Gauge	4 feet
Train Design Speed	28 mph
Trains	Two trains, three cars each
Passenger Capacity per Train	81
Passenger Stations	3
One-way Trip Time	5 minutes
Train Control System	Fully Automated

\* The Las Vegas Circus Circus People Mover was retired during the hotel’s recent renovation.





## THE CONSTRUCTION



**B**uilding the Clarian People Mover involved the upgrading of existing right-of-way infrastructure along the approved alignment route, the relocating of a significant number of utilities, the developing of three unique passenger stations, and the building of a 1.4 mile-long, dual track, elevated guideway superstructure. Although Clarian's RFP designated either steel or concrete for the guideway, Schwager Davis, Inc. strongly recommended concrete guideway construction for economic, aesthetic and maintenance reasons. As designed by SDI, its four-foot track would allow for a relatively narrow superstructure and its average 80-foot span between columns would minimize the number of required support piers.

Construction of the People Mover guideway began with a public ground-breaking ceremony on May 22, 2001. Within a week, SDI was overseeing the work of ten sub-contractors — a number that grew to more than fifty as

construction progressed to involve everything from traffic control to site improvements. "A quick, coordinated start and fast track progress are two clear advantages of the design/build approach," says Doug Morris, Director of Facilities, Clarian Health Partners. "Despite some surprises along the way, we never had a serious delay. SDI kept us on-schedule."

Guideway construction was accomplished in two, multi-stage phases that enabled the systematic execution of staggered activities. Phase One involved relocating above and below grade utilities to allow subsequent column foundation construction. The utilities needing to be moved included more than 1800 feet of 18" gas main, two 16" water mains, buried 13.6KV Power Lines, sewer lines, telephone & telecommunications lines, fiber optic cables, cables television lines, streetlights, traffic signals and roadway signage. SDI's goal during this and all stages of construction was to complete the work, on-time and







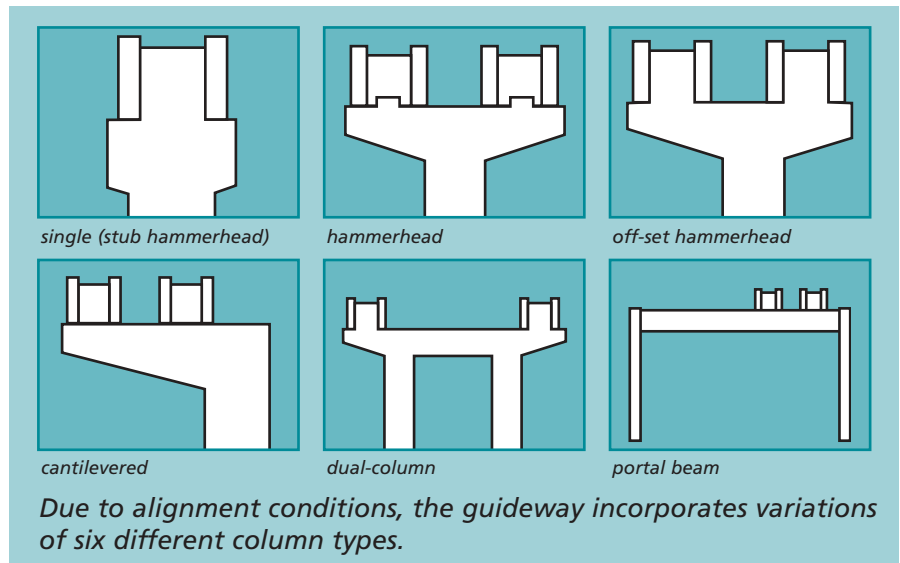
on-budget, while minimizing its impact on adjacent roadways. Effective traffic control, programmed with the help of the Indianapolis Department of Public Works, was key to achieving this goal.

Phase One also involved site improvements and the construction of guideway columns. SDI's guideway superstructure design required the drilling and casting of 87 column foundations and the construction of 85 columns (two are dual columns requiring two foundations each where the guideway splits around the Canal Station).

These columns are actually variations of six different column profiles, responding to alignment conditions. The typical column shaft is 6 ft. in diameter and 27 ft. deep. Loose upper soil conditions required SDI to use temporary sleeves while drilling which had to be removed during the concreting process. The process took 2-3 hours for each foundation and was scheduled around peak traffic periods. Paul I. Cripe, Inc., and DLZ Indiana LLC, provided process oversight for Clarian and the City, respectively, having previously reviewed the design.

Because of the congestion of the foundations' column splice steel, SDI needed to develop a process in which the column erector installed the splice steel during the final lift of the shaft foundation pour. Once the splice steel was installed, properly aligned and secured, the subcontractor would complete the final lift of concrete. All but the nine cantilevered columns were directly spliced to the shaft foundation in this way. Cantilevered columns were anchored to their foundations with a buried grade beam.

Most columns were erected in two steps: column steel followed by



*The total scope of work under SDI's design/build contract included all traffic control and traffic control devices required to minimize negative impacts of construction on the city's established traffic-flow patterns.*

hammerhead steel, then poured as a monolithic unit. Only the cantilevered columns were poured in two stages: grade beam, followed by monolithic column pour.

Site improvement work was performed before, during and after foundation/column construction, minimizing the visual impact of the work zone. This work was carefully coordinated to provide continuous access for necessary construction tools and equipment.



*In order to facilitate guideway construction, SDI had to affect extensive above and below grade utility relocations. Though most was completed before guideway construction began, total relocation work took 18 months and would not have been possible without the cooperation of the Indianapolis Department of Public Works and various utility companies including Indianapolis Power & Light, SBC-Ameritech, Brighthouse Networks (formerly, Time-Warner Cable & Telecom), the Indianapolis Water Company and Citizens Gas.*

Phase Two of construction included the guideway superstructure, system power distribution and tubing for a future translogic transfer system that will eventually facilitate pneumatic delivery of documents and samples along the People Mover's route. The construction of three, visually distinct passenger stations was also included in this phase.

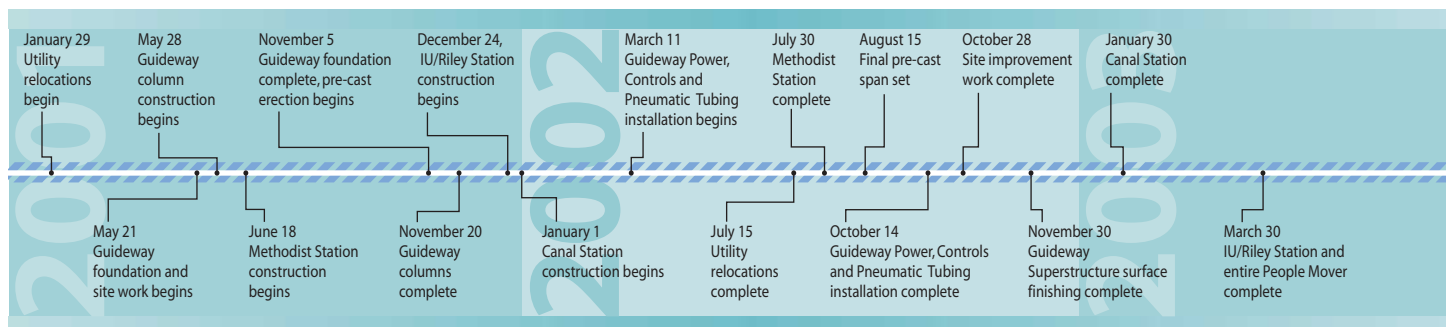
The guideway superstructure was fabricated at a local pre-cast yard using 344 individual, four-foot deep beams. The beams were independently cast, then mated to form 173 spans ranging in length from 43 ft. to 110 ft. Spans were cast in both straight and curved

configurations with the tightest curves having a 100 ft minimum radius. The pre-casting process used both pre-stressed flat bed forms for straight beams and adjustable curvature forms for curved beams. All beams were post-tensioned after they were mated as a unit. Provisions were also made during casting to allow for Stage Two post-tensioning in the field.

The mating process required strict accuracy and control to maintain track gauge width and surface alignment. Prior to site delivery, an elastomeric coating was applied to address Clarian's desire for a uniform surface appearance. This coating provides a moisture barrier for the structural concrete, maintaining adhesion despite expansion/contraction cycles.

Because mated beam sets weighed up to 66 tons, special equipment and support services were required for their delivery, including the employ of off-duty Police. There was no available storage on the congested urban construction sites, so SDI timed span deliveries to facilitate the actual erection schedule, requiring the coordination of multiple independent subcontractors. Two mobile 100-ton cranes were used to erect most spans. However, SDI needed to develop specialized lifting frames to accommodate the offset center-of-gravity of the curved spans. Many of the tighter

## Construction Timeline







radius curved spans also required the use of temporary shoring towers and restrainers to prevent uplift at the column seat.

Because of the size and quantity of equipment required to install the spans, adjacent roadways had to be closed for limited periods during the erection process. As requested by the City, SDI performed span erection work at night in high traffic areas. More than half of the spans were installed between the hours of 9 PM and 6 AM to minimize inconvenience to local residents and businesses.

Once erected, a complete frame locked together four to six spans. Stage Two post-tensioning locked the span together within each frame once closure pours between the spans were completed. Expansion joints and sliding bearings were also incorporated to allow for thermal expansion and contraction. The uniform surface appearance Clarian desired was assured with a final application of elastomeric coating.

Following the erection of each section of the guideway superstructure, installation of the power distribution

system began, including power rails, power feed conduit, control conduits, two fenced-in power drops, and control switches. Pneumatic tubing for a future "mail delivery system," including piping & supports, was also installed under the guideway alignment.

In addition, three People Mover stations were developed through a design/build subcontract with Clarian's chosen architect (Ratio Architects, Inc.) and local contractor (Wurster Construction Co., Inc.). Each station is architecturally unique and incorporates features and materials intended to complement present or planned adjacent structures.

"Thanks to the cooperation of Clarian, the City of Indianapolis, and the utility companies involved, all substructure work was completed within just seven months of ground-breaking and the entire superstructure was erected by mid-2002," notes Jeff Cavanaugh, SDI's Project Superintendent. "For a project of this complexity, a design/build contractor is the only way to interface with the City, the State, utility companies and dozens of subcontractors, and still stay on-track."



The Methodist Hospital Station, northern most on the APM route, features a passenger platform and safety and security Control Center on its upper level. The system's maintenance facility is on the lower level, as is power distribution equipment and the People Mover's back-up generator.



The Canal Station on 11th Street will eventually serve facilities in a planned life sciences complex, including a biotech research facility and a 180,000 sq. ft. Clarian medical lab. To accommodate connection with anticipated structures, SDI incorporated future walkway provisions into the station design.



The southern most, IU/Riley Station serves the University Medical Center, Riley Hospital for Children, and the entire campus area. Because adjacent projects were already underway, SDI coordinated its construction schedule with all involved parties through bi-weekly meetings.



## THE MOVERS



T

he Clarian People Mover is fully automated. SDI's Automatic Train Control (ATC) system provides reliable and frequent service

to passengers, while also allowing for Central Control Operator (CCO) interface. Train control subsystems direct all aspects of train operation and safety, including acceleration, operational speed, direction, location control and positioning, collision avoidance, normal and emergency braking, alarms, station docking and door activation.

The trains run automatically during the work day (5:30 AM - 10 PM) to handle greater travel demand, departing every six minutes. Overnight (10 PM - 5:30 AM), they operate on an "on-call" basis. The Control Room is staffed around the clock for maximum operational security and peace-of-mind.

The two, three-car People Mover trains feature a sleek exterior design with large tinted windows and fiberglass reinforced plastic nose sections. They were fabricated of

lightweight structural aluminum by CWA Constructions, AG., of Olten, Switzerland. These vehicles are designed, built and certified in strict adherence to ASCE APM and NFPA 130 standards as used for airport installations. The integrally constructed, double-walled car bodies provide exceptional insulation from exterior heat, cold and noise. Their box-type frame consists of closed, light-alloy profiles with bolted and welded joints. The floor of each train sits flush with station platforms, optimizing passenger accessibility.

SDI has equipped each train with a state-of-the-art communications system. A public address system allows the CCO to make announcements through in-car speakers. Pre-recorded announcements can also be broadcast. A two-way train intercom allows passengers to communicate with Control Center personnel, as needed.

Individual train cars are 22'L x 8'W x 10'H, with seating for eight passengers and standing room for 19, giving each





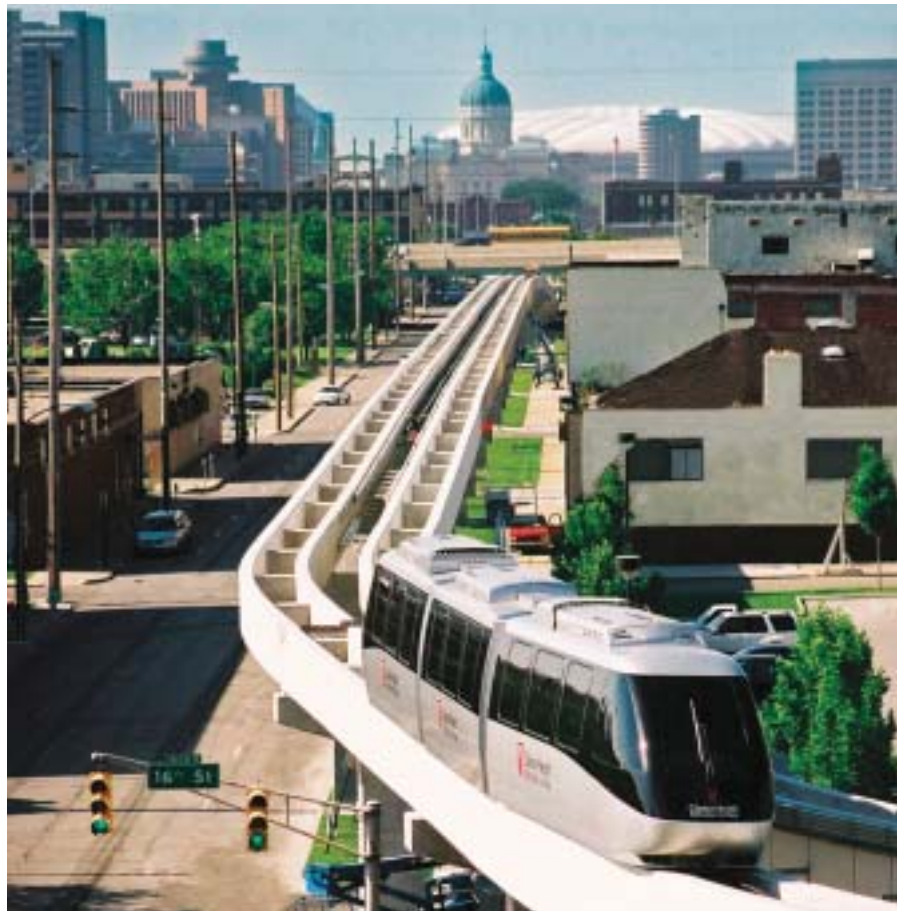


train an 81-passenger capacity. Standing room is calculated at 2.5 sq. ft. per passenger. Each car is fully air-conditioned and has a single 5' wide bi-parting door for center station loading. The empty weight of each train is 45,000 pounds. In early 2001, representatives from SDI, Clarian Health and Jakes Associates visited the CWA plant in Olten, Switzerland to inspect a full-scale model of the train body, approve styling, and select all exterior and interior materials and appointments. In April, 2002, SDI took delivery of the People Mover train cabins in Indianapolis.

Although the People Mover system is engineered and rated for a design speed of 28 mph (the maximum speed dictated by Clarian's guideway alignment and associated passenger comfort considerations), its SDI-designed propulsion bogies, or drive assemblies, can operate well in excess of this speed. They are heavier and stronger than previous models and feature variable speed AC motors driven by independent, digital flux vector AC drives, transmission assemblies, guidance and suspension assemblies, coupling hardware, and tires which support and propel the trains.

Each bogie is equipped with guide wheel assemblies, frequency alternating current drive with belt drive to the transmission, a Rockwell axle assembly and a pneumatic suspension and leveling system. Power to operate these on-board propulsion bogies is delivered at 480 volt, 3-phase, 60Hz by means of Wayside AC power rails. Rubber tires provide the traction force on the guideway running surface via all-wheel drive. Positive guidance is achieved by horizontal guide wheels that run along the vertical inside surfaces of the guideway girders.

Clarian's dual rail system incorporates the latest advances in on-board programmable logic controllers and redundant safety systems. This new-generation control system was designed by PSI, Inc. of Walnut Creek, CA and utilizes state-of-the-art Allen-Bradley control electronics. Allen-Bradley/PSI provided Adjustable Frequency AC Drives and Control Systems for SDI's People Mover design.



- Allen-Bradley AC drives provide adjustable motor speed and torque control to optimize energy use, improve performance, and increase motor control options. They are designed with advanced microprocessor technology for high reliability.
- PSI is one of Northern California's leading control system integrators and



are software-regulated. The control system is programmed for automatic acceleration from stations, maximum cruise speed, deceleration at curves and station approach, and stopping at stations. It also incorporates complete fail-safe features for train protection and safety, including speed control, direction and location monitoring, collision avoidance, braking, stopping and door control.

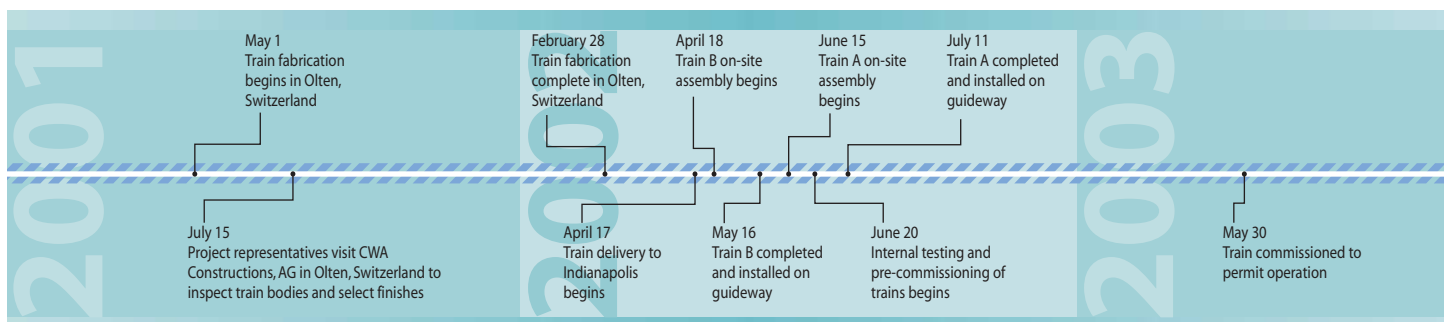
SDI designed and assembled all mechanical, electric, hydraulic and pneumatic components. Train bogie, suspension, control, electrical, HVAC and door-drive system components were fabricated in the USA. Only the train cars were built in Europe, as renown Swiss craftsmanship offered unparalleled quality and value. Following pre-assembly on-site, individual train cabins were installed on the guideway and mated to form two, three-car trains. SDI then towed each to the maintenance facility for final wiring. Verification testing followed to assure proper installation and function of all systems.

SDI began pre-commission testing of the trains in Fall, 2002. Subsequent formal commissioning was a cooperative effort, conducted under the supervision of Jakes Associates, Inc., Clarian's transportation consultant, and that of Parsons Brinckerhoff Quade & Douglas,

has extensive experience with human-machine interfaces (HMI). They specialize in platforms based on Microsoft Windows, which the Clarian system uses.

All operational functions are controlled by an on-board computer system and monitored via wireless data communication in the Central Control Room. All relays and switching devices

## Mover Timeline







subcontractor to DLZ, Indiana LLC, the City's primary project consultant.

SDI anticipates the system's life span to be 30 years and its annual operating budget approximately \$1,000,000. The marketing, public relations, economic development and employee morale dividends of this annual investment have yet to be calculated.



*The SDI-designed People Mover train bodies were hand-crafted from aviation grade structural aluminum.*



*Each People Mover train is powered by four on-board propulsion bogies that consist of a variable-frequency AC Drive, Rockwell Axle Assembly, transmission, drive wheels and guide wheel assembly.*



*After taking delivery of the Swiss-made train cabins, Schwager Davis, Inc., performed wiring and final assembly of the vehicles on-site.*



*The Clarian People Mover's four 'nose' cars are 28-feet long — six feet longer than the two center cars.*



## THE BENEFITS AND THE BUDGET



**T**he Clarian People Mover system, as supported by its owner, embraced by its hometown, and designed and built by Schwager

Davis, Inc., does more than offer clean, convenient and quiet transportation. It helps Clarian achieve its corporate mission, helps Indianapolis prepare for future growth and economic development, and helps SDI secure its position as preferred vendor of automated guideway transit and complex construction management.

Included in SDI's contracted scope of work was more than \$1.8 million in site improvements, including roadway replacement, new curbs, sidewalks, barrier walls, medians, and landscape services, only some of which were strictly required by City mandates and standard construction practices. Clarian also provided a generous budget and aesthetic guidelines to insure that the new structures would complement their surroundings by using compatible exterior design and materials. In

addition, Clarian worked closely with the Mayor's office and the City-County Council to develop a franchise agreement that considers the long-term interests of the community, including immediate public transit system accessibility, and future regional transportation system integration.

"Clarian is about helping people, about being a leader in health care and world-class research, and about serving our community as responsible corporate citizens," says Clarian Health President and CEO Dan Evans. "The People Mover system represents us."

The auxiliary benefits now associated with the system came at a price many organizations would have been unwilling to pay. "I give them a lot of credit," says Guido Schwager, SDI President. "Clarian funded this project in a way that addressed the community's interests and concerns right along with their own."

Members of the City Administration, a staunch supporter of the project, agree. "Improving mobility options



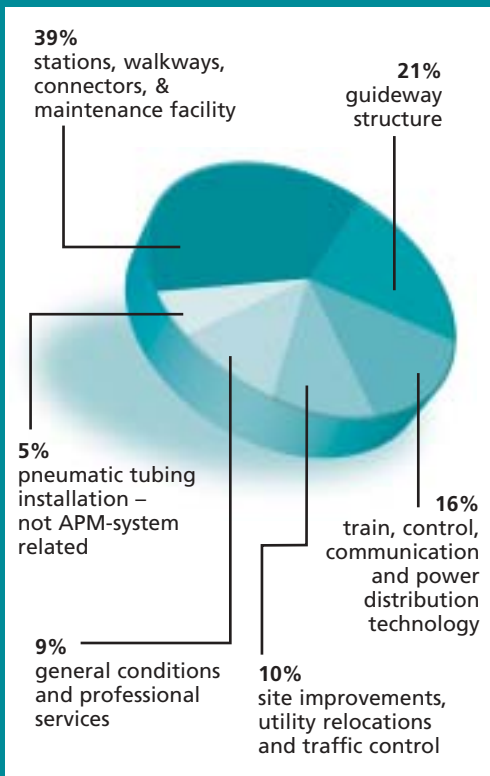




throughout Marion County has always been an important goal for Mayor Peterson, and everyone in his administration," notes Melina Kennedy, Indianapolis Director of Economic Development. "We see transportation as a quality-of-life issue that offers a variety of community benefits, including increased employment opportunities, revitalized neighborhoods and growth in key industries like life sciences — one of the City's stated commitments. In this way, Clarian Health Partners was ideally suited to initiate this unique private/public partnership."

### Budget Breakdown

Clarian Health Partners invested \$40,000,000 in its People Mover system, including discretionary funds earmarked for community improvements and station enhancements. Here is how the total budget breaks down:



### Before After





## THE BUZZ



"... this unique and creative People Mover project is an outstanding example of the celebrated

public/private partnership that has helped put Indianapolis on the map ..."

*Bruce Melchert  
Senior Vice President of Government Affairs, Clarian Health Partners*



"... The People Mover is a significant addition to our city. Not only does it provide a new, alternative form of

transportation to downtown Indianapolis, it also is a vital link to a life sciences framework that is an economic driver for Central Indiana. ..."

*Bart Peterson  
Mayor of Indianapolis*



"... the People Mover symbolizes Clarian Health Partner's ironclad commitment to providing the best

possible care to our patients and their families. It's more than a People Mover; it's a vehicle that will propel us into the future of medicine. ..."

*Craig Brater  
Dean of the IU School of Medicine*



"The Clarian People Mover makes a tremendous contribution to patient care by

allowing us to move resources and caregivers with special skills to patients who need them in a fraction of the time previously required."

*Dan Evans  
President & CEO  
Clarian Health Partners*





Schwager Davis, Inc., wishes to thank its client, Clarian Health Partners, and its host, the City of Indianapolis, for their contributions to this world-class transit project. Without their foresight, dedication and complete cooperation, the Clarian People Mover could not have been successfully fast tracked, from concept to completion, in just two years.



*On October 16, 2003, the Clarian Health People Mover was recognized at the 26th Annual Keep Indianapolis Beautiful awards dinner for its significance in the categories of Architecture, Construction, and Downtown Development. In addition, the project was chosen as the year's Monumental Award Winner over more than 70 other projects as "representing the most significant visual and physical enhancement in Marion County as selected by an impartial jury of industry and community leaders." Shown here with project awards are Albert W. Wurster of Wurster Construction Co. Inc., Stephen Vincent of Clarian Health Partners, Jeff Cavanaugh of Schwager Davis, Inc., and David J. Rausch of Ratio Architects, Inc.*





SCHWAGER DAVIS INC.  
Transit Systems Group  
198 Hilledale Avenue  
San Jose, California 95136

408 281 9300 T  
408 281 9301 F  
[www.schwagerdavis.com](http://www.schwagerdavis.com)