

MS. KARMI-MELAMEDE: James Carpenter was originally an architect/artisan in sculpture at the Rhode Island School of Design. He went on to study at the Harvard University Graduate School of Design as a Loeb fellow. After an extended consultancy with Corning Glass Works, he formed James Carpenter Design Associates in 1979.

He has worked collaboratively with major architects throughout the world, and on significant building projects, and has received many major architectural and public art commissions.

His studio's responsibilities include close collaboration with associated engineers to develop the architectonic expression of the work, including all stages of design, construction documentation, fabrication and installation.

He's been everywhere. He's taught everywhere. So you can trust me on that.

I would like to end with a quote taken from an interview.

"there will be much larger quantities of glass used in buildings, consisting of transparent and translucent glasses rather than colored and tinted glasses. Architects will employ more laminated glass because of the opportunities to include various films and prismatic devices to make our windows work harder in terms of energy efficiency and daylighting.

"I believe that the research taking place into daylighting and its importance to productivity gains and people's general feelings of well-being is just the tip of the iceberg. Daylighting will become even more important to architects in the next century than it is

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today." .

With that, I'd like to invite James Carpenter to give you his presentation.

MR. CARPENTER: Thank you very much for the introduction, and thank you to the Foundation and to Cecil for the invitation to come speak here and to come to Jerusalem for the first time. I've had a wonderful few days looking around.

It's a very long evening, and I'll try to put this together as concisely and quickly as possible.

Some of you were at the presentation I gave this afternoon, and I would like to just briefly reiterate some of the comments I made earlier today, for those of you who were not there.

I was trained as an architect and as a sculptor, and my interests are essentially in light -- how one manages light and makes the phenomenon of light manifest through the material of glass. My work essentially began in the late 1960's, working in glass and film in particular, and I'll show you a couple of films this evening about the sort of glass work I am doing today.

My pursuit of glass and light as a combined focus has to do with a premise of our awareness and perception of the world around us, that our eye is a device which does a remarkable amount of editing, for better or worse, in terms of incorporating information into our conscious world, and essentially ignoring or turning its back on an enormous wealth of information that we really do not pay attention to. It becomes a product of our unconscious or memory.

For me, it has always been this interest in glass as a bearer of information, and it is information that allows us to essentially cipher the world around us, whether built

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space or natural landscape, how light really is the defining component of our experience.

For me, glass is really the surface upon which information is embedded, reflected, transmitted, and essentially superimposed. In that respect, the glass is the substrate that functions between the conscious awareness of the world and also the memory that subsumes all of this fragmented information we tend to ignore and allow to be part of our unconscious world, part of our memory.

A transparent substrate is the compression of these two parts of perception of the world, and that's really how I approach it as a material. I am also very involved in the technical aspects of working with glass. But the driving interest for me is this remarkable property that the material has to essentially engage us in a much broader realization of the world around us.

By way of starting this talk, I thought it would be best if I showed you some work. This is a group of maybe 30 or 40 films I did back in the early 1970's, late 1960's. This is one which carries with it a very key component of what I translated from film installation work into built architectural projects.

What you have here is a series of films that were shot in Puget Sound. This is a small stream in Puget Sound in Seattle, Washington, a stream managed by the University of Washington. They use it basically for introducing different species of salmon into the stream, and then collecting and analyzing those fish when they return many years later.

We took this stream and built a series of scaffoldings over the river, and then positioned a series of film cameras down into the surface of the river. When you then take those films and represent them in a gallery or museum -- this project is a museum in

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Switzerland -- what you have, upon entering the space, is this fragmentary sequence of film frames projected on the floor carrying the image of the water moving across the surface.

Within the image is the movement of salmon from one film frame into the next. So we are taking a phenomenon of nature -- migration -- extracting that phenomenon and turning it into something you can then observe in a different atmosphere and context.

What happens when you do that is, by taking these films and removing them from the real-time environment from which they are derived and slightly altering the timing on the films, something quite remarkable happens.

Watching this in reality, you don't necessarily see this image of water moving over the surface of the rocks, but you are very aware that the image you are looking at is really the image of the sky overhead.

This is a function of how our eye discerns things. Our eye passes through that surface to observe objects beyond. It dismisses information, in fact, floating on the surface of the water.

The interface between two materials, air and water, is similar to what I imagine in terms of glass, sandwich information. It is only your ability to unlock that information that allows you to perceive this much richer world around us.

This type of film installation was done a long time ago. I use it as a relatively simple example because it has direct correlation to a film of a built project we did many years later.

This is a glass bridge for a family out in California. The bridge is a glass platform about 30 meters long that floats over the river itself, and is supported by two walkways. Thereby, your passage over the river is essentially moving across one gangway

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onto the glass platform, and then onto the other shore.

The notion is simply that, rather than just crossing the river as you might do in most any other bridge construction, your actual passage is delayed. And by delaying that passage, you are, in fact, engaged in the movement of the river itself.

That moment of time that you have passing along here to the other shore is an opportunity to transform your experience of that place.

The film connection here is very literal. You are looking at the glass platform that's imagined as if taking a section of the surface of river, extracting it vertically, and then supporting it so it becomes the surface on which you walk.

The way the light behaves is that it comes from over here, comes down, hits the surface of the river, and then reflects back up. So the glass platform is the receiver of the reflected water image from below. We are literally taking water and transforming it into a built structure which then becomes the surface on which you observe or are engaged in the landscape.

This connection to working in film and trying to institute a methodology by which those conceptual ideas can be built underlies the majority of the work we do. Even though the emphasis is much more on the technical development and realization of the projects, they ultimately are operating on this other level of interest which is much more about how ideas are conveyed through a built work.

This is another project done almost at the same time as that bridge. This also works essentially as a prismatic device, and is very simple in its concept.

The commission here was to do two windows in a small chapel, a very unusual sort of opportunity. The chapel is sited in a very beautiful landscape overlooking a

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valley, and there are no other built structures anywhere in view.

A requirement was that the window be totally transparent. So the window is built out of all clear glass, very large plates of glass about 12 meters high. Each piece of glass here is about 12 meters in length, single strips of glass that are cut and then positioned into the window using a strong backing system. Then, by means of these horizontal panels which are approximately two feet square, you stiffen that whole matrix. It's a very simple egg-crate structure.

What you have happening here is a clear window through which you observe the separation of nature outside. In these horizontal planes, you can begin to see the reflected image of trees brought up into the window pane here.

The horizontal plane of the glass and the metallic coatings are means by which one can fragment the visible or invisible spectrum of light. In this case, it's a coating which generically splits the spectrum at the middle of the visible spectrum, the portion of the spectrum which is being reflected.

In this case, we are getting bars of light at the yellow end being reflected. Simultaneously, a portion of light is being transmitted and is coming through at the opposite end of the spectrum.

What is happening then is that we are basically taking the daylight entering the building, splitting it, and allowing it to come into the space.

There are several things here. This is obviously a quite dramatic image, and it's one often used to represent the project. But more importantly, I think there are a couple of ideas here that you'll see carried forward in other projects, where you have the environment outside -- whether clouds or birds flying in the sky -- and that image is brought

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in and projected onto the wall, this entire surface.

The wall is carrying with it whatever image is in the sky itself. We are bringing the image of the sky into the building where you can observe it. Simultaneously, any activities in the tree outside -- leaves on the trees, wind moving the trees -- that image is brought over and transmitted here.

There is a superimposition of landscape and sky projected on the wall. Obviously, in a chapel or a space of this sort where you are engaged for a longer period of time, the most important thing of the project for me is the way the information is brought into the building. It essentially appears and disappears over moments of time.

There will be time sitting here when there is absolutely no presence in the space, and then these moments appear, this pulsation of the light, and an image comes into the space. Therefore, there is this opportunity to have a synthesis or extraction of information outside brought into an environment where can you observe it in a distinctly different way.

What is consistent in a lot of thinking about the work I do and about working with glass is that glass, for whatever reason, has historically always been a material in a frame. The frame goes into a subframe in buildings, and the material itself has been denied a specific materiality of its own.

It's always considered to be this abstract transparency that separates you from interior to exterior without having any material contribution to that transition or translation.

I tend to think of glass as a material that offers -- or not just the glass, but the glass and the aperture of the building -- being an opportunity to develop a translational

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device that transforms the information from exterior to interior.

By doing that, many of the projects are effectively taking that very narrow, abstract, thin boundary condition we always associate with glass, and extending that boundary condition so there is an interstitial zone that operates in terms of unlocking physical properties of light, and then revealing another body of information that's there but that we are otherwise not aware of.

The notion of extension of boundary conditions is something we have often neglected to understand or to explore meaningfully in any way. It changes our experience of a place or space.

This is another project which does this in a somewhat different way, but in a way that I think challenges our basic relationship to a window -- windows being generally our relationship to the horizon line and the world beyond the building that we are in.

This is a window done for a family in Minneapolis. I am just showing a few small projects to begin with so you get a sense of how I am thinking about light embedded in the window.

This operates like a periscope, like a construction- looking series of mirrors that run horizontally. Positioned in front of the mirrors is field of lenses. If you look through the outside glass in the wall, you see the stone wall and the fence and the adjacent building and a house. These are all immediately outside the window.

This family had a remarkable collection of art work and wanted total privacy in the house. They didn't want to see any adjacent buildings. So we devised this window as part of a whole sequence of windows and apertures in the building of the project where we worked on all the apertures of the building and shaded systems of this house of Vincent

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James.

We created this window, as shown by this very simple model, which basically takes the image of the sky and brings it down into the series of mirrors like a periscope. The lenses then read the image off the mirror.

Then, by positioning a piece of translucent glass in front of the mirrors and lens -- the lens has a specific focal length -- the image is then resolved and allowed to read the image of the sky which is brought down and projected into the building itself.

This is an opportunity to think of a window not so much as an immediate connection to the environment directly beyond the wall plane, but in reality, information can be coming from any direction and be brought into the space.

This is of multi-fold interest, I would say. It's very hard to see any of these projects through images because they are very active. They depend on your perception of what's in front of you and the very fleeting moments of how the sun interacts with them.

But what you are looking at here is a window at the moment of morning, meaning the sun is basically beyond where the screen is positioned. You are getting light coming directly towards the window in certain areas. There's a tree in the distance, and what you see here is the treetop that might be 15 meters away.

It's bringing the image of the sky and treetop into the window plane. Simultaneously, the sun is passing through that treetop and projecting the shadows of the very same leaves you can see here in the projection. So you are getting a one-to-one relationship of that tree in terms of these projections of leaves, and then seeing the image of the tree in the distance.

The reason I show this at this moment of time is that, as soon as the sun

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comes over the building slightly, the entire wall becomes like a whole field of video monitors. You can see the repetition of 90 images of what's going on outside.

This does not necessarily depend on daylight. It also functions at night. If the moon is out, you see an image of the moon projecting around 90 times into the window.

This volume of information that's beyond our perceived or closed world, how you take those fragment of information and superimpose them on a plane, allows you to interpret or present them in a different way for reinterpretation.

In these smaller projects, we design the work and do the engineering with various engineering firms. Most of the projects we fabricate and then install.

What students can learn from small projects is that they can be extraordinarily valuable in terms of pursuing an idea, allowing an idea to take its natural development in a fairly restricted context, and then the information can be extracted to much larger projects at a later date.

This is a project in New York City, a wall at Lincoln Center. It's a somewhat unusual circumstance of a totally opaque surface. There is no light coming through it whatsoever.

This was the product of a competition. The neighborhood objected to this building and to the fact that there were no openings or apertures in this very large surface area right near Lincoln Center.

We came up with this idea. This is glass in the background here, a machined glass that's used for solar collectors -- meaning it has a very defined prismatic surface that is designed to bring multiple angles of light through the surface of the glass, a prism that allows light to pass through it from many angles simultaneously.

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We laminated it to a mirror, which means that any ambient sky brightness passes through the prismatic surface and strikes the mirror behind. Then that light tries to come back out. But because of the light being sandwiched behind the field of prisms, it undergoes an inability to reflect out of the surface of the glass in one bounce. You get a primary reflection, and secondary and tertiary reflections.

Light is partially captured in the material before it is allowed to escape. Therefore, the material becomes very luminous in itself. Then, to capitalize on the capturing of light that occurs in the flat plane of glass, are these glass fins extending perpendicularly off the surface, extending out into space.

This wall is really purely an exercise in recording the phenomenon of light within a very dense urban environment. What you are seeing at this moment is looking at the wall as if you are positioned to the south.

The sun is coming back over and is hitting one of these fins. Then the reflective image off this fin is this bar of light you see down here, which is reflecting that image.

Then, of course, in this prismatic mirrored surface, you have that fantastic phenomenon of light reflection where you either have the total presence of light as reflected light coming back to you, or a total absence of light when it's reflected away from you.

You have a remarkable void here that appears to be absolutely nothing, no materiality whatsoever. The light is reflected away and you see no material surface whatsoever.

That same wall, if you were to walk underneath it, begins to shift. As the lighting angle begins to change, you start to see all these other phenomena of light.

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Then, if you were to move past the wall and stand at the north looking back at the wall with the sun still being south below here, you are seeing that same fin of glass reflecting a bar of gold light in that direction.

That same fin is then projecting this bar of blue light in the opposite direction. This is a similar phenomenon to the chapel, but just transposed into a surface on a city street.

It's very difficult to visualize these things in slide form. Just remember that two people looking at this wall at the exact same moment from two different angles would see totally different things as they move by the wall, that characteristic of animation.

That is fundamentally what I am most involved and intrigued with in terms of how we perceive things with light. There is a degree of animation and acclimation between your movements in an urban context or a built context, and simultaneously the position of the sun. There is always a linkage between you and the movement of light.

This wall demonstrates a very simple principle which we are always aware of in urban environments, and even where, in this case, the sun has basically moved behind the building. The sun is completely out of sight here and the wall is entirely in shadow. But what's occurring is that these fragments of light that you see hitting this brick wall are fragments of light hitting a building six or eight blocks away, and that light is being reflected back.

These are moments of reflected light that we might not otherwise pay attention to. When they strike this very active surface, it takes those very fleeting moments of ambient light and transforms them into something quite remarkable. It's a wall that essentially has numerous lives at different times of the day and the year. So this is a pure

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exercise in demonstrating the variability of light.

This is a project done with Richard Myers, the Phoenix corporate house in Phoenix, Arizona. It is a large glass hall, the main public space at the courthouse. Once you enter that space, there is a large circular drum -- the special proceedings courtroom, 300 or 400 people.

This environment, this large volume of space, is naturally cooled. Phoenix, of course, is an environment more similar to Jericho or sites a little further east where there is very little or no rain and very high dry temperatures. You can cool this type of dry atmosphere by introducing moisture at the top here. Introducing mist cools the space down.

In order to enclose this volume, the main courtroom, to control the air conditioning in it, we came up with a roof for this drum based on the idea of a soap bubble, a horizontal plane of glass with this lens that would descend down through this pane of glass here with this hemispherical form coming through it.

We took the idea of a bubble floating on the surface of the water as a way of developing a most delicate and most transparent ceiling or roof for that circular courtroom. This is an early drawing of it. You see the disc of clear glass that runs from here out to here, and the circumferential ring of glass that frames a hemispherical lens at the center.

This lens is made with a type of glass that's typically used for light-redirectional purposes in lighting systems. Our goal here was to remove all of the lights from the roof of the ceiling, move them up to the top of that drum, project them back down, and use this as a light-redirectional device. It is really the device that distributes the light within the courtroom.

Here you have the courtroom ceiling looking down on the construction. That

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upper row of cables is attached to this ring here, this compression ring, tension ring, that runs around the outside of the drum.

Those cables come down. Then they want to come down across here, but we modified that curvature by another series of cables that come out here. Then we were able to control it and create a hemispherical form that is then carried up the other side.

The other thing that was done here is the sprinkler system that's running through the building and through the roof. We used the design sprinkler system for fire safety purposes, and then put the whole sprinkler system into tension. It's used as part of the structural system to support the whole roof.

Below you see this floating hemisphere within a ring of transparent glass hovering in the middle of the courtroom. If you are in the courtroom, you can look up and see the sky overhead, and then all the lights come down. You can see the judge's bench through this.

This is another project in Bonn, Germany. We were asked to do the main entry circulation stair tower for the Deutsche Bank tower, very beautiful tower which you may have seen published recently.

The building was given permission to build in a park adjacent to the Rhine River, a very active park in terms of public use. There was a desire to mark the main entry from the park and from other major axes in town.

We developed this tower sitting in here. It's a four-story-high stair tower, and the stairway leads to the river. A bridge comes over and goes into the tower. The main street in town is on an axis with this tower. The focal points for all circulation systems in the city approach the tower.

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We used this approach to the glass which is seen here, a clear piece of glass. One side of the glass has a true mirror on it, therefore reflecting the landscape surrounding the tower facing out. Then, on the exact opposite side of each of these rectangles, is a blue rectangle -- very luminous, almost fluorescent blue -- that merges with the sky beyond.

What that creates in the tower is that you are basically enclosed within this sky-blue volume as you ascend up through the tower. But if you approach the tower from the outside, you have that feel of mirrored rectangles, almost a pixilated field of reflected images which is reflecting the image of the sky and the landscape beyond you.

You can see that pixilated image of the landscape presented in front of you. That merges to these fields of blue rectangles at the back surface. It has this remarkable perceptual illusion of not recognizing that you are actually seeing the sky or the landscape.

Again, this sort of complexity of perception relative to spatial location or awareness in the built space.

This is a project we have worked on for about the last two or two and a half years with a firm we do quite a lot of work with. We were brought on board by Skidmore and the owner of this building to work collaboratively with the architects on the glazing skin system for the tower, for the space of the building here, and for this entry to the tower at the main lobby.

You all know that the World Trade Center site has been under great discussion for the last year or two. This building is essentially across the street from the World Trade Center site. Tower 7 was originally a much bigger building than this tall building in terms of footprint and total square footage.

Tower 7 was the building that collapsed later in the day. It was totally

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evacuated and nobody was hurt in its collapse. The original building was up to about this height and with a much bigger footprint. It extended all the way across here and closed off what is called Greenwich Street, one of the early avenues that would have continued through the World Trade Center Site.

Tower 7, in its previous life, as well as in its current life, is the primary power distribution building for all electrical power for the World Trade Center site, as well as for downtown Manhattan. The base of the building is essentially a concrete vault housing very large transformers, and the original podiums for the World Trade Center site were at about this elevation.

Previously, you would have entered Tower 7 through a tunnel, a bridge that crossed the street, and the lobby was up on this level. This is a product of establishing the podium at the World Trade Center, establishing this height at Church Street, and then projecting that across other avenues or streets as they move west towards the Hudson River.

By the time you get to Greenwich Street, you are already up to the sixth floor. Obviously, that podium is gone. It is not part of any of the reconstruction plans that are in place.

That essentially left the need to take this industrial power-generation building and create something from it which now will have to be engaged with the new street life and the new activities that will occur on the World Trade Center site. Hopefully, there will be a cultural building directly across the street from this. Michael Arad, who will speak after my talk, is working on the memorial off to the southwest of the same site.

This building has remarkable requirements for power distribution, and therefore is already under construction. They are already up to about the 21st floor. The

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glass is going to go on this building starting in June, and it will have occupancy in about 18 months.

The desire on the part of the owner, Silverstein -- who is also the leaseholder for the World Trade Center -- right from the very beginning was to invest in a building and do something with this building that perhaps isn't done on other buildings in New York.

Generally, buildings in New York are not necessarily invested in in the sense that buildings in Europe are. They are done relatively inexpensively, and typically have a relatively short life span.

This will have a much more significant presence on the city skyline, and will also be a building that people will recognize as evidence of the desire to build buildings of great quality and resolution on the World Trade Center site itself.

We are involved in developing the skin for the tower. The skin for the building is double-glazed units a little over four meters in height. They come down with a clear glass light coating on them. The panels come down, and then they pass right by the floor line. That same double-glazed unit slips by the floor line and then overhangs the structural bay section of the building.

If you look at this structural bay system, you see there is a slightly curved metal element, and then it maneuvers along there. This is Greenwich Street again, moving through the metal base of the tower and the glass up above.

One of the means by which we were trying to integrate this very solid massive base of the tower with this very light glass skin above was this conceptual idea that there would be a block of light existing within the building, but linking the solid portion of the building to the very delicate glass portion.

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The conceptual idea is that there is a block of light that sits inside the building evidenced in the main lobby. You see a little bit of it appearing in the skin down below. This is a curtain wall, that curved section of metal, a stainless steel material that has a particular finish on it.

Its surface configuration is a rolled piece of stainless steel designed to sit in this area right here. These are test mock-ups of it. It's designed in such a way that, when you position a reflector running horizontally, the sunlight or sky brightness is going to come down and strike that reflector. The image of the sky is then projected back up into the spandrel area itself.

In this section of the building, you will read the image of the sky projected up into the tower. Every bar of the spandrel going up the 60 stories of the tower will carry with it the image of the sky. That occurs in this zone right here in conjunction with this imaging you are getting on the glass skin itself.

This is a more substantial mock-up done for size-mix behavior, and also for wind and water infiltration.

The wall -- the building itself -- is designed to be a very active responder to the sky conditions surrounding it, both in terms of this projected image of the sky as well as the straight, direct, reflected image of the sky.

The tower is thought to be really imaging the sky that you'll see from all angles around the city and from great distances. The building plan is a slightly skewed parallelogram, not a square, so it is much more prismatic in its interaction with light.

Coming down to the base of the building at the main lobby is a cable wall. Basically, these cable-supported walls are very highly-tensioned cables anchored up in the

building's concrete frame. They are brought down and terminate in this very robust header truss or header beam that's anchored down to the building foundation through these door entries, and the glass is also then horizontal cable anchored into concrete walls on either side.

Earlier, I gave a detailed explanation of this wall as being essentially blast-resistant. We are all becoming more and more conscious of security requirements in the States. You are far ahead of us on that in many respects.

In this case, the notion of working with cable structures is that these cables are very limber and highly-tensioned, but they have the capacity to damp high impulses of energy. That means that they are much like a tennis racket. There is tensioning cable in two directions, no lateral stiffness to the wall, no mullions, no deep beams, no trusses, no attempt to stiffen the wall to resist wind forces or blast forces.

The goal here is that, upon impulse, the wall basically moves. All the glass is mechanically locked into the cable system and can't leave it. Then the wall comes back into its original position. It resists forces by basically giving with the forces, and that is true of all of these door entries as well.

Then, as you go deeper into the lobby, there is a second wall. You are looking through that cable wall at the outside of the building, seeing above the lobby that a portion of that thing I mentioned -- that blue volume of light -- exists within the core of the building, manifested physically in this one location in the lobby.

Looking back, there is another glass wall inside, about 25 meters long and about five meters high. It is again a secondary wall with resistance in terms of blast. The other wall deals with the main lobby, security desk, and around this back to the elevators.

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This is a cantilevered spring design. The whole wall can give and come back to its initial condition.

As you saw on the previous image, there is text built into the wall. You can see it in the surface. This is a project we are doing with Jenny Holtzer, an artist who works with digital text, capturing information and phrases and putting it typically into a more conventional LED read-out system.

In this case, we have taken each of these large glass panels and embedded an entire field of LED lights into the glass panel. Then each of these sources of light is individually addressable. You can have streaming text moving through a totally transparent piece of glass. This is basically editing and composing a sequence of phrases, paragraphs or sentences that will be moving across that wall.

In the evening, the level of light will be ratcheted up slightly. Outside the building, you can see the text moving across the glass wall. In daytime, it's dialed down.

One aspect of the building -- coming back to the base of the building, the concrete enclosure transformer vaults -- we came up with this system of extruded stainless steel prisms. This is a system we developed with a company that makes mining equipment, and these are all robotically manufactured panels.

By taking these prisms, which are about 30 feet in length, and welding them down onto a light armature, you can orient one field of prisms at one angle, and then the adjacent field of prisms is rotated slightly at a five-degree angle.

What that does is that each bay of prisms is basically reflecting a slightly different vantage point of the surrounding environment or the sky. You are seeing two reflective images coming off the surface of the stainless steel.

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These screens are 50 percent open so air can move through the wall. The transformer vaults have to be ventilated, and the heat generated by the transformers can escape. There is an outer skin of stainless steel prisms, then about an eight-inch gap, and then a second field of stainless steel prisms on the inside.

This is the ground floor going up to about eight stories, just a diagram of how you can program the whole surface of a building to reflect light from different angles or perspectives. As you move by the building, it reflects a range of varied images.

This is the manufacturing of some components further into the building by the same company. This is the concrete vault quite some time ago, last October or September, right around the time of completion of the concrete work. Each of these bays has a very large transformer, and that stainless steel skin goes over this whole building, so it's about 200 feet square on all sides all the way around.

Here is a three-story-high mock-up of the stainless steel system. Again, it's an open system, meaning you can see right through it. Here you're looking right through the corner of it and not seeing the second layer of steel inside there. You can look right through the corner.

The goal is that you not only have the behavior of the wall during the daytime reacting to daylight and to ambient lighting conditions, and at night, car headlights or streetlights, but then, in the evening, you have another opportunity to light the wall with this series of LED that runs vertically up through the wall, basically projecting light back into the building.

It hits that second layer of stainless steel prisms and then back out to the street, in keeping with this notion of the building as a source of light emanating into the

immediate environment or context.

Here you see the control of the light which can go from white light to very subtle blue light. It's intended to be very quiet, not aggressive in the sense of Times Square, but something that is programmed to change over time, over a 20- or 30-minute period.

You might have a portion of the wall becoming that block of blue light that occurs inside here and extends up further into the building. All of a sudden, the whole building shifts and you read that blue volume of light that locks into that glass volume of light in this lobby.

You are looking at what would happen in the skin of the building which is still in process. We haven't settled on the final scheme. The site is taking on more and more presence because of the World Trade Center across the street, so the desire is to have these walls become quite active, quite a major contributor to the esthetic of what is occurring in the immediate environment.

This next sequence was done by introducing a series of video recognition cameras up here in this part of the building. Those cameras are reading the sidewalk down below the building. Then you have the potential of these bars of light tracking the people on the sidewalk. There is a way that this building can, at moments, take on a very active presence with the people around it.

This is another project we just recently won. We are basically working with Grimshaw's (?) part of the project, and another local architect on a different part of the project.

We are looking at a tunnel. I thought I'd end with a tunnel since most of the work I showed you deals with daylight and the urban environment around us.

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These are pedestrian subway tunnels that link all of the major north-south subway lines in New York City. This is a cut through two streets. This is Day Street, and this is Fulton Street from here over to the East River. The Hudson River. The World Trade Center site is off this screen. This is the new train station. You move from there underground.

All these train lines run north-south, and the opportunity here was to establish a new tunnel that runs perpendicular to the subway lines that would be exclusively for a pedestrian connection between all these various train lines, establishing a new transportation hub downtown.

Grimshaw is the architect for this new building. This is a glass dome up above here, a very beautiful and very simple glass building on the corner of Broadway and Fulton Streets. The goal is to achieve this grand public space, not dissimilar to Grand Central, that will create a new transportation interchange downtown.

This building is in a fairly confined site relative to daylight access, and it has been very precisely developed to be a responder to daylight. The shape of the dome is very specific to the angles of light available to the building.

We are working now as a member of that team to refine the interior reflector system that will bring daylight down from the dome three floors below ground here, so you have daylight down in the subway tunnels.

What we are initially attempting to execute now is, not only to have daylight come down through these large subway tunnels, but to transform all the street access points to this tunnel as daylight collectors. Daylight is projected down into the tunnels, and therefore allows for the light to be the way-finding element you would use moving

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underground.

Then, if you look at this, that changes the whole vocabulary of materials that will be used in the subway system. Historically, the subway systems all used ceramic tile and opaque white glass tile in the last century. Basically all of these historic lines running through the city are of that vocabulary -- ceramic glass, conventionally lit.

Our goal is to take this new line across here and essentially flip the vocabulary. Our proposal is to create an entire tunnel system that, in fact, gives you the impression that you are within an environment enclosed by light.

There is a volume of light outside the tunnel. The tunnel surface or skin is made out of stainless steel, and light emanates through the stainless steel skin to the space. The tunnels are as seen here.

Basically, there is a play of various surfaces and punches and qualities of reflection within the skin of the tunnels themselves. These are stainless steel panel systems that build up the desired levels of reflectivity, and the light then comes from behind the wall and emanates through this system of perforations.

You can see the idea in this image. The tunnels are lit at a relatively low level of light, and then the light basically moves in front of you. The whole tunnel is being lit in front of you as you move down the passageway, and you get this very active engagement of lighting.

We know all the statistics relative to numbers of people in the tunnels at different times of the day. This will be programmed to respond to those changing systems in the tunnel.

I tried not to rush, but to give you a bit of a comprehensive overview of the

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work we do. To reiterate, it is important to try to make people aware of these phenomena of light, to transform awareness of light, how it contributes to awareness and how it is used for pragmatic purposes like way- finding. In other projects, it is an opportunity to transform experience to a level they might not be experienced in any other way.

Thank you very much for the invitation to be here. Thank you.