

DMA Engineering  
6606 W. 96<sup>th</sup> Ave  
Westminster, Colorado 80021  
303-732-5559  
info@dma-eng.com

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## Steven Forrester, P.E., C.G.D

### Employment

|                |   |
|----------------|---|
| 2007 - Present | DMA Engineering<br>Westminster, Colorado<br>Principal           |
| 2005-2009      | Merritt Equipment<br>Henderson, Colorado<br>Mechanical Engineer |
| 2000-2004      | Kevry Corporation<br>Golden, Colorado<br>Mechanical Engineer    |
| 1998-2000      | Honeywell<br>Colorado Springs, Colorado<br>Mechanical Engineer  |

### Education and Other Training

UNIVERSITY OF COLORADO AT DENVER  
Masters of Science Degree  
Mechanical Engineering, August 2003

UNIVERSITY OF COLORADO AT DENVER  
Bachelor of Science Degree  
Mechanical Engineering, December 1997

### Software

TRACE 700 (Building Modeling)  
Earth Energy Designer (Ground Heat Exchanger Design)  
Solar Pathfinder  
(Solar Photovoltaic and Solar Thermal Design Software)  
T\*Sol (Solar Thermal Design Software)  
In House algorithms and software codes for the  
evaluating and design of renewable energy systems

**Certificates & Licenses**

Certified Geoexchange Designer Certification  
Registered Professional Engineer (Colorado)

**Memberships**

International Ground Source Heat Pump Association  
American Society of Heating, Refrigeration and Air  
Conditioning Engineers  
Colorado Renewable Energy Society  
AIA Colorado  
Colorado Geo Energy Heat Pump Association



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|-----------|---------------------|
| Name:     | Private Residence   |
| Location: | Longmont, Colorado  |
| Client:   | Building Collective |
| Project:  | Pratt Residence     |

**Project Description** – The clients are building a new 5,000 square foot home in Longmont Colorado. Longmont Colorado is located in Boulder County and all new construction must meet stringent building guidelines. The clients explored using ground source heat pumps for the HVAC system on their new home. They interviewed several mechanical contractors that specialized in ground source heat pumps and felt they were over selling the system.

**Services Provided** – We were contracted to provide a mechanical system design. The design parameters were to have radiant floor heating and forced air cooling system. We provided a life cycle analysis of 4 competing systems, conventional boiler and split system, air source heat pump system with boiler backup, boiler and evaporative cooling and ground source heat pump system. The life cycle analysis had to balance meeting a HERS score between the systems and each system would require using solar photo voltaic system to meet the required HERS score. Based upon the life cycle analysis the clients chose the ground source heat pump system. We are designing a 4 ton water to water ground source heat pump system. System also includes energy recovery ventilators providing minimal energy loss while maintaining a high level of indoor air quality. The system consists of 8 radiant floor zones for heating, 1 radiant floor zones for heating and cooling, one snowmelt zone and a hydronic fan coil units for cooling. Design included load calculations, ducting design, radiant floor design and ground heat exchanger design. The design is also incorporating a heat recovery system for the homeowner's beer making process.

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|-----------|--------------------------------|
| Name:     | Private Residence              |
| Location: | Cherry Hills Village, Colorado |
| Client:   | The Bristow's                  |
| Project:  | Blackmer                       |

**Project Description** – The clients are building a new 12,000 square foot home in Cherry Hills Village. Not necessarily concerned with having “green technologies” the clients wanted a highly efficient system. They explored using ground source heat pumps on their own and they still were undecided on which system to choose.

**Services Provided** – Provided life cycle analysis of ground source heat pump system versus a conventional system, based upon life cycle analysis clients chose ground source heat pump system. We designed a 16 ton water to water ground source heat pump system with a boiler backup. System also includes energy recovery ventilators providing minimal energy loss while maintaining a high level of indoor air quality. The system consisted of 16 radiant floor zones for heating, 2 radiant floor zones for heating and cooling, one snowmelt zone and 4 hydronic fan coil units for cooling. Design included load calculations, ducting design, radiant floor design and ground heat exchanger design. We are providing construction oversight, and system commissioning.



Name: Private Residence  
 Location: Cherry Hills Village, Colorado  
 Client: Harrison Custom Builders  
 Project: Colorado Blvd

**Project Description** – Harrison Custom Builders and their client decided to switch from a conventional HVAC system to a ground source heat pump system during project construction. . Design included load calculations, ducting design, and ground heat exchanger design.

**Services Provided** – Provided design services for two 5 ton water to air ground source heat pump systems. Design included load calculations, ducting design, and ground heat exchanger design. We provided construction oversight and system commissioning.



Name: City of Louisville  
 Location: Louisville, Colorado  
 Client: Louisville Public Works  
 Project: South Water Treatment Plant Pipe Gallery Heating Replacement

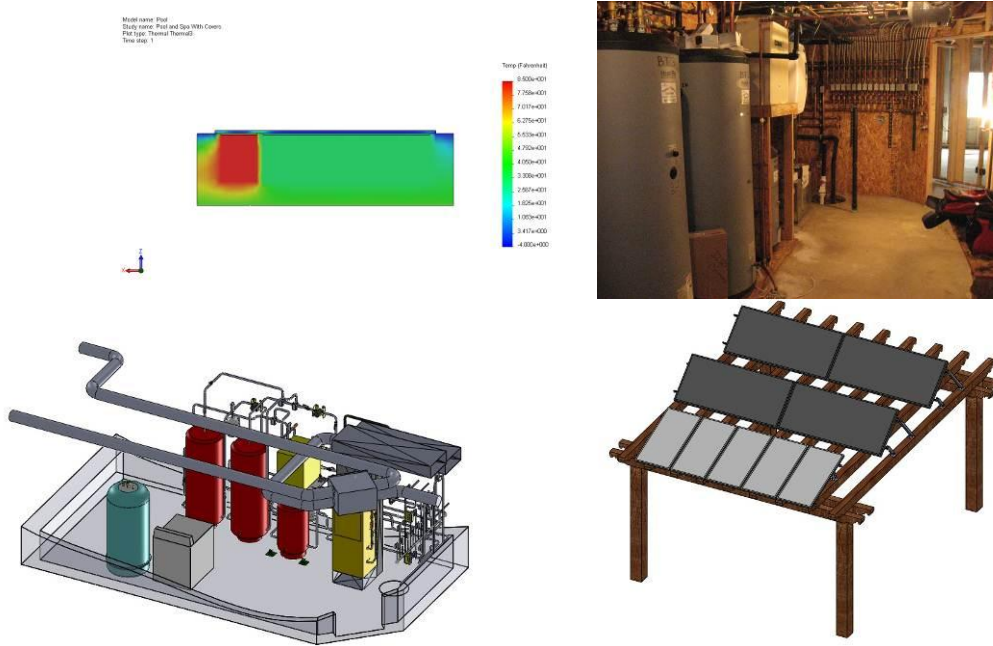
**Project Description** --The heating system for the pipe gallery consisted of a direct fired furnace. The utility cost to heat the pipe gallery was extreme. The city wanted a solution to reduce the energy consumption of the pipe gallery.

**Services Provided--** Evaluating solutions to reduce the energy consumption. Using a ground source heat pump utilizing the water storage tanks as source for the heat pump system. The ground source heat pump will operate at 400% more efficient than their current system. Evaluating an air source heat pump and high efficiency furnace as alternates. Final system selection determined by the results of the life cycle analysis.

Name: Private Residence  
 Location: Denver, Colorado  
 Client: Harrison Custom Builders  
 Project: Clermont

**Project Description** – Harrison Custom Builders for their personal residence wanted the highest efficient HVAC system for their new home. Their desire was to have a home that was functional and used a minimal amount of energy. The home is 6,000 square feet with a seasonal outdoor swimming pool and annual spa.

**Services Provided** – Provided design services for a 7 ton water to water ground source heat pump system and solar thermal system providing 50% of heating and domestic hot water needs. System also includes energy recovery ventilators providing minimal energy loss while maintaining a high level of indoor air quality. The system consisted of 18 radiant floor zones for heating and 2 hydronic fan coil units for cooling. Design included load calculations, ducting design, radiant floor design and ground heat exchanger design. We provided construction oversight, system commissioning along with a life cycle analysis. Based upon our analysis the home will be net zero on the meter. We also performed heat transfer analysis and load calculations for outdoor pool and spa.

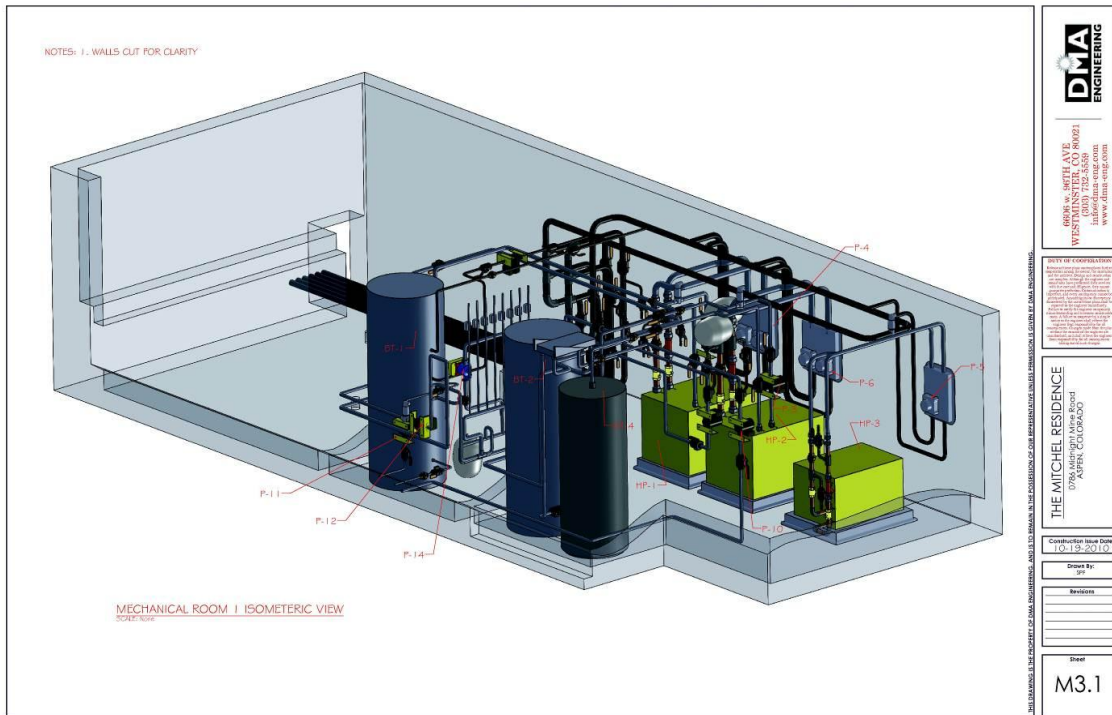



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| Name:     | Private Residence    |
| Location: | Aspen, Colorado      |
| Client:   | Energy Environmental |
| Project:  | Mitchell             |

**Project Description** – Energy Environmental was building an HVAC system for 7,000 square foot private residence in Aspen Colorado. The home consisted of a 13 ton ground source heat pump system, backup boiler system, with 16 radiant floor zones and a split system heat pump.

**Services Provided** – Provided design services for the hydronic system for the ground source heat pump, boiler system and radiant floor manifolds.



**DMA ENGINEERING**

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CITY OF COLLEGEVILLE

**THE MITCHELL RESIDENCE**  
1796 Michigan Ave. South  
APRIL, CALIFORNIA

Construction Issue Date: 10/15/2010

Sheet No: 03

Revisions:

Sheet: M3.1

Name: Housing Authority City of El Paso Texas  
 Location: El Paso, Texas  
 Client: Workshop8, Priest Engineering  
 Project: Housing Authority City of El Paso Texas

**Project Description** -- The Housing Authority for the City of El Paso Texas is developing a new retirement community within the city limits. The project consists of apartments, townhomes and a community center. The Housing Authority wanted to make the project a net zero campus.

**Services Provided** -- Contracted through both the Architect and the Prime Mechanical, Electrical and Plumbing firm to provide design services for the Solar Photovoltaic, Solar Thermal, and wind system's along with engineering support related to developing utility rates. Designed a 150 KW solar photovoltaic system along with a solar thermal system for domestic hot water heating. Assisted in working with the utility on the rate structure, and campus metering. Provided estimated monthly and annual energy production of the solar photovoltaic system.



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Name: Good Samaritan Society  
Location: Loveland, Colorado  
Client: Energy Solution Network, CMS Mechanical  
Project: Good Samaritan Society of Loveland

**Project Description** -- The Good Samaritan Society of Loveland wanted to explore how they could reduce their energy usage and identify technologies they needed to incorporate into their future renovation. The campus consists of three retirement apartment buildings housing 136 rooms and one four story building with 96 nursing home rooms.

**Services Provided** -- DMA Engineering provided energy modeling of the entire campus. The campus was served by three electric meters and two natural gas meters requiring that multiple buildings be modeled together. We had to disaggregate the utility bills to get monthly data that was used to baseline the energy model. Once a baseline energy model had been created energy conservation measures (ECM) were modeled. The ECM's were for the building(s) envelope, boiler chiller system, air source heat pump, solar thermal, solar photovoltaic and geothermal systems. Each ECM was weighted based upon life cycle costs and presented to the client for their consideration.

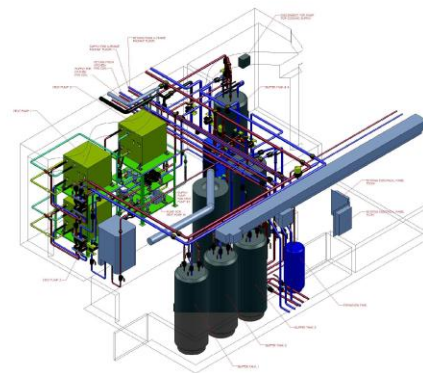
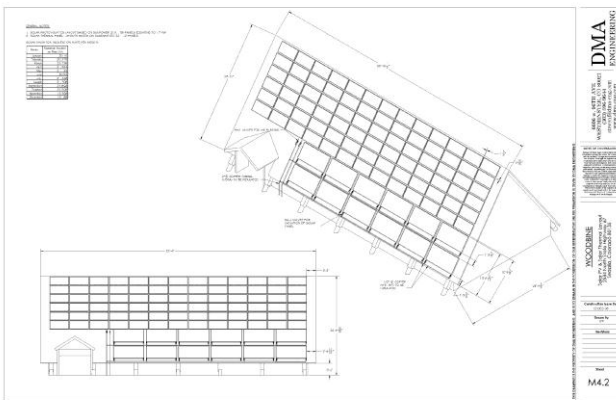


Name:  
Location:  
Client:  
Project:

Woodbine Ecology Center  
Sedalia, Colorado  
Energy Solution Network  
Woodbine Ecology Center

**Project Description** -- The Ecology Center has a 10,000 square foot multipurpose lodge and 2,000 Square foot A-frame conference room that needed to be upgraded. The center wanted to investigate the possibilities of using renewable energy systems for the campus.

**Services Provided** -- Provided energy modeling, mechanical and electrical design for the campus. The design incorporated ground source heat pump, solar thermal and solar photovoltaic systems.



Project Name:

Eagles Nest Early Learning Center

Location:

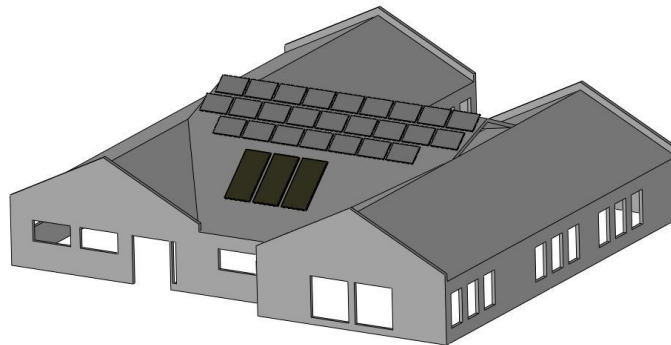
Blackhawk, Colorado

Client:

Energy Solution Network

**Project Description** -- The Eagles Nest Early Center is a preschool that was undergoing a 1,000 square foot addition. The preschool wanted to use renewable energy technologies to demonstrate their use in the world to the students and parents.

**Services Provided** -- Provided energy modeling, mechanical and electrical design for the preschool. The design incorporated ground source heat pump, solar thermal and solar photovoltaic systems.



Project Name:  
 Location:  
 Client:

City on the Hill Church  
 Boulder, Colorado  
 Rodwin Architecture

**Project Description** -- The City on the Hill Church was adding a 10,000 square foot sanctuary as their flock was growing. Rodwin Architecture orientated the building in an East West fashion giving a large south facing roof. It was the intent to add solar photovoltaic to the roof through a purchase power agreement.

**Services Provided** -- Provided energy modeling, mechanical, electrical and plumbing design for the church. The design incorporated air source heat pump along with a boiler backup system. Through the energy modeling it was determined that using the air source heat pump maximized the solar potential of the roof and provided the greatest utility offset.

