

ENGINEERING

2010 ANNUAL REPORT



PUBLIC WORKS DIVISION



Engineering A Better Future For Larimer County

Leveraging and Measuring

Although these are current ‘buzz words’ - they are nothing new in the Engineering Department and continue to be a big part of our jobs each day. However, the tight economic times have sharpened our focus on wanting to do the right things for the right reasons. Leveraging our resources – whether that’s funding or staff time – and measuring our performance are fundamental to the way we operate.

Leveraging: We continue to focus on being good stewards—making the most of tight budgets and limited resources. This report explores how we work hard to add value and look for collaborators to get more done, including applying for grants, and working with other jurisdictions to pool resources.

Measuring: As engineers analyzing and measuring things and looking at how they perform is part of our DNA. We want to know how pavements and bridges and drainage facilities operate and how to improve our processes and procedures. Several years ago, the Public Works Division’s *Transportation Report Card* started establishing annual ‘grades’ for our transportation system’s safety, capacity and condition. We are now taking the next step to further detail performance measures for two purposes: 1) to directly tie measures to funding and the budget process and 2) to establish benchmarks and measures for each work group within the department. This will allow to an increasing degree our county officials, our own staff, and interested citizens to see not only what we’re doing, but how we’re doing.

This report looks back at 2010 to highlight some of the project and program

accomplishments. To mark the end of the decade, we’ve also included an inset that is a broader five year review. It highlights trends and ways that we have changed to keep improving our projects and services. For example, we’re using very limited funding for a new low-cost traffic safety program with a great return on investment.

The strength of any organization is embodied in the skills, adaptability, motivation and initiative of the staff. At the Larimer County Engineering Department, I am both honored and privileged to work with a group of extraordinary professionals who truly want to make wise use of the resources that have been entrusted to us and help *Engineer a Better Future for Larimer County*.

Mark Peterson, PE
Engineering Department Head

Going Green

Environmental awareness and stewardship both in the office and in the field is one way the Engineering Department is reducing environment impacts of doing business while also stretching funds.

The department has transitioned to an online bid document process instead of making stacks and stacks of copies of plans for currently advertised construction projects. This means that interested contractors can access at anytime all the necessary information to bid

without driving to county offices or paying for a plan set. For the county, both the cost and impact of copying is eliminated.

Meanwhile, in the field, two new green technologies were implemented in a reconstruction project on a section of CR 17.

The first involved using Recycled Asphalt Pavement (RAP) to a much greater degree than historically done. Utilizing RAP allows for the re-use of existing asphalt instead of relying on virgin aggregate material. Although still similar in price, RAP’s benefit is that it reduces the demand on natural resources.

The second green practice used on the project was Warm Mix Asphalt (WMA) instead of the traditional Hot Mix Asphalt. WMA enables the asphalt to be placed at a lower temperature. This is

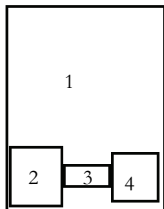
beneficial because it requires less energy to produce, can be hauled for longer distances (requiring fewer asphalt facilities), and projects can be completed during colder air temperatures. The project won an award for environmentally sustainable pavement practices from Colorado Asphalt Pavement Association (CAPA).

The department has found that ‘going green’ has produced positive financial and environmental results.



County staff Darrell Morrell (middle) and Preston Pierson (right) receive the CAPA award recognizing green practices on the CR 17 paving project. Photo: CAPA Staff

On The Cover:



1. Culvert installation on CR 38E Photo: Frank Kurtyka
2. Right-of-way utility work. Photo: Marc Lyons
3. Erosion control along Fossil Creek realignment. Photo: Marc Lyons
4. Road improvements from a Public Improvement District. Photo: Matt Johnson

Engineering In Action 2010



A large concrete box culvert was placed under CR 19 in order to maintain historic water flow paths under the road.
Photo: Marc Lyons



The approach to a railroad crossing on CR 30 is reconstructed to provide for a smooth traveling surface.
Photo: Marc Lyons



Elementary age students learn the importance of preserving water quality during CSU's Water Festival. Photo: Scott Cornell

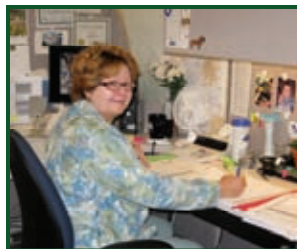
The River Bluffs pedestrian bridge over the Poudre River was put into position with a large crane. The bridge is connected to the concrete abutments at either end by only 4 bolts. The department's survey group was responsible for pinpointing the location of the bolts with almost no room for error. Photo: Jeffrey Boring



To meet new EPA mandates, the Larimer County Landfill was required to install scales to monitor the weight of materials brought to the site. The Engineering Department assisted the Solid Waste Department with the scale design, traffic circulation and construction management. Photo: Matt Johnson



Before paving CR 32E, a reinforcement material or mat (called geogrid) was used to strengthen the road subsurface. Geotextiles are just one of many solutions used to meet the unique physical constraints of each construction site. Photo: Preston Pierson



Engineering Department Major Service Areas:

- Asset Management
- Bridges
- Construction Management
- Development Review
- Engineering Design
- Improvement Districts
- Permitting
- Right of Way
- Stormwater and Floodplains
- Survey
- Traffic/Transportation Planning

Being a Good Steward of Public Resources

This portion of Larimer County's vision statement drives the efforts and is the focus of many aspects of the Engineering Department.

Pursuit of Federal Funding

As the gap between road infrastructure needs and funding continues to increase, department staff has re-dedicated efforts to pursue outside funding sources. The 'strings' attached to federal funding are significant and these projects require additional staff time to pursue and then administer, yet the payoff can be substantial. In 2010, more than \$ 250,000 worth of safety improvements were made, a bridge grant of \$ 2.0 million was awarded, and staff was pursuing about \$ 3 million in road and trail funds for upcoming years.

Project Collaboration

Regional: Since many mainline roadways are regional and cross multiple jurisdictions, partnering with neighboring entities has become an advantageous way to leverage projects and their funding. For instance, in 2010 a joint project with Weld County involved a contribution from them of \$ 375,000.

Local: The County now has more than 200 miles of public subdivision roads that receive no county maintenance due



Drainage work in an Improvement District was funded by local residents. Photo: Matt Johnson



The installation of guardrail along a section of CR 27 with higher than typical accidents was funded by a federal Hazard Elimination and Safety grant. Photo: Preston Pierson



The CR 17 (Shields Street in north Fort Collins) bridge over the Poudre River will be replaced using a federal bridge grant. Photo: Ron Winne

to a 1994 budget based policy decision. To mitigate the increasing challenges of maintenance for these roads, county staff collaborates with and supports area residents to create and manage Public Improvement Districts (PIDs) where residents tax themselves to collect money for maintenance. Six (6) new PIDs were created in 2010, bringing the county total to 43, by far the highest number of PIDs in a single county in Colorado. Funding collected for road maintenance in 2010 was \$ 1.2 million.

10%
Average Savings On Engineering and Management Costs for Projects Completed By County Staff Versus Private Consultants.

Project Design Efficiency - In-House or Out-Sourced?

Before a shovelful of dirt can be moved on a project, a design by professional engineering staff must be completed. Determining whether project design should be done 'in house' by County staff or 'out sourced' to private firms is a function of required skills, available timeframe, project size and cost.

In 2010 a comparative analysis between county and consultant designed projects was completed to fully understand the costs and benefits of both options. Results are summarized below:

In-House Design: County staff brings significant historical knowledge, an understanding of citizen concern and a greater sense of ownership to projects. Projects that dovetail into previous efforts, or require very quick turnaround are excellent candidates for in-house design.

Overall engineering and construction management costs on projects completed by internal staff average 10% less than those completed by consultants.

Out-Sourcing to Consultants: Consultants are utilized on specific projects, if specialized skills are needed and not available in-house. Consultants can also augment staff during workload peaks, and fill temporary or seasonal needs.

For example, the Engineering Department recently decided to out-source materials testing work that previously was done in-house.

In the past five years, the Engineering Department has averaged \$650,000 per year of outsourced work to private consulting firms.

Careful consideration will continue to be given to monitor and balance the costs and benefits of in-house and out-sourced design decisions to be most advantageous for the County.

Streamlining Government

In addition to day-to-day work, one of the objectives for department staff is to examine existing practices and look for ways to improve or simplify processes.

In the Development Review Team, a review of historic traffic reports for proposed projects highlighted the prevalence of small projects with very limited traffic impacts. In order to avoid unnecessary costly reports, the team created a **Transportation Worksheet** as a first step in traffic analysis.

Applicants began using the new worksheet in mid 2010. Feedback has been positive with applicants appreciative of the common sense approach to transportation concerns. Neighbors also benefit from having information compiled in an easy to understand worksheet rather than a lengthy report.

Internal to the department and division, a substantial effort to organize, manage and make practical use of the immense collection of road data and statistics is coming online. The **Road Information Locator, (RIL)** provides staff with information about traffic volumes, road maintenance, road ownership, street sign information and much, much more in an easy to access, map-based user interface. The data can also be displayed on top of aerial photography.

The information that RIL houses is used to help identify capital improvement projects, assess development review requirements and track the overall quality of the road system.

The County's transportation infrastructure is one of its largest assets and keeping track of it is a key part of engineering operations. RIL is an innovative method by which staff can easily and quickly access the information and make any number of daily decisions.

Community Connections



Engineering staff, friends and family clear slash in the Horsetooth Mountain Park area as a part of national **Make a Difference Day.** Photo: Larimer County Department of Natural Resources



Children receive educational and fun material from the Engineering booth at a farmer's market. Each year the department helps educate children and adults about protecting our valuable water system from pollutants. Photo: Scott Cornell



Martina Wilkinson leads the Engineering presentation called "**Why Don't You Just Fix It.**" for participants in the Larimer County 101 class. The class provided citizens with an inside look at the workings of Larimer County Photo: Sue Burke

"I really didn't think that engineering would be fun [but] it was!"

Larimer County 101 participant

Choosing To Make A Difference



Construction Inspector Preston Pierson is credited with thwarting an attempted kidnapping with his quick actions. Photo: Michelle Jenkins

In nothing more than a split second, **Preston Pierson** decided to make a difference. At 6:30 AM, on June 3rd, Preston was on his way to a construction site when he drove by an attempted

kidnapping of a 21 year-old woman in Fort Collins.

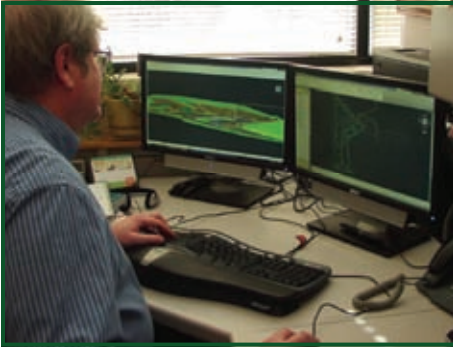
Preston turned his county vehicle around, approached the encounter taking place, and turned on his vehicle's yellow flashing overhead safety beacons. Apparently concerned about the attention being drawn, the suspect fled.

Preston then pursued the assailant far enough to record the license plate number and reported the incident to police. This led to the arrest of the kidnapping suspect two days later.

According to Preston, his actions were 'nothing special'. But to the young lady he assisted, his willingness to step in has made a tremendous difference. And to the community as a whole, his example is admirable and appreciated.

Technology Advances

CAD (Computer Aided Design) software continues to evolve and improve the quality and efficiency of designs.



Engineer Brian Fraaken uses three-dimensional software to design a road re-alignment.
Photo: Michelle Jenkins

The Engineering Department's capital improvement engineers and technicians recently upgraded to **Autodesk's Civil 3D** software. This software allows for three-dimensional (3D) modeling of roads, stormwater systems, and site grading.

As a dynamic system, once a model is set up, evaluation of multiple options and various alternatives can be done very quickly. This makes it easier to find the 'best solution' for a particular project.

In addition to design advantages, the software boosts productivity by linking the design to the drafting. This simplifies final calculations and construction plan preparation.

Staff Efforts Towards Professional Development

To be licensed as a **Professional Engineer** is an important professional benchmark for Civil Engineering. Two county staff members achieved that mark in 2010. Eric Tracy and Jeff Goodell met the educational and work experience requirements and successfully passed the 8-hour long National Professional Engineering exam.

All of the degreed engineers and surveyors in the County Engineering Department are now professionally licensed.

Engineering Department Managers Mark Peterson and Rusty McDaniel are lending their skills to the **Colorado Association of Road Supervisors & Engineers (CARSE)**. Mark Peterson was elected as secretary and treasurer of **CARSE** and Rusty McDaniel is serving on the Board of Directors as the North Central Director.

CARSE is dedicated to serving the needs of the road and transportation staffs in all Colorado counties.

Taking Flight Into Retirement



Jerry White

Photo: Charlie Johnson

After more than 30 years with the County, Senior Land Agent Jerry White retired. Jerry had a joint appointment between Engineering and Natural Resources and acquired property for both roadway projects and natural resource preservation. He is most appreciated for his tremendous skills, hard work, kind words, fairness in negotiations, and tenacity through challenging projects.

Staff Related Quotables

"He solved a bridge issue that had both safety and cost concerns.... to find a solution that was both safe and practical."

Jason Waldo, Developer
referring to staff on the Development Review Team

"The residents extend their gratitude and recognize that our roads would not be in as good of shape without the attention and expertise and follow through that you give us."

Dennis Spencer, Public Improvement District Road Board Member
referring to engineering staff working with PIDs

"Mr. Glejforst ... achieved the impossible twice and I am impressed with his willingness to work with citizens of this county to make sure that everything is Okay."

Jana Hess,
Larimer County Planning Commissioner
referring to staff working in the Traffic Group

"A huge thank you for all your help at our Family Science Night. We heard a lot of positive comments and appreciate your support of students and their learning!"

Shelly Butcher,
Rice Elementary School referring to engineering staff that participated in an outreach event

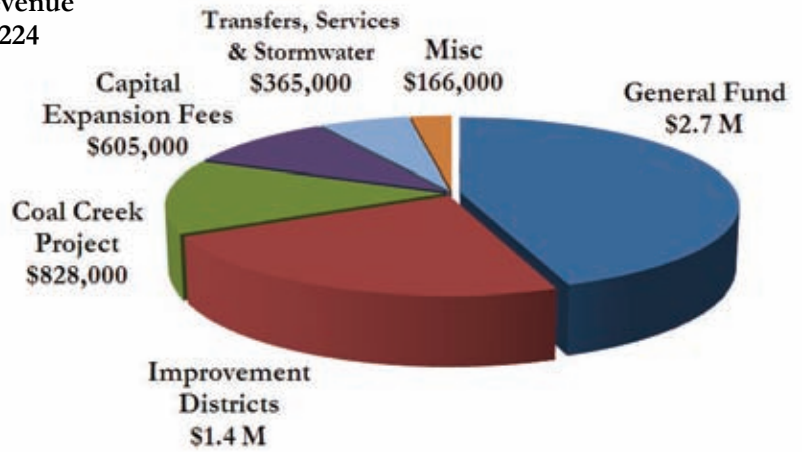
Summary of Finances

Engineering Department funding comes primarily from the County's general fund. As part of a County-wide budget reduction, the 2010 budget for Engineering Operations was reduced by about 4%. General funds covered 91% of the costs to operate the department.

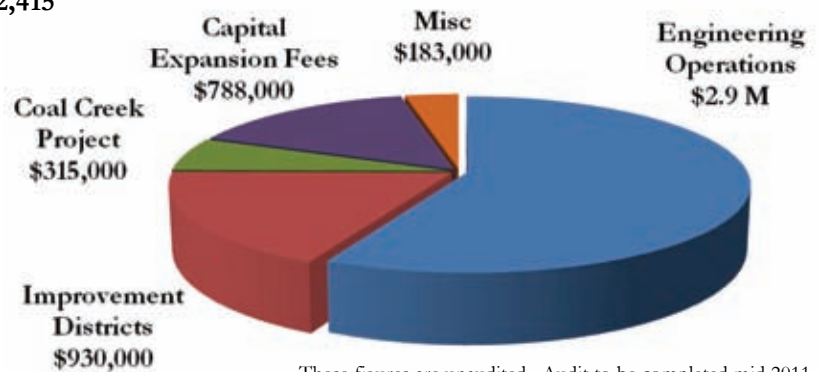
During 2010, the Engineering Department designed and managed the construction of approximately \$10 million of improvements for roadways and bridges (including \$930,000 of work in the 43 improvement districts) as well as special projects for the Departments of Natural Resources and Solid Waste.

The large difference between revenue and expenses is primarily from the Coal Creek flood mitigation project and Improvement Districts. Both of these projects have carryover funds for future construction.

2010 Revenue
\$ 6,033,224

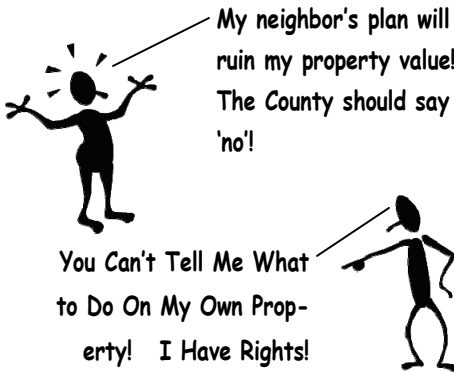


2010 Expenses
\$ 5,182,415



These figures are unaudited. Audit to be completed mid 2011.

Hot Topics — Dealing with Controversy



Distinctly diverging statements are not uncommon in the daily tasks of the Engineering Department. Listening carefully, understanding multiple perspectives, and applying standards, codes and policies with a consistent and common sense approach is staff's responsibility.

2010 saw a number of controversial issues, some of which are new topics without historical precedence:

To Connect or Not To Connect.....

Any number of national transportation studies will detail the benefits of 'connectivity' or how multiple roadway options improve the overall transportation system. Residents as 'motorists' will readily agree with the need for connections, but residents as property owners are often opposed to those connections occurring close to their homes.

These conflicting views were highlighted in 2010 in both local neighborhood access issues and in regional multi-jurisdictional planning studies.

In both instances, staff endeavors to provide accurate, timely information and analysis, make recommendations, and then implement direction from elected officials.

Horse Boarding

Engineering development review staff worked closely with the Planning Department to craft solutions for equestrian operations, including the development of a temporary staff review process that allowed identification of traffic safety concerns without undue burden on existing equestrian business owners.

Medical Marijuana

The proposal of marijuana facilities required staff to develop traffic generation estimates for this new use in the County. The estimates were used to identify potential impacts to area roads.

Middle Bald Mountain Tower

As discussions continue regarding the merits and potential impacts of a communications tower on Bald Mountain, the Engineering Staff provides technical information to decision makers.

Contact Information

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Physical constraints make construction challenging. Photo: Preston Pierson



Darrell Morrell and Marc Engemoen discuss project details in the field. Photo: Mark Peterson



Asphalt paving often includes paving driveway approaches to private properties. Photo: Marc Lyons

Did You Know?

Mandates, Mandates, Mandates!

Although Larimer County has its own Land Use Code and Supplemental Requirements that guides our work, numerous other state and federal agencies also mandate how we perform our jobs. Here are just a few examples:



Regulates stormwater quality and requires annual reporting

Manual on Uniform Traffic Control Devices
for Streets and Highways

Dictates requirements for roadway signing and striping



Encompasses numerous environmental regulations and permitting

Requires annual calculation and reporting of road miles

HUTF



New regulation that requires an annual accounting of infrastructure assets



Regulates floodplain mapping and associated requirements

Public Works Division

Marc Engemoen, Director

Engineering

Fleet

Natural Resources

Road and Bridge

Solid Waste

The Ranch



This publication is printed on recycled paper.

2006 - 2010 Five Year Review

A *Change In Perspective: Leveraging Programs To Add Value*

In years past, the most simple and straightforward approach to administering the numerous programs associated with transportation in Larimer County was individually and as separate programs.

For instance, improvement projects were often solely funded through the Capital Improvement Program, traffic operations were independent, and maintenance projects such as the annual overlay program were focused only on pavement condition.

More recently, as budgets tightened and the gap between needs and funding has increased, engineering staff has reacted by deliberately reviewing programs from multiple perspectives. The intent was to look for ways to leverage resources, augment available funding and add overall value to our work.

Alternate Funding Sources

Staff has become more involved with regional transportation partners looking for opportunities to fund projects from alternate sources.

This included a very successful stimulus project that utilized more than \$3 million dollars to improve 10 miles of CR 17 through four jurisdictions. The project was proposed and managed by Larimer County, and went from concept to completion in less than six months.

In the past two years, by working with traffic staff at the Colorado Department of Transportation (CDOT), the County identified more than \$250,000 of improvements on the county road system that were eligible for safety funding.

Piecing Projects Together

In many instances, the 'new reality' no longer allows single stream project funding. In order to make projects financially feasible, multiple funding sources are needed to piece projects together.

The State Highway 14 signals just east of I-25 were funded through a three-party collaboration, and included private developer dollars, county capital expansion fees, and CDOT safety money.

In the LaPorte area, a bridge project was combined with a transportation enhancement grant to complete both roadway and trail improvements.

Leveraging Existing Work

In an inter-county effort, planning for the annual maintenance work on mainline roads now includes a review by engineering staff for potential 'easy to add' improvements such as minor shoulder widening. For a minimal amount of additional cost, in some areas significant safety, capacity and multi-modal enhancements can be made.

Clearly the benefit of this change in perspective is added value to the citizens through improvements and consciously being good stewards of resources. The 'cost' is in staff needing to be more creative, and additional efforts for coordination and communication.

“Work with others to accomplish more together than we can accomplish alone” is one of the strategies in the transportation strategy map. This approach is fully embraced in our reaction to today's funding reality.



New Initiatives Enhance Understanding And Identify Trends

The past five years has seen several new initiatives that focus on performance and measurement.

Transportation Report Card

The transportation report card was launched in 2006 in a joint effort between Engineering and Road and Bridge. The report card assigns a letter grade to each segment of the roadway system for three metrics: Road Capacity, Road Condition, and Road Safety.

Keeping track of various measures not only provides a basis for funding requests, but also allows for a greater understanding of the issues, determining trends over multiple years, and aids in project prioritization.

To strengthen the data going into the report card, all of the mainline roadways in the county are now inspected and 'graded' each year instead of multiple year cycles.

The data collected and managed also supports a digital, map-based information system to oversee the County's infrastructure.

Low Cost Traffic Safety Program

The Low Cost Traffic Safety Program was initiated in 2009 with the goal to consistently and effectively reduce the numbers and severity of crashes on the County road system. The program systematically identifies, prioritizes, mitigates and evaluates transportation safety needs and investments.

Since the program started, more than 35 'spot' safety audits and low cost improvements have been completed. Also, based on program evaluation more than \$250,000 of state safety funding was secured, and several capital improvement projects based on safety were prioritized.

Monitoring of the improvements has begun and will highlight overall program effectiveness in coming years.

Division Wide Teams

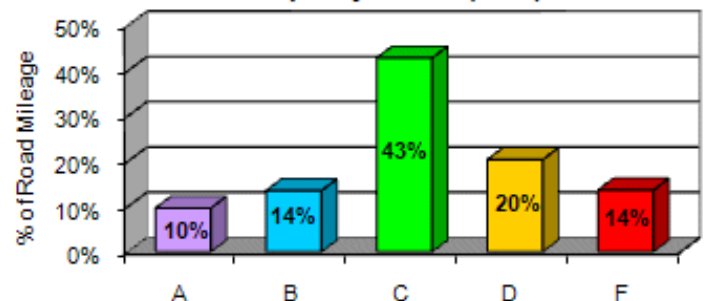
The Public Works Division has established two division-wide collaboration teams—a Finance Team and Communications Team with members from each department, including Engineering.

The Finance Team has developed consistent accounting reports for ease of understanding, and the Communications Team is creating annual reports, and continues work on website updates and other communications pieces.

All of these new initiatives are specifically targeted to enhancing understanding and communicating more effectively. The goal is to systematically identify areas for improvement, and implement and then closely monitor action plans.



Capacity Grade (2009)



2009 Roadway Capacity Grade as reported in the Transportation Report Card. Graphic: Brian Frauken

Engineering Department - Then and Now

	2006	2010	
Number of Staff	32	28.8	↓ 10%
Cost of Asphalt	\$ 42 / Ton	\$ 46 / Ton	↑ 9%
Functionally Obsolete / Structurally Deficient Bridges	51 of 216 (24%)	40 of 204 (20%)	↓ 4%
Number of Public Improvement Districts (PIDs)	26	43	↑ 65%
Annual Right of Way and/or Utility Permits	314	248	↓ 21%
Road Condition Rating (out of 100)			
Mainline Roads	74.9	73.4	↓ 2%
Subdivision Streets	63.8	58.4	↓ 5%
Number of Roundabouts	0	2	↑ ~