



استراتژی تصویربرداری برای مستندسازی وضعیت پروژه

ابزارها + فرآیندها + نکات حیاتی + چکلیست
(بر اساس سندی از AACE)

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مبینا اسمعیل زاده

عکاس، فیلم بردار و تدوین گر



What we will learn?

- ❑ **Jobsite photography should be a scheduler's job**
- ❑ **Introducing the AACE RP**
- ❑ **Introduction**
- ❑ **Select the right tools**
 - ❖ Digital zoom versus optical zoom
 - ❖ Available filters
 - ❖ Smartphone and tablet cameras
 - ❖ Point-and-shoot cameras
 - ❖ Dedicated digital single-lens reflex cameras

What we will learn?

❑ Recommended practice

- ❖ Capturing safety conditions
- ❖ Obtaining worker permission
- ❖ Protecting proprietary information
- ❖ Tell a story
- ❖ Focus on the important work
- ❖ Dimensional perspective
- ❖ Time perspective
- ❖ Other uses for photographs
- ❖ Photographer safety and other concerns
- ❖ Tips for taking good site photographs
 - ✓ Focus
 - ✓ Lighting
 - ✓ Optimum angle
 - ✓ Perspective
 - ✓ White balance
 - ✓ Wide pictures
 - ✓ File format



What we will learn?

☐ Recommended practice

- ❖ Project documentation procedures
- ❖ Chain of custody
- ❖ Document the pictures
 - ✓ Organize and identify the photos
 - ✓ Add information directly to the picture
- ❖ Distribute the pictures
- ❖ Aerial photography

☐ Final essential tips of construction photography

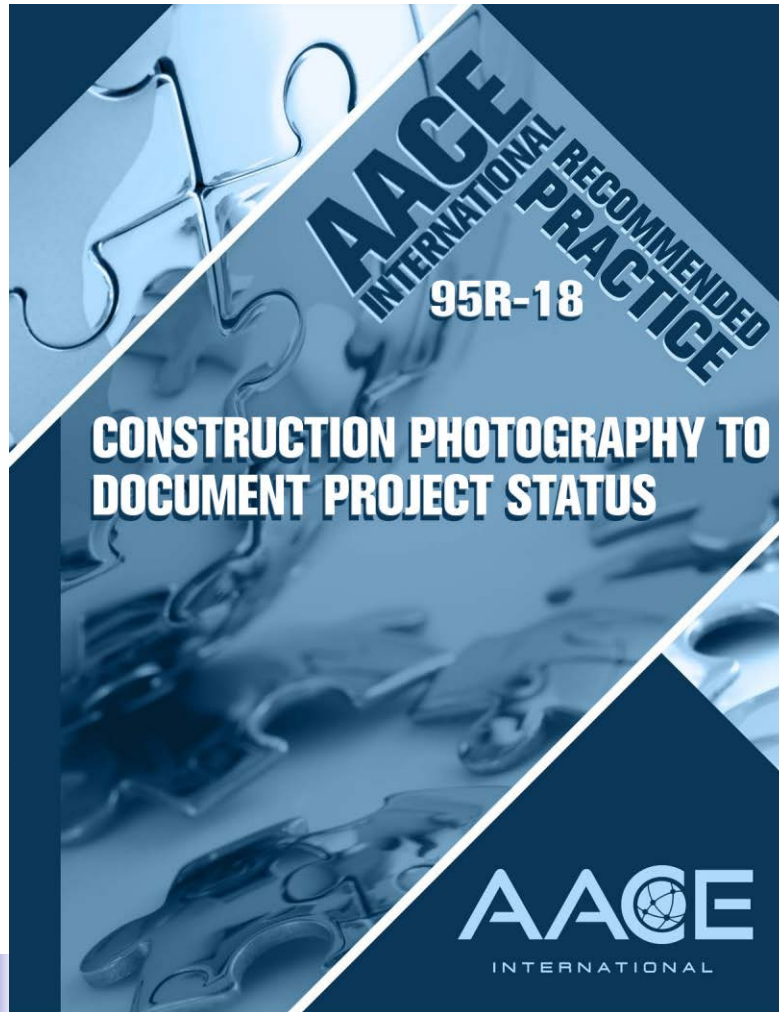
☐ Conclusion

مبینا اسمعیل زاده

- ☐ دارای مدرک سینما گرایش تدوین
- ☐ دارای مدرک عکاسی از کانون هنرهای تجسمی دانشگاه تهران
- ☐ عکاس چندین پروژه در شرکت IGC
- ☐ عکاس آزادراه تهران-شمال
- ☐ تصویربرداری از روند پیشرفت پروژه های تریتیوم چیتگر
- ☐ همکاری با پروژه های شرکت فلات قاره و شرکت IGC
- ☐ همکاری با بیمارستانهای پاستور و دهخدای قزوین
- ☐ مدیر تصویربرداری و تدوین موسسه ACEMI

Reference

Primary reference



AACE International Recommended Practice No. 95R-18

CONSTRUCTION PHOTOGRAPHY TO DOCUMENT PROJECT STATUS

TCM Framework: 9.2 – Progress and Performance Measurement

Rev. February 27, 2019

Note: As AACE International Recommended Practices evolve over time, please refer to web.aacei.org for the latest revisions.

Any terms found in AACE Recommended Practice 105-90, *Cost Engineering Terminology*, supersede terms defined in other AACE work products, including but not limited to, other recommended practices, the *Total Cost Management Framework*, and *Skills & Knowledge of Cost Engineering*.



Primary reference

Jobsite Photography Should Be a Scheduler's Job

By Ron Winter, PSP, FAACE

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Jobsite Photography Should Be a Scheduler's Job



Why pictures and videos for construction projects?

- ❑ Communicating and **‘proving’** the current construction jobsite status is **difficult** to do in prose.
- ❖ **Pictures** are often **far more effective** in this regard.
- ❖ **Photos** have the potential to **present more information** that any other medium but they **often fail** to fully realize their potential in **documenting** the construction process.

Expensive?



Why pictures and videos for construction projects?

- ❑ **'Old' film-based** photography used to be somewhat expensive, inconvenient, and time-consuming.
 - ❖ The **photographer** was required to fill up a roll of film, take it to be processed, and later organize the physical pictures in boxes or books.
- ❑ **Digital** photographs and videos are **relatively** inexpensive, quick, and easy to create.
- ❑ **Digital** picture files can be stored on cheap and plentiful storage devices.

So, what is the problem?



Why pictures and videos for construction projects?

❑ The **problem** arises when photographer

1. Does not understand how to identify and compose a good picture,
2. Doing it
 - ❖ So **poorly** as to be unusable, or
 - ❖ Even just **losing the important information** due to lack of organization or proper documentation of where and when the photo was taken.

What are the uses of jobsite photos?



Why pictures and videos for construction projects?

- ❑ Jobsite photos have **many uses** including
 - ❖ Capturing current status,
 - ❖ Documenting project or milestone completions, and
 - ❖ Marketing purposes to demonstrate a company's talent.

Who is responsible for that?



Who is responsible?

- ☐ Some companies hire a professional photographer to capture pictures of the construction process.

What is the problem with that?



Who is responsible?

- ❑ While photographers have **knowledge of how** to take a good picture, they **often fail to understand**
 1. What needs to be photographed or
 2. How to properly document the photos captured.
 3. In addition, they often are **not able to understand** and highlight changing events as they occur.

What about CM and foreman?



Who is responsible?

- ❑ **Construction managers and foremen understand** the construction processes well but are primarily **focused on managing** events instead of documenting them.
- ❖ They often also **lack the understanding** of taking good photographs or documenting them **well enough** to be useable once the project is over.

So, who is the perfect one to do that?



Why a scheduler?

- ❑ **Construction schedulers** who are **trained in photography** are the perfect fit to photograph and document the events on the **construction field**.
- ❖ **Schedulers** are charged with **monitoring and documenting** activity status.
- ❖ They are **less distracted** by management issues and **better able** to maintain a constant observation of the project.

Who knows the schedule?



Why a scheduler?

❑ **Schedulers** are keenly aware of the construction schedule.

❖ *For example, they are one of the few personnel who know when the internal rough-in facilities are about to be covered by concealing drywall.*

✓ It is important to **wait until** all of the internal rough-in is completed **but not covered-up** before photographing in order to capture the entirety of the as-built condition.

How it helps project?



Better project management

- ☐ **Schedulers** also understand the **importance** that **each task provides** to project completion.
- ☐ They should be amongst the **first people to understand** the relative importance of **any delay** and to **immediately capture** the job status should a near-critical or critical delay occur.



Better project management

- ❑ **Photos** can communicate the issue being referenced in **Requests for Information (RFI)** from the contractor to the project architect, **speeding the resolution** of open issues. .



Better project management

- ❑ **Photos** can be used to orient and assure the **owner** that the necessary **progress** is being made.
- ❑ **Attaching** focused pictures of in-progress work to status reports
 - ❖ **Improves communications** and
 - ❖ Possibly avoids confusion or **misidentification** during **review meetings**.

How it helps delay analysis?



Better project management

- ☐ **Time Impact Analyses (TIA)** would be enhanced by including a **picture** depicting the problem.
- ☐ This would **allow the counsel or an upper-management** reviewer to quickly **comprehend** the issue being discussed.

How it helps claim and dispute resolution?



Better project management

- ❑ Finally, **jobsite photos** can be used to later support or defend unresolved claim issues.
- ❑ **Expert witnesses** can testify to the objects in the **picture** instead of just using conjecture and inspection **reports**.

Introducing the AACE RP

- ☐ **Communicating** and **substantiating** the current construction jobsite status is **difficult to do in writing.**
- ☐ **Photographs** can be **far more effective** as they have the potential to present more information than any other medium.

- ❑ This **recommended practice (RP)** of AACE International defines the tools, processes, and procedures that should be considered in order to **optimize** the planning, capture, organization, retrieval, and uses for **electronic photographs** of jobsite status.

- ☐ This RP is intended to provide **guidelines** (i.e., not a standard) for jobsite photography.
- ☐ **Although** the photographer can be **anyone who visits** the jobsite, this RP is **most applicable** to those with an understanding of
 1. Current project performance and
 2. Work prioritieswho desire to **develop** a good and reliable **practice of this skill**.

Select the Right Tools

❑ If a **scheduler** is to be good at jobsite photography, he or she must be **trained** on

1. Choosing the right camera,
2. Properly planning and executing the photographic session,
3. Capturing good pictures under unusual conditions, and
4. Properly storing the pictures for later quick retrieval

So, what do they need to know here?

- ❑ Understanding the **various forms** of equipment and tools available is an important aspect of **construction photography**.
- ❑ Digital cameras make the job of obtaining professional quality pictures **much easier** than using **film cameras**;
it also contributes to **significant savings in time**.
 - ❖ One can **shoot as many shots** as desired and select the **best one** **without additional cost**.

Regardless of the type of camera, there are various features that should be considered when choosing a camera.

مقدمه

- در یکونیم قرن گذشته به وضوح شاهد کوچک شدن، ارزان شدن و آسان شدن دوربین‌های عکاسی و تصویربرداری بوده‌ایم.
- این فاکتورها و نفوذ تلفن‌های همراه هوشمند در هر خانواده‌ای، دانستن دانش تصویربرداری برای هر فرد را ضروری نموده است.
- اما امروزه، فراگیر شدن دوربین‌های دیجیتال در بین تعداد زیادی از افراد جامعه باعث تولید حجم زیادی از فایل‌های تصویری شده است که بسیاری از آن از لحاظ تکنیکی دچار مشکل فراوانی است؛ ازین‌رو تلاش ما در بخشی از این دوره آشنا کردن علاقمندان با ساختار کلی دوربین‌های دیجیتال، معرفی و بیان ویژگی‌های آنها به شکلی است که زبان مشترکی بین متخصصین تصویربرداری و اعضای تیم پروژه ایجاد شود.

مقدمه

- دوربین‌های دیجیتال شرکت‌های مختلف، با وجود طراحی و ظاهر متفاوت نسبت به هم، دارای ساختار و کارکرد یکسان در نحوه تشکیل تصویر و ذخیره‌سازی اطلاعات هستند.
- برای شروع تصویربرداری با هر دوربین حرفه‌ای و نیمه حرفه‌ای باید ابتدا به نکاتی توجه داشت یا به عبارتی حداقل‌هایی را دانست و بعد اقدام به تصویربرداری نمود.

ساختار دوربین‌های تصویربرداری (DSLR)

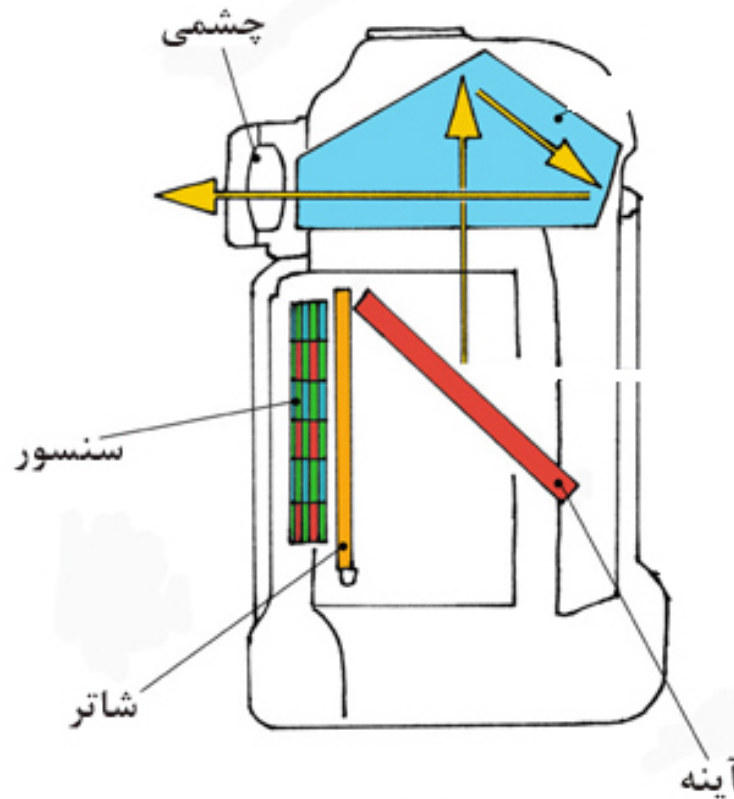
این دوربین‌ها معمولاً از دو بخش تشکیل شده‌اند:

❖ بدنه (Body)

❖ لنز



بدنه یا Body



سنسورها

ویدئویی سنسورها

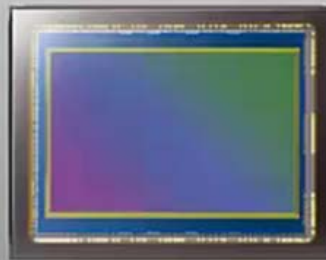
☐ کراپ فریم

☐ فول فریم

Full Frame

VS

Crop



سنسورها - نکته

□ سنسورها دو نوع CCD و CMOS هستند.

□ اما دوربین های DSLR فاقد این دو نوع سنسور است و سنسوری با نام FOVEON دارند که توسط

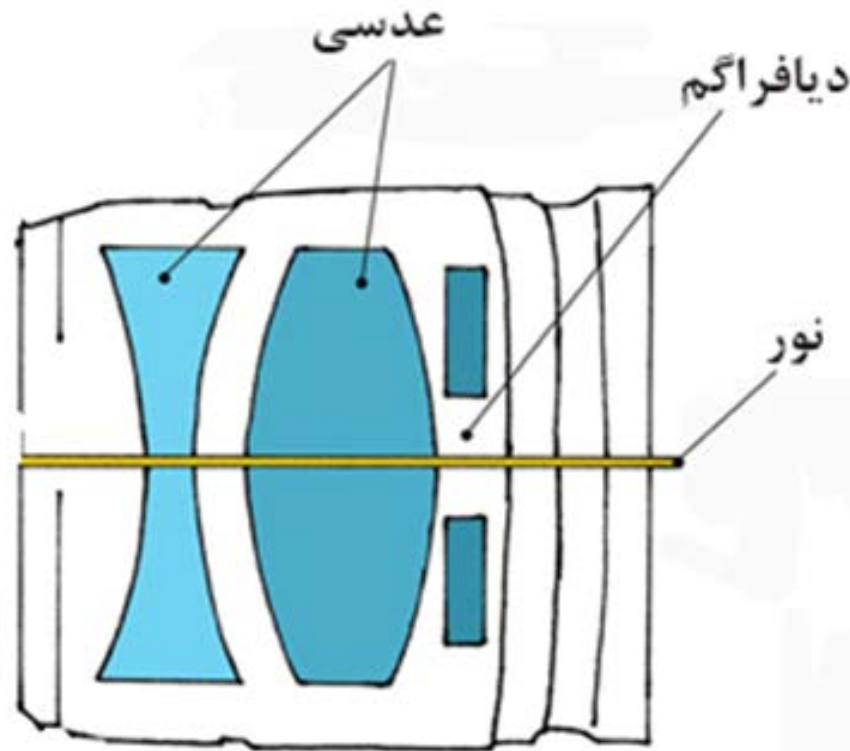
شرکت سیگما استفاده شده و ساختار و کارکرد متفاوتی نسبت به دو سنسور دیگر دارند.

❖ در سنسورهای FOVEON سه لایه پیکسل درون سیلیکون قرار دارد که هر پیکسل دارای سه

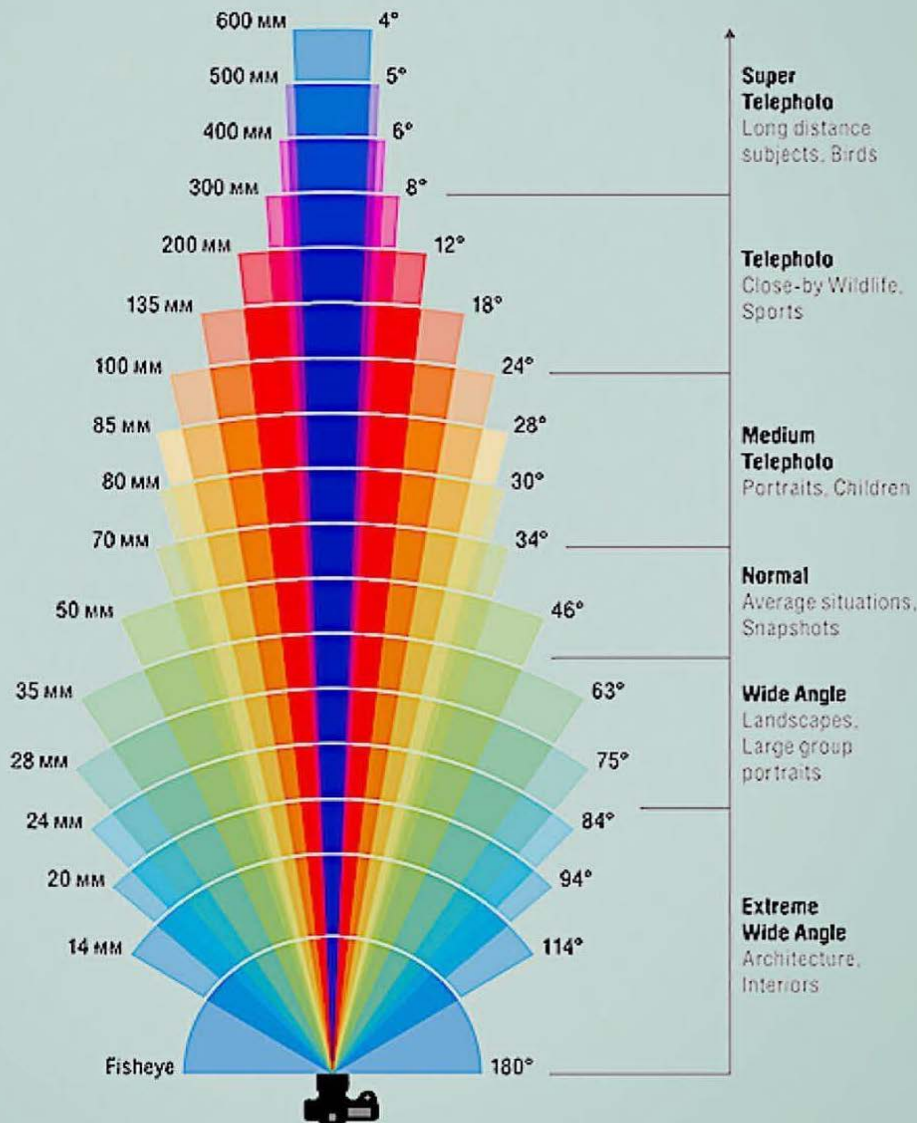
رنگ rgb است و هر سه رنگ توسط یک پیکسل ثبت می شود.

❖ از معایب این سنسور می توان به حساسیت کم نسبت به نور اشاره کرد.

لنز



لنزها و فاصله کانونی آنها



Lens category	Focal length of the lens on a full frame camera
Ultra-Ultra wide	12-16mm
Ultra wide	17-21mm
Wide	24-35mm
Normal	40-58mm
Tele	58mm and more

ذکر مطالب فوق تنها در صورت ذکر منبع بلامانع است.

دیافراگم

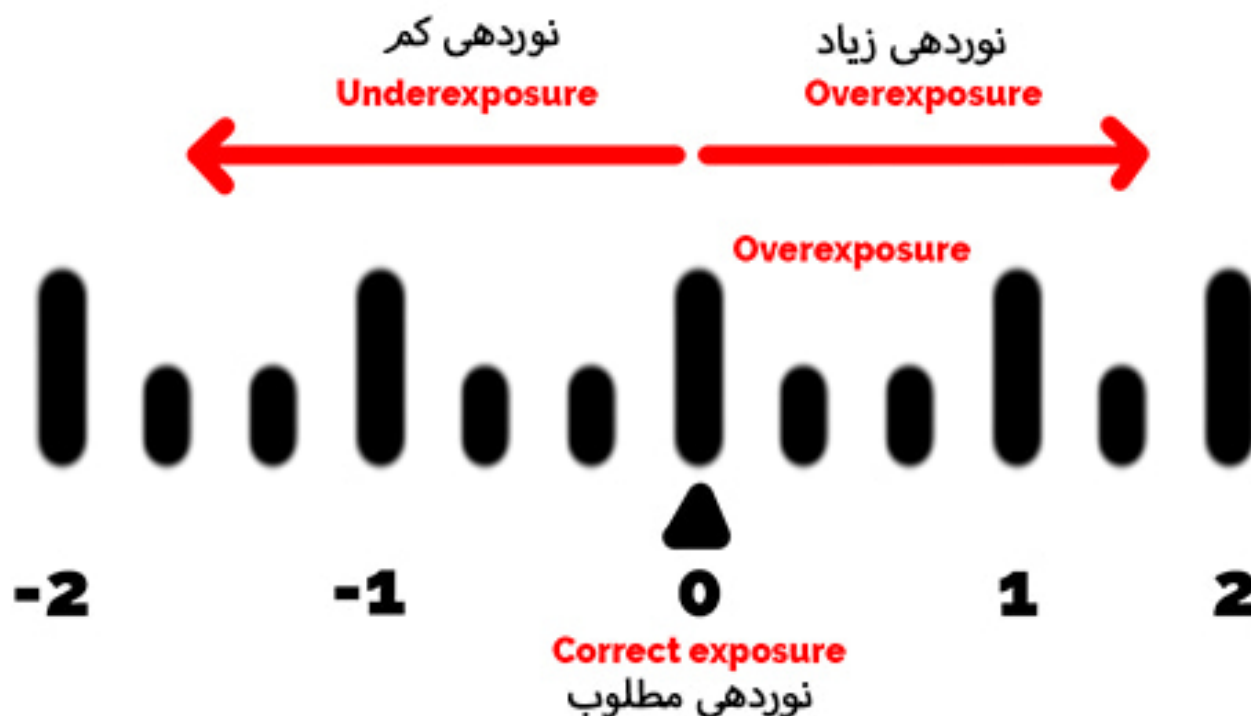
□ به تیغه‌هایی گفته می‌شود که با کوچک و بزرگ کردن روزنه خود میزان نور ورودی به دوربین را کنترل می‌کنند، این تیغه‌ها به طور معمول ۶ تا ۹ عدد هستند.



عکاسی
AKASI.NET

مثلت نورسنجی

□ برای نورسنجی ما به هماهنگی و ایجاد رابطه درست بین سه المان ISO، دیافراگم و سرعت شاتر
احتیاج داریم، در ادامه با معانی و مفاهیم و اعداد این سه المان آشنا می‌شویم.

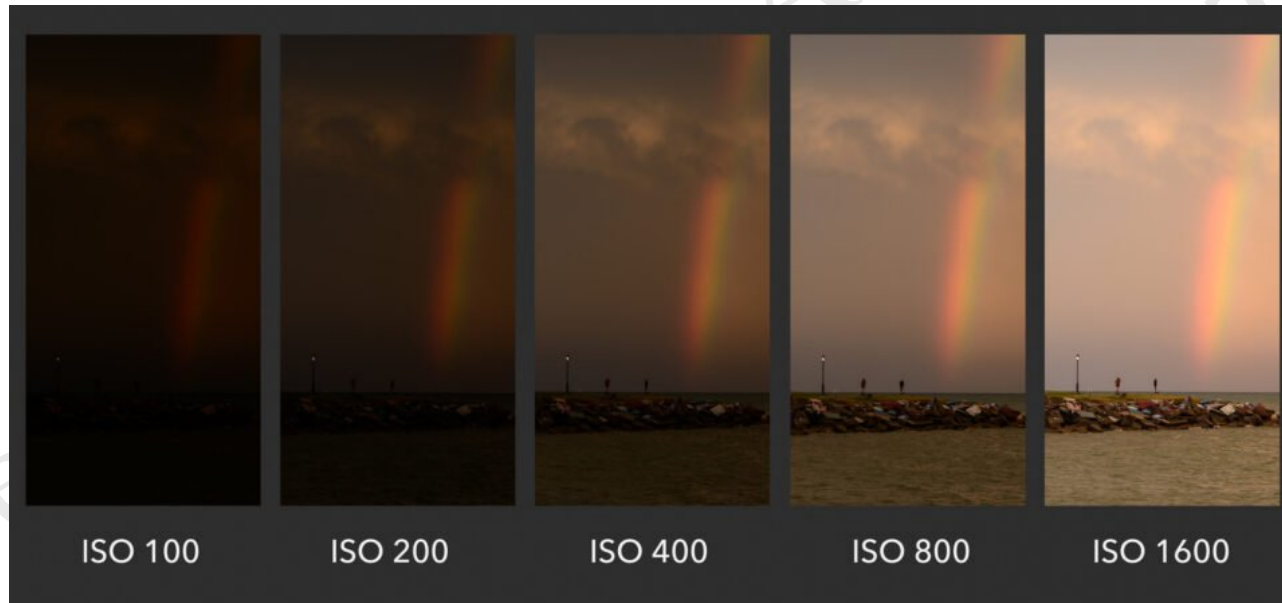


ISO یا نور مصنوعی

- ISO در واقع مخفف کلمه International Organization for Standardization به معنای سازمان بین‌المللی استانداردسازی است.
- هرچند، ISO به کار رفته در دوربین‌ها مستقیماً به سازمانی اشاره نمی‌کند که استانداردهای مختلف برای محصولات و تکنولوژی‌های مختلف تعیین می‌کند.
- در واقع دو استاندارد به نام‌های ASA و DIN در عکاسی و فیلم‌برداری وجود داشتند که در سال ۱۹۷۴ با یکدیگر ترکیب شده و به عنوان ISO شناخته شدند.
- ISO در ابتدا تنها به حساسیت فیلم‌ها اشاره می‌کرد، ولی بعدها سازندگان دوربین‌های دیجیتال عکاسی نیز از این اصطلاح استفاده کردند. چرا که تقریباً با همان هدف، یعنی نگاه داشتن سطح روشنایی در عکس‌ها عمل می‌کند.

ISO

تاثیر اعداد ISO



ISO

CAMERA ISO/SENSOR SENSITIVITY GUIDE

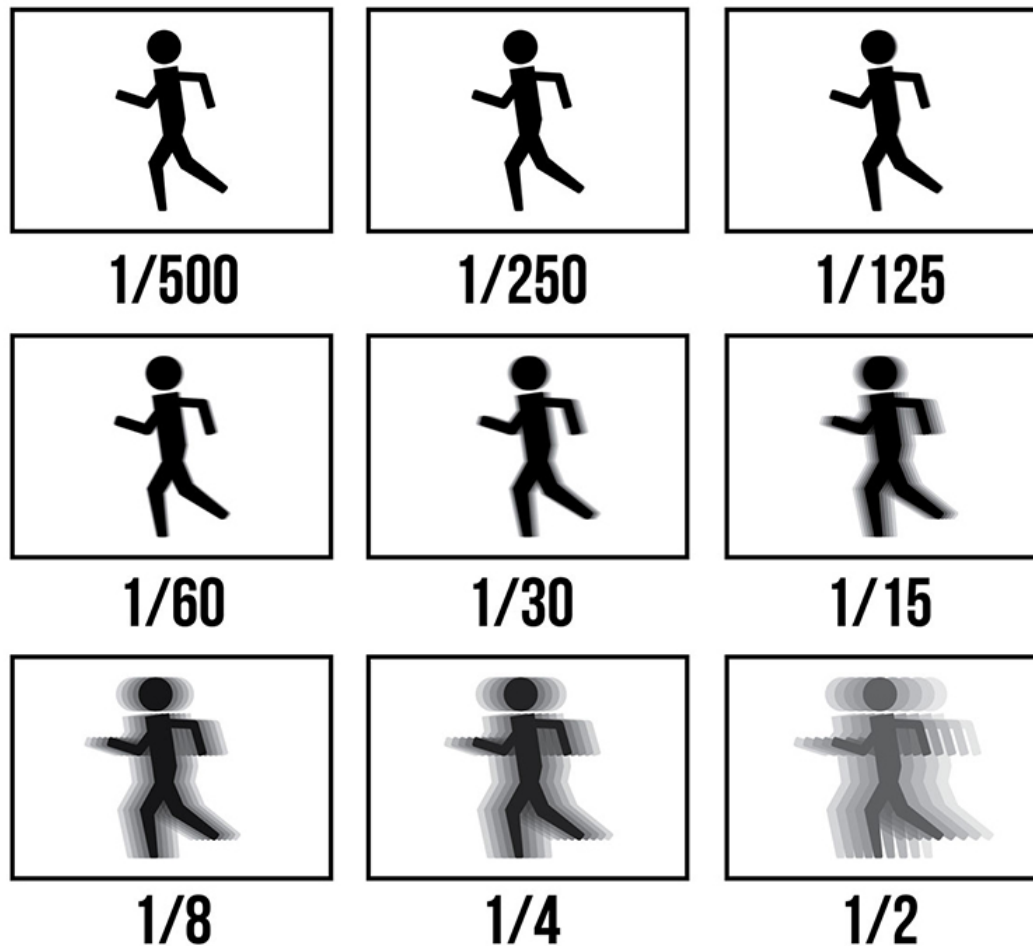


□ ISO و ایجاد گین تصویر

سرعت شاتر

□ دومین عامل موثر بر نور ورودی دوربین، شاتر است. کلمه شاتر از نظر لغوی به معنای مسدودکننده است، اما در علم تصویربرداری مدت زمان رسیدن نور را به سنسور تعیین می‌کند؛ هرچه سرعت شاتر بیشتر باشد یعنی شاتر سریع‌تر باز و بسته شود، سنسور مدت زمان کمتری در معرض نور خواهد بود و بالعکس.

سرعت شاتر



سرعت شاتر

□ سرعت شاتر بالا (فریز کردن)



سرعت شاتر

□ سرعت شاتر پایین (خط نوری)



دیافراگم

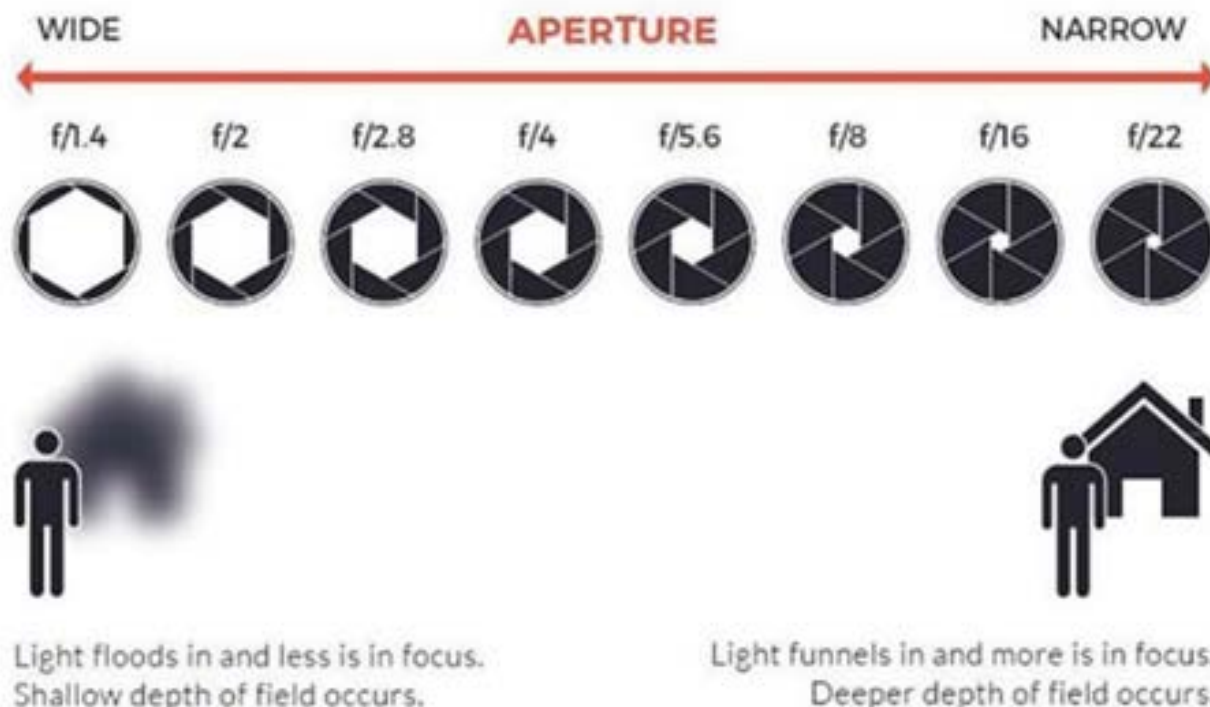
□ دیافراگم به صورتی طراحی شده که با باز شدن، میزان عبور نور را افزایش و با تنگ شدن، میزان عبور نور را کاهش می دهد.

What happens inside your lens when the aperture changes?



دیافراگم و عمق میدان (فکوس)

□ هر چه عدد دیافراگم پایین تر باشد یا به عبارتی دیافراگم بازتر باشد، عمق میدان ما کم تر است و هرچه عدد دیافراگم بیشتر باشد یا دیافراگم بسته باشد، ما عمق میدان بیشتری داریم.



دیافراگم و عمق میدان (فکوس)



 $f/1.8-f/4$ 



 $f/4-f/8$ 

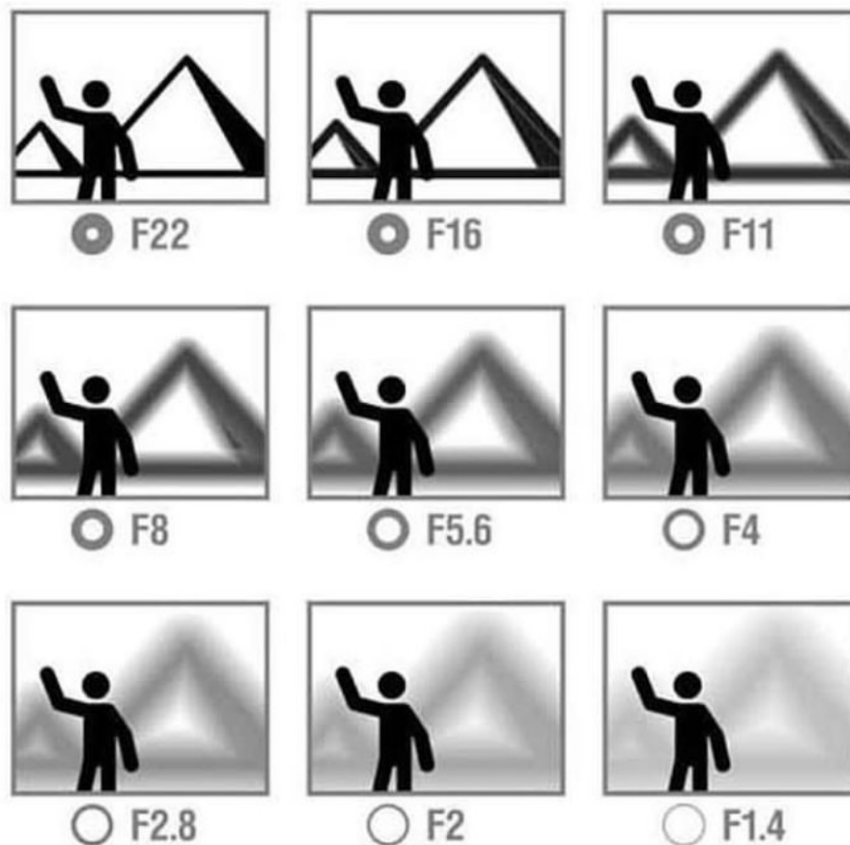


 $f/8-f/11$ 

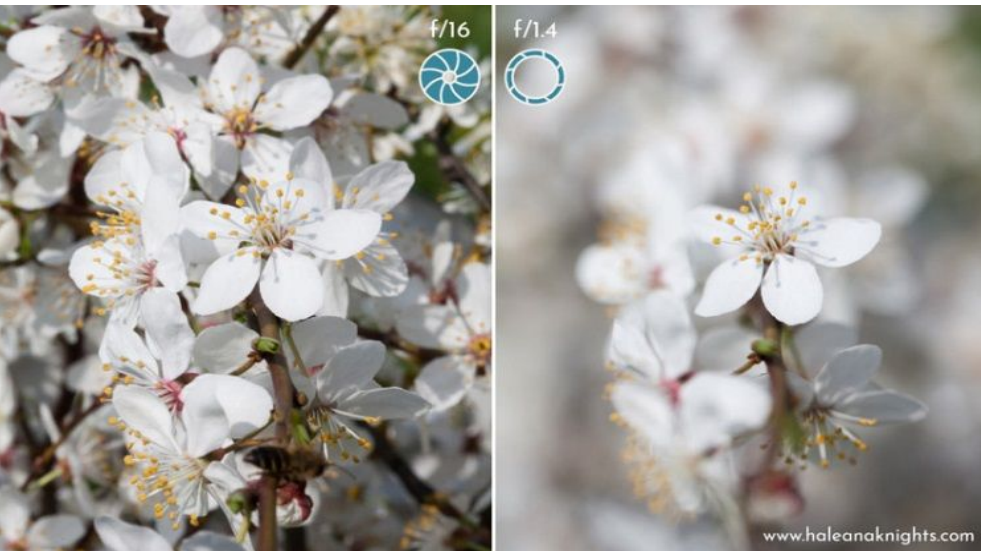


 $f/11-f/22$ 

دیافراگم و عمق میدان (فکوس)



دیافراگم و عمق میدان (فکوس)



f/1.8



f/2.8



f/4.0



f/5.6

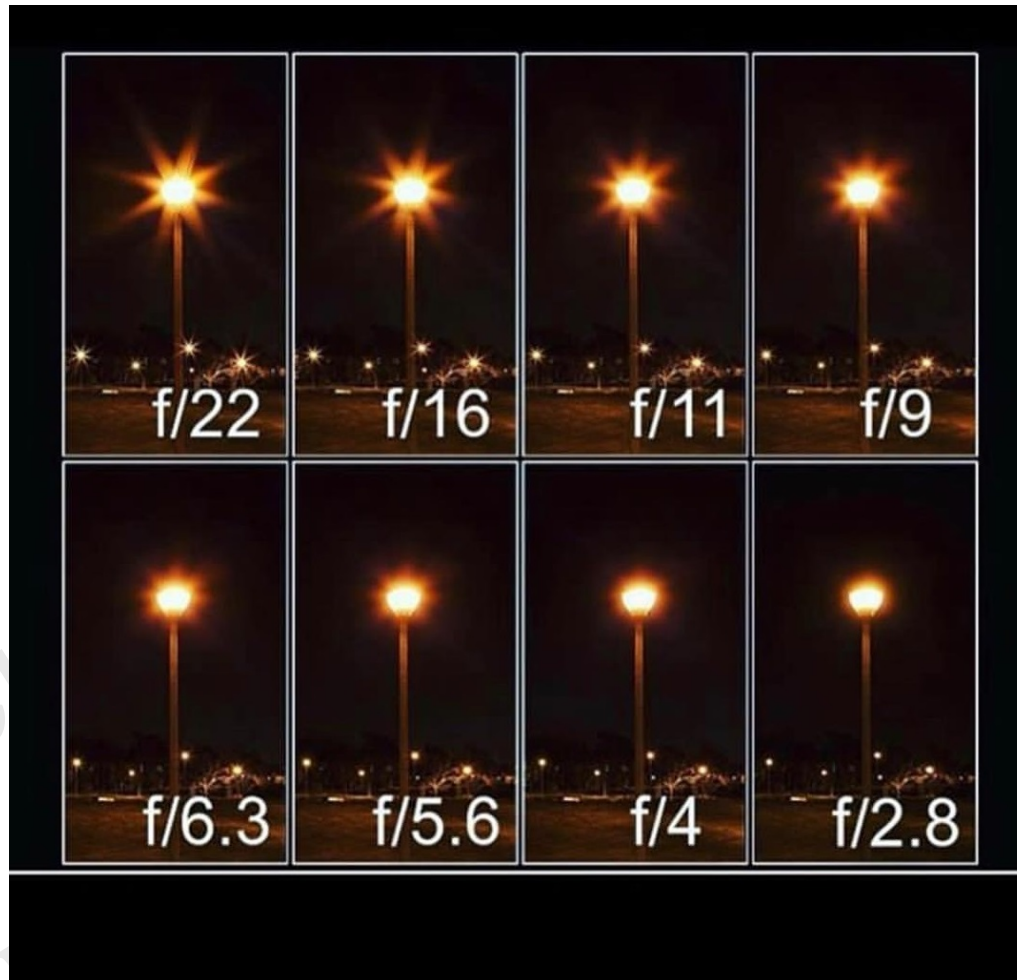


f/16

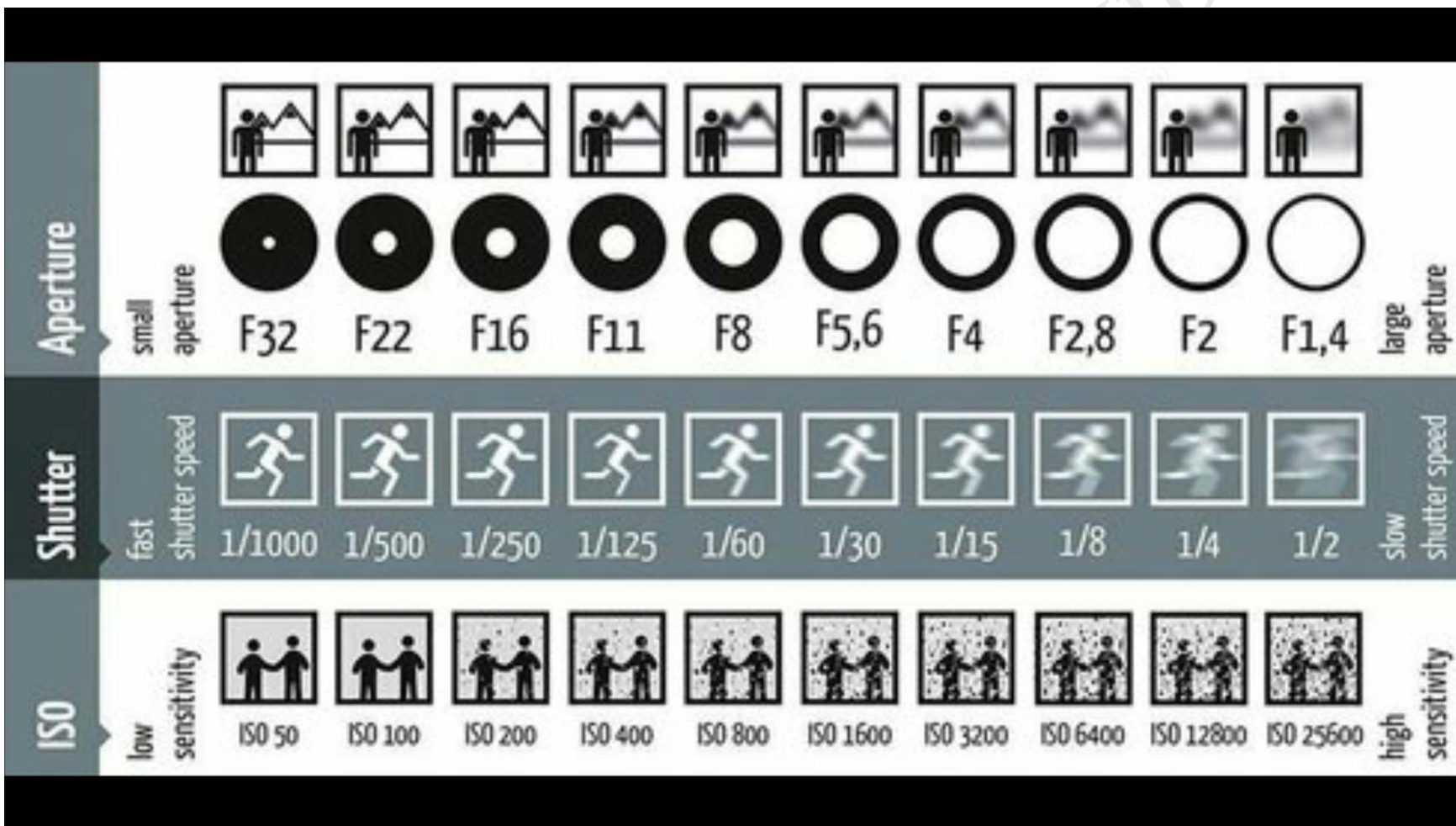


f/22

دیافراگم



جمع بندی مثلث نورسنجی





Digital zoom versus optical zoom

- ☐ The **zoom feature** in a camera allows the photographer to **properly frame** a picture without having to move closer to the subject.
- ☐ There are two types of zoom, digital and optical.



Digital zoom versus optical zoom

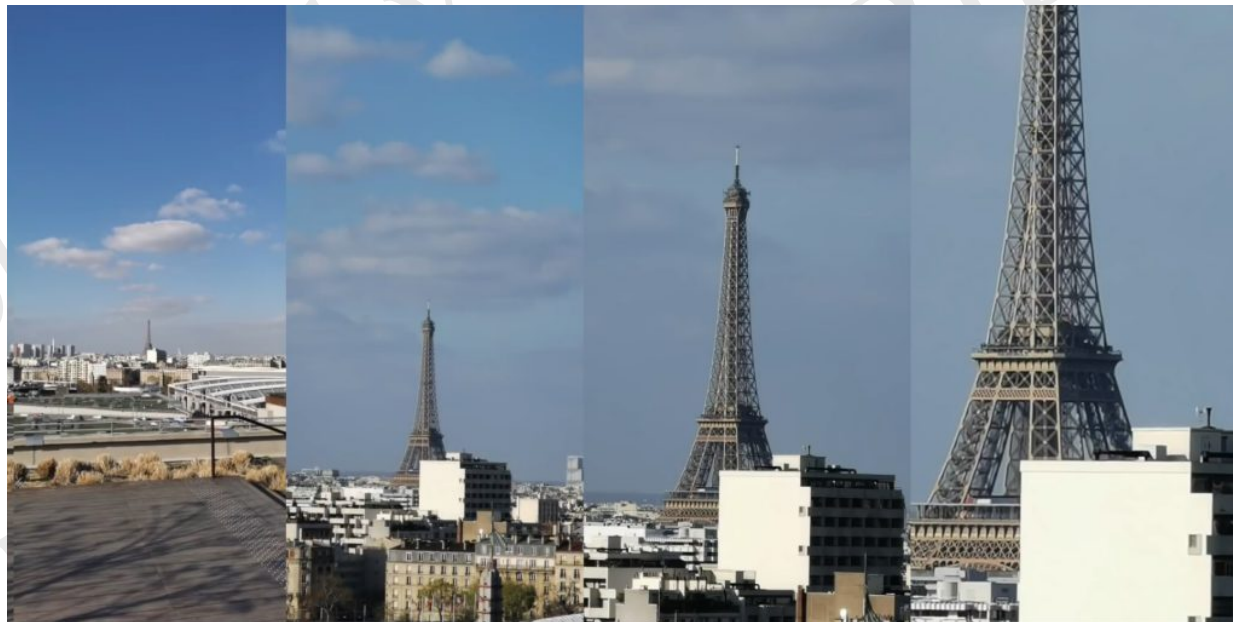
- ❑ Optical zoom uses a **mechanical adjustment** of the lenses to achieve the image magnification.
- ❑ Digital zoom **cuts out** part of the **captured picture** and then **expands** the remaining to fill the **original size**, just as a software photo-editing program might do.
 - ❖ This expansion of the picture results in
 - ✓ A loss of quality,
 - ✓ Reducing the ability to later **expand** the picture **again** and
 - ✓ Still maintain sufficient detail.

زوم دیجیتال و زوم اپتیکال

- زوم این قابلیت را به عکاس می دهد که بدون نیاز به نزدیک شدن به سوژه عکس را بدرستی بگیرد.
- زوم ها به دو دسته زوم دیجیتال و زوم اپتیکال تقسیم می شوند.

زوم اپتیکال

- زوم اپتیکال یا بزرگ‌نمایی به کمک لنز، زمانی که اجسام از ما دور هستند و برای ثبت آن‌ها ما نیاز به بزرگ‌نمایی بدون کاهش کیفیت داریم، از زوم اپتیکال استفاده می‌کنیم.
- در زوم اپتیکال عناصر داخل لنز حرکت می‌کنند تا فاصله کانونی را کاهش و افزایش دهند.
- با کاهش فاصله کانونی میدان دید وسیع‌تر خواهد شد و جزئیات درون تصویر کمتر دیده می‌شوند.

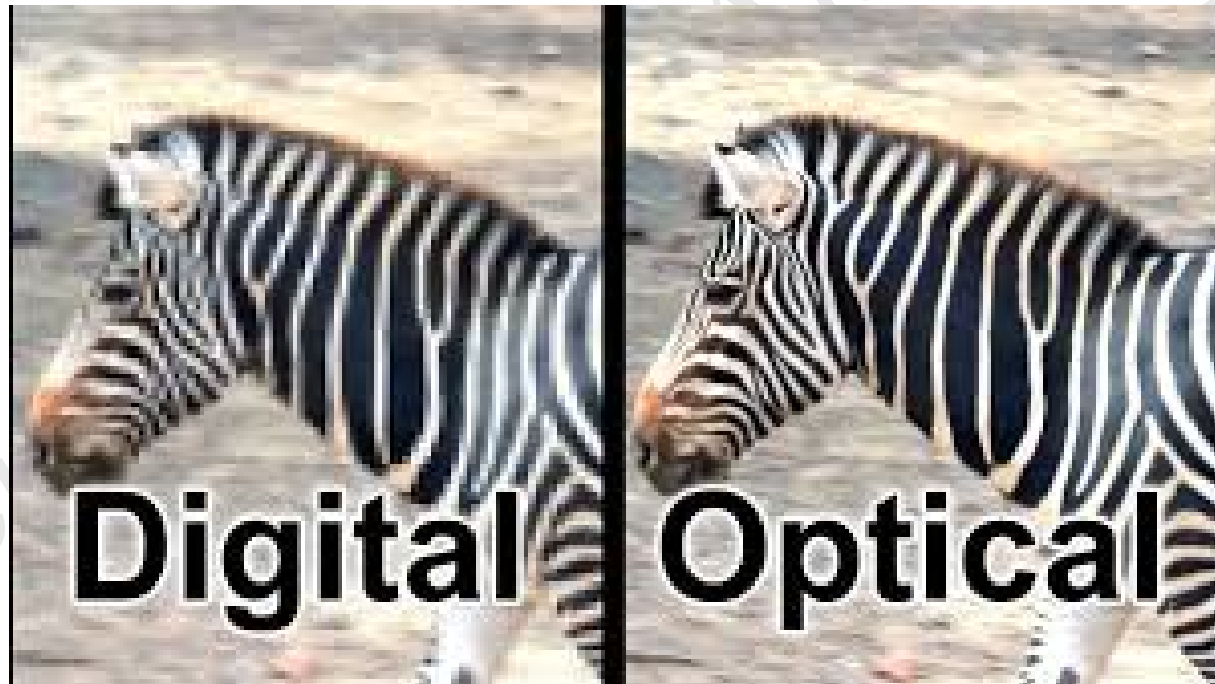


زوم دیجیتال

- ❑ در زوم دیجیتال معمولاً در دوربین‌های تلفن همراه یا دوربین‌هایی فاقد لنز قابل مشاهده هست که قابلیت تنظیمات مکانیکی لنز وجود ندارد.
- ❑ در زوم دیجیتال قسمتی از تصویر که قصد بزرگ‌نمایی آن را داریم بریده می‌شود و سپس با اضافه کردن پیکسل عکس را بزرگ می‌کند.
- ❑ زوم دیجیتال کیفیت تصویر را به شدت کاهش می‌دهد و جزئیات تصویر در آن دیگر به وضوح قابل مشاهده نیست؛ از زوم دیجیتال در دوربین‌های DSLR برای فکوس بهتر استفاده می‌شود.



تفاوت زوم دیجیتال و زوم اپتیکال در یک نگاه



تفاوت زوم دیجیتال و زوم اپتیکال در یک نگاه



ویدئویی توضیح زومها



Digital zoom versus optical zoom

Which one should be used?



Digital zoom versus optical zoom

- ❑ In conclusion, **while both** digital and optical zoom have their place, optical zoom is generally **more beneficial** for construction projects due to its **superior image quality** and ability to capture **fine details**.
- ❑ It is essential for ensuring project quality, safety, and efficient progress monitoring.

Available filters

❑ Neutral-Density Filter.

- ❖ One important **trick** to **prevent bright areas** from being completely washed out in a photograph is to **use** a neutral-density (ND) filter.
- ❖ This type of physical filter **reduces** the **intensity** of all **light wavelengths** equally,

allowing the camera or photographer to **select**

- ✓ Wider range of settings,
- ✓ Exposure time, and
- ✓ Sensitivity.

- ❑ This process can produce superior results in **high-contrast situations**.



Available filters

❑ Polarizing Filter.

- ❖ Light reflecting off a **non-metallic surface** may become **polarized** in a direction parallel to the surface.
- ❖ The intensity of the reflected polarized light may then **wash out other objects** in the area and **hide what is behind** an otherwise transparent surface.

- ❑ Using a polarizing filter can selectively block out this phenomenon, reducing the glare from puddles or windows, allowing the camera to capture what is visible behind a transparent surface.



Without Filter

With Filter

فیلترها

□ صفحه‌ای شفاف یا نیمه‌شفاف که جلو یا پشت عدسی قرار می‌گیرد و ورود و انتقال طول موج نور و رنگ‌ها را کنترل میکند.

□ انواع فیلتر:

❖ رنگی

❖ غیررنگی

❖ تزئینی

فیلتر ND

- از جمله فیلترهای غیر رنگی، فیلتر ND (فیلتر خاکستری یا تراکم خنثی) است.
- این فیلتر که مخفف Neutral Density هست بدون آسیب به ترکیب رنگ، نور را کاهش می‌دهد.
- به ازای هر ۰.۳ غلظت، یک درجه دیافراگم نور کمتر عبور می‌دهد؛ که با نماد nd3 نشان داده می‌شود.
- ❖ مثلاً nd9 سه استپ یا درجه نور کمتری را وارد می‌کند.

انواع فیلتر ND

☐ خاکستری

☐ نیمه خاکستری

☐ دایره‌وار

☐ بالا به پایین

فیلتر ND

- این فیلتر به طور کلی از پاک شدن نواحی روشن در عکس جلوگیری می کند، به این شکل که شدت طول موج های نور را به طور یکسان کاهش می دهد.
- استفاده از این فیلتر موقعیت را برای عکاس موقع نورسنجی بهتر می کند و نتایج بهتری را در موقعیت هایی با کنتراست بالا ایجاد می کند.
- ❖ کنتراست: تضاد بین روشن ترین نقطه و تیره ترین نقطه.



فیلتر پولارایزر یا قطبی

- نور به دلیل خاصیت پولاریت خود هنگام برخورد به اجسام غیر فلزی به یک جهت انعکاس پیدا می کند به این اتفاق به اصطلاح پولاریزه شدن می گویند.
- فیلتر پولارایزر از دو صفحه تشکیل شده که این دو صفحه شیشه ای قابل حرکت هستند.
- مهم ترین کاربرد این فیلتر حذف انعکاس است مانند زمان تابش خیره کننده نور به گودال ها یا پنجره ها
- به کمک این فیلتر می توان انعکاس های غیر ضروری را حذف کرد و تصاویر واضح تر با غلظت رنگ بیشتری را ثبت کرد.

انواع فیلتر پولارایزر

❑ حلقوی

❑ خطی

- ❖ نکته مهم: فیلتر خطی بر روی دوربین‌ها با سیستم فکوس اتومات دوربین را دچار خطا می‌کند و بهتر است هنگام استفاده از این فیلتر فکوس به صورت دستی انجام شود.
- ❖ همچنین استفاده از این فیلتر در هنگامی که هوا مه‌آلود یا ابری است توصیه نمی‌شود.



انواع فیلتر پولارایزر



Photo shot with a POL-filter cut in half - left side being without a filter, right side with the PhantomFilters.com POL-filter (Polarizer).



Available filters

What are the benefits of using filters in construction photography?



Available filters

1. **Improved image quality:** Filters can enhance color accuracy, contrast, and overall image clarity.
2. **Detailed documentation:** Filters can capture specific details that might be **missed without them**, such as material defects or safety hazards.
3. **Protection of equipment:** UV filters safeguard the camera **lens from damage**.
4. **Creative options:** Filters can be used to create unique and **visually appealing images for marketing or promotional** purposes.

Smartphone and tablet cameras

- ❑ While **smartphone cameras** are convenient and are steadily improving, they may be subject to **several limitations**.

Let's see some of these limitations!





Smartphone and tablet cameras

❑ They typically

1. **Lack** a physical zoom lens,
2. Have a **short battery** life, and
3. Generally produce **poor results** when shooting in **low light conditions**.

How about computer tablets with camera?



Smartphone and tablet cameras

- ❑ Computer tablets with built-in cameras similar to smartphones are often issued to project controls personnel.
- ❑ Like smartphones, they typically
 - ❖ Lack a zoom lens and
 - ❖ Do not perform well in low light conditions.

Many computer tablets allow the CAD plans to be tagged with relevant photos.

دوربین‌های گوشی‌های هوشمند و تبلت

- ❑ خیلی راحت و در دسترس‌تر هستند، اما محدودیت‌هایی دارند.
- ❖ مثلاً فاقد لنز فیزیکی هستند و عمر باتری کوتاهی دارند و در هنگام عکاسی در نور کم نتیجه ضعیفی دارند.
- ❑ اما موبایل‌ها و تبلت‌هایی هم وجود دارد که دارای مزیت هستند و می‌توان لنزهایی را روی لنز آن‌ها سوار کرد.
- ❑ از دیگر خوبی‌های دوربین‌های موبایل و تبلت این است که تلفن‌های دارای GPS معمولاً به کاربر این اجازه را می‌دهد که عکس برچسب‌گذاری جغرافیایی شود.

دوربین‌های گوشی‌های هوشمند و تبلت



NEGAH
SHOP

Smartphone and tablet cameras

How to improve?

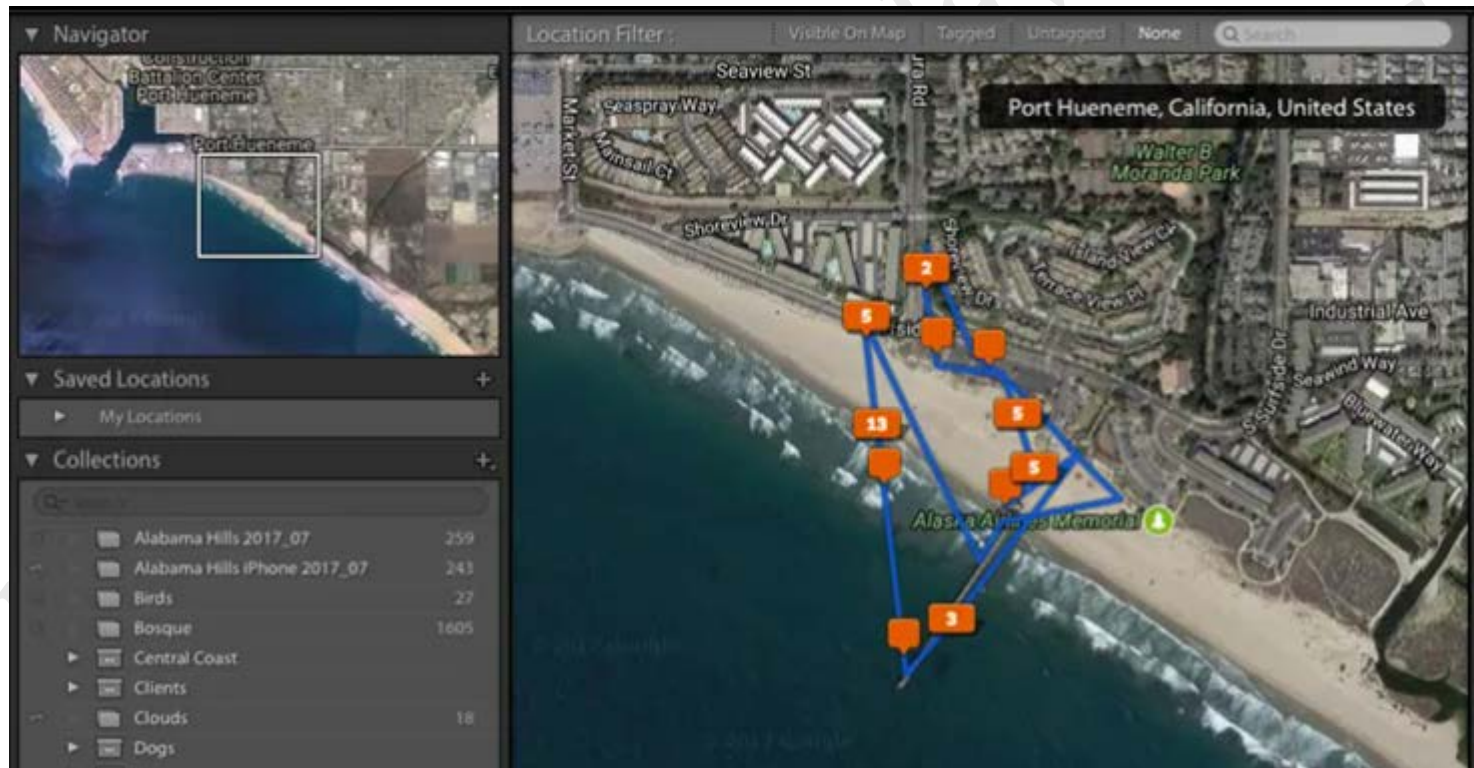
Smartphone and tablet cameras

- ❑ Smartphone and tablet camera users should consider using a **photo app** to enhance the image to produce the best picture possible.
- ❑ One can also add attachment lenses over the **original lens** to obtain wide-angle and telephoto effects.



Smartphone and tablet cameras

- ❑ In addition, the user usually may be able to **geotag** the photos if the mobile unit has a Global Positioning System (GPS) built-in.



What are the benefits in projects?



Smartphone and tablet cameras

- ❑ **Accurate Documentation:** By knowing the **exact location** where a photo was taken, it provides **precise documentation** of project progress, material placement, and equipment positioning.
- ❑ **Efficient Site Management:** Geotagged photos can help locate specific areas or assets quickly, improving site management and resource allocation.
- ❑ **Improved Communication:** Sharing geotagged photos with stakeholders allows for **better visualization** of project progress and potential issues.
- ❑ **Legal and Insurance Purposes:** In case of **disputes or claims**, geotagged photos can serve as evidence of project **conditions and progress**.
- ❑ **Safety and Compliance:** Documenting **safety hazards** or **non-compliance** issues with precise location data strengthens safety protocols.



Smartphone and tablet cameras

- ❑ **Asset Tracking:** Geotagging equipment or materials can aid in **inventory management** and **theft prevention**.
- ❑ **Post-Construction Analysis:** Analyzing geotagged photos over time can provide valuable insights into project performance and identify areas for improvement.
- ❑ **Integration with Other Data:** Geotagged photos can be integrated with other project data, such as building information models (**BIM**), for comprehensive analysis.
- ❑ **Virtual Site Visits:** Geotagged photos can be used to create **virtual site tours** for **remote stakeholders** or clients.

Point-and-shoot cameras

- ❑ The next step up from a smartphone camera is a **‘Point-and-Shoot’** camera.
- ❑ Similar to a smartphone, they are **small and light enough** to fit in a **pocket**.
- ❑ Their **lenses have a wider** aperture with substantially **more light gathering area**, producing crisper and cleaner pictures.
- ❑ They also have much **better battery life**, allowing for an entire day’s worth of pictures on a single charge.



دوربین های Point and Shoot

این دوربین ها نسبت به دوربین های موبایل و تبلت بسیار بهتر عمل می کنند چرا که کوچک و سبک هستند، لنز آنها با دیافراگم بازتر از موبایل که با فضای جمع آوری نور قابل توجه عمل می کند باعث می شود تصاویر واضح تر و تمیزتر ثبت شوند.

همچنین طول عمر باتری بیشتری دارند و با یکبار شارژ شدن اجازه می دهد یک روز کامل عکس برداری انجام شود.



Point-and-shoot cameras

What are the benefits of using point-and-shoot cameras in construction photography?



Point-and-shoot cameras

- ❑ **Rapid Documentation:** Their simplicity allows for quick capture of project milestones, daily progress, and unexpected events.
- ❑ **Versatility:** Point-and-shoot cameras can be used for a **wide range of documentation purposes**, from capturing overall site progress to detailed close-ups of materials and workmanship.
- ❑ **Cost-Effective:** Compared to specialized construction cameras, they are often **more affordable**.
- ❑ **Accessibility:** Their **compact size** makes them easy to carry around the construction site, allowing for on-the-spot documentation.
- ❑ **Image Quality:** Modern point-and-shoot cameras offer surprisingly **good image quality**, sufficient for many construction documentation needs.

Dedicated digital single-lens reflex cameras

- ❑ **Dedicated Digital Single-Lens Reflex (DSLR)** cameras produce **superior pictures**.
- ❑ These cameras employ a mechanical shutter to switch from the user viewing the scene to the camera capturing the picture.
- ❑ This normally provides for **higher resolution** and **lower noise** (imperfect capture) due to not sharing the duties of capture and driving the viewfinder.



دوربین‌های DSLR

- دوربین‌های DSLR یا Digital single-lens reflex camera دوربین‌هایی هستند که در ثبت تصاویر بسیار عالی عمل می‌کنند، وضوح بالایی دارند و تصاویر از نویز کمتری برخوردار است؛ همچنین قابلیت افزودن لنز و فیلتر را دارند.
- اما این دوربین‌ها نقاط ضعفی هم دارند چرا که بسیار گران هستند و نسبت به سایر دوربین‌ها بزرگ‌تر و سنگین‌ترند.

Dedicated digital single-lens reflex cameras

What is the negative aspect of them?



Dedicated digital single-lens reflex cameras

- ❑ The **negative aspect** to this **mechanical shutter design** is that real-time information cannot be displayed.
- ❑ The **internal mirror** can focus
 1. Incoming light on the monitoring sensor or
 2. Recording sensor**but not on both** at the same time.
- ❑ This **eliminates digital features** such as recording video or giving a live image display.
- ❑ DSLR cameras also tend to be **much larger as well as more expensive** than other types of digital cameras.

Dedicated digital single-lens reflex cameras

- ❑ DSLR cameras typically offer the ability to add on **filters** and **different types of lenses**, including telephoto.
- ❖ Jobsite photos **rarely require** telephoto focal lengths **longer than 85mm**.



- ❑ **Additional attachments** should be **minimized** for safety and logistical reasons.

Recommended Practice

- ☐ A good scheduler is also a **planner**.
- ☐ A **good plan** makes for **great pictures**.
- ☐ The plan should include a **checklist of items** to be documented, including
 - ❖ Areas covered by open request for information (RFI) submittals,
 - ❖ Completed and active activities, and
 - ❖ Any locations where an accident recently occurred.

**What is the role of
schedule here?**



Recommendations

- ❑ The **jobsite photographer** should be aware of **what the schedule says** is in progress.
- ❑ It is particularly important to **capture the detailed progress** for critical and near-critical activities.
- ❑ **Before beginning**, the photographer should
 1. **Plan** the route and
 2. Be **consistent** and **methodical** for all photo sessions.

How about foreman?



Recommendations

- ❑ In addition, be sure to **ask** the foreman or supervisor to suggest other **important shots** that should be captured in a picture.
- ❖ Their **knowledge of current construction issues** is critical to performing this photographic job correctly.

**Take one angle or two
angles photo?**



Recommendations

- ❑ Shoot the important work from **at least two angles** to help negate issues of shadows and hidden details.
- ❑ Shoot **wide-angle shots first** and **then approach the work** for more detailed pictures.
 - ❖ This will put the **details into a context** that will make **comprehension clearer**.
- ❑ **Moving** in a predictable pattern also increases later viewer **comprehension**.

How about capturing safety issues?



Capturing safety conditions

- ❑ **In the USA**, the Occupational Safety and Health Administration regulations are very **specific about occurrences** of unsafe practices.
 - ❖ Pictures submitted to document construction status should **avoid depicting safety violations**.
 - ❖ **Pictures depicting** poor safety practices could be used **against the photographer or the company** in charge.
 - ❖ **Review each picture** taken for safety violations and immediately address them with the appropriate management team.
 - ❖ Once this has been done, the **photographer should replace the original pictures** with new ones that properly show the status they were attempting to document earlier.



Capturing safety conditions

- ❑ Carefully review all pictures taken in each session.
- ❖ Worker safety is only just one consideration.
 - ✓ Additional infractions to consider might include
 - Union rules,
 - Jobsite rules violations, or
 - Immigration and tax violations.

**What if the photographer wants to
record safety issues?**



Capturing safety conditions

- ❑ There may be cases where the intent of construction photography is to **capture safety issues and/or violations**.
 - ❖ These images should **not be a part** of construction status documentation.

Should we include people in the jobsite status pictures?



Obtaining worker permission

- ❑ Including people in the jobsite status pictures is **good for** viewer interest and composition but can be **problematic**.
 - ❖ Pictures showing particular persons can be **used to prove** that they were present and cognizant of the **issue being captured**.
 - ❖ **Notify workers** in the scene that **pictures are being taken** so that those who are **camera shy or unwilling** to have their picture taken can **step away** from the scene before the shoot.
 - ❖ A **sign-off from every person** included in the picture may be required **before a photo** may be made available to the **public**.

What about proprietary information?



Protecting proprietary information

☐ **Inform** the **management** of working crews of the **intent to photograph** construction status.

❖ In some cases, the **technique or equipment** being used might be considered proprietary by the **contractor** and they may be **hesitant to share it**.

☐ The **owner** of the project may also need to be **notified**.

☐ In some cases, **site security concerns** by the owner may also limit the pictures that can be taken.

Is there any technique to take photos?



Tell a story

- ❑ Photos should **communicate** the **issue being captured** to the viewer.
- ❑ Use a **series of pictures** to better explain to the viewer what they are seeing.
 - ❖ One way to tell a story is to take **two photographs** of the same subject:
wide-angle views and detail images.
 - ✓ A **wide-angle** view helps orientate the viewer to the location and configuration of the scene.
 - ✓ The **detailed image** shows the current status of the work.

Should we take photos from different locations?

- ❑ It is recommended to take **both pictures** from the same location using the **same focal length settings** to give meaning to the **comparisons**.
- ❑ **Mounting** the camera **on a tripod** is suggested in these situations.
- ❑ It is recommended to **mark** the **tripod position** to later **return and duplicate** the positioning.
- ❑ It is also useful to **bring earlier pictures** to help reframe the picture to match earlier ones.

Dimensional pictures?





Dimensional perspective

- ☐ Include **rulers** or **other referential objects** in the picture to allow for dimensional estimations.
- ☐ Objects with variable lengths such as **pens** should **not be used** for this purpose.
- ☐ **People standing** in the picture can serve as a **reference to size** but are **not suitable** for accurate measurement.

**How time perspective
could help?**



Time perspective

- ❑ Another way to document status is to **view the same area** over time.
- ❑ **Repeated use** of static, strategic shooting locations can provide a time-lapse review of progress.
 - ❖ A **wide-angle** image works best for this.
 - ❖ **Picking a location** to place the camera for time-lapse shots **requires** planning and **knowledge** of the final layout of the work.
 - ❖ It is also important to choose a location that will **not be demolished** **prior to project completion**.

How to select pictures?



Other uses for photographs

- ☐ It is good practice to **select several pictures** that best represent the current progress and
share these with the owner and architect/CM of the project.
- ☐ **They will then** be able to selectively **share these photos** with their coworkers and upper management.
- ☐ **Current pictures** help build relationships between the stakeholders by **reassuring** everyone that the project is proceeding **as planned**.

**Where should these pictures included
by scheduler?**



Other uses for photographs

- ☐ The scheduler should consider including appropriate photos in the **Daily Log**.
 - ❖ They make it **easier** to describe the **issues at hand**.
- ☐ **Photos from other parties** such as the site supervisors and subcontractors may also be included.
- ☐ The scheduler should ensure that all pictures are properly annotated and dated, **regardless of source**.

How about as-built documentation?



Other uses for photographs

- ☐ Associating relevant pictures with the **electronic plans** for construction completes the **as-built documentation process**.
- ☐ Care should be made to **fully document** the subject and date of such pictures.

Does it help to review punch-list?



Other uses for photographs

- ☐ **Punch-lists** can be more **easily handled** if the **outstanding issues** are documented with a photograph.
- ☐ This will help **prevent working** on a similar item in the **wrong location**, saving time as well as money.

How about dispute resolution?



Other uses for photographs

- ☐ Project photographs are **especially useful** in dispute resolutions.
- ☐ They can increase **understanding of the issues** and provide a **reference for expert testimony**.



Photographer safety and other concerns

- ☐ As with any jobsite visit, always be **wary** of dangerous areas and wear the required **safety protection** gear.
- ☐ Do **not walk around** while **looking** into the **camera's monitor**.
- ☐ The **camera** should always be **protected** from moisture and dust.
- ☐ Use a **hand or neck strap** to prevent dropping the camera in rugged areas and to **free** your hands to use handrails.
- ☐ **Lock up the gear** when not in use.
- ☐ **Download the pictures** frequently to **avoid losing** the photos along with a **missing camera**.
- ☐ **Uploading** the pictures to an off-site cloud service will further safeguard the pictures.

Tips For Taking Good Site Photographs

موسسه مهندسی و مدیریت ساخت علوی پور (ACEMI)

دفتر آموزش



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